CITY OF MAPLE RIDGE

STORMWATER MANAGEMENT PLANS
GUIDE TO APPLYING THE 3 TIER PRINCIPLES

The goal of this document is to provide clarity on the three tier storm water management principles. Also included are sample equations on calculating Tier A and B storm runoff. This document shall be used in conjunction with the City's Design Criteria Manual.

1. Tier A is to **detain on-site through infiltration, evapotranspiration or re-use**. Demonstrate how 50% of the MAR is being captured on-site. This is to include the lots and the run-off from the road/parking/landscaped areas.

2. Tier B is to **detain runoff from the entire site** resulting from larger rainfall events that exceed Tier A, up to and including MAR. Tier B release rate shall be limited to the **2yr forested flow rate** derived based on:
   a. Slow release - the MAR intensity with a maximum orifice size of 16.5mm, and (if required)
   b. Full release - the derived rainfall intensity with a "secondary" orifice opening

   Designer can use the Modified Rational Method to determine the volume of the detention tank required. Detention system, including flow control manholes, shall be on private property before discharging to the City's storm sewer.

3. Tier C (minor) is to detain the 10yr post-development event and release it at the **2yr pre-development flow rate**. This should be detained as per #2 above. The storm sewer in the road allowance needs to be designed to convey the 10yr event.

4. Water quality needs to be addressed on-site prior to discharging to the City's storm sewer – provide how this will be achieved (oil/grit separator, stormceptor, etc)

Sample Calculations

Tier A
Calculate Tier A by using the entire site area and do not apply a run-off coefficient for the volume calculation. Tier A should be calculated using 36mm of rain over the site area. That amount needs to be detained on-site through infiltration, evapotranspiration or re-use.

Tier A Target Rainfall Capture = 50% MAR Depth x A

50% MAR Depth= 0.036 m

A = Total Site Area (m2)

Tier B

Slow forested flow rate using MAR intensity:

Q_{slow} = Forested Runoff Coefficient x A x MAR Intensity x N

Where:

Forested Runoff Coefficient = 0.1 x Soil Adjustment Factor

A = Total Site Area (hectares)

MAR Intensity = 3.1 mm/hr

N = 0.00278

Tier B slow release rate shall be achieved by using a maximum of 16.5mm dia. circular orifice (or equivalent) in a flow control manhole.

Full forested flow rate using derived rainfall intensity

Q_{full} = Forested Runoff Coefficient x A x Intensity x N

Where:

Forested Runoff Coefficient = 0.1 x Soil Adjustment Factor

A = Total Site Area (hectares)

Intensity = calculate

N = 0.00278

In addition to the slow release orifice, it may be necessary to have a second orifice/opening to reach full release rate for tier B.

Tier B Detention Volume – with the full release rate, required storage volume can be calculated using Modified Rational Method detailed. See the City's Design Criteria Manual section D7.2 and D7.3.

Tier C

Tier C will need to be calculated using the methods detailed in the City's Design Criteria Manual section D7.2 and D7.3. Tier C cannot rely on any infiltration, and must detain the 10yr storm over the entire site, and release at the 2yr pre-development rate. This will require an orifice/opening sized for the Tier C "pre-development rate".

Tier C Release Rate = Pre-development Runoff Coefficient x A x 2yr Intensity (TOC based on pre-development condition) x N

As with Tier B, determine the storage volume required based on the Tier C release rate.

Should you require additional information, please contact the Engineering Department at:

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