

Planning Ingenuity Pty Ltd

Stormwater Management Report:  
Royal Motor Yacht Club  
46 Prince Alfred Parade, Newport, NSW

P2209347JR01V01  
February 2023

ENVIRONMENTAL



WATER



WASTEWATER



GEOTECHNICAL



CIVIL



PROJECT  
MANAGEMENT



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# 1 Background

## 1.1 Overview

This stormwater management report has been prepared by Martens and Associates Pty Ltd (MA) to support a development application (DA) for the proposed alterations and additions to the Royal Motor Yacht Club at 46 Prince Alfred Parade, Newport, NSW 2106.

This document provides an assessment of the effects of the proposed development upon the site in relation to stormwater quality requirements and a proposal to mitigate any identified adverse impacts.

This report is to be read in conjunction with the Concept Stormwater Management plan set P2209347PS01 prepared by MA (Attachment A).

## 1.2 Proposed Development

The proposed development consists of an expansion of the existing facilities for the Royal Motor Yacht Club, including:

- Internal refurbishment of existing club facility.
- Construction of a two storey extension to the west of the existing clubhouse.
- Provision of improved accessibility and fire safety compliance to existing parts of the development.
- Upgrade of sustainability performance of the new and upgraded building.

## 1.3 Scope

This report provides the following:

- Documentation of the water quality assessment modelling and results using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) in accordance with Northern Beaches Council's Water Management for Development Policy and design specifications.

#### 1.4 Relevant Planning Controls and Design Principles

The following planning and engineering controls and design principles have been considered:

- BMT WBM (2015) - NSW MUSIC Modelling Guidelines.
- Northern Beaches Council (2021) – *Water Management for Development Policy*.
- Northern Beaches Council (2016) – *WSUD & MUSIC Modelling Guidelines*.
- Pittwater Council (2004) – *Development Control Plan*.
- Pittwater Council (2014) – *Local Environmental Plan*.

## 2 Site Description

The existing site description is provided in Table 1 below.

**Table 1:** Summary of site description and conditions based on desktop review and site walkover.

Item	Details
Site Address (Lot/DP)	Lot 3 DP 791214, Lot 262 DP 752046, Lot 3 DP 225339, Lot 6 DP 110670, Lots 5 & 7 SEC 1 DP 4689
Local Government Area (LGP)	Northern Beaches Council
Site Elevation	Site levels range from 27 m AHD in the south-east to 1 m AHD in the north-east, north-west and south-west portions of the site neighbouring the coastline (SDG Land Development Solutions, 2022)
Site Aspect	The ground levels across the southern and central parts of the site falls with a gentle gradient generally towards the neighbouring coastline to the north-west.
Surrounding Land Use	The site is bounded by: <ul style="list-style-type: none"><li>o Residential housing classified under environmental living;</li><li>o Recreational waterways to the south and west.</li></ul>
Site Drainage	The site currently drains stormwater from the club building via an existing Ø375 outlet pipe which discharges water into the adjacent Pittwater estuary to the north-west at RL 0.59 m AHD.

## 3 Stormwater Quality Assessment

### 3.1 Water Quality Objectives

#### 3.1.1 Treatment Train Effectiveness (TTE)

The following stormwater treatment targets in the Northern Beaches Council Water Management for Development Policy have been adopted to ensure the modelling treatment train is suitable:

- 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).

#### 3.1.2 Neutral or Beneficial Effect (NorBE)

The proposed development is classified as a Commercial Waterfront Development under clause D15.20 of the Pittwater DCP. Due to the sensitivity of the receiving waters, stormwater quality discharging from the development must demonstrate a neutral or beneficial effect (NorBE) to maintain the integrity of the downstream water bodies.

### 3.2 Modelling Methodology

#### 3.2.1 Overview

The Model for Urban Stormwater Improvement Conceptualisation (*MUSIC*, Version 6.3) developed by the CRC for Catchment Hydrology was utilised to evaluate treatment train effectiveness (TTE) and pre development and post development pollutant generation from the site.

Modelling has been undertaken in accordance with Northern Beaches Council's Water Management for Development Policy and WSUD & MUSIC Modelling Guidelines and BMT WBM (2015) guidelines. The developed site is based on proposed layout with water quality treatment devices included to achieve adopted objectives.

The MUSIC model layout is provided in Attachment A, refer to MA planset P2209347PS01 drawing No. PS01-E700.



### 3.2.2 Approach

To achieve adopted objectives, an iterative approach was used for post-development modelling to determine appropriate types, sizes and locations of stormwater treatment devices.

The following modelling scenarios were considered:

- Pre Development – the existing site was modelled to determine baseline pollutant generation rates for TSS, TN, TP and GP.
- Post-development (untreated) – the developed site without any water quality improvement devices included.
- Post-development (treated) – the developed site with water quality improvement devices included to achieve stormwater quality objectives.

### 3.2.3 Climate Data

Rainfall climate data was sourced from the Sydney Observatory (Station No. 066062). The data was run on a 6 minute timestep from 01/01/1981 – 31/12/1985. The average monthly evapotranspiration (PET) data for the Sydney Region was adopted, in accordance with Council's design requirements.

### 3.2.4 Input Parameters

Input parameters for source and treatment nodes are consistent with Council's guidelines and the BMT WBM (2015) guidelines, and the manufacturer's specifications for proprietary devices.

All MUSIC modelling inputs and treatment node parameters are provided in Attachment A.

### 3.2.5 Catchment Parameters

Pre development and post development catchment delineation and breakdowns are provided in MA planset P2209347PS01 drawing No. PS01-E700.

## 3.3 Treatment Train Philosophy

The stormwater treatment strategy for the site uses a cartridge stormfilter system as an end of line control to ensure the water quality objectives defined by Council are satisfied.

A PSorb Stormfilter produced by Ocean Protect (or approved equivalent device) is a filter device designed to remove fine solids, soluble heavy metals, oil and total nutrients, hydrodynamically filtering water as it passes through the device. 13 Ocean Protect 310 PSorb Stormfilter cartridges were modelled, with the treatment efficiency of the device based on manufacturer's specifications, to provide treatment for the design catchment area.

The location and product specification are presented in MA planset P2209347PS01 drawing PS01-E100 and drawing PS01-E200.

### 3.4 MUSIC Water Quality Results

The results of the MUSIC modelling assessment of the proposed site development against Council's treatment train effectiveness (TTE) and neutral or beneficial effect (NorBE) requirements is provided below in Table 2 and Table 3, respectively.

**Table 2:** MUSIC TTE results (P2209347MUS01V01).

Parameter	Sources	Residual Load	Achieved Reduction	Required Reduction	Complies (Y/N)
TSS (kg/year)	32.7	4.83	85.2%	85%	Y
TP (kg/year)	0.19	0.04	79.7%	65%	Y
TN (kg/year)	2.7	1.3	51.6%	45%	Y
Gross Pollutants (kg/year)	31.7	0.0	100.0%	90%	Y

**Table 3:** MUSIC NorBE results (P2209347MUS01V01).

Parameter	Pre Development	Post Development	% Change
TSS (kg/year)	175	4.83	-97.2%
TP (kg/year)	0.30	0.04	-86.7%
TN (kg/year)	2.30	1.30	-43.5%
Gross Pollutants (kg/year)	25.8	0.0	-100.0%

These results demonstrate that post development water quality TTE and NorBE requirements specified in Council's Water for Development Policy will be met by the proposed stormwater treatment train.

### **3.5 Conclusions**

Results indicate that post development water quality objectives will be met by the proposed stormwater treatment train.

Further refinement of the model at detailed design stage may alter the sizes and locations of proposed treatment structures however, performance outcomes of the final design are to achieve the specifications provided in this report.

## 4 References

MCHP Architects (30.11.2022) – *Royal Motor Yacht Club Overall Proposed Site Plan & Proposed Ground Floor Site Plan.*

BMT WBM (2015) - *NSW MUSIC Modelling Guidelines.*

Northern Beaches Council (2021) – *Water Management for Development Policy.*

Northern Beaches Council (2016) – *WSUD & MUSIC Modelling Guidelines.*

Pittwater Council (2004) – *Development Control Plan.*

Pittwater Council (2014) – *Local Environmental Plan.*

SDG Land Development Solutions (21.07.2015) – *Detail and Level Survey of Lots 5 & 7 SEC 1 DP 4689, Lot 6 DP 110670, Lot 3 DP 225339, Lot 262 DP 752046, Lot 3 DP 791314. 'Royal Motor Yacht Club'.*

SDG Land Development Solutions (21.12.2022) – *Additional Survey of Stormwater Information.*

## 5 Attachment A – MUSIC Modelling Parameters

**Table 4:** Treatment node inputs.

Element	Factor	Input	Source
Setup	Climate File	Sydney Observatory 6 minute timestep from 01/01/1981 – 31/12/1985	eWater
Source Nodes	Rainfall Threshold	As per Northern Beaches Council (2016) WSUD & MUSIC Modelling Guideline	Northern Beaches Council (2016)
	Base & Stormflow Properties	As per Northern Beaches Council (2016) WSUD & MUSIC Modelling Guideline	Northern Beaches Council (2016)
	Estimation Method	Stochastically generated	BMT WBM (2015)
StormFilter Chamber	Low Flow By-Pass (m <sup>3</sup> /s)	0	By manufacturer
	High Flow By-Pass (m <sup>3</sup> /s)	100	By manufacturer
	Surface Area (m <sup>2</sup> )	6.4	By manufacturer
	Extended Detention Depth (m)	0.39	By manufacturer
	Initial Volume (m <sup>3</sup> )	0	By manufacturer
	Exfiltration Rate (mm/hr)	0	By manufacturer
	Evaporative Loss as % of PET	0	By manufacturer
	Equivalent Pipe Diameter (mm)	66	By manufacturer
	Overflow Weir Width (m)	2	By manufacturer