

Stormwater Management Plan Guidelines

On site Stormwater Management Plans (SMPs) are required for all development sites under the current *Watercourse Protection Bylaw* and under the *Subdivision and Development Servicing Bylaw*.

A preliminary SMP technical memo is required at the beginning of the development process. It must be integrated with the proposed layout, environmental protection plans, landscaping plans, geotechnical recommendations, tree management plans, and site development layouts. SMP's must comply with the current municipal bylaw requirements which includes adherence to federal and provincial requirements, along with Metro Vancouver (MV) Stormwater Source Control Design Guidelines and any other applicable municipal policies, standards, and design requirements.

The preliminary SMP technical memo must include the following information:

1. SMP reports and plans must include the following items:
 - a. Rationale and description of how and where 3 tiers on site are being achieved including water quality requirements along roads & parking areas. For Tier A, include location & description of recommended mechanical controls, topsoil amendments, infiltration, bio-filtration & exfiltration efforts, and integration with proposed environmental protection areas and the proposed landscaping plans;
 - b. Identify how drainage & pre-development flows will be integrated with any hydrological features observed onsite or offsite within 50 metres such as watercourses, ditches, ponds, wetlands and existing/proposed landscaping or green infrastructure features;
 - c. Identify whether development (existing or proposed) or groundwater in the general area may require coordination/integration of stormwater management resources for dealing with water volumes, velocities, and water quality both on site and/or off site;
 - d. Where applicable, identify potential drainage impacts, challenges, or information gaps either onsite or offsite that might impact SMP solutions, with consideration for impacts on neighboring properties, environmental sensitive areas, and landscaped areas.
2. Design the site to maintain the natural hydrology and flows. Provide preliminary calculations for Tier A requirements, pre-development flows, and approximate sizing for any surface level detention or bio-filtration facilities being proposed. What percent of Tier A requirements are being met? Include information on groundwater recharge, bio-filtration (topsoil amendments, rain gardens & vegetative swales) and exfiltration (vegetation & trees) that is being used on site.
3. The report and final design plans must demonstrate how stormwater management designs will utilize low impact development designs, including consideration for the following:
 - a. Designs must consider form and functionality of proposed measures including ongoing maintenance requirements, access, & designs to avoid safety concerns,
 - b. Ensure that stormwater facilities, such as detention ponds and hard infrastructure do not encroach into existing or future park areas or designated protected areas.
 - c. Minimize the amount of impervious area on site where possible. Where surface water cannot be infiltrated, assess rainwater volumes and identify appropriate alternatives;
 - d. On Site SMP Designs must consider potential impacts on existing or proposed landscaping, tree protection or replacement areas, and potential recharge of groundwater systems.
 - e. Consider green roof (intensive and extensive) measures where pervious surfaces and space is limited on site. This can help with rainwater storage, release rates, climate change abatement, and more attractive spaces for future residents.

Three Tier SMP Principles:

The Three Tier Approach is outlined in the City’s Design Criteria Manual. Additional information and requirements can be found in the BC Ministry of Environment Stormwater Planning Guidebook for British Columbia as well as the most current Dept. Fisheries & Oceans Stormwater Guidelines.

These three rainfall tiers correspond to three components of the integrated strategy for managing the sites complete spectrum of rainfall events:

Tier A events are first flush events that are typically less than 50% of the mean annual rainfall. These represent about 90% of all rainfall. These events should be captured at source to reduce runoff volume and provide rainfall capture.

Tier B events are larger rainfall events that are greater than half the size of the mean annual rainfall. These represent about 10% of the rainfall. Typically these events are to be managed through detention in concert with infiltration and exfiltration.

Tier C events are the extreme rainfall events that may or may not occur in any given year. Tier C is separated into the minor and major systems and must provide adequate conveyance for runoff from extreme storms without causing property damage or impacts to public safety. Consideration for potential groundwater influences in certain areas, potential downslope impacts, and cumulative impacts of heavy rainfall events over time. In some circumstances the City may determine that the minor system must detain the 1:100 year event and release at an appropriate pre-development rate.

Designers are encouraged to think about combinations of stormwater source controls with a stormwater treatment chain to maximize benefits for the site including water quality, landscaping treatments, and green infrastructure low impact development. Tier A examples are as follows:

| <i>Development Type</i> | <i>Absorbent Landscape</i> | <i>Infiltration Swale</i> | <i>Rain Garden</i> | <i>Pervious Paving</i> | <i>Infiltration Trench or Shaft</i> | <i>Green Roof</i> |
|---|-----------------------------------|----------------------------------|---------------------------|-------------------------------|--|--------------------------|
| <i>Park / Open Space may include parking / buildings</i> | X | X | X | X | X | X |
| <i>Low Volume Road with roadside landscape or medians</i> | X | X | X | | X | |
| <i>Surface Parking on-street or off-street w/ islands</i> | X | X | X | X | X | |
| <i>Single Family / Low Density 30 – 50% building coverage*</i> | X | X | X | X | X | X |
| <i>High Density / Industrial/ Commercial/Institutional 50 – 90% building coverage*</i> | X | X | X | X | X | X |
| <i>Ultra High Density >90% building coverage*</i> | | | | | | X |

*In Table 1–6, the building coverage figures refer to the percent of building footprint covering the site. This should not be confused with % impervious area, or FSR (floor site ratio).