9.3/19
Edition 1

Stormwater Specifications

Development Control Plan

Sutherland Shire Council

This page has intentionally been left blank.

TABLE OF CONTENTS

This page has intentionally been left blank.

1. INTRODUCTION

This Stormwater Specification Development Control Plan (DCP) outlines detailed design requirements relating to stormwater management. It covers areas to do with on-site retention, on-site detention, discharge, water quality, overland flow paths, constructed flood ways and other matters where specific design requirements are necessary to ensure compliance.

The specifications outlined in this DCP are supported by objectives and policy guidance outlined by Sutherland Shire Local Environmental Plan 2000, Menai Town Centre Local Environmental Plan 1992 and Sydney Regional Environmental Plan 17 (Kurnell Peninsula 1989) but more importantly, Council's Stormwater Management Development Control Plan. This specification should be read in conjunction with these documents.

This development control plan is effective from 24 May 2005.

Important note: This DCP recognises the water conservation principles of State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004. The rainwater harvesting provisions for all forms of residential housing with the exception of residential dwellings is regulated by BASIX and not this DCP or the Stormwater Specifications DCP.

2. ON-SITE RETENTION

2.1 General

- Guidelines with respect to design solutions for on-site retention can be sourced through “Water Sensitive Urban Design (WSUD) basic procedures for source control of stormwater, Australian Water Association, November 2004”.

- Underground rainwater tanks or infiltration systems shall be located beneath driveways

2.2 Paving

- Non-porous paving shall be designed to direct rainfall runoff onto adjacent grassed or landscaped areas or into another source control device prior to discharge off-site. Overland flow shall be managed to prevent erosion in garden beds, mulched areas and the like.

- Where used, porous paving shall be provided to manufactures specifications and the suitability of the site in accordance with Appendix A.

2.3 Constructed Infiltration Systems

(a) Infiltration Test Method

- Appendix A of this specification outlines an infiltration test method, which is to be submitted as additional documentation where an infiltration system is proposed. This document will set out the parameters a geotechnical engineer will need to satisfy.

(b) Infiltration Rates

- Soils shall have an infiltration rate of at least 15 mm/h in all moisture conditions. There should be at least 1 metre between the base of the infiltration system and the seasonal water table. Conditions in which percolation is more than 15 mm/h, soil storage depth is in excess of 1 metre and residence time is of the order of 12-72 hours, is sufficient to remove "first flush" pollutants (first 0.5 mm of runoff) and prevent their accession to the water table.

(c) Existing trees and vegetation

- On-site infiltration systems shall be located well clear of existing trees and vegetation that are to be retained. Where this is not practical, an aborist should be consulted to report the prospects for affected trees and vegetation. Any existing trees that will be adversely affected shall be identified.

(d) Erosion Controls

- Controls to prevent fine sediment from entering infiltration systems shall be applied using upstream treatment measures. Contamination of infiltration systems with industrial, putrescible and petroleum derived wastes in addition to other upstream treatment measures. Site management is also to prevent compaction of the infiltration area and maintain grass cover.

(e) Other

- Systems must be provided with an appropriate overflow facility which incorporate measures to control erosion.

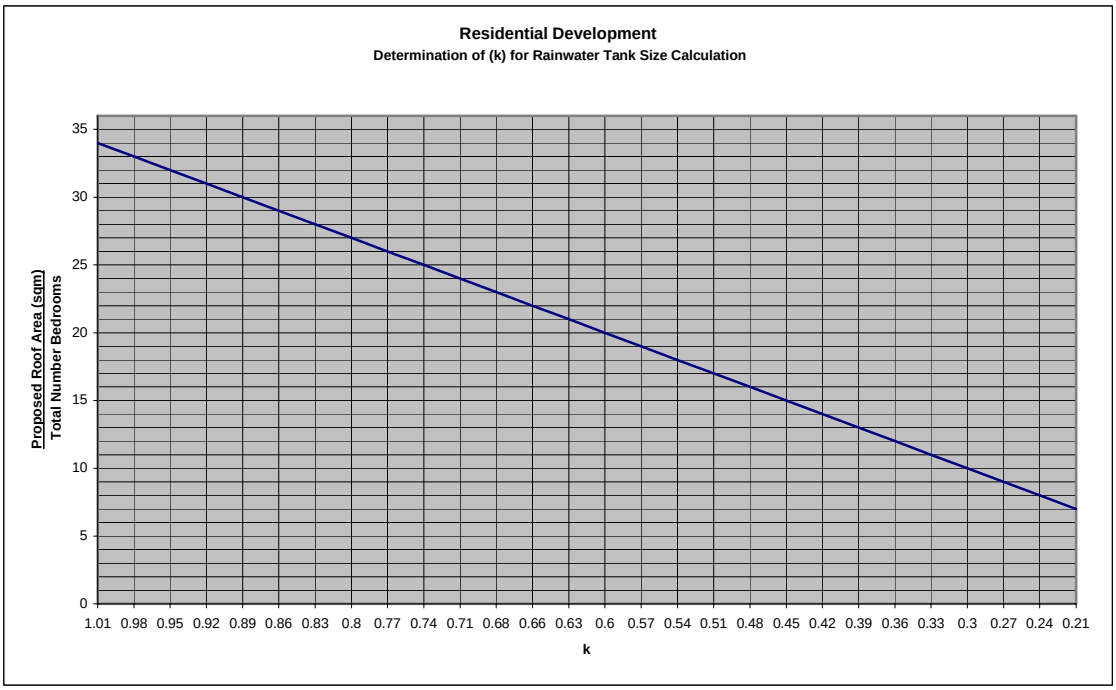
- Up to 100% of the volume of infiltration, storage provided (based on pore space) may be deducted from any On-Site Detention (OSD) volume requirements.

- If ponding is noticed, (ground surface saturated) replacement of the media may be required to increase the infiltration rate. This may be needed every 5 to 20 years. Planting suitable local native vegetation may assist in the take up of water.

2.4 Rainwater harvesting and use

(a) Rainwater Tank Capacity (Q) for residential development not subject to BASIX is: Q=C x L x k

Where:
Q= rainwater tank(s) volume in litres
C= 100 litres per day multiplied by the no of bedrooms on new dwelling
L= the mean dry period between rain events is adopted as 14 days
k= Co-efficient derived from the proposed roof area and the total number of bedrooms. This is determined by the graph below. Regardless of the ratio of the roof area and total number of bedrooms, the maximum value of k is 1.01 and the minimum is 0.21



Example:

Determine the required minimum rainwater tank size for a proposed 4-bedroom home having a total roof area of 120 sqm.

roof area / total bedrooms = 120 sqm / 4 = 30
from the graph, k = 0.89

C = 100 litres/day x 4 bedrooms = 400 litres/day

so, the minimum required rainwater tank(s) storage capacity is therefore:

Q = 400 litres/day x 14 days x 0.89 = 4,984 litres

(b) Rainwater Tank Capacity (Q) for other development is: Q=C x L x k

Where:
Q= rainwater tank(s) volume in litres
C= minimum 25 litres per day per number of car parking spaces
L= the mean dry period between rain events is adopted as 14 days

A further calculation is designed to determine the minimum roof area **(R)** to be connected to a rainwater tank(s)

R = 8.5 x P

Where:
R = minimum roof area permanently connected to the rainwater tank(s)
P = total number of car parking spaces

Example:

Determine the required minimum rainwater tank size for a proposed warehouse having a total of 15 car parking spaces.

C = 25 litres/day x 15 parking spaces = 375 litres/day

so, the minimum required rainwater tank(s) storage capacity is therefore:

Q = 375 litres/day x 14 days = 5,250 litres

and

The minimum roof area permanently connected to the rainwater tank(s) is:

R = 8.5 x 15 car parking spaces = 127.5 sqm

(b) Installation

- The rainwater tank may be free standing, partially or wholly below ground, incorporated into the eaves of the building or fixed to a wall.

- The support structure or footings used for a tank must be placed on a suitable foundation in accordance with the manufacturer's details or any other structure designed by a appropriately qualified person. It must not rest (in full or part) on the footing of any building or structure or on a retaining wall.

- It must not be installed over or immediately adjacent to stormwater drainage easement or a water or sewer main (unless the requirements of the public authority with responsibility for the main/easement have been met) or over any structure or fittings used by the public authority to maintain a water or sewer main.

- Tank installation and all plumbing works must be carried out by a plumber licensed with the NSW Department of Fair Trading.

- One third of the volume of the rainwater may be used to offset On-Site Detention (OSD) volume requirements after the stormwater reuse requirement has been met using this specification.

- Where an underground rainwater tank is proposed, the minimum soil depth above the tank is to be a minimum of 300mm to enable the area to be grassed.

(c) Plumbing Connections

- Water collected in rainwater tanks shall be plumbed separately from the mains water supply system to ensure no possibility of cross connection.

- All drainage connections are to be in accordance with the Drainage and Plumbing Code AS 3500

- All rainwater storage shall be directly connected to the permanent reuse system within the building and other systems. Potable water shall only be introduced to the rainwater tank and not to any part of the reuse system directly.

(d) Potable Water back-up

- Potable water from the back-up system shall be introduced directly to the rainwater tank(s) and not to the distribution system. Potable water is to be supplied via a dry break connection.

- For developments where a single rainwater tank is used, this tank shall be considered as the Potable Water Make-up Tank. Should a development include more than one rainwater tank, a single rainwater tank shall be nominated as the Potable Water Make-up Tank.

- The Potable Water Make-up Tank shall be installed such that potable water is supplied when the storage level is reduced to between 5 and 10% of installed rainwater storage capacity. At this level, an approved mechanical float device or electrical float switch is to be used to make up potable water.

(e) Taps

- Any outlets provided other than overflows are to be marked "Rainwater - Not for human consumption".

(f) Overflow

- Intense or prolonged rainfall will exceed the capacity of the tank so it is essential to have an overflow system that complements the overall design of the stormwater system..

- Overflow shall not be directed into the sewer

(g) Visual appearance

- While the rainwater tank, its associated drainage, plumbing and supporting structure must be located as dictated by hydraulic requirements, they shall be fully integrated into the design of the building and site to achieve the best aesthetic outcome.

- Rainwater tanks in residential areas are to be located in the rear or side of a property and at least 450 mm from any boundary. They should not be located forward of the building line.

- Materials, colours and shapes of the tanks should be compatible with the proposed building, adjoining buildings, and streetscape.

(h) Health and Safety

- Tanks must be covered or fully enclosed and any lid shall be designed to prevent someone from wilfully or accidentally entering, climbing or falling into a tank.
- Rainwater tanks shall have suitable contaminant screens and be fitted with an appropriate first flush diverter.
- Stored water should not be used for drinking or bathing
- Sound proofing the pump of a water reticulation system is required

(i) Mosquito Proofing

- Tanks and associated openings including inlet and outlet pipes shall be made mosquito proof.

(j) Pump Installation

- Irrigation systems should be gravity fed where possible. Pump installations will be permitted where a reuse system is employed.
- Where feasible pumps are to be solar powered. Mains or battery backup shall be provided to ensure the system is continuously operational.
- Pressurising pump(s) locations shall be nominated on the stormwater Management Concept Plan. A sound enclosure shall be provided for each pump to limit generated noise in accordance with the NSW EPA noise control manual.

(k) Maintenance

- Gutter and roofs should be cleaned and maintained regularly.
- Clean inlet strainers whenever necessary, or use self-cleaning strainers.
- Rainwater tanks will require periodic cleaning to remove accumulated sediment and debris. However, the first flush diverter and containment screens will minimise this requirement.
- Ensure the inlet strainers, mosquito proofing and lids are in good repair. Lids shall be tight fitting.

i) Australian Standards

- Rainwater tanks and their associated fittings and fixtures must comply with the relevant Australian Standards; AS/NZS 2179-1994 'Specifications for Rainwater Goods, Accessories and Fasteners AS2180-1986 'Metal Rainwater Goods - Selection and Installation
- A certificate of compliance from a suitably qualified person showing that the tank meets these standards shall be submitted.

3. ON-SITE DETENTION

(a) Control devices and storage pits

– A high-level outlet is to be provided at the discharge control pit to cater for surcharge during major storm events. Access to the discharge control pit is to be provided for inspections and maintenance of the silt trap and mesh screen. Such opening is to be a 600mm x 600mm and is to be fitted with a removable galvanised steel grate and to be placed above the outlet & silt trap. Additional access may be required for larger underground storages. The system is to be designed to maximise ease of maintenance of the OSD structure. Must be carried out on a regular basis by the owner.

– Where an outlet is piped to the kerb, a hot dipped galvanised steel hollow section with a minimum wall thickness of 3 mm, section height of 75 mm where connected to roll kerb or 100 mm where connected to barrier kerb.

– A stainless steel or galvanised mesh screen (maxi-mesh RH3030 or equivalent) with a minimum area of 50 times the orifice area, and fitted with a lifting handle, shall be provided between the orifice and the inlet. The screen is to be a minimum distance from the orifice equal to 1.5 times the diameter of the orifice or 200 mm, whichever is greater. The screen should be positioned so that the inflows are directed parallel to the screen.

– Orifice plates shall be a minimum 200mm x 200mm flat stainless steel plate, 3mm thick. The orifice is to be tooled to the exact dimension as calculated, uniform circular shape with sharp (not rounded) edges.

– All maintenance access to storages must conform to the current confined spaces regulations.

– Venting shall be provided where there is potential for gas build up. A hydrostatic value is to be provided where necessary. Step irons are to be installed where the depth of the underground tank is 1000mm or greater.

– Orifice diameters smaller than 75mm will not be permitted.

(b) Storage areas

- Maximum ponding depth shall not exceed 300mm under design conditions.

- Storage volumes in landscaping areas shall include an allowance for 20 percent additional storage for vegetation growth and construction inaccuracies.

- The desirable minimum surface slopes to be 5:1 (5 horizontal : 1 vertical)

- Where the discharge is connected to Council's piped system, subsoil drainage around the outlet is to be provided to prevent the ground becoming saturated during prolonged wet weather. Subsoil drainage shall not be provided where the discharge is connected to the kerb and gutter.

- Where the storage is located in an area where frequent ponding could create maintenance problems or personal inconvenience to property owners, the first 10-20% of the storage should be provided in an area able to tolerate frequent inundation. For example, a paved outdoor area, a small underground tank or a rock garden can be used.

- The structural adequacy of any retaining walls, including the hydrostatic loads caused by full storage shall be structurally fit for there purpose.

(c) Driveways and car parks

- to avoid damage to vehicles, depths of ponding on driveways and car parks shall not exceed 200 mm.

- Transverse paving slopes within storage areas should not be less than 0.7%.

(d) Legal requirements

- Where On-Site Detention systems are required, the following condition will appear on any development consent:

  (i) keep the drainage system facility clean and free from silt, rubbish and debris.
  (ii) maintain and repair the drainage system facility so that it functions in a safe and efficient manner.
  (iii) replace, repair, alter and renew the whole or parts of the drainage system facility within the time and in a manner specified in a written notice issued by the Council.
  (iv) not make any alteration to the drainage system facility or elements thereof without prior consent in writing of the Council.
  (v) permit the Council or its authorised agent from time to time upon giving reasonable notice (but at anytime and without notice in the case of an emergency) to enter and inspect the land for compliance with the requirements of this clause.
  (vi) comply with the terms of any written notice issued by the Council in respect to the requirements of the Clause within the time stated in the notice.
  (vii) On completion the works are to be certified by a suitably qualified and experienced Chartered Professional Engineer registered on the National Professional Engineers Register (NPER) in Civil Engineering or a Land Surveyor registered with the Institute of Surveyors NSW and "Works As Executed" drawings provided to Council in respect of:

    - Fitness for purpose of storage structure
    - The structural adequacy of the storage device
    - The adequacy of the OSD system

- The works being approved in accordance with the approved design

(viii) The Works-As-Executed drawings submitted to Council are also to include all relevant levels, reduced to Australian Height Datum, dimensions and locations including:

- invert levels
- surface and pavement levels
- floor levels, including adjacent property
- maximum water surface level for a 1% AEP storm event.
- Floor levels and freeboard
- The location, volume and dimensions of the basin and level and dimensions of overflow weir, distances from boundaries /buildings.

Note – The Menai Town Centre OSD Facilities as referred to in Council's previous stormwater policy of 1997 is no longer relevant as this area has been fully developed.

4. DRAINAGE

4.1 Controls for Piping

(a) General

- Natural surface drainage and waterways shall be retained on all sites

(b) Drainage Easements

- Private inter-allotment drainage lines shall be a minimum 900 mm wide and contain a minimum 150 mm diameter pipeline.

- Drainage structures, which are or will pass into Council's care, control and ownership shall be contained within a legally created stormwater drainage easement created in favour of Council and complying with the following minimum standard:

Pipe Diameter (mm)	Minimum Easement widths
< 1200	3.0 m
> 1200 - < 1500	3.5 m

- Council will specify easements widths for pipe diameters greater than 1500 mm or open channels.

(c) Overland flow paths

- Are to be designed to convey the 1% AEP storm event less the capacity of the minor system assuming all inlet pits (NOT pipes) in the total network are 50% blocked. Overland flow shall be fully contained within a drainage easement. Overland flow paths shall remain safe for vehicles and pedestrians (including small children) in all storms up to and including the 1% AEP event.

- Overland flow resulting from extreme storm events up to and including the Probable Maximum Flood (PMF) must be considered in the design of overland flow paths. Flows in excess of the 1% AEP may not be diverted away from defined overland flow paths or outside of drainage easements.

ii) Design storms shall comply with the table below.

Situation	Design Flood Recurrence Interval	Excess Flow Passage
Street, accessway and pathway – excluding low points which discharge through building allotments	20% AEP	1% AEP to be confined to carriageway, pathway or reserve
Relief of low point areas via drainage lines traversing building allotments	5% AEP	Boundary of 1% AEP to be fully contained within a drainage easement and shown on the plans along with cross-sections of the overland flow path and surface treatment
Major system traversing developed areas. (Major systems are defined as those having catchment areas in excess of 15 hectares or run off in excess of 3cu.m/sec whichever is the lesser	5% AEP	Boundary of 1% AEP to be fully contained within a drainage easement and shown on the plans along with cross-sections of the overland flow path and surface treatment

Notes to Table:

(i) Design analysis shall be by the most appropriate and accurate method.

(ii) Detailed calculations and catchment area plans, including areas external to the subdivision and contributing to the catchment are required in conjunction with engineering drawings.

(iii) The minimum pipe diameter for all Council drainage is 375 mm.

For basement garages and driveways sloping towards the garage

- Two pump units are to be installed, the capacity of each being calculated based on a 1% AEP storm event and a storm duration of 6 minutes, one pump acting in reserve capacity. The two pumps are to be designed to work on an alternate basis to ensure that both pumps receive equal usage and neither pump remains continuously idle. The pump out system is to be independent of any gravity drainage lines except at the property boundary where a grated surface pit is to be constructed, from which a connection will be permitted to the gravity drainage system. The invert levels of the pipes in the grated surface pit are to be such that the outlet from the pump out system is above the inlet of the gravity system. The contributing catchment area to the pump out system is to be limited to the driveway area only and subsoil drainage.

5. WATER QUALITY

The general provisions that apply to reduce stormwater pollution and the effects on the receiving environment are as follows.

5.1 Water quality control measures

- All water quality control measures/devices shall trap the full range of typical urban stormwater pollutants and demonstrate compliance to the fullest extent with each of the stormwater treatment objectives set out in the table below.

Pollutant	Stormwater Treatment Objectives
Suspended solids (SS)	80% retention of the SS average annual load
Total Phosphorus (TP)	40% retention of the TP average annual load
Total Nitrogen (TN)	40% retention of the TN average annual load
Faecal coliform	90% retention of the faecal coliform average annual load
Litter and Organic matter	Total retention of litter and organic matter greater than 50 mm for storm events of up to 1 in 3 month ARI
Oil and Grease	Total retention of oil and grease for storm events of up to 1 in 3 month ARI

  (i) Make provision for convenient and safe regular inspection/periodic cleaning.

  (ii) Demonstrate measures to minimise the likelihood of the measure/device being tampered with or otherwise damaged through vandalism.

  (iii) Demonstrate means of minimising the potential safety risk of the measure/device to the community.

  (iv) Minimise long-term expenditure on maintenance and cleaning while still achieving treatment objectives.

- The following specific specifications apply to the water quality control devices below.

  (i) Trash Racks: the gaps between the bars shall be 60 mm.

  (ii) Litter Booms: shall be placed only where normal flow velocities are low and incorporate a trap where used in tidal waterways.

  (iii) Stormwater Pit Litter Baskets: shall not exacerbate flooding and shall incorporate a bypass.

  (iv) Sand filters: shall be restricted to urbanised catchments smaller than 2 hectares. The entry of sediment and oil to the filtration media shall be controlled and a sediment trap provided upstream for pre-treatment. Applications with large concentrations of oil and litter, which could potentially block the sand filter shall be avoided. A suitable grain size, which maintains percolation rates shall be used. Sand replacement schedules shall be provided.

APPENDIX A – SOIL INFILTRATION FIELD TEST RESULTS

ATTENTION: _____

LOCATION OF PROPERTY

_____

OWNER'S NAME

_____

ADDRESS

_____

Real Property Description: Parish: _____
County of Cumberland

LOT / PORTION NO.	DP NO.	DA NO.

The design of stormwater infiltration systems is strongly dependent upon local soil and subsoil conditions in addition to other site specific factors.

A geotechnical investigation is required to assess the suitability of the site, design of the infiltration system, if viable and potential impact of the system to existing or proposed structures, adjoining properties and the environment.

The geotechnical investigation shall include a field infiltration test as per the method below. The design of the infiltration system shall be based upon the actual infiltration rate as indicated by the field test. Laboratory tests are NOT an acceptable substitute.

Generally, infiltration systems will not permitted in areas with:
- land slip or geo technical problems associated with reactive soils; or existing, or
- seepage problems on-site or on immediate/adjacent properties, or
- where groundwater pollution is possible (eg:chemicals, pesticides, herbicides, petroleum, or
- where the site is known or suspected of being contaminated, or
- where there is potential to affect existing or proposed structures.

FIELD INFILTRATION TEST METHOD

1. Dig three (3) test holes spaced over the location of the proposed infiltration system and representative of soil in that area. The test holes shall be 300mm square and of a depth equivalent to that of the proposed infiltration system, but not less than 600mm deep. Care shall be taken to minimise disruption to the surrounding soil.

2. Add a 50mm layer of coarse sand or 6mm screenings to the bottom of each test hole.

3. Add clean water to each test hole to a depth of 300mm over the sand or gravel and maintain this depth for a minimum period of 4 hours.

   START OF SOAKING PERIOD _____ am/pm

   FINISH OF SOAKING PERIOD _____ am/pm (minimum 4 hours)

4. **Top up water** as required to **300mm** above the surface of the sand or screenings.

5. Measure the drop in water level over a **30 minute** period. **Insert nail** or similar into the wall of each test hole at the water level and record the test results in the table below.

TIME	TEST HOLE 1	TEST HOLE 2	TEST HOLE 3
START	am/pm	am/pm	am/pm
ALLOW WATER TO INFILTRATE	WAIT 30 minutes	WAIT 30 minutes	WAIT 30 minutes
FINISH	am/pm	am/pm	am/pm
MEASURE DROP IN WATER LEVEL	mm	mm	Mm

6. Average drop in water level of the three (3) test holes = _____ mm/30 minutes.

7. Average rate of infiltration = _____ mm/hour to be used in the design of the infiltration system.

CERTIFICATION

I certify that the attached infiltration tests were performed by me and that the results shown above are a true and accurate record of those tests.

NOTE: Tests are only to be undertaken by persons suitably qualified and experienced to do so.

PLEASE PRINT

Name _____

Qualification _____ Lic/Reg No.___

Address._____

Date _____ Signature _____Telephone_____