GENERAL DESCRIPTION

Soakaways are rectangular or circular excavations lined with geotextile fabric and filled with clean granular stone or other void forming material that receive runoff from a perforated pipe inlet and allow it to infiltrate into the native soil. They typically service individual lots and receive only roof and driveway runoff, but can also be designed to receive overflows from rainwater harvesting systems. Soakaways can also be referred to as infiltration galleries, dry wells or soakaway pits.

Infiltration trenches are rectangular trenches lined with geotextile fabric and filled with clean granular stone or other void forming material. Like soakaways, they typically service individual lots and receive only roof and driveway runoff. The design variation on soakaways is well suited to sites where available space for infiltration is limited to narrow strips of land between buildings or properties, or along road rights-of-way. They can also be referred to as infiltration galleries or linear soakaways.

Infiltration chambers are another design variation on soakaways. They include a range of proprietary manufactured modular structures installed underground, typically under parking or landscaped areas that create large void spaces for temporary storage of stormwater, allowing it to infiltrate into the underlying native soil. Structures typically have open bottoms, perforated side walls and optional underlying granular stone reservoirs. They can be installed individually or in series in their final configuration. They are often referred to as retrofit, walkway, parking lot and road runoff with adequate pre-treatment. Due to the large volume of underground void space they create in comparison to a soakaway of the same dimensions, and the modular nature of their design, they are well suited to sites where available space for other types of facilities is limited, or where it is desirable for the facility to have little to no surface footprint (e.g., high density development contexts). They can also be referred to as infiltration tanks.

DESIGN GUIDANCE

- **MONITORING WELLS**
  - Capped vertical non-perforated pipes connected to the inlet and outlet pipes of the infiltration facility are recommended to provide a means of monitoring and troubleshooting out of part as routine maintenance. A capped vertical standpipe consisting of anS06PVC or 100 to 150 mm diameter perforated pipe with a cap securely fastened to the top of the facility is also recommended for monitoring the length of time required to fully drain the facility between storms.
  - Manholes and inspection ports should be installed in infiltration chambers to provide access for monitoring and maintenance activities.

- **PRE-TREATMENT**
  - It is important to prevent sediment and debris from entering infiltration facilities because they could contribute to clogging and failures of the system. The following pre-treatment devices are options:
    - **Leaf screens:** Leaf screens are mesh screens installed either on the building eavestrough or roof downspouts and are used to remove leaves and other large debris from roof runoff.
    - **In-ground devices:** Devices placed between a conveyance pipe and the facility (e.g., oil and grit separators, sedimentation chamber or goss trap) can be installed to remove both large and fine particulates from runoff. A number of proprietary stormwater filter media designs are available.
    - **Vegetated filter strips or grass swales:** Road and parking lot runoff can be pretreated with vegetated filter strips or grass swales prior to entering the infiltration practice.

- **FILTER MEDIA**
  - **Stone reservoir:** Soakaways and infiltration trenches should be filled with uniformly graded, washed stone that provides 30 to 40% void space. Granular material should be 50 mm clear stone.
  - **Geotextile:** A non-woven or woven geotextile fabric should be installed around the stone reservoir of soakaways and infiltration trenches, with a minimum overlap at the top of 300 mm. Woven slit film and non-woven heat bonded fabrics should not be used as they are prone to clogging. Specification of geotextile fabrics should be consistent with the design for non-woven fabrics, or percent open area (POA) for woven fabrics, which affects the long-term strength of the filter layer. Other factors that need consideration include maximum forces to be exerted on the fabric, and the load bearing ratio, texture (i.e., grain size distribution) and permeability of the native soil in which they will be installed.

- **CONVEYANCE AND OVERFLOW**
  - Inlet pipes to soakaways and infiltration trenches are typically perforated pipe connected to a standard non-pierced pipe or savenet, which is followed by a standard stone reservoir and geotextile lining. The flow rate of the facility should be installed below the maximum frost penetration depth to prevent freezing. The overflow point can simply be the perforated pipe inlet that breaks up when the facility is at capacity and discharges as much water as it can onto a pipe that is at the top of the gravel layer and is connected to a storm sewer. Outlet pipes must have capacity equal to or greater than the inlet.

- **SOIL INNOVATION AND COMPACTABILITY**
  - Soil infiltration practices are well suited to areas with low to medium native soil infiltration rates, including urban slopes greater than 15%. Designers should verify the soil in- filtration and depth through field measurement of hydraulic conductivity under field saturated conditions.

- **WATER BALANCE**
  - BMP Water Balance
    - Facilities receiving road or parking area runoff can be located within two (2) year time-of-travel wellhead protection areas.
    - Facilities cannot be located on natural slopes greater than 15%. The bottom of the facility should be vertically separated by one (1) metre from the seasonally high water table or top of bedrock elevation.
  - Soil infiltration, infiltration trenches and chambers can be constructed over any soil type, but hydraulically stable soil group A or B soils are best for achieving water balance and channel erosion control objectives. If possible, facilities should be located in portions of the site with the highest native soil infiltration rates. Designers should verify the soil infiltration rate before designing the facility.

- **COMMON CONCERNS**
  - **RISK OF GROUNDWATER CONTAMINATION**
    - Most pollutants in urban runoff are well retained by infiltration practices and soils and, therefore, have a low probability of being released into the groundwater. The risk of groundwater contamination is minimized by maintaining the dryland area of the facility.
    - Infiltration practices should not receive runoff from high traffic areas where large amounts of de-icing salts are applied (e.g., busy highways), nor from areas where high amounts of de-icing salts are applied (e.g., busy highways), nor from areas where de-icing salts are applied (e.g., busy highways), nor from areas where de-icing salts are applied (e.g., busy highways), nor from areas where de-icing salts are applied (e.g., busy highways).

  - **RISK OF SURFACE WATER INTRUSION**
    - Surface water infiltration is a concern that needs to be managed. Infiltration practices may be located within the maximum acceptable length of time (typically 72 hours) at least annually and following any major storms. This is to ensure that the system remains functional and does not contain pollutants or harmful substances.