

### **5.3 Non-NPDES Phase II Permit Priority Preservation/Restoration Projects**

As previously mentioned, there are numerous actions that work towards improving water resources in the Clinton Main subwatershed and the overall Clinton River Watershed. These projects are identified separately in order to qualify for eligibility under the EPA Section 319 grant funding program. While similar categories of information are required for both for Phase II and Non-Phase II activities, these projects are called-out in this section separately so as to clearly identify them as 319 projects. Priorities were established by the Clinton Main Subwatershed Group in December 2009. The prioritized best management practice categories and associated projects for implementation over the short-term (5 – 10 years) are identified as follows:

#### **1. Storm Water Enhancements/Retrofits**

- Land Cover Classifications Analysis
- Downspout Disconnect
- Detention Pond Retrofits
- Athletic Field Retrofits
- Porous Pavement
- Regional Detention/Wetland Basins
- Rain Gardens
- Bioswales

#### **2. Stabilization Projects**

- Streambank
- Lakeshore
- Outfall
- Easement Acquisition

#### **3. Recreational Enhancements**

- Easement Acquisition
- River/Lake Access

#### **4. Habitat Restoration**

- Easement Acquisition
- Wetland Restoration/Enhancement
- Invasive Species Management

#### **5. Preservation**

- Easement Acquisition

Table 5.7a Clinton Main Proposed Projects Prioritized by Community below identifies the specific BMP projects that have been targeted for implementation over the short-term. The “Priority BMP Category” reflects the priorities listed above, followed by individual prioritization by subwatershed representative.

In order to further evaluate benefits of the proposed projects, a number of approaches were utilized, including the following:

- An estimate of existing storm water runoff volume across the subwatershed was developed that includes both runoff volume during a 2-year, 24-hour event and annual runoff. These estimates are strictly based on the curve number method and an annual rainfall of thirty-two (32)-inches per year and an average runoff coefficient of 0.7. See Table 5.7b. Clinton Main Storm Water Runoff Volume – Existing Conditions.
- Table 5.7c. Clinton Main Annual Storm Water Runoff Volume, Total Phosphorus Loading & Total Phosphorus Loading Reduction Targets shows the annual total phosphorus load estimate along with the estimated phosphorus reduction from the above mentioned projects. These loading estimates were based on the PLOAD analysis described earlier in the watershed plan. The loading reduction estimates were determined from the Center for Watershed Protection spreadsheet tool or the Oakland County Site Evaluation Tool developed as part of the Clinton River project.
- Table 5.7d. Clinton Main Annual Storm Water Runoff Volume, Total Nitrates/Nitrites Loading & Total Nitrates/Nitrites Loading Reduction Targets shows the annual total nitrogen load estimate along with the estimated total nitrogen reduction from the above mentioned projects. The loading reduction estimates were determined from the Center for Watershed Protection spreadsheet tool or the Oakland County Site Evaluation Tool developed as part of the Clinton River project.
- Table 5.7e. Clinton Main Annual Storm Water Runoff Volume, Total Suspended Solids Loading & Total Suspended Solids Loading Reduction Targets shows the annual total suspended solids loading along with the estimated total suspended solids loading reduction from the above mentioned projects. The loading estimates and loading reduction estimates were calculated similarly to the previous pollutants.

Table 5.7f outlines the Pollutants/Threats, Sources and Causes that are addressed by each of these priority projects. Table 5.7g shows the volume and pollutant loading reductions for each project, if applicable. It should be noted that not all projects can specifically estimate direct pollutant loading reduction benefits; however, these projects are still highly valuable in working towards improving water resources. Table 5.7h outlines the individual project costs, schedule, milestones and methods of evaluation. A total estimate of these projects for watershed restoration and preservation is on the order of \$13 million. All of these tables referenced are located at the end of this chapter.

#### **5.4 Available Technical Resources from Partner Organizations**

There are many local resources to help further understand and implement the more than 130 different BMPs that can potentially be used to restore urban subwatersheds. Below are a few of the organizations currently working within the Clinton River Watershed:

- Clinton River Watershed Council ([www.crowc.org](http://www.crowc.org))
- Clinton River Remedial Action Committee (<http://www.epa.gov/glnpo/aoc/clinriv.html>)
- Southeast Michigan Council of Governments ([www.semcog.org](http://www.semcog.org))
- Michigan Department of Environment ([www.michigan.gov/deq](http://www.michigan.gov/deq))
- Michigan Department of Natural Resources ([www.michigan.gov/dnr](http://www.michigan.gov/dnr))
- Oakland County Water Resources Commissioner's Office ([www.oakgov.com/drain/](http://www.oakgov.com/drain/))
- Oakland County Planning & Environment ([www.oakgov.com/peds/info\\_pub/planning\\_and\\_enviromental\\_infoandpubs.html](http://www.oakgov.com/peds/info_pub/planning_and_enviromental_infoandpubs.html))
- United States Environmental Protection Agency – Region 5 ([www.epa.gov/region5/](http://www.epa.gov/region5/))

- ◆ United State Army Corp of Engineers Great Lakes & Ohio River Division ([www.lrd.usace.army.mil/](http://www.lrd.usace.army.mil/))

## 5.5 Potential Funding Sources

The following are some of the possible funding sources such as grants, loans, and cost share programs, available to stakeholder agencies and non-governmental organizations for watershed management. This list is not exhaustive. Information on these funding sources can be found on the Internet or by contacting the agency.

### Agricultural

- ◆ Agriculture in Concert with the Environmental Program (USDA)
- ◆ Watershed Protection and Flood Prevention Program (USDA)
- ◆ Conservation Reserve Program (NRCS)
- ◆ Wetlands Reserve Program (NRCS)
- ◆ Wildlife Habitat Incentive Program (NRCS)
- ◆ Forestry Incentives Program (NRCS)
- ◆ Environmental Quality Incentives Program (NRCS)
- ◆ Farmland Protection Program (USDA)
- ◆ Debt for Nature (Farm Service Agency)
- ◆ SARE Producer Grant Program (USDA)

### Storm, waste and drinking water improvements and management

- ◆ MDEQ Clean Water State Revolving Fund Loans
- ◆ MDEQ Drinking Water Revolving Fund Loans
- ◆ Rural Business Enterprise Grants (water, wastewater, storm water) (USDA)
- ◆ Rural Development Water & Wastewater Disposal Program Grants & Loans (USDA)

### Habitat restoration and creation

- ◆ Partners for Fish & Wildlife (US Dept Fish & Wildlife)
- ◆ North American Wetland Conservation Act Grant Program (US Dept of Interior)
- ◆ National Fish & Wildlife Foundation (US Dept of Interior)
- ◆ US EPA Five Star Restoration Grant Program
- ◆ Great Lakes Aquatic Habitat Network and Fund
- ◆ Natural Heritage Grant Program (MDNR)
- ◆ Inland Fisheries Grant Program (MDNR)
- ◆ Private Stewardship Grant Program (US Dept of Interior, US Fish & Wildlife, Endangered Species)
- ◆ Aquatic Ecosystems Restoration Grants (US Army Corps of Engineers)
- ◆ Great Lakes Fishery Trust
- ◆ DTE Energy Tree Planting Grants
- ◆ NOAA: Open Rivers Initiative
- ◆ NOAA Community-based Restoration Program - Project Grants

### Education

- ◆ US EPA Environmental Education Program
- ◆ US EPA Five Star Restoration Grant Program

### Watershed planning and implementation

- ◆ Clean Water Act Section 319 Nonpoint Source Pollution Management Grants (MDEQ)

- ◆ Clean Michigan Initiative Grants

General

- ◆ Non-point Source Pollution Management Grant (MDEQ)
- ◆ US National Research Initiative Competitive Grants Program (USEPA)
- ◆ Community Forestry Grant Program (MDNR)
- ◆ Great Lakes Basin Program for Soil Erosion and Sediment Control (Great Lakes Commission)
- ◆ The Joyce Foundation
- ◆ Wal-Mart Environmental Grants
- ◆ Michigan Gateway Community Foundation
- ◆ Great Lakes Commission Grants
- ◆ Great Lakes Protection Fund
- ◆ Small Watershed Program (NRCS)
- ◆ Community Foundation for Southeast Michigan
- ◆ Plant Conservation Alliance: NFWF Native Plant Conservation Initiative
- ◆ Paul H. Young Trout Unlimited

Water quality monitoring

- ◆ Clean Water Corps grant program (MDEQ)
- ◆ Great Lakes Aquatic Habitat Network and Fund

Table 5.7a. Clinton Main Proposed Projects Prioritized by Community

Community/County		Project Name	Priority BMP Category	Subbasin Number	Subbasin Type
Entire Subshed		Land Cover Classifications Analysis	1	All	All
City of Auburn Hills	1	Civic Center Parking Lots	1	11	Preservation/Restoration
	2	Hawk Woods Parking Lot	1	12	Preservation
	3	Fire Station No.3 Parking Lots	1	13	Preservation/Restoration
	4	Manitoba Park Parking Lots	1	14	Restoration
	5	Community Dev Center	1	11	Preservation/Restoration
	6	Baseball Field Parking Lot	1	11	Preservation/Restoration
	7	Athletic Field Parking Lot	1	11	Preservation/Restoration
	8	River Woods Parking Lot	1	4	Restoration
City of Keego Harbor	1	City Hall Detention Pond Retrofit	1	2	Preservation
Oakland County	1	Mainland Drain Project-Cons Wet	1	14	Restoration
	2	Mainland Drain Project-Stabilization	2	14	Restoration
	3	Waterford Oaks County Park	3	14	Restoration
	4	PCR#2 Streambank Stabilization	2	4	Restoration
Oakland University	1	East Ravine Tributary Restoration	2	11	Preservation/Restoration
	2	Golf Course Galloway Creek Restoration	2	11	Preservation/Restoration
	3	West Ravine Tributary Restoration	2	11	Preservation/Restoration
	4	Belgian Barn & Pioneer Drive Restoration	2	11	Preservation/Restoration
	5	NW Tributary Enhancement	2	11	Preservation/Restoration
	6	P-11 Biofiltration	1	11	Preservation/Restoration
Orchard Lake Village	1	Orchard Lake Bank Stabilization	2	2	Preservation
City of Pontiac	1	City-Owned Parking Lot Storm Water Pretreatment	1	3, 4, 11, 13, 14	Restoration/Preservation
	2	City-Wide Outfall Stabilization	2	3, 4, 11, 13, 14	Restoration/Preservation
	3	Downspout Disconnection Program	1	3, 4, 11, 13, 14	Restoration/Preservation
City of Rochester	1	Canoe Launch near Diversion St Parking Lot for Clinton River Trail	3	5	Preservation/Restoration
	2	Clinton River Pedestrian Bridge	3	5	Preservation/Restoration
	3	Bank Stabilization near Letica Rd Parking Lot for Clinton River Trail	1	5	Preservation/Restoration
City of Rochester Hills	1	Riverside Put-In/Take-Out	3	5	Preservation/Restoration
	2	Fisherman Access Points	3	5	Preservation/Restoration
	3	Natural Channel Restoration	2	5	Preservation/Restoration
	4	Invasive Species Control	4	5, 11	Preservation/Restoration
	5	City Hall Employee/Visitor Lot	1	5	Preservation/Restoration
	6	Cistern Installation	1	5	Preservation/Restoration
	7	Wetland, floodplain, steep slope and riparian buffer protection through easement acquisition	3	4, 5, 11	Preservation/Restoration
Sylvan Lake	1	Pontiac Drive Cul-de-Sac Retrofit	1&2	2	Preservation

Table 5.7b. Clinton Main Storm Water Runoff Volume - Existing Conditions<sup>1</sup>

Land Use Type	Total Area (Acres)	Total Area (Sq.Ft)	Curve Number Existing	Runoff Volume Existing (CF)	Runoff Volume Existing (MG)	Sub-basin ID	% of Total Subwatershed Area	Runoff Volume by Sub-basin (CF)
Single Family	12,915	562,577,400	77	27,596,478	206	1	14%	24,357,889
Road Right-of-Way	6,406	279,045,360	85	22,854,131	171	2	9%	16,077,718
Vacant	5,680	247,420,800	61	2,641,276	20	3	5%	8,658,857
Water	4,759	207,302,040	100	38,869,133	291	4	14%	24,269,493
Industrial	4,385	191,010,600	91	22,042,884	165	5	9%	15,209,897
Recreation / Conservation	3,719	161,999,640	86	14,074,051	105	6	2%	3,827,660
Public / Institutional	3,754	163,524,240	85	13,392,821	100	7	4%	6,302,359
Commercial / Office	2,850	124,146,000	94	16,879,986	126	8	1%	903,023
Multiple Family	1,800	78,408,000	90	8,559,412	64	10	1%	1,676,919
Transportation / Utility / Communication	605	26,353,800	90	2,876,913	22	11	14%	23,574,846
Mobile Home Park	501	21,823,560	90	2,382,370	18	12	6%	10,377,727
Railroad Right-of-Way	251	10,933,560	85	895,471	7	13	6%	9,849,019
Extractive	22	958,320	70	27,284	0	14	10%	17,832,890
						15	5%	9,434,059
<b>Total</b>	<b>47,647</b>	<b>2,075,503,320</b>	<b>71</b>	<b>173,092,208</b>	<b>1,295</b>	<b>16</b>	<b>0.4%</b>	<b>739,853</b>

<sup>1</sup>Based on a 2-year, 24-hour rain event.

Table 5.7c. Clinton Main Annual Storm Water Runoff Volume<sup>1</sup>, Total Phosphorus Loading<sup>2</sup> & Total Phosphorus Loading Reduction Targets<sup>3</sup>

Sub-basin ID	Acreage	% of Total Subwatershed Area	Runoff Volume by Subbasin (Annual Billion Gallons)	Annual Total Phosphorus Loading (lbs)	Total Annual Phosphorus Loading Reduction from Proposed 319
1	6,543	14%	4.08	3,369	
2	4,319	9%	2.69	2,446	34
3	2,326	5%	1.45	1,869	2
4	6,519	14%	4.06	5,478	119
5	4,086	9%	2.55	2,872	96
6	1,028	2%	0.64	450	
7	1,693	4%	1.06	453	
8	243	1%	0.15	38	
10	450	1%	0.28	218	
11	6,333	14%	3.95	4,294	989
12	2,788	6%	1.74	1,064	0.30
13	2,646	6%	1.65	1,794	3
14	4,790	10%	2.99	4,627	376
15	2,534	5%	1.58	1,899	
16	199	0.4%	0.12	100	
<b>TOTAL</b>			<b>29</b>	<b>30,971</b>	<b>1,618</b>

<sup>1</sup>Estimate using annual rainfall of 32 inches/year and average subwatershed C-factor

<sup>2</sup>Using loading from PLOAD estimates and sub-basin acreage

<sup>3</sup>Using pollutant loading estimates from proposed projects in sub-basin

**Table 5.7d. Clinton Main Annual Storm Water Runoff Volume<sup>1</sup>, Total Nitrates/Nitrites Loading<sup>2</sup> & Total Nitrates/Nitrites Loading Reduction Targets<sup>3</sup>**

Sub-basin ID	Acreage	% of Total Subwatershed Area	Runoff Volume by Subbasin (Annual Billion Gallons)	Annual Total Nitrates/Nitrites Loading (lbs)	Total Annual Nitrates/Nitrites Loading Reduction from Proposed 319 Projects (lbs)
1	6,543	14%	4.08	41,993	
2	4,319	9%	2.69	31,134	96
3	2,326	5%	1.45	18,977	7
4	6,519	14%	4.06	55,788	298
5	4,086	9%	2.55	29,902	256
6	1,028	2%	0.64	4,813	
7	1,693	4%	1.06	5,405	
8	243	1%	0.15	544	
10	450	1%	0.28	2,602	
11	6,333	14%	3.95	43,161	2,063
12	2,788	6%	1.74	11,575	2.00
13	2,646	6%	1.65	18,164	11
14	4,790	10%	2.99	46,483	1,360
15	2,534	5%	1.58	19,749	
16	199	0.4%	0.12	1,438	
<b>TOTAL</b>			<b>29</b>	<b>331,727</b>	<b>4,093</b>

<sup>1</sup>Estimate using annual rainfall of 32 inches/year and average subwatershed C-factor

<sup>2</sup>Using loading from PLOAD estimates and sub-basin acreage

<sup>3</sup>Using pollutant loading estimates from proposed projects in sub-basin

**Table 5.7e. Clinton Main Annual Storm Water Runoff Volume<sup>1</sup>, Total Suspended Solids Loading<sup>2</sup> & Total Suspended Solids Loading Reduction Targets<sup>3</sup>**

Sub-basin ID	Acreage	% of Total Subwatershed Area	Runoff Volume by Subbasin (Annual Billion Gallons)	Annual Total Suspended Solids Loading (lbs)	Total Annual Suspended Solids Loading Reduction from Proposed 319 Projects (lbs)
1	6,543	14%	4.08	490,459	
2	4,319	9%	2.69	367,650	51,578
3	2,326	5%	1.45	452,755	326
4	6,519	14%	4.06	1,616,099	215,010
5	4,086	9%	2.55	689,517	603,006
6	1,028	2%	0.64	83,731	
7	1,693	4%	1.06	84,149	
8	243	1%	0.15	12,098	
10	450	1%	0.28	68,042	
11	6,333	14%	3.95	1,075,931	4,978
12	2,788	6%	1.74	301,775	65
13	2,646	6%	1.65	448,441	436
14	4,790	10%	2.99	1,294,413	98,444
15	2,534	5%	1.58	353,156	
16	199	0.4%	0.12	10,419	
		<b>TOTAL</b>	<b>29</b>	<b>7,348,634</b>	<b>973,843</b>

<sup>1</sup>Estimate using annual rainfall of 32 inches/year and average subwatershed C-factor

<sup>2</sup>Using loading from PLOAD estimates and sub-basin acreage

<sup>3</sup>Using pollutant loading estimates from proposed projects in sub-basin

Table 5.7f. Associated Pollutants/Threats, Sources and Causes Addressed by Project

Community/County		Project Name	Pollutants/Threats	Sources	Causes
City of Auburn Hills	1	Civic Center Parking Lots	H; S; N	Storm Water Runoff; Decreased Groundwater Recharge; Streambank Erosion	Lack of BMPs; Increased Impervious Surfaces
	2	Hawk Woods Parking Lot			
	3	Fire Station No.3 Parking Lots			
	4	Manitoba Park Parking Lots			
	5	Community Dev Center			
	6	Baseball Field Parking Lot			
	7	Athletic Field Parking Lot			
	8	River Woods Parking Lot			
City of Keego Harbor	1	City Hall Detention Pond Retrofit	H; S; N	Storm Water Runoff; Decreased Groundwater Recharge;	Increased Impervious Surfaces; Improper or poor BMP Maintenance; Removal of Vegetation throughout watershed;
Oakland County	1	Mainland Drain Project-Cons Wet	H; S; N; P	Storm Water Runoff; Streambank Erosion;	Lack of BMPs; Removal of Vegetation; Increased Impervious Surfaces; River Flashiness
	2	Mainland Drain Project-Stabilization	H; S	Storm Water Runoff; Streambank Erosion	Lack of BMPs; Removal of Vegetation; Increased Impervious Surfaces; River Flashiness
	3	Waterford Oaks County Park	H; S; N; P	Storm Water Runoff;	Improper or Poor BMP Maintenance; Removal of Vegetation; Road & impervious surface maintenance practices; Lack of BMPs
	4	PCR#2 Streambank Stabilization	H; S	Storm Water Runoff; Streambank Erosion	Lack of BMPs; Removal of Vegetation; Increased Impervious Surfaces; River Flashiness
	1	East Ravine Tributary Restoration	H; S; N	Streambank Erosion; Road-Stream Crossings	Removal of Vegetation; Increased Impervious Surfaces; River Flashiness; Lack of BMPs
	2	Golf Course Galloway Creek Restoration	H; S; N	Streambank Erosion; Road-Stream Crossings	Removal of Vegetation; Increased Impervious Surfaces; River Flashiness; Lack of BMPs

Table 5.7f. Associated Pollutants/Threats, Sources and Causes Addressed by Project

Community/County		Project Name	Pollutants/Threats	Sources	Causes
Oakland University	3	West Ravine Tributary Restoration	H; S; N	Storm Water Runoff; Streambank Erosion	Removal of Vegetation; Increased Impervious Surfaces; River Flashiness; Lack of BMPs
	4	Belgian Barn & Pioneer Drive Restoration	H; S; N	Storm Water Runoff; Streambank Erosion; Road-Stream Crossings	Removal of Vegetation; Increased Impervious Surfaces; River Flashiness; Lack of BMPs
	5	NW Tributary Enhancement	H; S; N	Storm Water Runoff; Decreased Groundwater Recharge; Streambank Erosion	Removal of Vegetation; Increased Impervious Surfaces; River Flashiness; Lack of BMPs
	6	P-11 Biofiltration	S; N	Storm Water Runoff	Increased Impervious Surfaces; Lack of BMPs
Orchard Lake Village	1	Orchard Lake Bank Stabilization	S; N	Storm Water Runoff; Bank Erosion	Increased Impervious Surfaces; Road & Impervious Surface Maintenance Practices; Removal of Vegetation
City of Pontiac	1	City-Owned Parking Lot Storm Water Pretreatment	S; N	Storm Water Runoff	Increased Impervious Surfaces
	2	City-Wide Outfall Stabilization	S; N	Storm Water Runoff	Increased Impervious Surfaces; Removal of Vegetation; lack of BMPs
	3	Downspout Disconnection Program	H; S; B	Decreased Groundwater Recharge; Streambank Erosion; Illicit Discharges	Sanitary Sewer Overflows; Increased Impervious Surfaces; Lack of BMPs; Impervious Surface Maintenance Practices
City of Rochester	1	Canoe Launch near Diversion St Parking Lot for Clinton River Trail	P	Storm Water Runoff; Streambank Erosion; Lack of Publicly-Owned Riparian Land; Lack of Conservation Easements; Lack of Public Education	Increase in Impervious Surfaces; Economical Constraints
	2	Clinton River Pedestrian Bridge	P	Storm Water Runoff; Streambank Erosion; Lack of Publicly-Owned Riparian Land; Lack of Conservation Easements; Lack of Public Education	Increase in Impervious Surfaces; Economical Constraints
	3	Bank Stabilization near Leticia Rd Parking Lot for Clinton River Trail	S; N	Storm Water Runoff; Streambank Erosion; Lack of Publicly-Owned Riparian Land; Lack of Conservation Easements; Lack of Public Education	Increase in Impervious Surfaces; Removal of Vegetation;

Table 5.7f. Associated Pollutants/Threats, Sources and Causes Addressed by Project

Community/County		Project Name	Pollutants/Threats	Sources	Causes
City of Rochester Hills	1	Riverside Put-In/Take-Out	S; N; P	Storm Water Runoff; Streambank Erosion; Lack of Publicly-Owned Riparian Land; Lack of Conservation Easements; Lack of Public Education	Removal of Vegetation; Increase in Impervious Surfaces; Economical Constraints
	2	Fisherman Access Points	S; N; P	Storm Water Runoff; Streambank Erosion; Lack of Publicly-Owned Riparian Land; Lack of Conservation Easements; Lack of Public Education	Removal of Vegetation; Increase in Impervious Surfaces; Economical Constraints
	3	Natural Channel Restoration	H; S; N	Storm Water Runoff; Streambank Erosion; Lack of Aquatic/Riparian Habitat	Lack of BMPs; Removal of Vegetation; Increased Impervious Surfaces; Improper or Poor BMP Maintenance; Low Flow Conditions
	4	Invasive Species Control	P	Storm Water Runoff; Lack of Public Awareness	Removal of Vegetation; Increase in Impervious Surfaces; Economical Constraints
	5	City Hall Employee/Visitor Lot	H; S; N	Storm Water Runoff;	Increase in Impervious Surfaces; Lack of BMPs
	6	Cistern Installation	H	Storm Water Runoff;	Increase in Impervious Surfaces; Lack of BMPs
	7	Wetland, floodplain, steep slope and riparian buffer protection through easement acquisition	H; S; N	Storm Water Runoff; Streambank Erosion; Lack of Public Awareness; Lack of Publicly-Owned Riparian Land Lack of Conservation Easements	Increase in Impervious Surfaces; Removal of Vegetation; Lack of BMPs; Economical Constraints
Sylvan Lake	1	Pontiac Drive Cul-de-Sac Retrofit	H; S; N	Storm Water Runoff	Lack of BMPs; Increased Impervious Surfaces

<sup>1</sup>Pollutants/Threats (H = Hydrology/Flashiness; S = Sediment; N = Nutrients; B = Bacteria; P = Limited Public Access/Education)

Table 5.7g. Project Volume and Pollutant Load Reductions

Project Name	Sub-basin No.	Other Methods of Improvements	Volume (CF)	TSS (Lb/Yr)	TP (Lb/Yr)	TN (Lb/Yr)
City Hall Detention Pond Retrofit	2	Load Reductions (CWP)	0	1021	6.00	27
Orchard Lake Bank Stabilization	2	Lineal Footage Stabilized	NA	50,000	25	51
Pontiac Drive Cul-de-Sac Retrofit	2	Load and Volume Reductions (CWP)	10,000	557	3	18
River Woods Parking Lot	4	Load Reductions (CWP)	2,790	184	1.00	6
PCR#2 Streambank Stabilization	4	Lineal Footage Stabilized	NA	212,000	106	212
Canoe Launch near Diversion St Parking Lot for Clinton River Trail	5	Project Completion	NA	NA	NA	NA
Clinton River Pedestrian Bridge	5	Project Completion	NA	NA	NA	NA
Bank Stabilization near Letica Rd Parking Lot for Clinton River Trail	5	500 ft -Lineal Footage Stabilized	NA	84	84	170
Riverside Put-In/Take-Out	5	Project Completion	485	57	0	2
Fisherman Access Points	5	1000 ft of streambank managed	NA	NA	NA	NA
Natural Channel Restoration	5	Lineal Footage of Channel Restored	NA	600,000	NA	NA
City Hall Employee/Visitor Lot	5	Load and Volume Reductions (SET)	31,500	365	2	12
Cistern Installation	5	Volume of Storm Water Reduction	4,000,000	NA	NA	NA
Civic Center Parking Lots	11	Load Reductions (CWP)	695	82	0.40	3
Community Dev Center	11	Load Reductions (CWP)	678	80	0.40	3

Table 5.7g. Project Volume and Pollutant Load Reductions

Project Name	Sub-basin No.	Other Methods of Improvements	Volume (CF)	TSS (Lb/Yr)	TP (Lb/Yr)	TN (Lb/Yr)
Baseball Field Parking Lot	11	Load Reductions (CWP)	791	93	0.40	3
Athletic Field Parking Lot	11	Load Reductions (CWP)	1,623	188	0.90	7
West Ravine Tributary Restoration	11	Lineal Footage Stabilized	NA	128	128	256
East Ravine Tributary Restoration	11	Lineal Footage Stabilized	NA	102	102	204
Belgian Barn & Pioneer Drive Restoration	11	2900 Lineal Feet Stabilized	NA	492	492	986
Golf Course Galloway Creek Restoration	11	1000 Lineal Feet Stabilized	NA	170	170	340
NW Tributary Enhancement	11	Lineal Footage Stabilized	NA	80	80	160
P-11 Biofiltration	11	Acres Managed	6400	737	3	21
Hawk Woods Parking Lot	12	Load Reductions (CWP)	549	65	0.30	2
Fire Station No.3 Parking Lots	13	Load Reductions (CWP)	935	110	0.50	4
Manitoba Park Parking Lots	14	Load Reductions (CWP)	320	38	0.20	1
Mainland Drain Project-Cons Wet	14	Load and Volume Reductions (CWP)	4,500,000	60,480	355	1,315
Mainland Drain Project-Stabilization	14	Load and Volume Reductions (CWP)	NA	37,600	19	37
Waterford Oaks County Park	14	Public Education	NA	NA	NA	NA
City-Owned Parking Lot Storm Water Pretreatment	3, 4, 11, 13, 14	Load Reduction	NA	1630	10	36

Table 5.7g. Project Volume and Pollutant Load Reductions

Project Name	Sub-basin No.	Other Methods of Improvements	Volume (CF)	TSS (Lb/Yr)	TP (Lb/Yr)	TN (Lb/Yr)
City-Wide Outfall Stabilization	3, 4, 11, 13, 14	No. Outfalls Stabilized	NA	NA	NA	NA
Downspout Disconnection Program	3, 4, 11, 13, 14	Volume of Storm Water Reduction	48,555	NA	NA	NA
Wetland, floodplain, steep slope and riparian buffer protection through easement acquisition	4, 5, 11	5000 ft (35 acres) property protected (estimates of runoff and loads not entering river)	135,785	7,500	29	217
Invasive Species Control	5, 11	5000 ft of streambank managed	NA	NA	NA	NA
<b>Total Estimated Reductions</b>			<b>8,741,106</b>	<b>973,843</b>	<b>1,618</b>	<b>4,093</b>

Table 5.7h. Project Costs, Schedule, Milestones and Evaluation

Community/County		Project Name	Project Costs	Schedule	Milestones	Evaluation
All	1	Land Cover Classifications Analysis	\$200,000	2012	Contractor Procurement - Year 2; Project Completion - Year 3	Project Completion Demonstrating Existing Volume and Load Reductions based on Current Land Cover
City of Auburn Hills	1	Civic Center Parking Lots	\$200,000	2011	Design - Year 1; Construction- Year 2	Acres of Impervious Surface Managed; Estimated Volume & Load Reduction
	2	Hawk Woods Parking Lot	\$150,000	2011	Design - Year 1; Construction- Year 2	
	3	Fire Station No.3 Parking Lots	\$250,000	2012	Design - Year 2; Construction - Year 3	
	4	Manitoba Park Parking Lots	\$100,000	2012	Design - Year 2; Construction - Year 3	
	5	Community Dev Center	\$180,000	2012	Design - Year 2; Construction - Year 3	
	6	Baseball Field Parking Lot	\$200,000	2013	Design - Year 3; Construction - Year 4	
	7	Athletic Field Parking Lot	\$150,000	2013	Design - Year 3; Construction - Year 4	
	8	River Woods Parking Lot	\$350,000	2014	Design - Year 3; Construction - Year 4	
City of Keego Harbor	1	City Hall Detention Pond Retrofit	200000*	2012	Design - Year 2; Construction - Year 3	Acres Managed; Native Vegetation Installed; Reduction in Runoff Rate &/or Volume
Oakland County	1	Mainland Drain Project-Cons Wet	\$1,900,000	2012	Design - Year 2; Construction Year 3 & 4	Acres Managed in Wetland; Acres of Habitat Constructed; Reduction in River Flow
	2	Mainland Drain Project-Stabilization	\$1,400,000	2012	Design - Year 2; Construction Year 3 & 4	Lineal Footage of Bank Stabilized
	3	Waterford Oaks County Park	\$200,000	2012	Design - Year 3; Construction Year 3	Quantity of Native Vegetation Installed

Table 5.7h. Project Costs, Schedule, Milestones and Evaluation

Community/County		Project Name	Project Costs	Schedule	Milestones	Evaluation
	4	PCR#2 Streambank Stabilization	\$450,000	2013	Design - Year 2; Construction Year 4	Lineal Footage of Bank Stabilized
Oakland University	1	East Ravine Tributary Restoration	\$312,000	2013	Design - Year 2; Construction - Year 3	Lineal Footage of Bank Stabilized
	2	Golf Course Galloway Creek Restoration	TBD	2014	Design - Year 3; Construction - Year 4	Lineal Footage of Bank Stabilized
	3	West Ravine Tributary Restoration	\$333,500	2012	Design - Year 1; Construction - Year 2	Lineal Footage of Bank Stabilized
	4	Belgian Barn & Pioneer Drive Restoration	\$904,000	2013	Design - Year 2; Construction - Year 3	Lineal Footage of Bank Stabilized
	5	NW Tributary Enhancement	TBD	2015	Design - Year 4; Construction - Year 5	Lineal Footage of Bank Stabilized
	6	P-11 Biofiltration	\$25,000	2015	Design - Year 4; Construction - Year 5	Acres Managed; Estimated Storm Water Volume Reduction
Orchard Lake Village	1	Orchard Lake Bank Stabilization	\$55,000	2013	Design - Year 2; Construction - Year 3	Project Completion; Lineal Footage of Lakeshore Stabilized
City of Pontiac	1	City-Owned Parking Lot Storm Water Pretreatment	\$700,000	2012	Design - Year 2; Construction - Year 3	Acreage of Impervious Surface Managed
	2	City-Wide Outfall Stabilization	\$330,000	2013	Design - Year 2 or 3; Construction - Year 3 or 4	Number of Outfalls Stabilized
	3	Downspout Disconnection Program	\$1,600,000	2012-2014	Design - Year 3; Construction - Years 3 & 4	Number of Downspouts Disconnected; SF of Roof Area / Impervious Area Disconnected from System
	1	Canoe Launch near Diversion St Parking Lot for Clinton River Trail	\$50,000	2010	Design - Year 1; Construction - Year 1	Project Completion; Estimate of Use by Community

Table 5.7h. Project Costs, Schedule, Milestones and Evaluation

Community/County		Project Name	Project Costs	Schedule	Milestones	Evaluation
City of Rochester	2	Clinton River Pedestrian Bridge	\$400,000	2013	Design - Year 2; Construction - Year 3	Project Completion; Number of Residents Provided Access to River
	3	Bank Stabilization near Letica Rd Parking Lot for Clinton River Trail	\$500,000	2015	Design - Year 4; Construction - Year 5	Lineal Footage of Bank Stabilized
City of Rochester Hills	1	Riverside Put-In/Take-Out	\$240,000	2012	Design - Year 2; Construction - Year 3	Number of Direct Access Points Constructed
	2	Fisherman Access Points	\$250,000	2012	Design - Year 2; Construction - Year 3	Number of Direct Access Points Constructed
	3	Natural Channel Restoration	\$150,000	2013	Design - Year 3; Construction - Year 4	Lineal Footage of Channel Restored to Natural Regime
	4	Invasive Species Control	\$30,000	2013	Design - Year 3; Construction - Year 4	Acres of Invasive Species Removed
	5	City Hall Employee/Visitor Lot	\$325,000	2014	Design - Year 4; Construction - Year 5	Acres of Impervious Surface Managed; Reduction in Storm Water Runoff Volume
	6	Cistern Installation	\$60,000	2014	Design - Year 4; Construction - Year 5	Acres of Impervious Surface Managed; Reduction in Storm Water Runoff Volume
	7	Wetland, floodplain, steep slope and riparian buffer protection through easement acquisition		2015	Design - Year 5; Construction - Year 6	Acres Preserved
Sylvan Lake	1	Pontiac Drive Cul-de-Sac Retrofit	\$800,000	2015	Design - Year 3; Construction - Year 4 & 5	Acres of Impervious Road Surface Managed; Estimated Volume Reduction

\*Schedule (2010 - 2018 with 2010 as Year  
1)

<b>Total Estimate of Watershed Restoration/Protection</b>	<b>\$12,594,500</b>
---	---------------------