

AGREEMENT FOR MAINTENANCE OF STORM WATER DETENTION SYSTEM

This agreement is made on 4/3/2024, by the Huntington National Bank, a national banking association, whose address is 5555 Cleveland Avenue, Columbus OH 43231, ("**Developer**" or "**Owner**") and the CITY OF ROCHESTER HILLS (the "**City**"), whose address is 1000 Rochester Hills Drive, Rochester Hills, MI 48309.

RECITALS:

WHEREAS, The Huntington National Bank owns and occupies the property described in attached **Exhibit A**; and

WHEREAS, The Huntington National Bank has proposed, and the City has approved, a storm water drainage and detention system (the "**System**"), which includes a detention basin, for the property as described and depicted in the attached **Exhibit B**; and

WHEREAS, the parties will benefit from the proper use and maintenance of the System and desire to enter into this agreement to provide for the same.

THEREFORE, the parties agree:

1. **Use of the System:** Components of the System, including the detention basin, shall be used solely for the purpose of detaining storm and surface water on the property until such time as: (i) The City may determine and advise The Huntington National Bank, or The Huntington National Bank's successors, grantees or assigns, in writing that it is no longer necessary to use the detention basin to detain storm or surface water; and (ii) An adequate alternative for draining storm and surface water has been provided which is acceptable to the City and which includes the granting of such easements to the City or third parties for the alternative drainage system as may be necessary.

2. **Maintenance:**

A. The Huntington National Bank shall be responsible for the proper maintenance, repair and replacement of the System and any part thereof, including the detention basin as detailed in the Maintenance Plan attached as **Exhibit C**, excepting corrections or repairs resulting from the negligence or willful misconduct of the City.

B. Proper maintenance of the System shall include, but not limited to: (i) Keeping the bottom of the detention basin free from silt and debris; (ii) Removing harmful algae; (iii) Maintaining steel grating across the basin's inlets; (iv) Controlling the effects of erosion; and (v) Any other maintenance that is reasonable and necessary in order to facilitate or accomplish the intended function and purpose of the System.

3. **Action by City:** In the event The Huntington National Bank or The Huntington National Bank successors, grantees, or assigns, neglects, or fails at any time to properly maintain the System or any part thereof, the City may notify The Huntington National Bank or The Huntington National Bank successors, grantees or assigns, in writing, and the notice shall include a listing and description of maintenance deficiencies and a demand that they must be corrected within thirty (30) days of receipt of such notice. The notice shall further specify the date and place for a hearing to be held at least fourteen (14) days after the date of the notice before the City Council, or such other board or official to whom the City Council may delegate responsibility. At the hearing, the City Council (or other board or official) may endorse or modify the listing and description of deficiencies to be corrected and, for good cause, may extend the time within which the deficiencies must be corrected.

Thereafter, if the maintenance deficiencies are not corrected within the time allowed, the City may undertake and make the necessary corrections, and may maintain the System for a period not to exceed one (1) year. Such maintenance of the System by the City shall not be deemed a taking of the property, nor shall the City's actions be deemed to vest in the public any right to use the property. If the City determines maintenance of the system by the City should continue beyond one year, the City shall hold, and provide advance written notice of, a further hearing at which it will be determined whether The Huntington National Bank or The Huntington National Bank successors, grantees or assigns, will not or cannot properly maintain the System, and if such determination is made, the City may continue to maintain the System for another year, and subject to a similar hearing and determination, in subsequent years.

In the event the City determines an emergency condition caused by or relating to the System imminently threatens the public health, safety or general welfare, the City shall have the right to immediately and without notice enter the property and undertake appropriate corrective action.

4. **Charges:** The City shall charge to the current owner of the property the cost of maintenance or other corrective action undertaken by the City in accordance with this agreement, plus a ten percent (10%) administrative fee. If not timely paid, the City may assess the charges on the City's tax roll, which charges shall be a lien on the real property and shall be collectable and enforceable in the same manner general property taxes are collected and enforced.

5. **Notice:** Any notices required under this agreement shall be sent by certified mail to the address for each party set forth below, or to such other addresses as such party may notify the other parties in writing:

To The Huntington National Bank

5555 Cleveland Avenue,
Columbus OH 43231

To the City:

Clerk
City of Rochester Hills
1000 Rochester Hills Drive
Rochester Hills, MI 48309

6. **Successors and Assigns:** This agreement shall bind and inure to the benefit of the parties and their respective successors, grantees and assigns. The rights, obligations and responsibilities hereunder shall run with the land and shall bind all current and future owners of the property.

7. **Recording of Agreement:** This agreement shall be recorded at the Oakland County Register of Deeds.

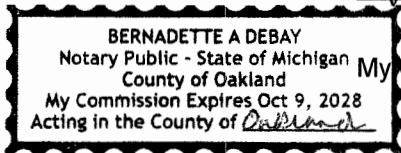
The Huntington National Bank

By: *Jeanne Petty*
Jeanne Petty
Construction Project Manager

STATE OF MICHIGAN }
COUNTY OF *Oakland* }SS

This agreement was acknowledged before me on *April 3*, 2024, by Jeanne Petty, who is the Construction Project Manager of The Huntington National Bank, a national banking association on behalf of the association.

Bernadette A. DeBay, notary public
Oakland County, Michigan
My commission expires: *10-09-2028*



CITY OF ROCHESTER HILLS

By: _____
Bryan K. Barnett, Mayor

STATE OF MICHIGAN }
COUNTY OF OAKLAND }SS

This agreement was acknowledged before me on _____, 2024, by Bryan K. Barnett, Mayor, of the City of Rochester Hills, on behalf of the City.

Drafted By:
Jeanne Petty
2025 Woodward Ave
Detroit, MI 48226

notary public

County, Michigan
My commission expires: _____

When Recorded Return to:
Clerks Dept.
City of Rochester Hills
1000 Rochester Hills Drive
Rochester Hills, MI 48309

4/29/24
P. Dau Christ
Approved

Exhibit "A"

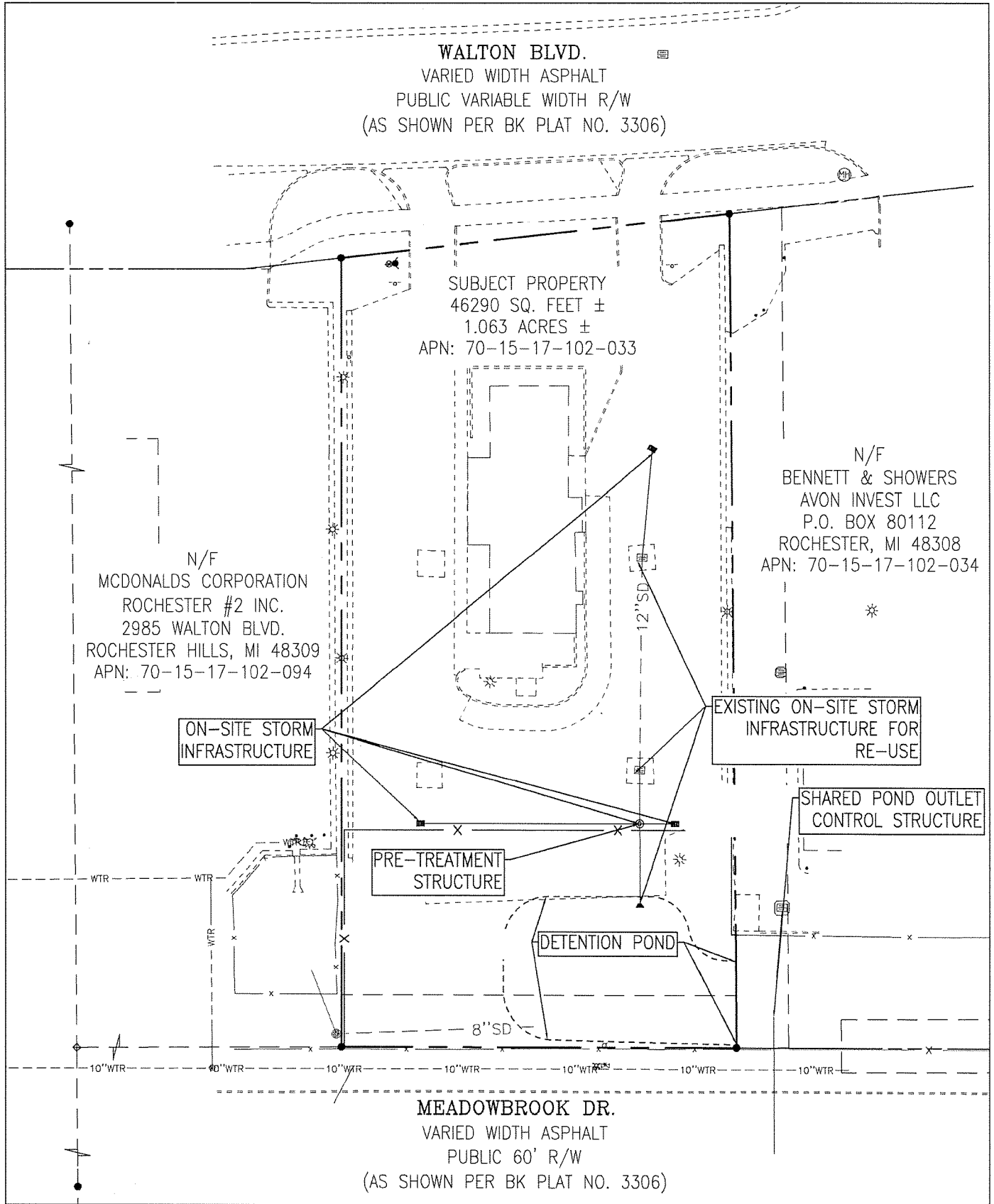
Legal Description of Huntington National Bank Parcel:

A PARCEL OF LAND LOCATED IN AND BEING A PART OF THE WEST HALF OF THE NORTHWEST QUARTER OF SECTION 17, TOWN 3 NORTH, RANGE 11 EAST, CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN, BEING MORE PARTICULARLY DESCRIBED AS: BEGINNING AT A POINT A DISTANCE OF 440.00 FEET SOUTH 00 DEGREES 14 MINUTES 40 SECONDS EAST ALONG THE WEST LINE OF SAD SECTION 17, AND A DISTANCE OF 419.89 FEET DUE EAST OF THE NORTHWEST CORNER OF SAID SECTION 17; THENCE NORTH 00 DEGREES 14 MINUTES 40 SECONDS WEST, 302.14 FEET TO A POINT IN THE SOUTHERLY RIGHT-OF-WAY LINE OF WALTON BOULEVARD; THENCE NORTH 83 DEGREES 51 MINUTES 46 SECONDS EAST, 148.79 FEET ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE OF WALTON BOUUEVARD; THENCE SOUTH 00 DEGREES 14 MINUTES 40 SECONDS EAST, 318.05 FEET; THENCE DUE WEST, 148.00 FEET TO THE POINT OF BEGINNING, AND ITS STORM SEWER PERPETUAL EASEMENT AS RECORDED IN UBER 6800, PAGES 433, 434, 435, OAKLAND COUNTY RECORDS, TOGETHER WITH THE EASEMENT TO THE FULL USE OF THE WATER RETENTION BASIN, WATER SHED AND EXISTING 42" STORM SEWER WHICH IS INCLUDED AS PART OF THIS CONVEYANCE FOR THE BENEFIT OF THE PURCHASER AND THEIR ASSIGNS FOREVER.

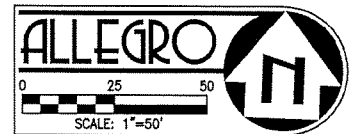
#15-17-102-033



HUNTINGTON NATIONAL BANK - ROCHESTER HILLS
EXHIBIT B - STORM WATER SYSTEM EXHIBIT
2975 WALTON BLVD | ROCHESTER HILLS, MI 48309



PROVIDED BY:



Approved
 ARS 5/21/24

ALLEGRO CIVIL ENGINEERS
 4322 N. LINCOLN AVE. SUITE A
 CHICAGO, IL 60625
 (872) 270-3682

CHICAGO
4322 N. LINCOLN AVENUE
SUITE A
CHICAGO, IL 60618



COLUMBUS
620 E. BROAD STREET
SUITE K
COLUMBUS, OH 43215

Exhibit C

Operation and Maintenance Manual

Huntington National Bank – Walton & Adams

2975 Walton Boulevard
Rochester Hills, MI 48309

Property Owner:

Huntington National Bank
37 W. Broad Street, HP 1097
Columbus, OH 43215
Contact: Mr. Fred Hawk

Prepared By:
Allegro Civil Engineers, P.C.
Austin Hahn, P.E. (MI) as Engineer-of-Record

Adele Swann
Approved 6/3/24



Introduction

This manual outlines the operation and maintenance responsibilities for the stormwater infrastructure at 2975 Walton Blvd. in Rochester Hills, MI. The structures in question include a sedimentation and detention basin and the underground storm sewer system as shown on plans produced by Allegro Civil Engineers, P.C. (ACE). To comply with City of Rochester Hills' requirements for best management practices (BMPs) this manual should be considered as a minimum performance requirement. This manual should be kept in its entirety and readily accessible to those responsible for the operation and maintenance of the on-site BMPs. These BMPs include storm sewer pipes and structures, outlet control structures, pre-treatment devices (CS-4), detention/sedimentation basin, and riprap.

Owner:

Huntington National Bank
37 W Broad Street, HP 1097
Columbus, OH 43215
Contact: Mr. Fred Hawk

Property Information:

This document shall be applicable to the stormwater infrastructure located at the property with the legal description included in Exhibit A.

Stormwater Systems Maintenance Agreement:

Exhibit B provides a clear presentation of all components of the stormwater system. Exhibit B-1 and B-2 provide comprehensive information on the proposed stormwater infrastructure and the long-term maintenance thereof. This system is subject to the long-term operation and maintenance responsibilities detailed in this manual. The system includes:

- Stormwater conveyance infrastructure (piping and similar)
- Stormwater structures (catch basins, curb inlets, yard drains and manholes)
- Outlet control structures
- Pre-treatment/water quality installations
- Detention pond (re-excavation of existing pond)
- Permanent erosion control measures

Inspections

Inspections on the BMPs implemented onsite should be inspected according to the guidelines presented in this manual, at a minimum. After the system has been in operation, and inspections, the frequency of inspections should be adjusted to account for conditions in the field. Maintenance inspection checklists are provided for each of the BMPs implemented in this system. Inspections should be performed by qualified personnel and should take appropriate safety measures while doing so. Operations of the detention basin, outlet control structures, and pre-treatment devices may need to be inspected by a practicing professional engineer.

Records of all routine inspections and work on BMPs for maintenance, repair, or replacement should be maintained by the owner for a minimum of 10 years. A copy of all records should be submitted to the City of Rochester Hills Engineering Division, including this manual, inspections sheets, approved construction plans, a maintenance log of work performed to the systems, and contact information for parties involved in the design and maintenance of this system.

Stormwater Systems Maintenance:

Regular inspection and maintenance of BMPs are necessary for consistent performance. Stormwater systems are expected to control quality and quantity of stormwater for the lifetime of the project. Not doing so may cause the system to fail, causing increased pollution runoff, loss of life or property from system failures, and aesthetic or nuisance conditions like mosquitoes or unintended ponding. The most common cause of stormwater system failure is the lack of adequate and proper operation, inspection, maintenance, and management.

Good design and construction can reduce maintenance needs and costs, but a long-term maintenance plan is still essential to have a properly functioning storm system. The most important part of any maintenance program is consistent monitoring of the system's overall performance. The maintenance responsibilities lie with the current property owner and transfer with the property in perpetuity. If the system maintenance is not performed, the City of Rochester Hills reserves the right to enter the property and perform all necessary work at the owner's expense. Refer to the Agreement for Maintenance of the Stormwater Detention System for additional details.

General Maintenance Items:

Parking Lot Sweeping: Routine sweeping of all paved parking surfaces improves the property aesthetics and removes accumulations of trash and sediment that tend to migrate into stormwater management systems during a storm event. Parking lot sweeping should be performed quarterly or as necessary to limit sediment and trash build-up.

Grass Mowing: Mowing requirements should be tailored to the site conditions, grass types, and seasonal climate variations. Grassed areas may require periodic fertilizing or soil conditioning in order to maintain healthy growth. Areas may need to be reseeded periodically to replenish grass cover in areas damaged by sediment accumulation, stormwater flow, or erosion. Dead turf needs to be replaced after being discovered. Inspection of grassed areas and other landscaping features should occur annually.

Trash and Debris Removal: Removal of all trash and debris from the property should occur monthly. Removal of these items will prevent damage to vegetated areas and prevent interruption of the stormwater system's functioning. Any removed debris should be disposed of according to Local, State and Federal regulations.

Stormwater System Maintenance Items: The following narratives give an overview of the maintenance requirements for the stormwater system components. The inspection list included offers a more thorough listing of what should be inspected and at what time intervals.

Storm Sewer and Structures: Catch basins, inlets, manholes, and sewer pipes should be inspected for sediment accumulation and clogging, floating debris, dead flora/fauna, and any other potential obstructions. The structures and sewers should be observed during a storm event to ensure proper operation. Accumulated sediment and debris should be removed on a yearly basis or as needed. Structural repairs should take place as needed for cracks, spalling, leakage, joint failure, misalignment, or settlement of structures. A civil engineer should be consulted if problems are thought to exist.

Detention Basin: The basin should be kept free of any obstructions that would inhibit drainage. The basin and outlet control structure should be checked for structural integrity in the same manner described for the storm sewer and structures above. Any visible signs of erosion or flow bypassing the outlet control structure should be addressed by a civil engineer-of-record.

Stormwater Pre-Treatment Devices: Refer to Exhibit B-1.

Stormwater Management System Maintenance Tasks and Schedule:

Maintenance Activities	Stormwater Structures	Storm Sewer & Detention Pond	Rip Rap	Frequency	Comments
<i>Monitoring & Inspection</i>					
Inspection for Sediment Accumulation	X	X	X	Annually	
Inspection for Floatables, Debris, and Dead Vegetation	X	X	X	Annually	
Inspection for Erosion			X	Annually	
Inspection for Invasive Plant Species				Annually	
Inspect all components during we weather and compare to as-builts	X	X		Annually	
Inspect inside of structures and pipes for structural deficiencies	X	X		Annually	
<i>Preventative Maintenance</i>					
Remove accumulated sediment	X	X	X	Annually or as needed	
Remove floatables, debris, and dead vegetation	X	X	X	Annually or as needed	
Professional application of herbicide for invasive species that may be present				Annually or as needed	
<i>Remedial Actions</i>					
Repair/stabilize areas of erosion			X	As needed	
Structural repairs	X	X		As needed	
Make adjustments/repairs to ensure proper functioning	X	X	X	As needed	

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Exhibit B-1

Cascade Separator[®] Inspection and Maintenance Guide



Maintenance

The Cascade Separator® system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects sediment and debris will depend upon on-site activities and site pollutant characteristics. For example, unstable soils or heavy winter sanding will cause the sediment storage sump to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall). However, more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment wash-down areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

A visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet chamber, flumes or outlet channel. The inspection should also quantify the accumulation of hydrocarbons, trash and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided in this Inspection and Maintenance Guide.

Access to the Cascade Separator unit is typically achieved through one manhole access cover. The opening allows for inspection and cleanout of the center chamber (cylinder) and sediment storage sump, as well as inspection of the inlet chamber and slanted skirt. For large units, multiple manhole covers allow access to the chambers and sump.

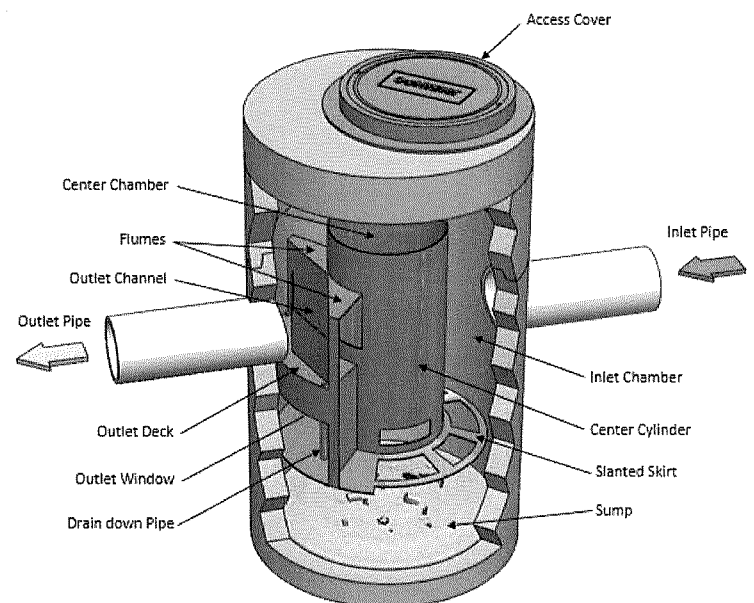
The Cascade Separator system should be cleaned before the level of sediment in the sump reaches the maximum sediment depth and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance may be impacted when maximum sediment storage capacity is exceeded. Contech recommends maintaining the system when sediment level reaches 50% of maximum storage volume. The level of sediment is easily determined by measuring the distance from the system outlet invert (standing water level) to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the chart in this document to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage.

Cleaning

Cleaning of a Cascade Separator system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole cover and insert the vacuum tube down through the center chamber and into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The areas outside the center chamber and the slanted skirt should also be washed off if pollutant build-up exists in these areas.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. Then the system should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and to ensure proper safety precautions. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the Cascade Separator system must be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal. If any components are damaged, replacement parts can be ordered from the manufacturer.



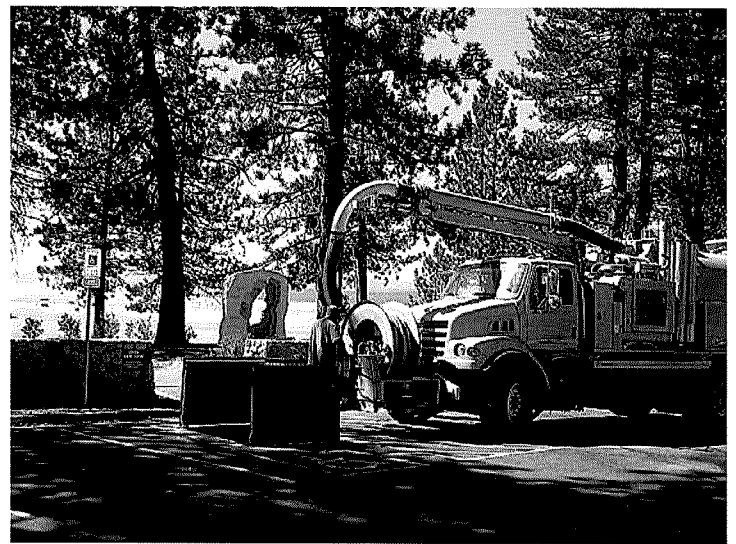
Cascade Separator® Maintenance Indicators and Sediment Storage Capacities

Model Number	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y ³	m ³
CS-3	3	0.9	1.5	0.5	0.4	0.3
CS-4	4	1.2	2.5	0.8	0.7	0.5
CS-5	5	1.3	3	0.9	1.1	0.8
CS-6	6	1.8	3.5	1	1.6	1.2
CS-8	8	2.4	4.8	1.4	2.8	2.1
CS-10	10	3.0	6.2	1.9	4.4	3.3
CS-12	12	3.6	7.5	2.3	6.3	4.8

Note: The information in the chart is for standard units. Units may have been designed with non-standard sediment storage depth.



A Cascade Separator unit can be easily cleaned in less than 30 minutes.



A vacuum truck excavates pollutants from the systems.

Cascade Separator® Inspection & Maintenance Log

Date	Depth Below Invert to Top of Sediment ¹	Floatable Layer Thickness ²	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The depth to sediment is determined by taking a measurement from the manhole outlet invert (standing water level) to the top of the sediment pile. Once this measurement is recorded, it should be compared to the chart in the maintenance guide to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, and earth stabilization products. For information, visit www.ContechES.com or call 800.338.1122

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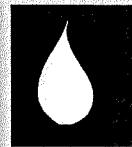


COLUMBUS
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SUITE K
COLUMBUS, OH 43215

Exhibit B-2



Maintaining Your Detention Basin



A Guidebook
for Private Owners in
Southeast Michigan



Assembly
of Rouge
Communities

OURS TO PROTECT

Working together, restoring the river



Allen Park	Novi
Auburn Hills	Oakland County
Beverly Hills	Plymouth
Bingham Farms	Plymouth Township
Birmingham	Pontiac
Bloomfield Hills	Redford Township
Bloomfield Township	Rochester Hills
Canton Township	Romulus
Commerce Township	Southfield
Dearborn	Troy
Dearborn Heights	Van Buren Township
Farmington	Washtenaw County
Farmington Hills	Wayne
Franklin	Wayne County
Garden City	Walled Lake
Inkster	West Bloomfield Township
Lathrup Village	Walled Lake
Livonia	Westland
Melvindale	Wixom
Northville	Superior Township
Northville Township	Ypsilanti Township

Prepared by the Public Involvement and Education Committee of the Assembly of Rouge Communities.
All photos provided courtesy of Environmental Consulting & Technology, Inc.

The Rouge River National Wet Weather Demonstration Project is funded, in part, by the United States Environmental Protection Agency (EPA) Grant #XP995743-01 through -08 and #C995743-01. The views expressed by individual authors are their own and do not necessarily reflect those of EPA. Mention of trade names, products, or services does not convey, and should not be interpreted as conveying, official EPA approval, endorsement, or recommendation.



Maintaining Your Detention Basin

A Guidebook for Private Owners in Southeast Michigan

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Additional information regarding detention basins and water quality maybe obtained from your local community or county. Also visit www.rougeriver.com.



Introduction

Your detention basin is a storm water Best Management Practice (BMP) designed to reduce the impacts of pollutants and increased storm water on local streams caused by development. They are an essential part of southeastern Michigan's efforts to improve the quality of our streams, rivers, and lakes; however detention basins will fail prematurely if not properly maintained. Once a detention basin fails, it will no longer perform its intended function and it is often very expensive to replace.

What are detention ponds and why are they important?

Do you have a detention pond near your property?

Are there different types of detention ponds?

Are you responsible for maintenance?

Maintenance? Why is it necessary?

What maintenance tasks should be considered?

How can you enhance the appearance and function of your detention pond?

What does it mean to naturalize your detention pond?

Wildflower buffers? Bird Boxes? Wildlife enhancements?



Whether you are an individual property owner, a home owners' association representative, or a residential/commercial property manager, this Guidebook will answer all of these questions and provide you with step-by-step instructions for maintenance activities. Routine maintenance will prolong the life of your detention pond, improve its appearance, prevent flooding and property damage and enhance local streams and lakes. This Guidebook is not a set of rules and regulations on how to design or build a detention basin.



What are detention ponds and why are they important?

When land is altered to build homes and other developments, the natural system of trees and plants over relatively spongy soil is replaced with harder surfaces like sidewalks, streets, decks, roofs, driveways, and even lawns over compacted soils. As a result, less rainwater is soaked up and more rain water/ storm water flows off the land at a faster rate. This can lead to streambank erosion within the local streams and possible downstream flooding.

In addition, there are increased concentrations of pollutants in storm water/drain water (called nonpoint source pollution). These pollutants include sediment, phosphorus and nitrogen from fertilizers, salts, and oil/grease from roads and parking surfaces, and bacteria from pet waste. These pollutants, which are a direct result of a variety of common outdoor human and animal activities in the neighborhood, degrade water quality and limit the habitat for wildlife in the stream. Every storm water detention basin located in the communities of southeastern Michigan plays an important role in improving and protecting water quality.

Your detention basin (along with others in the area) helps to slow the rate of runoff from the neighborhood and improve the quality of the storm water leaving the detention pond. They are important in protecting public and private property, public health and safety, and water quality. The basin collects and traps sediment from storm water that would otherwise end up clogging our rivers and streams and degrading the environment for fish, birds, and other wildlife.



The establishment of wetland vegetation within your basin as well as the creation of vegetated buffers or no-mow zones around the basin will help to improve water quality by filtering pollutants in storm water. This, in turn, helps to reduce algae growth within the basin and in downstream rivers, lakes, and streams. Reducing pollutants that may get to the basins is important in protecting water quality. Excess nutrients, including nitrogen and phosphorus, encourage algae growth. If fertilization of private property is necessary, then only use the low-phosphorus, slow release varieties. If you have a detention basin or other BMP, you are not alone. A variety of laws, including the federal Clean Water Act, encourage or require the control of urban pollutants. As such, maintaining your BMP is an important part of Michigan's environmental protection efforts.



Do you have a detention basin near your property?

If your development was built after the mid-1980's, you may have a detention basin that manages storm water runoff. If you live in a residential community, your association bylaws or master deed may indicate the location of any detention basins. If you are unsure, then contact your local community's public works department.

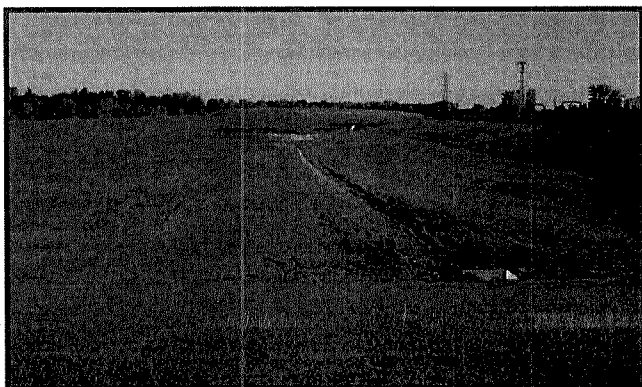


Are there different types of detention basins?

Yes there are. Some detention ponds are dry and have mowed turf grass in the bottom of them. These basins are referred to as dry basins.



Some detention basins are primarily dry, but have a narrow concrete channel for water flow from the inlet to the outlet.



Newer detention ponds are designed to have a permanent pool of water and are commonly called wet ponds. These wet ponds store water throughout the year, but also fill with storm water after rain events, but allow the water to exit to a neighboring storm sewer or creek through an outlet structure. If a detention pond does not have an outlet, then it is called a retention basin. Water that collects in retention basins must infiltrate into the ground or evaporate.



The advantages of a wet pond over a dry pond are higher pollutant removal efficiencies and less chance that pollutants will be re-suspended during a storm. Wet ponds can also serve as an aesthetic or recreational amenity as well as habitat for some wildlife.

All detentions basins will collect and fill with rain water or storm water runoff during and after rain events. Because there are several categories of detention basins, understanding the type of detention basin you have will help to better plan for its maintenance needs. Contact your local public works department for more information regarding your specific detention basin.



Are you responsible for detention basin maintenance?

We are all responsible for protecting water quality. Responsibility for maintenance varies across southeast Michigan. However, if your home owners' association or business is subject to a maintenance agreement, most likely you are the responsible party. It is important to check your maintenance agreement to identify your specific legal obligations. If you are not sure who is responsible for maintenance, contact your local community's public works department.



What maintenance tasks should be considered?

A consistent maintenance program is the best way to ensure that a detention basin will continue to perform its water quality and flood control functions. The first step in a maintenance program is to obtain a copy of the detention basin plan from your local engineering or public works department to determine how your basin was designed to function. In general, a maintenance program should contain the following components:

- regular inspections;
- review by a licensed Professional Civil Engineer;
- vegetation management;
- embankment and outlet stabilization;
- debris and litter control; and
- sediment/pollution removal.



The remaining sections of this Guidebook focus on describing the maintenance tasks required for proper basin function as well as frequency of various tasks. The following categories of maintenance tasks are further described in this Guidebook:



- storm sewer system and structural components;
- vegetation management;
- wildlife and insects; and
- property management activities that benefit your pond.

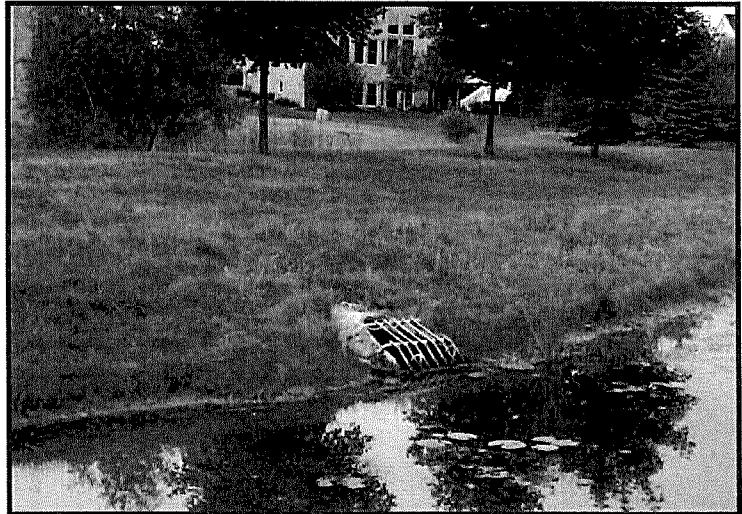
It's important to keep records of all inspections, maintenance activities, repairs and associated costs. A table has been provided at the back of this Guidebook for your use to assist in documentation (Detention Basin Inspection and Maintenance Record). Finally, before starting any maintenance activities, check with your local public works department to determine what, if any, permits are necessary.



Maintenance Tasks: storm sewer system

The storm sewer system includes pipes, catch basins and the outlet structures that enter and exit the detention basin. It is important to regularly inspect the structural elements (inlet/outlet pipes and animal grates) of your detention basin in order to ensure that storm water is flowing in and out of the pond as originally designed. Debris and sediment commonly clog detention basins and reduce the pond's overall effectiveness.

The following maintenance and inspection tasks should be included for the structural basin components: (also see Detention Basin Inspection and Maintenance Record located at the end of this Guidebook.



- 1. Inspect the inlet pipes and outlet pipes for structural integrity. (Annually)** Check inlet/outlet pipes for structural integrity to ensure they aren't crumbling or broken.
- 2. Inspect riprap at the inlet pipes. (Annually)** Replace when the riprap is clogged with sediment and debris.
- 3. Conduct routine inspections for trash or other debris that may be blocking the inlet or outlet pipes or emergency spillway. (Monthly and after rain events)** Remove all trash and debris from the basin. Improperly maintained ponds can harbor breeding area for mosquitos and reduce the storage volume of the pond.
- 4. Inspect and clean the storm sewer system and catch basins upstream from the detention basin. (Every 5 years or as needed)**
- 5. Inspect for sediment accumulation at the inlet pipes. (Semiannually and after rain events)** It's important to clean out sediment that might be restricting water flow. Remove accumulated sediment with a shovel and wheelbarrow if it is blocking water flow. Small amounts of removed sediment can be spread evenly on upland areas and seeded with natural vegetation.



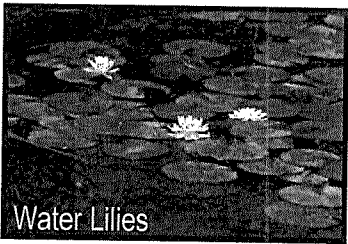
- 6. Inspect the stone around the riser/standpipe (outlet pipe). (Semiannually and after rain events)**
If stone has accumulated sediment, vegetation and/or debris to an extent that water is not flowing through the stone and out of the pond as originally designed, then the stone should be replaced with clean 3" diameter stone choked with clean 6A stone.
- 7. Inspect for excess sediment accumulation in the pond (Annually)**
Remove every 5-10 years or when the sediment accumulation is more than 6-12".
- 8. Have a Professional Civil Engineer inspect the pond to ensure it is functioning properly. (Annually)**
Compare existing conditions to as-built engineering plans.



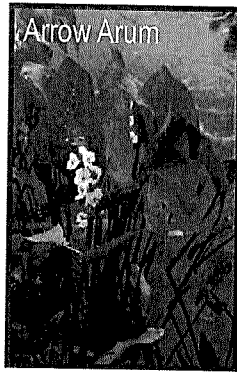
Maintenance Tasks: vegetation management

Many detention basins rely on vegetation to filter sediment from storm water before it reaches the outlet of the basin and to prevent erosion of the banks and the bottom of the basin. Turf grass is the most common ground cover - although many BMPs use woody vegetation (rain gardens) and wetland plants (wet ponds) to increase pollutant removal efficiencies.

In the spring and fall, inspect the vegetation along the side slopes/banks and in the basin. In the spring, dead cattails and other decomposing vegetation in the basin should be removed if they are clogging pipe openings. Eroded areas should also be repaired to minimize sediment entering the basin.



Water Lilies



Arrow Arum

A variety of wetland vegetation species that may be growing or that you may plant in your detention basin will enhance the overall aesthetic appeal and reduce algae growth. The creation of a vegetated "no-mow" zone (15' to 25') around the basin will also help reduce the amount of nutrients such as nitrogen and phosphorus entering the basin, and ultimately reduce algae growth in the pond. Wetland vegetation that may be found (or planted) in your basin includes water lilies, arrow arum, pickerel plant, bulrush, sweet flag, swamp milkweed and joe-pye weed. Sample photos shown in this section may assist in identifying the variety of plants.

The following maintenance and inspection tasks should be included for proper vegetation management: (also see Detention Basin Inspection and Maintenance Record located at the end of this Guidebook):



Joe-Pye Weed

1. Reestablish permanent native vegetation on eroded slopes. (Annually in the spring and after rain events)
2. Maintain 15-25 foot "no-mow and chemical free" zone around the pond edge. (Annually)
3. Mow or burn the "no-mow" buffer zone once a year to a minimum height of 6". (Annually in late April/early May) Rake mown material off and compost, burn or discard.
4. Inspect basin and "no-mow" zone for invasive species such as purple loosestrife, phragmites, buckthorn (common & glossy), honeysuckle and autumn olive that out-compete native vegetation. (Annually - July)
5. Have a professional selectively remove invasive species with applications of appropriate herbicides. (Annually - July/August)

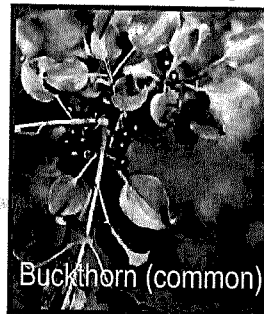
If woody debris is cut, cut 4" above the ground surface and treat the stumps with herbicide immediately after cutting. Monitor for sucker growth.



Bulrush



Pickerel Plant



Buckthorn (common)



Autumn Olive

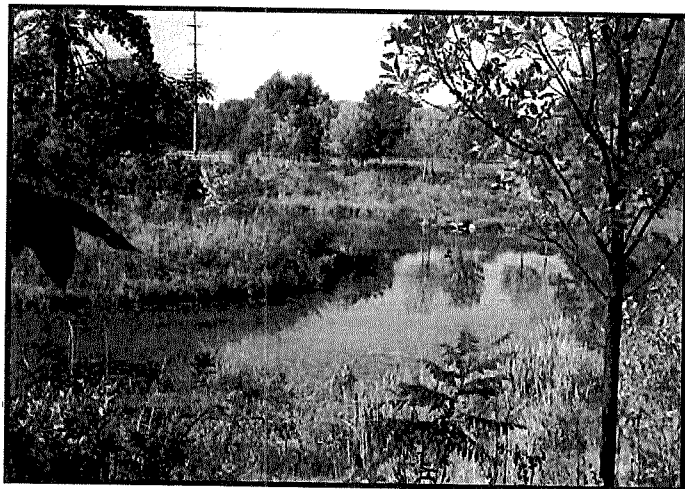
6. Purple loosestrife flower heads can be clipped off to reduce seed production until plant removal may be achieved.

Pulling purple loosestrife is not an effective removal method. Pulling purple loosestrife may actually encourage plants to multiply. Herbicide application of plants is the most efficient method. If stands of loosestrife are dense, it may take several years of maintenance to eliminate the plants from the site. Apply one round of herbicide in mid-July. Reassess the site three weeks after application to ensure all plants have been treated successfully. Apply additional herbicide treatment as necessary.



7. Increase plant diversity. (Annually - fall or early spring) Purchase native seed mix and wetland vegetation from a native plant nursery and install plantings in the early spring or fall. Increasing plant diversity in your basin will enhance water quality, minimize algae blooms and encourage habitat for birds, frogs & toads and other wildlife.

Native vegetation and seed mixes may be purchased through a number of plant nurseries. Contact your local public works department for a list of various suppliers and contractors.





Maintenance Tasks: wildlife and insects

Detention ponds that are properly maintained will consist of a healthy, balanced animal community that may include birds, mammals, fish and insects. Opportunities for creating habitat in and around detention basins should be evaluated in conjunction with annual maintenance activities in order to support a balanced ecosystem. Unhealthy ecosystems may occur in basins that are not maintained and can lead to unbalanced populations of nuisance animal species. Common topics relating to wildlife and insects are described as follows:



1. Wildlife Enhancements.

Installing bird boxes around basins and stocking fish in detention basins are common alternatives for enhancing wildlife and creating balanced ecosystems. Contact your local community for more information.

2. Mosquitos and West Nile Virus.

Overpopulation of mosquitos may occur in detention ponds that are not functioning properly and are not maintained. Many alternatives exist for managing mosquito populations including the use of natural predators. In addition, many local communities and local health departments have West Nile Virus programs. Contact your local agency for more information regarding individualized programs.



3. Nuisance Geese.

Canadian geese have experienced huge population increases throughout the state and are commonly attracted to lawns that are mowed, fertilized and regularly watered. The following activities will help minimize the presence of geese in and around your detention ponds:

- Do not feed the geese. Feeding the geese leads to large numbers of geese congregating for free food that, in turn, makes controlling the population around your detention pond more difficult. In addition, goose droppings may increase the levels of fecal coliform in the detention pond.
- Establish vegetated buffers around your detention pond as described in the Vegetation Management section of this Guidebook.
- Create fence barriers at least 30 inches in height to exclude the geese from the turf areas.
- Contact your local public works department or the Michigan Department of Natural Resources for more information.





Maintenance Tasks: property management

Property management refers to specific activities that you as a property owner can do to enhance the detention basin and minimize long-term maintenance. A number of these activities are described as follows:

- 1. Do not use pesticides, herbicides, or fertilizers in your pond.**
These products will leach from the pond and pollute our streams and rivers. In addition, these chemicals are harmful to wildlife, including frogs, toads, fish, dragonflies, etc. in the pond.
- 2. Do not place yard waste such as leaves, grass clippings or brush in the detention pond or in the storm drains located in the streets.** These materials release excess nutrients as they decompose and will lead to more algae growth in the pond.
- 3. Do not dump any materials in the storm sewer system.**
Improperly disposed of materials will pollute the basin.
- 4. Consider contracting with a street sweeping company to minimize excess sediment from entering your storm sewer system and detention basin.** This can reduce the need for future pond maintenance.
- 5. If you must use fertilizers, only use low-phosphorus, slow-release varieties.**
Keep fertilizers on the lawn and not on paved areas.
- 6. Pick up and dispose of pet waste with your weekly garbage.**
- 7. Provide educational updates to the property owners.** Discuss your maintenance plan at regular meetings, provide information in newsletters, and host annual clean-up days.





Detention Basin Inspection & Maintenance Record

Task	Inspection Frequency	Year _____		
		Contractor (Name & Phone #)	Cost	Notes
Storm Sewer Systems				
Inspect the inlet pipes and outlet pipe for structural integrity	Annually			
Inspect riprap at inlet pipes	Annually			
Conduct routine inspections for trash or other debris that may be blocking the inlet or outlet pipes or emergency spillway	Monthly and after rain events			
Inspect and clean the storm sewer system and catch basins upstream from the detention basin	Every 5 years or as needed			
Inspect for sediment & trash accumulation at the inlet pipes	Semiannually and after rain events			
Inspect the stone around the riser/standpipe (outlet pipe)	Semiannually and after rain events			
Inspect the riser/standpipe cover for trash and debris	Monthly and after rain events			
Inspect for excess sediment accumulation in the pond	Annually			
Remove accumulated sediment at basin inlets or in basin forebay	Semiannually and after rain events			
Have a Professional Civil Engineer inspect the pond to ensure it is functioning properly	Annually			
Have a Professional Civil Engineer inspect all outlet control structures to ensure they are functioning properly	Annually			



Detention Basin Inspection & Maintenance Record

Task	Inspection Frequency	Year _____		
		Contractor (Name & Phone #)	Cost	Notes
Detention Basin Vegetation				
Inspect side slopes, berms and spillways for erosion	Annually and after rain events			
Reestablish permanent native vegetation on eroded slopes	Annually and after rain events			
Maintain 15-25 foot "no-mow and chemical-free" zone around the pond edge	Annually			
Mow (or burn) the "no-mow" buffer zone once a year	Annually - late April/ early May			
Inspect basin and "no-mow" zone for invasive species such as purple loosestrife, phragmites, buckthorn (common & glossy), honeysuckle and autumn olive that out-compete native vegetation	Annually - July			
Have a qualified professional selectively herbicide invasive species	Annually July/August			
Increase plant diversity by planting additional vegetation in around the pond	Annually fall or early spring			
Property Management				
Common area maintenance	Annually			
Street sweeping	Semiannually			
Inspect basin for signs of chemicals (solvents, gas, diesel, paint, natural gas). Identify and remove/dispose of properly	Monthly and after rain events			
Review maintenance plan	Annually			