55 Market Street
Sydney, 2000

T 02 9438 5098

ENGINEERS

MANAGERS

INFRASTRUCTURE PLANNERS

DEVELOPMENT CONSULTANTS

Stormwater Management Plan

Forestville RSL, Melwood Avenue, Forestville

Prepared for: Forestville RSL

Document no: NA241102

Issue: A

ACOR Consultants Pty Ltd (ACN 079 306 246) (ABN 40 079 306 246)

www.acor.com.au

Disclaimer

This Report has been prepared in accordance with the scope of services described in the contract or agreement between ACOR Consultants Pty Ltd and the Client. The Report relies upon data, surveys, measurements and results taken at or under the particular terms and conditions specified herein. Changes to circumstances or facts after certain information or material has been submitted may impact on the accuracy, completeness or currency of the information or material. This Report has been prepared solely for use by the Client, ACOR Consultants Pty Ltd accepts no responsibility for its use by other parties without the specific authorisation of ACOR Consultants Pty Ltd . ACOR Consultants Pty Ltd reserves the right to alter, amend, discontinue, vary or otherwise change any information, material or service at any time without subsequent notification. All access to, or use of, the information or material is at the user's risk and ACOR Consultants Pty Ltd accepts no responsibility for the results of any actions taken on the basis of information or material provided, nor for its accuracy, completeness or currency. Any reference to "Report" where used in this Disclaimer is also a reference to any plan, table, data or other document that has been created for the purposes of the "Report" and referred to in the "Report"

REVISIONS

Revision	Date	Purpose	Prepared By	Approved By
A	06/05/25	DA	GL	GL

Review Panel	
Division/Office	**Name**
Sydney	Gregory Lyell

Table of Contents

List of Figures

1 Introduction

1.1 Purpose and Scope of Report

ACOR Consultants P/L has been engaged by Forestville RSL to undertake the DA design of the stormwater drainage system to service the proposed redevelopment of the Forestville RSL. This stormwater management report supports the DA submissions providing an assessment of the proposed development with respect to stormwater drainage, quantity, and quality management.

This report documents the methodology involved in determining the design of the proposed stormwater drainage system and is to be read in conjunction with drawings by ACOR, NA241102-Stormwater Management Plans

1.2 Project Description

In accordance with the Northern Beaches Council Water Management for Development Policy and Australian Rainfall & Runoff 2019, the proposed stormwater management system will, in principle, consist of a major and minor stormwater runoff conveyance system, incorporating surface collection pits and underground pipes for minor flow. Major flows in excess of the capacity of the pipe system will be safely conveyed overland within the roadways.

2 SITE

2.1 Property Description

The design proposes two staged redevelopment of the Forestville RSL Club involving the construction of a registered club and fifty five independent living units and ancillary uses. One large stormwater detention tank with water quality improvement devices included within the tank footprint have been provided to achieve the water quality targets. The main stormwater detention strategy tank to ensure that the post-development peak discharges from storm events, including the 20%, 5%, and 1% AEP storms, do not exceed the pre-development site discharge.

The 9,059 m^2 site, located at 22 Melwood Avenue is characterised by a developed RSL club and associated facilities. The site is currently zoned as R2 low density residential (Warringah LEP 2011). It is situated on a natural slope falling to the south at grades varying between 10-40%. These steep grades naturally drain the site towards the Melwood Avenue. A connection point to a piped drainage system will need to be provided by extending the existing stormwater infrastructure located at the Cannons Parade/Melwood Avenue Roundabout. A proposed kerb inlet pit will be provided at the RSL frontage.

To the west the site is bordered by RE1 Public Recreation zoning, to the east by Melwood Avenue and to the south by carpark associated with the RE1 Recreation area.

Figure 1: Site Location (Nearmaps)

2.2 Proposed Works

The proposed development involves the redevelopment of the existing RSL site to accommodate a new residential precinct, in accordance with applicable planning controls. Refer to plan C08-0001 for the general layout of the proposed development.

Vehicular access to the site is proposed via three new driveway access points. The primary access will be provided Melwood Avenue, continuing west from the internal to the site.

A geotechnical investigation was undertaken by Geo-environmental Engineering, detailed in the Geotechnical Investigation Report – RSL Club Redevelopment dated 21st August 2024. This report identifies subsurface conditions across the site and informs the civil design and construction methodology for the redevelopment.

2.3 Upstream Catchment

There is no significant upstream catchment as the site is located close to the local crest of the area, thus majority of flows will be catered for in Melwood Avenue and are unlikely to enter the site. Refer to NA241102 – C08-0401 for the definition of the local catchment, which has been established based on a combination of the site survey and LiDAR data. In order to maintain the existing flow regime and flows – an OSD tank is proposed for the site to attenuate the flows.

3 Stormwater Quantity

3.1 Standards and References

The stormwater quantity measures implemented in this design have been designed in accordance with the following documents:

- Australian Rainfall and Runoff 2019
- Northern Beaches Council Water Management for Development Policy – Version 2, 26 February 2021

- AUS-SPEC #1 Development Specification Series Design

3.2 Minor Pipework

The minor system for stormwater conveyance consists of a traditional pit and pipe network catering for 5% AEP flows.

Refer to Stormwater Drainage Plan NA241102 – C08-0001 for the minor system layout.

3.3 Major Flow Paths

The major system for stormwater conveyance consists of internal roadways and overland flow paths catering for 1% AEP flows to be discharged to Melwood Avenue, resulting in safe VxD (velocity and depth) products no more than 0.4 m^2/s and safe flow width of no more than 1.5m.

3.4 Legal Point of Discharge

The legal point of discharge for the site will be the extended drainage pit line from the Melwood Avenue roundabout up to the site frontage. This pit connects to an existing Council pit and pipe network in Melwood Avenue and the proposed OSD ensures no increase to the flows impacting the system.

3.5 Detention Strategy

The strategy for the provision of on-site detention for this development is summarised as follows:

- Detention of internal catchments will be provided in an OSD tank located at the low point of the site, adjacent to the legal point of discharge

3.6 DRAINS Modelling

There is one DRAINS model setup to analyse the sites drainage and the main OSD system volume included in the model based on Northern Beaches Council Water Management for Development Policy 9.3.1 These models are as follows:

- NA241102_DRAINS_240819.drn

3.6.1 Detention Modelling

3.6.1.1 On Lot Detention

In order to design this system, the detention volume has been modelled based on the pre-development flow rates for all storm events up to the 1% AEP.

3.6.1.2 Overall Site Detention

DRAINS modelling has resulted in total storage volume of 480m^3 being required for the development to achieve reduction in flow rates. This and summary of the modelling parameters and outcomes are provided on C08-0302.

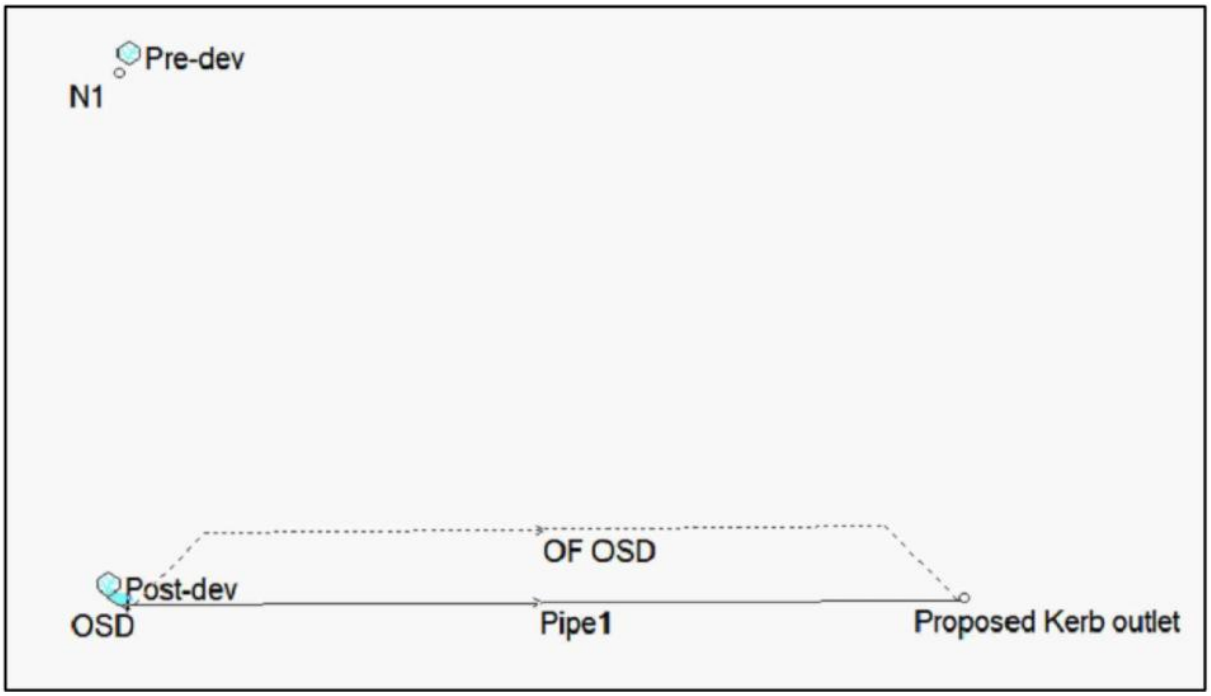

Figure 2: OSD Configuration in DRAINS

Some extra volume has been provided for the OSD tank volume to allow for construction tolerance.

3.6.2 Tailwater

Given that the site is not flood effected and that the point of connection into the existing system is upstream of any other points of connection, there has been no tailwater assumed. The calculations assume that the outlet is free-draining.

3.6.3 Catchment Modelling

The pre-development catchment has been modelled to include the site area.

3.6.4 Results

Tabulated below are the pre and post development discharges from the site with the implementation of the detention structures and the discharge controls that have been documented.

DESIGN CRITERIA - ON-SITE DETENTION	
TOTAL SITE AREA OF DEVELOPMENT WORKS =	9014 m^2
DESIGN METHOD =	ILSAX
PRE-DEVELOPED IMPERVIOUS AREA =	9014m^2 (0%)
POST-DEVELOPED IMPERVIOUS AREA =	6654m^2 (74%)
PRE DEVELOPED FLOWS (l/s) =	Q_5 = 66.0 Q_{20} = 153.0 Q_{100} = 173.0
POST DEVELOPED FLOWS (l/s) =	Q_5 = 42 Q_{20} = 53.0 Q_{100} = 66.0
PORTION OF SITE THROUGH OSD SYSTEM =	9014m^2 (100%)
TAILWATER LEVEL DOWNSTREAM 1% AEP =	RL126.7
TORAL OSD STORAGE VOLUME PROVIDED =	480m^3

4 Stormwater Quality

4.1 Standards and References

The stormwater quality measures implemented in this design have been designed in accordance with the following documents:

- Northern Beaches Council Water Management for Development Policy – Version 02, 26 February 2021
- Northern Beaches Council WSUD & MUSIC Modelling Guidelines – Version 03, June 2016
- NSW MUSIC Modelling Guidelines (BTM WBM Pty Ltd, August 2015)

The overall water quality performance objectives are as follows

- 90% reduction in total gross pollutants (GP)
- 85% reduction in total suspended solids (TSS)
- 65% reduction in total phosphorus (TP)
- 45% reduction in total nitrogen (TN)

4.2 Methodology and Modelling

4.2.1 Overview

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) is used to assess the pollutant generation from the site in post-development conditions and to evaluate the proposed treatment train effectiveness.

Modelling has been undertaken in accordance with BMT WBM (2015) guidelines with the developed site based on a conceptual lot layout with water quality treatment devices included to achieve councils' objectives. The model referred to in this report is NSW210416_MUSIC_DA_V10.

The treatment train adopted across the site consists of the following elements:

- 10kL rainwater tank for the site
- OceanProtect Filter Cartridges within OSD tank structure
- Ocean Guard Pit inserts

4.2.2 Catchment Areas

The sites catchment has been divided into roof areas, paved road areas and residential/commercial area.

Upstream catchments have been excluded from the model as they are not part of the development.

The land uses adopted in the model are based on the proposed site layout design. Refer to ACOR drawing NA241102_C08-0401 for the proposed general siteworks plan.

4.2.3 Climate Data

As per table 2 of the NBC WSUD & MUSIC Modelling Guidelines, the pluviograph rainfall data was sourced from rainfall station No. 066062 Sydney Observatory. The data was run on a 6-minute timestep from 1/01/1981 to 31/08/1985.

4.2.4 Model Parameters

Soil and groundwater parameters were adopted from tables 4 & 5 of the NBC WSUD & MUSIC Modelling Guidelines. The pervious area parameters for sandy soils have been adopted based on geotechnical investigations identifying sandy soils.

Table 1: MUSIC Source Node Soil Properties

Soil Parameter	Value
Rainfall Threshold (mm/day)	0.3 (for Roof) & 1.50 (for Roads/Paths)
Soil Storage Capacity (mm)	108
Initial Storage (% of Capacity)	30
Field Capacity	73
Infiltration Capacity Coefficient – a	250

Infiltration Capacity Coefficient – b	1.3
Groundwater Initial Depth (mm)	10
Groundwater Daily Recharge Rate (%)	60
Groundwater Daily Base Flow (%)	45
Groundwater Daily Deep Seepage Rate (%)	0

4.3 Model Results

The results of the assessment of the proposed site development are provided below in Table 4.

Table 2: MUSIC Model Results

	Source Load	Residual Load	% Achieved Reduction	% Required Reduction	Complies (Y/N)
TSS (kg/yr)	745	111	85.1%	85%	Y
TP (kg/yr)	1.91	0.474	75.2%	65%	Y
TN (kg/yr)	19.8	9.84	50.4%	45%	Y
Gross Pollutants (kg/yr)	236	0	100%	90%	Y

MUSIC results show that the required reduction criteria can be achieved for the site with the implementation of the proposed treatment train.

5 Conclusion

As outlined in this report, the stormwater management strategy for the proposed development of Forestville RSL addresses both stormwater quality and quantity. With the implementation of on-site detention structures, flows can be reduced to less than pre-development levels for the design events analysed. This detention system in conjunction with the stormwater treatment train detailed in this report also reduces post-development pollutant loading to the specified levels.

The proposed development therefore complies with current requirements of The Northern Beaches Council for both stormwater quality and quantity controls.

Yours faithfully,

Gregory Lyell

Principal Civil Engineer – Civil Team Lead
ACOR Consultants Pty Ltd

Appendix A - Maintenance Schedules

A.1 OSD Tank Maintenance Schedule

Maintenance Action	Frequency	Procedure
Outlet		
Inspect and remove any blockage of orifice in tank	Six months	Open control pit and remove screen to inspect orifice.
Check attachment of orifice plate to wall of basin	Annually	Remove access grate to control pit and remove screen. Ensure plate is mounted securely, tighten four dynabolts if required. Seal gaps as required.
Check orifice diameter is correct and retain sharp edge.	Five yearly	Compare diameter to design and ensure edge is not pitted or damaged.
Inspect screen and clean	Six months	Remove access grate to control pit and remove screen to clean it.
Check attachment of trash screen to wall of basin.	Annually	Remove access grate to control pit and remove screen. Ensure screen fixings are secure. Repair if required.
Check screen for corrosion	Annually	Remove access grate to control pit and examine screen for rust and corrosion, especially at corners or welds.
Inspect walls for cracks and spalling	Annually	Remove access grates to pits to inspect the walls. Repair as required.
Inspect outlet sump and remove any sediment/sludge	Six months	Remove access grate to control pit. Remove sediment/sludge build-up and check orifice is clear.
Inspect pits grate for damage or blockage	Six months	Check both sides of a grate for corrosion, (especially corners and welds) damage or blockage
Inspect outlet pipe and remove any blockages	Six months	Remove control pit access grate and screen. Check for sludge/debris on upstream side of outlet pipe and remove as necessary.
Check step irons for corrosion	Annually	Remove access grate to control pit. Examine step irons and repair any corrosion or damage.
Check fixing of step irons is secure	Six months	Remove access grate to control pit and ensure fixings are secure prior to placing weight on step iron.
OSD Storage		
Inspect storage and remove any sedimentation/sludge	Six months	Check for sedimentation/sludge inside tank structure and remove as necessary.
Inspect and remove any debris/litter/mulch etc blocking access grates	Six months	Remove blockages for grates.