PORT STEPHENS COUNCIL

Soil Infiltration

TECHNICAL INFORMATION SHEET

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Important Information

PLEASE **NOTE**

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Document History and Status

ISSUE	DESCRIPTION OF REVISION	DATE	REVIEWED	AUTHORISED
Rev 0	Issued for use	Jul 2018	Principal Drainage & Flooding Engineer	Engineering Services Manager
Rev 1	Reviewed, updated and rebranded	Feb 2019	Principal Drainage & Flooding Engineer	Engineering Services Manager
Rev 2	Updated Engineer requirements	Mar 2019	Principal Drainage & Flooding Engineer	Engineering Services Manager
Rev 3	Administrative amendment to align with Style Guide	May 2019	Principal Drainage & Flooding Engineer	Engineering Services Manager

For specific technical enquiries related to this Technical Information Sheet please contact Council.

Background

Councils Development Control Plan (DCP) requires that stormwater drainage plans and a written description of the proposed drainage system be prepared in accordance with the approaches outlined in the current ARR Guidelines using the current Hydrologic Soil Mapping data for Port Stephens. These soil maps, released by the NSW Government in October 2016, can be found on Councils website at:

https://www.portstephens.nsw.gov.au/development/flood-safety

Geotechnical testing requirements

Council do not object to a development proponent wishing to undertake geotechnical testing to determine site specific permeability. Given the potential for large variability in test results and their impact on design and performance outcomes Council require the approach outlined below to be followed:

i. Prior to design, a Geotechnical Engineer shall determine the steady state infiltration rate using the Double Ring Infiltrometer test method (ASTM D3385-18).

ii. Provide an assessment of the soil profile to determine the steady state infiltration rate for saturated soil conditions.

iii. Test in accordance with the double ring infiltrometer method.
Testing should take place in locations deemed suitable for the placement of an infiltration system (ie. those that satisfy slope, access and setback distance requirements). The number of infiltration tests in those complying areas is based on lot size as per **Table 1**.

Table 1 – Number of infiltration tests required

Lot Size (m^2)	Number of Infiltration Tests
Less than 500	1
Greater than 500 but less than 1000	2
Greater than 1000	2 + 2 for each additional 500m^2 over 1000m^2

iv. A Geotechnical Report, prepared by a suitably qualified and experienced Geotechnical Engineer recognised or eligible for recognition under the National Engineering Register, should be submitted to Council for assessment prior to sizing the infiltration system. The Report should include, but not be limited to, the following:

- Weather conditions preceding and during the field test.
- Summary of subsurface conditions encountered, including soil profile and water table within exploration and an estimate of the depth to seasonal high groundwater.

- Summary of infiltration testing including location and number of tests and testing method used. Discussion of how the tests were performed (ie. pipe size or diameter or test pit dimensions).
- Infiltration testing results in millimetres per hour for each interval as well as the lowest test result for the entire testing period.
- Provide charts and/or tables along to demonstrate that the steady state was achieved.
- Graph and calculation of hydraulic conductivity from testing results as well as the recommended design infiltration rate.
- Site plan showing location of infiltration tests.
- Provide recommendations on the suitability of the site for infiltration purposes considering soil profiles, water table, land slip and other relevant site factors.

Design requirements

On determination of the steady state infiltration rate, the infiltration system shall be sized by a suitably qualified and experienced Civil Engineer providing calculations and a report. The design shall:

i. Incorporate Australian Rainfall & Runoff 2016 methodologies.
ii. Incorporate pre-treatment facilities prior to the infiltration system.
iii. Incorporate a factor of safety applied to the infiltration rate determined to ensure designs are adequate to cope with surface runoff. The appropriate factor of safety to be used depends on a variety of considerations including the amount and type of development the catchment will be subjected to, the sensitivity and vulnerability of the catchment and land use to inundation, the type of development, site coverage, surrounding topography, varying subsurface conditions, existing site conditions and constraints including existing stormwater management infrastructure, potential influence of groundwater, the amount of maintenance the infiltration system will receive to ensure infiltration rates remain as high as possible and risk and liability issues. **Table 2** shows the factor of safety to be used in design calculations.

Table 2 – Factor of safety to be used in design of infiltration system

Catchment Risk Profile	Factor of Safety
Low	5
Medium	7
High	10

Liaise with Council at pre-lodgement stage to determine requirements.

iv. Be appropriately located clear of structural foundations and property boundaries with minimum setback distances for different soil classes listed in **Table 3**.

Table 3 – Minimum setback distances for infiltration systems

Soil Group	Minimum (Final) Infiltration Rate (mm/hr)	Minimum Distance from Structures and Property Boundaries (m)
A	25.0	2
B	13.0	2
C	6.0	5
D	3.0	5

An infiltration system should not be installed where the land slopes towards buildings or foundations. Positioning the system downslope from buildings and foundations will reduce the potential for foundation and ponding problems caused by periodic soil saturation near the building.
The system also needs to be positioned in an easily accessible area for inspection and maintenance purposes. Consideration also needs to be given towards preventing damage to existing and future services including power, telecommunications, gas, water and sewerage. Trees with a mature height of more than 1.5 metres should not be located within the zone of influence of the infiltration system.
Trenching of infiltration systems should be placed level where possible and along the contour of the land.

v. Take into account and demonstrate appropriate consideration of the following:
   - Unsuitable ground conditions. Infiltration devices should not be installed in saline, sodic or very shallow soils, windblown or loose sandy areas, rock and shale, clay soils that collapse in contact with water or have high shrink/ swell characteristics, and soils with a hydraulic conductivity of less than 0.36 mm/hr.
   - Slope. Installation of infiltration devices on slopes greater than 5% is not recommended. Installation of infiltration devices within the zone of influence behind the top of a slope greater than 5% is not recommended.
   - Water table. The use of infiltration devices in areas with high or fluctuating water tables is not recommended. The presence of a high water table can limit the effectiveness of infiltration devices. A minimum of 1m clearance is required between the base of the infiltration system and highest water table.

- Sediment and pre-treatment. Adequate filter and pre-treatment systems are required to limit the amount of sediment that reaches any infiltration devices in order to avoid clogging and failure of the device.
- Access, inspection and maintenance.
- Lifecycle costs.

vi. Provide an overflow discharge point to the public drainage system.

vii. Where the site slopes away from the street the stormwater shall be connected to an inter-allotment drainage line.

viii. Take into account the time taken for the system to empty to be ready to accept a subsequent rain event.

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