GENERAL DESCRIPTION

Simple downspout disconnection involves directing flow from roof downspouts to a pervious area that drains away from the building. This prevents stormwater from directly entering the storm sewer system or flowing across a “connected” impervious surface, such as a driveway, that drains to a storm sewer. Simple downspout disconnection requires a minimum flow path length across the pervious area of 5 metres.

DESIGN GUIDANCE

Roof downspout disconnections should meet the following criteria:
- Pervious areas used for downspout disconnection should be graded to have a slope of between 1 to 5%.
- Pervious areas should slope away from the building.
- The flow path length across the pervious area should be 5 metres or greater.
- The infiltration rate of soils in the pervious area should be 15 mm/hr or greater (i.e., hydraulic conductivity of 1x10-6 cm/s or greater).
- If infiltration rate of the soil in the pervious area is less than 15 mm/hr, it should be tiled to a depth of 300 mm and amended with compost to achieve a rate of 8 to 15% organic content by weight or 30 to 40% by volume.
- If the flow path length across the pervious area is less than 5 metres and the soils are hydrologic soil group (HSG) C or D, roof runoff should be directed to another LPD practice (e.g., rainwater harvesting system, bioretention area, swale, soakaway, perforated pipe system).
- The total roof area contributing drainage to any single downspout discharge location should not exceed 100 square metres, and.
- A level spreading device (e.g., pea gravel or diatomite) or energy dissipating device (e.g., splash pad) should be placed at the downspout discharge location to distribute runoff as evenly as possible over the pervious area.

APPLICATIONS

There are many options for keeping roof runoff out of the storm sewer system. Some of the options are as follows:
- Simple roof downspout disconnection to a pervious area or vegetated filter strip, where sufficient flow path length across the pervious area and suitable soils conditions exist;
- Roof downspout disconnection to a pervious area or vegetated filter strip that has been tiled and amended with compost to improve soil infiltration rate and moisture storage capacity;
- Directing roof runoff to an enhanced grass swale, dry swale, bioretention area, soakaway or perforated pipe system;
- Directing roof runoff to a rainwater harvesting system (e.g., rain barrel or cistern) with overflow to a pervious area, vegetated filter strip, swale, bioretention area, soakaway or permeable pavement;
- Directing roof runoff to an impervious area that is connected to a storm sewer could be used to encourage property owners or managers to maintain existing practices.

CONSTRUCTION CONSIDERATIONS

SOIL DISTURBANCE AND COMPACTION

Only vehicular traffic necessary for construction should be allowed on the pervious areas to which roof downspouts will be discharged. If vehicular traffic is unavoidable, then the pervious area should be filled to a depth of 300 mm to loosen the compacted soil.

EROSION AND SEDIMENT CONTROL

If possible, construction runoff should be directed away from the proposed downspout discharge location. After the contributing drainage area and the downspout discharge location are stabilized and vegetated, erosion and sediment control structures can be removed.

OPERATION AND MAINTENANCE

Maintenance of disconnected downspouts will generally be no different than for lawns or landscaped areas. A maintenance agreement with property owners or managers may be required to ensure that downspouts remain disconnected and that the pervious area remains pervious. For long-term efficacy, the pervious area should be protected from compaction. One method is to plant shrubs or trees along the perimeter of the pervious area to prevent traffic. On commercial sites, the pervious area should not be an area with high foot traffic. If ponding for longer than 24 hours occurs, the pervious area should be dethatched and aerated. If ponding persists, raking or filling to reverse compaction and addition of compost to improve soil moisture retention may be required.

ABILITY TO MEET SWM OBJECTIVES

<table>
<thead>
<tr>
<th>BMP</th>
<th>Water Balance Benefit</th>
<th>Water Quality Improvement</th>
<th>Stream Channel Erosion Control Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downspout Disconnection</td>
<td>Partial – depends on soil infiltration rate and length of flow path over the pervious area</td>
<td>Partial – depends on soil infiltration rate and length of flow path over the pervious area</td>
<td>Partial depends on combination with other practices</td>
</tr>
</tbody>
</table>

Downspout disconnection is primarily a practice used to help achieve water balance benefits, although it can also contribute to water quality improvement. Very limited research has been conducted on the runoff reduction benefits of downspout disconnection, so initial estimates are drawn from research on filter strips, which operate in a similar manner. The research indicates that runoff reduction is a function of soil type, slope, vegetative cover and filtering distance. A conservative runoff reduction rate is 25% for hydrologic soil group (HSG) C and D soils and 50% for HSG A and B soils.* These values apply to disconnections that meet the feasibility criteria outlined in this section, and do not include any further runoff reduction due to the use of compost amendments along the filter path.

*Hydrologic soil group (HSG) classifications are based on the ability of the soil to transmit water. Soil groups are ranked from A to D. Group A soils are sandy, loamy sand, or sandy loam types. Group B soils are alluvial fan types. Group C soils are sandy clay loam types. Group D soils are clay loam, silty clay loam, sandy clay loam or sandy to clay loam types.

SITE CONSIDERATIONS

Site Topography

Disconnected downspouts should discharge to a gradual slope that conveys runoff away from the building. The slope should be between 1% and 5%. Grading should discourage flow from re-connecting with adjacent impervious surfaces.

Water Table

Roof downspouts should only be disconnected where the minimum depth to the seasonally high water table is at least one (1) metre below the surface.

Pollution Hot Spot Runoff

Downspout disconnection can be used where land uses or activities at ground-level have the potential to generate highly contaminated runoff (e.g., vehicle fueling, servicing and demolition areas, outdoor storage and handling areas for hazardous materials and some heavy industry sites) as long as the roof runoff is kept separate from runoff from ground-level impervious surfaces.

COMMON CONCERNS

On Private Property

Property owners or managers will need to be educated on its function and maintenance needs, and may be subject to a legally binding maintenance agreement. An incentive program such as a storm sewer user fee based on the area of impervious cover or a property that is directly connected to a storm sewer could be used to encourage property owners or managers to maintain existing practices.

Standing Water

Downspout disconnection is not intended to provide water, so any standing water should be intercepted and conveyed within 24 hours of the end of each runoff event. If ponding for longer than 24 hours occurs, mitigation actions noted under Operation and Maintenance should be undertaken.

FOR FURTHER DETAILS SEE SECTION 4.3 OF THE CVC/TRCA LID SWM GUIDE