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1. Regulatory and Policy Reference

The authority for rainwater management within the City of Vancouver (the City) derives primarily from the following by-laws, policies, and strategies:

- Zoning and Development By-law;
- Cambie Corridor Utilities Servicing Plan;
- Green Buildings Policy for Rezonings; and
- Rezoning Policy for Sustainable Large Developments.

For additional by-laws and policies related to rainwater management, refer to the rainwater management webpage.

2. Background and Context

2.1. Purpose

This bulletin provides rezoning, development and building permit applicants with information on the process and submission requirements related to rainwater management throughout the development process.

Rainwater management requirements are in place for rezoning applications that are:

i. subject to the Green Buildings Policy for Rezonings; or
ii. subject to the Rezoning Policy for Sustainable Large Developments.

A Rainwater Management Plan (RWMP) should be included for rezonings to CD-1. For rezonings to RM-8A/AN, RR and I-1C zones, a RWMP is not required until the associated development permit application is submitted.

A RWMP should be included in direct development permit applications that are:

iii. located in areas of concern for rainwater management.

For a list of the current areas of concern, refer to the rainwater management webpage.

A RWMP may be also needed for a development permit application pursuant to Section 4 of the Zoning and Development By-law if there is inadequate drainage on the site.

Figure 1 provides a visualization of the four intake pathways for rainwater management and the associated documentation to be provided by the applicant at each development stage.
Figure 1: Intake Pathways for Rainwater Management

<table>
<thead>
<tr>
<th>Applicability</th>
<th>Submission Requirement(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirement triggered for developments subject to the Green Buildings Policy for Rezonings</td>
<td>Preliminary RWMP and supporting documentation</td>
</tr>
<tr>
<td>Requirement triggered for developments subject to the Rezoning Policy for Sustainable Large Developments</td>
<td></td>
</tr>
<tr>
<td>Requirement triggered for developments located in areas of concern for rainwater management</td>
<td>Complete RWMP and supporting documentation</td>
</tr>
<tr>
<td>Requirement triggered for developments where adequate drainage is unclear or not available</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Development Permit</td>
<td>Final RWMP, O&amp;M Manual and supporting documentation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Permit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupancy Permit</td>
<td>Sealed letter and supporting documentation, if applicable</td>
</tr>
</tbody>
</table>

2.2. Definitions

In addition to the definitions for rainwater, rainwater drainage, RWMP, and rainwater management system contained in Section 2 of the Zoning and Development By-law, the following additional definitions apply to this bulletin:

- Best management practice (BMP): Common best practices to improve rainwater management.
- Green rainwater infrastructure: An approach to rainwater management that mimics the natural water cycle by reducing and treating rainwater where it lands while delivering environmental, social, and economic benefits.
- Operations & Maintenance Manual (O&M Manual): A comprehensive document that sets out details about the operation and maintenance necessary for the rainwater management system.
3. Rainwater Management Requirements

RWMPs are intended to detail how a proposed rainwater management system meets the requirements of Section 4 of the Zoning and Development By-law. The RWMP should include responses to the sections below and is to be prepared, signed and sealed by a responsible Professional Engineer.

3.1. Volume Reduction

3.1.1. Capture 24 millimetres of rainfall in 24-hours (or 70% of the average annual rainfall volume) from all areas, including rooftops, paved areas, and landscape and infiltrate, evaporate or reuse it.

3.1.1.1. Landscape areas over native subsoils with appropriately sized growing media to meet the 24 millimetres capture requirement. All proposed landscape areas are to ensure adequate growing media for both horticultural and rainwater management needs. For additional guidance on sizing topsoil, refer to Metro Vancouver’s Stormwater Source Control Design Guidelines linked to on the rainwater management webpage.

3.1.1.2. Prioritize methods of capture according to the three tiers in Table 1, beginning with Tier 1.

<table>
<thead>
<tr>
<th>Tier</th>
<th>Method</th>
<th>Best Management Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Runoff volume reducing green infrastructure</td>
<td>Infiltration of in-situ soils</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rainwater harvesting and re-use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green roofs</td>
</tr>
<tr>
<td>2</td>
<td>Runoff reducing non-infiltrating landscapes</td>
<td>Absorbent landscape on-slab</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Closed bottom planter boxes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lined bioretention systems</td>
</tr>
<tr>
<td>3</td>
<td>Runoff detention</td>
<td>Detention tank in combination with a water quality treatment practice</td>
</tr>
</tbody>
</table>

3.1.1.3. Justification should be provided for using Tiers 2 and 3. Each justification will be reviewed by the City on a case-by-case basis. Examples of potential exemptions are listed in Table 2.

<table>
<thead>
<tr>
<th>Tier</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low infiltration capacity (i.e. less than 1.5 millimetres per hour)</td>
</tr>
<tr>
<td></td>
<td>Limited available space for engineered infiltration systems due to onsite conditions, such as tree retention or permeable space being within 5 metres of a building’s foundation</td>
</tr>
<tr>
<td></td>
<td>Seasonally high groundwater table or bedrock within 0.6 metres of the bottom of a BMP</td>
</tr>
<tr>
<td></td>
<td>Contamination concerns</td>
</tr>
<tr>
<td></td>
<td>Slope stability concerns</td>
</tr>
<tr>
<td>2</td>
<td>Limited available space for non-infiltrating facilities due to onsite conditions, such as tree retention</td>
</tr>
</tbody>
</table>
3.2. Release Rate

3.2.1. The rainwater management system shall be designed so that the peak flow rate discharged to the sewer under post-development conditions is not greater than the peak pre-development flow rate for the return period specified in the City's Intensity-Duration-Frequency curve (IDF curve) as found in Schedule I of the *Zoning and Development By-law*.

3.2.1.1. The City’s 2014 IDF curve will be used for pre-development design flow calculations, and the City’s 2100 IDF curve will be used for post-development design flow calculations.

3.2.1.2. Pre-development, in this context, means the site’s immediate use preceding development.

3.3. Water Quality

3.3.1. The first 24 millimetres of rainfall from all pervious and impervious surfaces shall be treated to remove 80% Total Suspended Solids (TSS) by mass prior to discharge from the site. For impervious surfaces with high pollutant loads, including roads, driveways, and parking lots, the rainfall to be treated increases to the first 48 millimetres of rainfall.

3.3.1.1. Treatment can be provided by one of two methods: a single BMP or by means of a treatment train comprising of multiple BMPs that collectively meet the reduction target.

3.3.1.2. Vegetated practices or absorbent landscapes that infiltrate or filter the appropriate water quality volume (based on the type of pollutant generating surface) through a minimum of 450 millimetres of growing media are assumed to meet the quality requirement. For additional guidance on growing media specifications, refer to Metro Vancouver’s *Stormwater Source Control Design Guidelines* linked on the rainwater management webpage.

3.3.1.3. For proposed proprietary treatment devices:

3.3.1.3.1. provide product information for proposed proprietary treatment devices; and

3.3.1.3.2. demonstrate the product is certified by either the Washington State Department of Ecology's Technology Assessment Protocol – Ecology Program (TAPE) or Environmental Technology Verification (ETV) Canada.
4. Submission Requirements

All RWMPs should be coordinated with other relevant design professionals and submissions should meet all approved policies and guidelines governing the project. The submission details for RWMPs at each application stage are further detailed in the Appendix. For reference, the required documentation at each development stage is summarized in Table 3.

<table>
<thead>
<tr>
<th>Table 3: Required Documentation at Each Development Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Table 3" /></td>
</tr>
</tbody>
</table>

Applicants may also request a meeting with the City by contacting rainwater@vancouver.ca to present the draft proposed site plan drawing with the proposed rainwater management system BMPs included and receive feedback prior to any submission. The meeting can also include an opportunity for the applicant team to ask questions related to the conditions and notes.

**4.1. Rezoning Applications**

Submission requirements vary depending on the type of rezoning application:

4.1.1. Rezoning to RM-8A/AN, RR and I-1C: The applicant does not need to provide a Preliminary RWMP at rezoning but should provide a Complete RWMP at the development permit stage and a Final RWMP at the building permit stage.

4.1.2. Rezoning to CD-1: The applicant should provide a Preliminary RWMP outlining the proposed rainwater management system and how the project will meet the requirements for volume reduction, rate control, and water quality. This approach is to inform a Complete RWMP that is to be submitted prior to the issuance of any development permit and a Final RWMP to be submitted prior to the issuance of any building permit. Refer to Section C of the Appendix for the submission details associated with a Preliminary RWMP.

**4.2. Development Permit Applications**

At the time of a development permit application, the applicant should provide a Complete RWMP outlining the near-finalized rainwater management system with the relevant design details in the approved form of development. Refer to Section D of the Appendix for the submission details associated with a Complete RWMP.

A Rainwater Management Agreement that is acceptable to the General Manager of Engineering Services and the Director of Legal Services is to be registered prior to issuance of any development permit.

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1 For a fillable copy of the form, refer to the rainwater management webpage.
4.3. Building Permit Applications

At the time of a building permit application, the applicant should provide a Final RWMP outlining the final rainwater management system to be constructed. The Final RWMP may not deviate from the accepted Complete RWMP. Detailed design must include all relevant information for the proposed rainwater management system including BMPs located within the building footprint. Refer to Section E of the Appendix for the submission details associated with a Final RWMP.

The building permit application should also include a standalone O&M Manual detailing the maintenance program for the rainwater management system in order to maintain its future upkeep and performance.

4.4. Occupancy Permit Applications

At the time of an occupancy permit application, a registered professional should inform the City by sealed letter describing whether the rainwater management system has been constructed in accordance with the accepted Final RWMP.
Appendix: Submission List for Rainwater Management Plans

This submission list provides information on what should be included in a submitted RWMP. It is intended as a guide only for applicants and consultants, and does not need to be submitted with an application. If the information requested below is included in a submission, the City Engineer will have sufficient information to complete the review.

Note that this list is provided for convenience only and is not a substitute for applicable City by-laws or other regulations. It is the applicant’s responsibility to ensure that any existing or proposed construction or other works comply with all applicable regulations, and that an appropriate level of site investigation and assessment is undertaken prior to submission.

Sections A and B apply to all RWMP submissions. Section C applies to Preliminary RWMPs provided when rezoning to CD-1, Section D to Complete RWMPs provided at development permit, and Section E to Final RWMPs provided at building permit.

A. Submission Format
   A.1. The RWMP should be submitted electronically in a searchable PDF format.
   A.2. All pages of the study, including those in any appendices, should be numbered for easy reference by City staff.
   A.3. Only include pages or excerpts from supporting documents that are relevant to the rainwater management design.
   A.4. All figures and tables should be legible.
   A.5. All estimates should include a statement of assumptions.
   A.6. All units should be metric.

B. Submission Details
   B.1. The name of the consultancy, names of author(s) and reviewer(s), and contact information.
   B.2. The date of submission.
   B.3. The title of submission.
   B.4. Type of submission, indicating either:
       - Preliminary Rainwater Management Plan for rezoning applications;
       - Complete Rainwater Management Plan for development permit applications; or
       - Final Rainwater Management Plan for building permit applications.
C. Preliminary RWMP (CD-1 Rezoning)

C.1. Outline the rainwater management approach proposed to meet the volume reduction requirement. The approach shall include descriptions of each rainwater management practices/BMPs. BMPs proposed to meet the volume reduction requirement shall be classified as either Tier 1, 2, or 3.

C.2. Outline the rainwater management approach proposed to meet the water quality requirement. The approach shall include descriptions on how the water quality requirement is to be achieved on site and include supporting calculations and specifications necessary to demonstrate adequate design.

C.3. Outline the rainwater management approach proposed to meet the release rate requirement. The approach should include descriptions on how the release rate requirement is achieved on site and specify the peak flow rates at both pre-development and post-development site conditions, as well as the designed release rate. Ensure that the pre-development calculation uses the 2014 IDF curve values and the post-development calculation uses the 2100 IDF curves.

C.4. Provide justification for not prioritizing Tier 1 or 2 approaches, and specify the alternate system to meet requirements.

C.5. Provide an overview of each BMP and design specifics to support the design claim for meeting target requirements. Design detail of each BMP should be coordinated with other disciplines, if necessary, and the report should include the necessary rainwater management specific supporting drawings and calculations.

C.6. Provide a pre-development site plan that includes the following: orthophoto, delineated catchment(s), area take off for all different surface types, and onsite and downstream offsite drainage appurtenances.

C.7. Provide post development site plan(s) that includes the following: building location/footprint; underground parking extent; proposed service connections to the municipal sewer system; location and labels for all proposed rainwater management practices; area take off for all different land use surface types within the site limits; and delineated catchments to demonstrate BMPs are appropriately sized.

C.8. Provide a schematic sketch or detail demonstrating how the overall rainwater management system is hydraulically connected with each other and the proposed tie-in to the municipal service connection.

C.9. If the development is associated with a CD-1 rezoning or proposes an engineered infiltration BMP, provide a geotechnical report/infiltration study that includes the following: an evaluation of the potential for and risks of onsite rainwater infiltration, such as slope stability and soil contamination; results of infiltration testing at likely locations for infiltration practices and a proposed design infiltration rate; soil stratigraphy; and depth to bedrock and seasonally high groundwater at likely locations for infiltration practices.

C.10. Ensure document is signed and sealed by the responsible Professional Engineer.

C.11. Provide a completed Rainwater Management Project Summary Form as a PDF in a separate file to the RWMP. For a fillable copy of the form, refer to the rainwater management webpage.
D. **Complete RWMP (Development Permit)**

D.1. Provide all the information expected for a Preliminary RWMP.

D.2. Provide a summary of all the catchment areas in a tabular form that include the required capture and treatment, any direct capture and treatment achieved from adjacent surfaces, and storage capacities of the proposed rainwater practices. All area catchments must be shown in the proposed site plan drawing or figure in the document.

D.3. Provide calculation-sizing summaries of all rainwater BMPs proposed. The calculation-sizing summaries shall demonstrate how each BMP achieves the volume reduction, water quality, and release rate requirements. Note that excess storage provided for rainwater practices will not contribute towards the volume reduction requirement.

D.4. Specify the detention storage required based on the greater of either the pre-development peak flow storage volume requirement or the amount of the 24mm rainfall not captured in Tier 1 & 2 practices. Detention storage should be fully utilized by further reducing the target release rate if the required detention volume is greater than the amount necessary to meet the pre-development peak flow rate.

D.5. Provide detailed drawings of all proposed rainwater management systems including, but not limited to: locations, geometric properties (including footprint, volume, and depth), method of flow control (including orifice size and control structure configuration), emergency bypass, inverts, stage-storage-discharge table, design criteria and all assumptions. Relevant drawings from other disciplines or design professionals such as landscaping or mechanical plans should be provided as part of the submission package.

D.6. Provide cross-sections and details to demonstrate the overall rainwater management configuration of underground system, if proposed, including the tie-in connection to the municipal service pipe.

D.7. Provide all supplementary documentation for any proprietary products that clearly demonstrates how they contribute to and/or meet the volume reduction, water quality, and release rate requirements.

D.8. Confirm that access to various components of the rainwater management system for maintenance purposes is considered in the overall design. Placement of rainwater management system components that would require occupancy of the public right-of-way to perform routine maintenance tasks should be avoided.

D.9. Ensure all designs are in conformance with Book II (Plumbing Systems) of the Vancouver’s Building By-law. Note that conformance with the Building By-law is not reviewed by Engineering Services and acceptance of any RWMP does not indicate or imply compliance with the Building By-law.

D.10. Provide a written response clearly indicating how each of the Prior-To-Letter conditions relevant to rainwater management are addressed in the updated submission.

D.11. Provide a completed Rainwater Management Project Summary Form as a PDF in a separate file to the RWMP. For a fillable copy of the form, refer to the rainwater management webpage.
E. Final RWMP (Building Permit)

E.1. Provide all the information expected for a Complete RWMP.

E.2. Provide a final servicing plan that includes all routing of rainwater into the proposed systems and out to the municipal system.

E.3. Provide final level detailed drawings (including landscape detailed drawings) for all proposed rainwater management systems including, but not limited to: locations, geometric properties (including footprint, volume, and depth), method of flow control (including orifice size and control structure configuration), emergency bypass, inverts, stage-storage-discharge table, design criteria and all assumptions.

E.4. Provide an O&M Manual, signed and sealed by the responsible Professional Engineer, tailored specifically for all rainwater management systems proposed on-site and submitted as a standalone document that is provided to the owner or party responsible for operation and maintenance. The O&M Manual shall include, but is not limited to:

- site plan showing proposed conditions from the Final RWMP;
- phasing considerations (including early stages requirements immediately following construction and on-going requirements once the site is established);
- a table or schedule that describes the level of effort and frequency of tasks required to maintain optimal performance for each individual component of the system and indicate which activities would require occupancy of the public right-of-way;
- contact information for any proprietary systems to be located on-site;
- checklists to assist non-technical persons in assessing operation and maintenance performance and requirements (including pictures where appropriate); and
- a description of how access to each of the proposed rainwater management features would be achieved with all necessary maintenance vehicles and equipment.

E.5. Provide a completed Rainwater Management Project Summary Form as a PDF in a separate file to the RWMP. For a fillable copy of the form, refer to the rainwater management webpage.