

# STORMWATER MONITORING GUIDELINES SOUTH OF DUNDAS STREET

## OPERATION, MAINTENANCE AND MONITORING OF STORMWATER MANAGEMENT PONDS

Planning and Development Commission



**STORMWATER MONITORING GUIDELINES:  
Operation, Maintenance and Monitoring Of Stormwater Management Ponds  
South of Dundas Street**

**DEVELOPMENT ENGINEERING DEPARTMENT  
Revised: January 2011**

---

**TABLE OF CONTENTS**

<b>1.0</b>	<b>OVERVIEW .....</b>	<b>2</b>
<b>1.2</b>	<b>PROGRAM OBJECTIVES.....</b>	<b>3</b>
<b>2.0</b>	<b>OPERATIONS AND MAINTENANCE .....</b>	<b>3</b>
<b>2.1</b>	<b>SEDIMENT CLEANOUT: HANDLING, REMOVAL, AND DISPOSAL .....</b>	<b>4</b>
<b>3.0</b>	<b>MONITORING .....</b>	<b>5</b>
<b>3.1</b>	<b>CONSTRUCTION MONITORING .....</b>	<b>5</b>
3.1.1	<i>Sediment Monitoring.....</i>	<i>5</i>
3.1.2	<i>Hydraulic Monitoring.....</i>	<i>6</i>
3.1.3	<i>Water Quality Monitoring .....</i>	<i>6</i>
<b>3.2</b>	<b>POST CONSTRUCTION MONITORING.....</b>	<b>6</b>
3.2.1	<i>Sediment Monitoring.....</i>	<i>7</i>
3.2.3	<i>Water Quality Monitoring .....</i>	<i>7</i>
<b>4.0</b>	<b>REPORTING AND DELIVERABLES.....</b>	<b>8</b>
<b>4.1</b>	<b>TERMS OF REFERENCE .....</b>	<b>8</b>
<b>4.2</b>	<b>MONITORING REPORTS .....</b>	<b>8</b>
<b>4.3</b>	<b>OPERATIONS AND MAINTENANCE MANUAL (ASSUMPTION REPORT) .....</b>	<b>8</b>

## 1.0 OVERVIEW

The purpose of this document is to present guidelines for the operation, maintenance and monitoring of existing and newly developed Stormwater Management (SWM) facilities located south of Dundas Street within the Town of Oakville. SWM facilities located in the North Oakville East/West Secondary Plans are subject to separate requirements set out in the North Oakville Stormwater Monitoring Program guidance document.

This guideline were prepared in accordance with the Stormwater Management Planning & Design Manual (MOE 2003), Storm Water Management Facility Sediment Maintenance Guide (Greenland Inc. 1999), Erosion & Sediment Control Guideline for Urban Construction (GGHA CAs, December 2006) and the Town of Oakville's Development Engineering Procedures & Guidelines Manual (Development Engineering Department, January 2011).

The goals of this program are to ensure that the SWMFs to be acquired by the Town meet the targets in the approved Stormwater Management Plan and the Town's approved standards and policies. In order to achieve these goals, the Development Engineering Department shall meet the following objectives:

- Review the terms of reference for monitoring stormwater management ponds prepared by the landowner's chosen monitoring consultant;
- Review monitoring data and track the performance of the ponds;
- Review the developers request for assumption; and
- Liaise with various Town of Oakville Departments to facilitate the activities/meetings/works required for assumption.

Maintenance activities, including sediment removal, and monitoring of Stormwater Management Facilities is the sole responsibility of the developer until works are assumed by the Town. The Town recognizes that various landowners may contribute drainage to the ponds and every effort should be made by the owner of the SWM pond to facilitate cooperation to carry out the required monitoring work. Following assumption, in a joint effort between the Departments of Engineering & Construction and Roads & Works Operations, pond maintenance is carried out by the Town.

The Stormwater Monitoring Program was designed as a guideline to developing a detailed schedule for inspection, maintenance and performance monitoring. The OM&M Program for each SWM facility will be tracked by the SWMF Database and evaluated in two (2) phases: "During-Construction" (Phase I) and "Post-Construction" (Phase II) during which time it must be demonstrated that the pond meets the specific targets identified in the approved Stormwater Management Plan/Study and/or MOE Certificate of Approval (CofA).

## **1.2 Program Objectives**

The objectives of the OM&M Program are as follows:

- To utilize maintenance, operations and monitoring data to demonstrate to various stakeholders that the ponds are achieving their intended design objectives;
- To transition the SWMF through the Town's Assumption process;
- To increase the public awareness of Stormwater Best Management Practices and encourage community stewardship;
- To promote cooperation and communication with the development industry, concerned citizens, public agencies, neighbouring municipalities and other stakeholders;
- To develop a comprehensive database for comparison and trend analysis and future design considerations.

## **2.0 OPERATIONS AND MAINTENANCE**

It is the responsibility of the developer to inspect the SWMFs to ensure compliance with the SWM targets as determined by the Subwatershed Study and take corrective action as required. Town staff will inspect the ponds periodically, however it is the developers' obligation to ensure that the facilities are routinely inspected and maintained. We acknowledge that each SWMF is unique to its environment (watershed) and therefore, unique in its design. The OM&M Program proposal should reflect the specific configuration and features of the pond(s).

The ponds should be inspected at the onset of each season (minimum 4 times per year) to ensure that the pond features (inlet, outlet, spillway etc.) are in good operating condition and following every significant rainfall event to ensure proper functioning.

The following is a broad checklist of concerns applicable to most SWMFs and should be used as a spring-board for the development of the O&M Program proposal:

- Obstruction at the inlet, outlet, diversion structure and emergency spillway.
- Oil/grease contamination (with an unnatural odour) or evidence of hydrocarbon spills (ie. gasoline) in the pond or the receiving watercourse.
- Accumulation of trash in or around the pond.
- Accumulation of algae or other form of choking vegetation.
- Sediment buildup in Sediment Forebay, main cell or in the receiving watercourse at the outlet.
- Evidence of animal activity such as burrowing or damming within the pond or at the outlet.
- Evidence of hydraulic malfunctioning such as frequent overtopping of the high water level or low water levels following significant rainfall events.
- Inappropriate or dead vegetation in and around the pond.
- Evidence of fish stocking in the pond.
- Evidence of community activities, vandalism and encroachment.
- Status of the pond's safety features and grading (fencing, side slopes, safety grates, retaining walls).
- Erosion around the inlet and outlet structures.
- Erosion of the berm, spillway and receiving watercourse.
- Signs of seepage through berms.
- Ensure any movable parts are free to operate (ie. maintenance valve, etc.).

## **2.1 Sediment Cleanout: Handling, Removal, and Disposal**

Prior to any handling, removal and disposal of sediment from SWMFs during cleanout operations, the Town of Oakville requires that the owner provide the following information to the satisfaction of the Town of Oakville and Conservation Halton:

- A Handling, Removal and Disposal Plan for the proposed works including:
  - Written notice to local residents within a minimum 120m radius;
  - Temporary public notice to identify maintenance works and duration;
  - Erosion and Sediment Control Plans;
  - Dewatering techniques; and
  - Sediment drying techniques (if site suitable).

- Sediment chemistry analysis in accordance with the Environmental Protection Act (EPA) Regulation 347-Leachate Test, CCME Guidelines and the Guidelines For Use at Contaminated Sites in Ontario (GCSO), (MOE 1997); and
- Correspondence with local MOE staff for agreed testing parameters in the context of local site conditions prior to testing.

### 3.0 MONITORING

The intention of the Monitoring Program is to evaluate the performance of the SWMFs under partial and full development conditions. In accordance with the MOE Guidelines, these facilities are typically designed to reduce contaminant loading on the receiving watercourse. The information obtained through annual reporting will support the SWMF Database, aid in the design of future stormwater management ponds and provide historical data for future maintenance budget considerations.

The goals of the monitoring component of the OM&M Program are as follows:

- Establish a maintenance schedule based on the facility's past performance;
- Evaluate the pollutant removal efficiency of the constructed SWMF;
- Evaluate the SWM pond's hydraulic response to rainfall events with respect to the MOE Certificate of Approval for peak discharge at the outlet;
- Evaluate the performance of erosion and sediment controls;
- Evaluate the impact of SWM controls on the receiving watercourse;
- Evaluate the condition of vegetation and overall health of the facility (i.e. relate to pollutant removal efficiency);
- Establish historical record of the facility's performance for future evaluation at final assumption; and
- Determine budget for future long term maintenance works by the municipality.

### 3.1 Construction Monitoring

#### 3.1.1 Sediment Monitoring

To ensure the continued pollutant removal efficiency of SWMFs, the accumulated sediment should be periodically removed. According to MOE Guidelines, removal frequency is based on 5% reduction in storage of a particular facility. It is also required that the owner of the facility mitigate the impacts of sediment on the downstream receiving watercourse. The Sediment Monitoring component of the OM&M Program aims to determine the sediment accumulation in the pond and outlet in order to forecast maintenance cleanouts and evaluate the impact of sedimentation in the receiving watercourse. The sediment depth in the pond and forebay should be checked to indicate the need for sediment removal. A sediment survey using the disk/rod technique is the Town's preferred practice. The measurement should be performed using a graduated pole with a flat plate attached to the bottom to first measure the depth from the water surface to the sediment layer and the second measurement from the top of the sediment layer to the native soil. A marker should be placed in the pond to indicate the place(s) where a measurement should be taken. Practitioners are encouraged to consult the *Stormwater Management Sediment Maintenance Guide* (Greenland, August 1999) for sediment measurements, sampling, and analysis techniques. Sediment

disposal is regulated through the Environmental Protection Act and other MOE Guidelines.

During the construction phase of monitoring, the impacts of sedimentation are significant and therefore, the following information should be provided in the Annual Maintenance Report:

- Sediment survey is required at the beginning and end of the monitoring season (March to November) to quantify the sediment accumulation in the pond and evaluate the removal efficiency of the pond as per Ministry of Ontario Guidelines.
- Sediment depth measurements in the receiving watercourse should be performed within 2-5 meters of the outlet routinely to monitor sediment accumulation in the receiving watercourse or swale outlet.

### **3.1.2 Hydraulic Monitoring**

Continuous water level monitoring is required from construction to assumption of the stormwater management pond. The proponent shall evaluate the hydraulic performance during 4 significant storm events each year and summarize results with respect to water levels, outflow rates and drawdown time to normal operating conditions. Data collected should be graphically interpreted (stage hydrograph tied to rainfall) and summarized with conclusions and recommendations for future design and/or monitoring.

To establish the accuracy of water level measurements and instruments, a staff gauge should be secured to a fixed location (i.e. inlet headwall) and set up to read water levels above the permanent pool elevation.

### **3.1.3 Water Quality Monitoring**

Water Quality Monitoring is not required during construction until the contributing drainage area has been fully developed and the pond has been cleaned out.

## **3.2 Post Construction Monitoring**

Post construction monitoring is required for two (2) consecutive monitoring seasons (March to November). To initiate post construction monitoring, the following conditions shall be met:

- The contributing drainage area has met 100% build out and the Town is satisfied that the all plans and phases of development are stable;
- All accumulated sediment has been removed from the sediment forebay and main pond;
- A topographic survey of the pond has been provided that demonstrates that the volume of the facility has been restored to its approved design condition;

- All deficiencies are restored;
- Remedial work to the facility, maintenance access and landscaping have been restored following cleanout;
- Yearly Monitoring Reports have been provided to the satisfaction of Development Engineering and relevant partners; and

### **3.2.1 Sediment Monitoring**

Once construction within the watershed is complete, it is expected that sediment loading to the pond will significantly decline. A final sediment depth survey shall be completed to demonstrate the sufficient pond volume is available at assumption.

### **3.2.3 Water Quality Monitoring**

The goals of Water Quality Monitoring are to evaluate the percent removal efficiency of total suspended solids (TSS) in the pond, measure the temperature effects of wet ponds and gain a greater understanding of ponds' effectiveness in meeting background conditions (subwatershed studies) or design targets.

Therefore, water quality monitoring should be performed during a significant rainfall event (>12mm rainfall depth) a minimum of two (2) to four (4) times during the monitoring season (March to November). Grab samples should be taken at the inlet(s) and outlet(s) of the pond to capture the first flush, rising and falling limbs of the hydrograph. It would be prudent to coordinate the water level/flow monitoring with the water quality monitoring for better interpretation of the results. Results of water quality sampling, including grain size analysis, should be fully interpreted and tied to rainfall events in the Annual Report.

**Water quality results vary according to the method of sampling. Continuous automated sampling will capture the distribution of TSS throughout the rainfall event whereas grab-samples will only capture portions of the hydrograph and therefore proper interpretation of the results is required to determine the worth of the data collected. Although automated sampling is not a requirement, it is the preferred method.**

## **4.0 REPORTING AND DELIVERABLES**

### **4.1 Terms of Reference**

A Terms of Reference for monitoring the stormwater management pond(s) shall be prepared by the landowner in accordance with this document and consultation with Development Engineering. The Terms of Reference shall set out the monitoring requirements, scheduled and deliverables at each stage of monitoring. The ToR should also provide details on the preferred equipment and protocols for sampling and reporting. The ToR should set out a contingency plan in the event that the SWM facility does not meet design targets.

### **4.2 Monitoring Reports**

The proponent's consultant shall prepare a monitoring report each year that includes:

- Approach to water level monitoring, present results and discuss accuracy
- Approach to water quality monitoring, present results and discuss accuracy
- Description of maintenance activities;
- Overall Summary and Recommendations

Appendices may include but are not limited to the following:

- Figure illustrating the location of subject lands and development phasing/activity and overall storm drainage area contributing to the pond
- Recent bathymetric survey of the sediment layer
- Details of sediment removal activities including quality sampling, removal and disposal
- Raw data
- Photographic records
- Inspection records
- Terms of Reference

### **4.3 Operations and Maintenance Manual (Assumption Report)**

The final Operations and Maintenance Manual should be prepared before the Town's assumption of the stormwater facility. This manual will serve as an instruction manual to the Town and should provide detail related to the following:

- Subwatershed and/or Ministry of Environment Targets and SWMP design;
- Instruction guide for long term operation and maintenance including details related to specific features of the pond (i.e. flow bypass structures)
- Performance highlights of SWM pond based on historical data (min. 2 years) after the full build-out condition;
- Budget forecasting based on historical maintenance reports;
- Copy of Ministry of Environment Certificate of Approval for the stormwater pond outlet;
- As built drawings;
- Bathymetric survey following cleanout and subsequent sediment depth survey results;
- Storm Drainage Area Plan(s); and
- Pond schematics where appropriate.