Stormwater Management Report

The purpose of this document is to provide a term of reference for the preparation of a Stormwater Management Report, which may be required as part of the submission of an application for Official Plan Amendment, Zoning By-law Amendment/Community Planning Permit, Draft Plan of Subdivision/Condominium, Site Plan, Consent and Minor Variance.

The objective of a Stormwater Management (SWM) Report is to evaluate the effects of a proposed development on the stormwater and drainage system, and to recommend how to manage rainwater/snowmelt for the proposed development, consistent with the municipal requirements and those of the applicable provincial and federal regulations.

It provides staff with a basis on which to assess the increased demands on municipal infrastructure posed by the development and the need for future study requirements such as detailed designs. The study recommends improvements to the municipal infrastructure and mitigative measures to reduce erosion, risk of flooding and maintain water quality in receiving stormwater systems. The Stormwater Management Report provides detailed design calculations/modelling and drawings for Stormwater infrastructure identified within the Functional Servicing Report.

Required by Legislation

The Ontario Planning Act and the Ontario Water Resources Act. 990

Who should prepare this report?

The Stormwater Management (SWM) Report shall be prepared by a registered professional engineer qualified in civil/water resources/environmental engineering. All drawings must be stamped, signed, and dated by a professional engineer, licensed in the Province of Ontario.

Why do we need this report?

A Stormwater Management Report is required to assess matters such as:

- To identify the quality and quantity impacts of the change in stormwater runoff on existing infrastructure and watercourses due to a proposed development
- To determine the requirement of new infrastructures and/or improvements to existing municipal servicing infrastructure required to support the proposed level of development, where applicable
- To determine mitigation measures to minimize any negative impacts on the drainage system
- To identify opportunities for enhancement of stormwater management facilities and features in redevelopment sites

How should this study be prepared?

A Stormwater Management Report should at a minimum contain:

Introduction

- Address of the subject property
- General site location of the subject property and neighbouring properties
- Project Name (if applicable)
- Applicant and owner's contact information
- Author name, title, qualifications, company name and appropriate stamp
- Brief description of the proposed development
- Overview of the study area and connected external drainage areas
- Purpose of the study
- Reference background studies/reports (watershed, subwatershed study, MESP, Functional Servicing Report (FSR), other master planning documents etc.)
- Related supporting studies such as geotechnical, hydrogeological, Environmental Impact Study (EIS) etc.
- Location and context map
- Site Plan of the subject property which includes property area, pavement areas and building areas
- Property description
- Pre- and Post-development drainage plans including flood lines and overland flow routes
- Schematic layout of proposed and existing site services
- Schematic layout of the sub-watershed showing the main watercourse, tributaries and outfall locations
- Run-off coefficients
- Summary table illustrating Pre- and Post-development flows for 2-year to 100-year and Regional storms including supporting calculations
- A clause stating that "Post-development flows must be equal to or less than Pre-development flows"
- Description of storm water management techniques being used to maintain pre-development flows
- Signature and stamp of a professional engineer.

Proposal Description and Context

- A description of the proposal, development stats (such as number of units, site area) type of development proposed, height, FSI, parking areas, access points, location of amenity areas, proposed phasing
- A description of the existing on-site conditions as well as surrounding areas, development limits, soil conditions, natural heritage features, groundwater, roads, buildings, parking areas, minor and major drainage systems, SWM facilities etc.
- Concept Plan for the development including building location, parking, access, amenity areas, grading and natural features and any natural hazards, proposed minor and major drainage system, location of SWM facilities

Storm Water Management Requirements

- A storm water management report which addresses quality and quantity control in accordance with Ministry requirements will be required for all developments other than one single family residential dwelling. The report shall illustrate appropriate storm water management techniques and design flows;
- Post-Development flows must be equal to or less than Predevelopment levels for all storm events up to and including the 100 year event. Safe overland conveyance of flows from storms in excess of the 100 year event must be incorporated into the design;
- “Enhanced” level of water quality treatment (80% TSS removal) is to be provided prior to discharging from a site, in accordance with Ministry requirements,
- LID principles, including treatment train measures, shall be employed to achieve water quality and quantity objectives.

Design Flows

Design flows shall be calculated in accordance with the Ministry’s current version of the Stormwater Management Planning and Design Manual, and with the Design Guidelines for Sewage Works, and the following;

- Design storms are to be modelled for 2, 5 10, 25 and 100 year design storms;
- Storm event criteria used in design shall be in accordance with The District’s current Muskoka Rainfall Data - Intensity-Duration-Frequency Values in Appendix D of the Design Criteria and Standards Manual;
- Use of the Rational, or Modified Rational Method, to calculate runoff is to be limited to drainage areas less than 5 ha, in general. Accordingly, the Rational Method shall be used for sizing storm sewer pipes in residential development areas for a 5 year return period storm event, at maximum 80% capacity in a subcritical condition;
- Urban commercial developments on local roads shall utilize a 10 year return period storm event for a minor system;
- Runoff from larger, complex drainage areas for stormwater management design and storage requirements is to be calculated using software programs such as OTTHYMO, MIDDUS or OTTSWMM, as appropriate. The designer shall justify their software selection in their design report;
- Pipe sizing shall be based on actual flow velocity as calculated using the Manning formula, Q = (1/n)AR2/3S1/2, with a minimum velocity of 0.75 metres per second and a maximum velocity of 6.0 m/s during the design event.

Gravity Storm Sewer Pipe Design Minimum Sewer Sizes

The following lists the minimum pipe sizes allowable;

- Single catch basin lead 300 mm
- Double catch basin lead 375 mm
- Storm sewer main 300 mm

Minimum Pipe Slope

The minimum pipe slope shall be 0.5%. Proposed lower slopes may be considered for large diameter trunk sewers or where constraints necessitate and shall require approval by the District or Area Municipality prior to construction.

Location

Sewers shall be located in accordance with the Area Municipality's standard locations. Where local municipal standards for sewer installation locations are not available or when installation is located within a District roadway, installation shall be in accordance with DMM 102. The preferred location of the sewer main is in the centre of the driving lane. The sewer must have a minimum horizontal separation of 2.5 m (edge to edge) and a minimum vertical separation of 0.5 m (bottom of pipe to top of pipe) from any watermain as per Ministry design criteria. Where sewer is constructed in bedrock a common trench design may be permitted in accordance with DMM 210 or 211 so long as the minimum vertical separation of 0.5 m (bottom of pipe to top of pipe) between the watermain and sewer is maintained. All non-standard sewer locations will require individual approval by the District and Area Municipality.

A 2.0 m horizontal separation between the sanitary sewer and storm sewer will be permitted to allow for common trench construction as long as the inverts of both sewers are relatively at the same elevation. Should the sewer inverts vary by more than 1.0 metre, a 3.0 metre separation shall be maintained.

Depth

The sewer obvert shall be constructed a minimum of 1.2 m below the finished grade. Where frost cover requirements cannot be satisfied, insulation requirements shall be in accordance with OPSD 1109.030. Approval of the reduced cover must be obtained from The District prior to construction. Applicants shall consider the minimum basement elevations in the adjacent lands if footing or similar private drains are to be connected to the storm sewer system.

Installation

Sewers shall be installed in accordance with the appropriate OPSD. Bedding class and material shall be confirmed in the geotechnical investigation.

Maintenance Holes/Catch Basins

- Spacing shall be determined based on inlet capacity of grates.
- The maximum spacing between maintenance holes shall be 110 m for sewers less than 300 mm diameter, 120 m for sewers 300 mm to 900 mm diameter and 150 m for sewers 975 mm to 1350 mm diameter.
- The maximum spacing between catch basins shall be 110 m for road gradients between 0.0 and 3.0%, 90 m for road gradients between 3.0 and 4.5% and 75 m for road gradients greater than 4.5%.

- Drops through maintenance holes shall match the incoming and outgoing sewer slopes and be in accordance with the following:

  Minimum drop on 0° turn = 0.01 m
  Minimum drop on 1° to 45° turn = 0.03 m
  Minimum drop on 45° to 90° turn = 0.06 m
  Maximum drop (without drop structure) = 0.30 m

- At maintenance holes where pipe sizes change, the above criteria shall be altered such that the obverts of the pipe are matched.
- Prefabricated internal drop structures are required in maintenance holes where the difference in invert elevation is greater than 0.60 m.
- A minimum 1500 mm diameter maintenance hole is required when there is an internal drop structure.
- Grade adjustment rings shall be in accordance with the Approved Products List and shall not exceed 0.3 m in height.
- When a PVC or HDPE sewer is installed into a new maintenance hole a sealing boot is required in accordance with the Approved Products List.
- Catch basin and storm maintenance holes shall include sumps with a minimum depth of 0.6 m.
- All maintenance holes shall be prefabricated with a monolithic base.

Catchment Points

- The design for catch basin location and type shall take into consideration the lot areas, lot grades, road widths and road grades. Design Consultant shall complete inlet grate review and confirm appropriate inlets types and catch basin spacing to suit.
- Road grading shall be assessed for efficient drainage of storm water to provide safe passage of vehicles.
- At street intersections, catch basins shall be located immediately upstream of sidewalk or pedestrian crosswalks.
- Catch basins shall be located upstream of the curb depression for any driveway and shall not be located within the driveway entrance area.
- Catch basins, inlet grates and connections shall provide for the expected maximum flow.
- Double catch basins are to be provided where flows are to be collected from two directions.
- Catch basin grates shall be to OPSD 400.010.
- Ditch inlet catch basins shall be designed to allow intake of expected flow rates at 50% blockage from debris.

Outfall Structures

All outfalls shall include a headwall to OPSD 804.030 or 804.040 as appropriate and include grating to OPSD 804.050. Design Consultant shall be responsible for confirming suitable erosion protection measures are included at the outfall and downstream of the outfall.

Storm Sewer Laterals

Residential

All residential connections shall utilize materials listed on the current Approved Products list in Appendix C and be in accordance with OPSD 1006.010. The minimum diameter within the road allowance shall be 125 mm. The minimum cover at street line shall be 1.20 m, unless circumstances require otherwise. Services with less than the minimum cover shall be insulated in accordance with OPSD. Connections directly into maintenance holes shall be minimized and reviewed on an individual basis.

Commercial / Industrial

All commercial or industrial connections shall utilize materials listed on the current Approved Products list in Appendix C. The minimum diameter within the road allowance shall be 150 mm and installed in accordance with OPSD 1006.010. The minimum cover at street line shall be 1.20 m, unless circumstances require otherwise. Services with less than the minimum cover shall be insulated in accordance with OPSD. A maintenance hole will be required at the main for all services exceeding 150 mm diameter.

Approved Products List The products specified in The District Municipality Design Criteria and Standards Manual Appendix C shall be utilized in the storm sewage system. All requested substitutions, or products for purposes not listed, shall be approved by the District prior to construction.

Recommendations

- Recommendations for mitigation or upgrades
- Summary of the identified Stormwater Management strategy for the proposed development

Drawings and Supporting Information

- Submit all drawings, figures, reference reports, computer modeling results and design calculations to support the proposed Stormwater Management scheme.

What else should we know?

The scope of the study should be discussed with municipal engineers, district and/or area municipal planning staff and or other staff or agencies as part of the consultation process.

The level of detail for the Stormwater Management Report depends on the type and scope of application, the size of the development and the types of stormwater management schemes proposed. For example, a report for a Plan of Subdivision will typically be more complex than a report in support of a Site Plan Control application.

A Stormwater Management Report must include the basic quantity and quality assumptions upon which the report is based, and all appropriate functional plans of infrastructure elements for major and minor flow, which could have an impact on the layout of the Plan of Subdivision or site and building design.

These infrastructure elements may include stormwater management facilities, all water resources features and functions (i.e., watercourses, riparian areas, recharge/discharge areas), existing overland flow routes, surface features (i.e., top of bank of valleys) and existing infrastructure (i.e., water and wastewater infrastructure and underground utilities).

Additional Terms

To be identified by the District and/or Area Municipality where proposed development is located.

Study Submission Instructions

To be identified by the District and/or Area Municipality where proposed development is located.

What other resources are there?

Ontario Ministry of Environment and Energy:
Stormwater Management Planning & Design Manual (March 2003)
District Municipality of Muskoka Design Criteria and Standards Manual
Professional Engineers of Ontario
Ontario Professional Planners Institute (OPPI) – Hire an RPP
Ontario Planning Act, R.S.O. 1990
Provincial Planning Statement 2024 (PPS)
Muskoka Official Plan (MOP)
Applicable Area Municipal Official Plans:
Town of Huntsville Official Plan
Town of Bracebridge Official Plan
Town of Gravenhurst Official Plan
Township of Lake of Bays Official Plan
Township of Muskoka Lakes Official Plan
Township of Georgian Bay Official Plan

About these Terms of Reference

The need and scope for this study will be decided by the District and/or Area Municipality during initial pre-consultation process with input from partner agencies. This pre-consultation process may include:

- Determination if this study is applicable
- Confirmation of criteria within these Terms of Reference that are appropriate for your development project
- Identification of specific technical components that need to be addressed
- Identification of detailed standards to be met

Notes:

If the proposed development is revised, the study/report shall reflect the revisions by an updated report or letter from the author indicating the changes and whether or not the recommendations and conclusions are the same (Note: this is subject to the extent of the revisions).

A peer review may be required. The cost of the peer review will be borne by the applicant.

If the submitted study is incomplete, is authored by an unqualified individual or does not contain adequate analysis, the applications will be considered incomplete and returned to the applicant.