NORTHROP

WATER CYCLE MANAGEMENT PLAN

Trinity Catholic College – Goulburn

Site : Lot 147 DP 750015

Project: Development of a 4-storey education building

DA: TBA

LGA: Goulburn Mulwaree Council

Prepared for Webber Architects

NORTHROP.COM.AU

Document Information

PROJECT NUMBER:	CR242881
PROJECT NAME:	Trinity Catholic College - Goulburn
REPORT TITLE:	Water Cycle Management Plan
CLIENT:	Webber Architects
REVISION:	1

REVISION	STATUS	REVISION BY	VERIFIED BY	DATE
1	FOR INFORMATION	Maddison Billett	Joey Wiltshire	19 December 2025

Northrop Consulting Engineers Pty Ltd

ACN 064 775 088 | www.northrop.com.au

CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

1 Executive Summary

This report has been prepared for Webber Architects. The purpose of this Water Cycle Management Plan (WCMP) is to provide support for a development consent for a 4-storey educational building located within Lot 147 DP 750015 at Clinton Street & College Street, Goulburn.

The scope of this WCMP includes assessment of the water cycle management requirements to support the proposed development and frame the implementation of Water Sensitive Urban Design (WSUD) best practise measures to the proposed development. This will include treatment measures implemented to address water quality and quantity requirements calculated from various modelling analysis. The report will include the findings of the analysis and propose best practice strategies.

Furthermore, as the site is located inside of the WaterNSW Catchment Area, this assessment has been prepared in accordance with the standards and guidelines listed in the references on this page of the report. Stormwater quality analysis will be undertaken in accordance with WaterNSW guidelines to achieve a NorBE water quality outcome using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software.

REFERNCES

The following is a list of references used to determine the results of the design review.

Goulburn Mulwaree Council – Development Control Plan 2009 (Effective 18th July 2025)
Goulburn Mulwaree Council – Development Design Specification D5 2020
Goulburn Mulwaree Council – Stormwater Drainage and Rainwater Collection Systems Policy (Effective 18th August 2023)
WaterNSW – NorBE Assessment Guidelines 2022
WaterNSW – Using MUSIC in Sydney Drinking Water Catchment 2023
WaterNSW – Developments in the Sydney Drinking Water Catchment – Water Quality Information Requirements 2023
DA Issue Concept Stormwater Plan by Northrop Consulting Engineers dated 19th December 2025

2 Project Overview

2.1. Site Description

The site is located on Lot 147 & DP 750015 at Clinton Street & College Street, Goulburn and is a large well established co-educational school for Years 7 - 12 students. The College operates under the governance of the Catholic Education Office of the Archdiocese of Canberra and Goulburn. and is within the Goulburn Mulwaree Council LGA and the WaterNSW catchment area. The site appears to be above the 1% AEP flood planning levels.

2.2. Proposed Development

The proposed development works includes demolition of an existing building and the construction of a new 4-storey teaching block with associated accessible footpaths, and stormwater drainage.

Northrop cannot comment on the accuracy of the site extents at this stage, as no detailed plan has been prepared to confirm the boundaries. Based on the available information, it appears the site work extents have an area of 1240m^2 located within the lot.

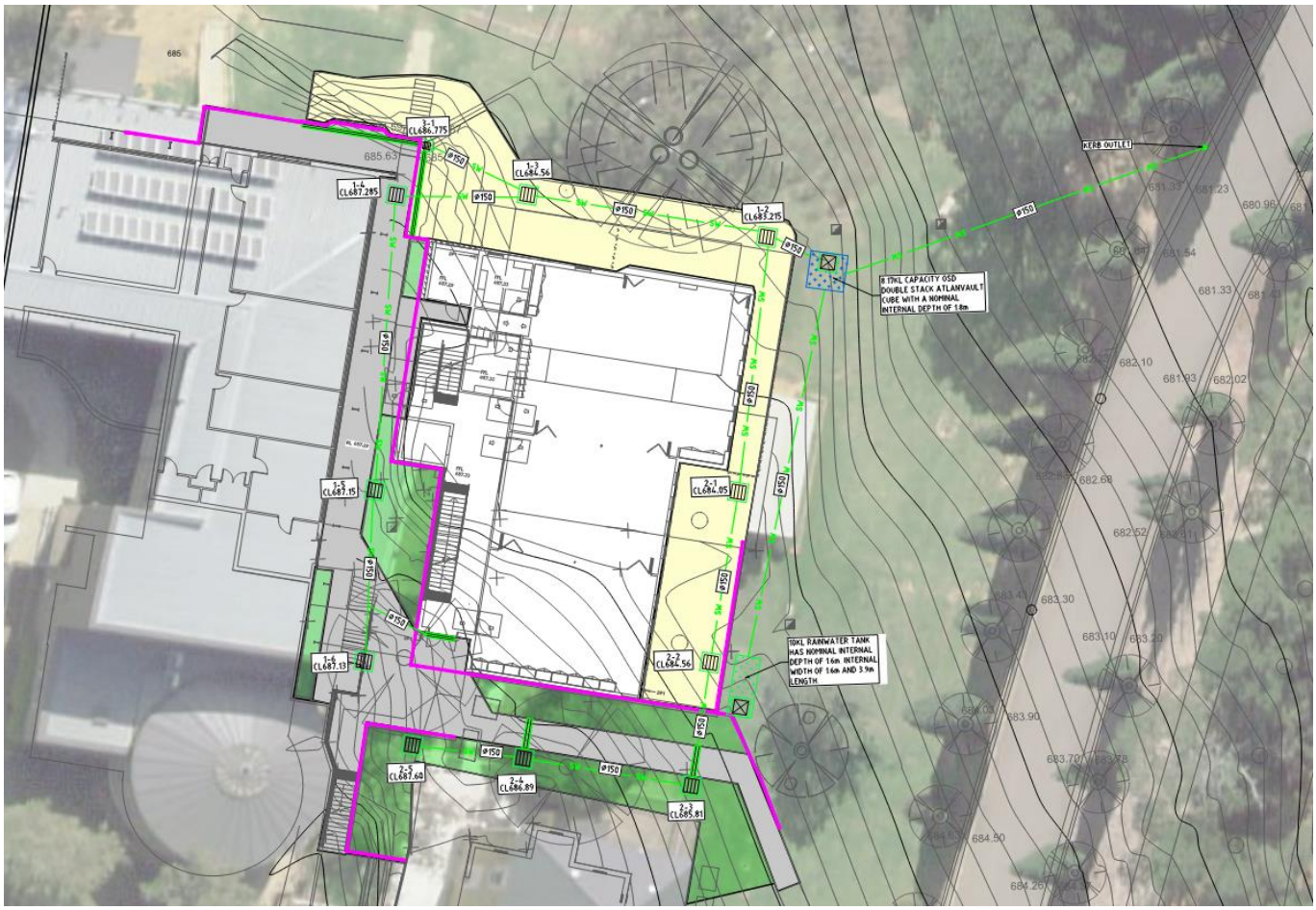

Figure 1: Proposed Site

3 Rainfall Data, Catchments and Hydrology

Rainfall on the site area considered to be developed will naturally flow towards the front of the site, and the associated pits and pipes network discharges via a new pipe kerb adapter installed along the existing road.

The rainfall data used to undertake the required modelling, analysis and design has been drawn from the ARR Data Hub and BoM using Australian Rainfall and Runoff 2019 (ARR19). The data drawn from the nearest point to the subject site was a Latitude 34.7625 South and Longitude 149.7125 East.

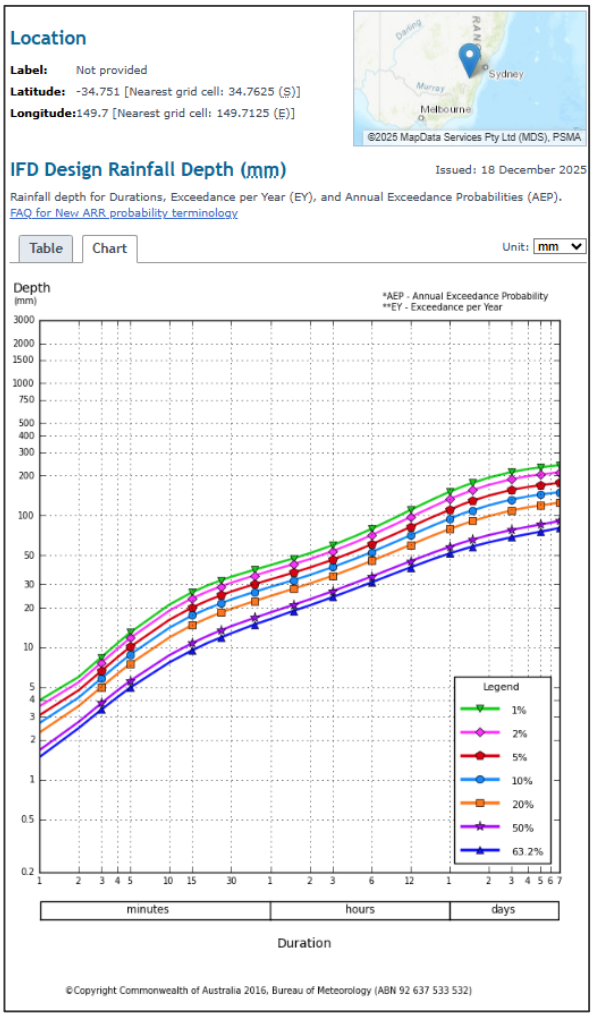

Figure 2: IFD Design Rainfall Intensity Data (BoM, December 2025)

3.1.1. SITE CATCHMENT COMPARISON

The pre and post development catchments within the is, including impervious breakdown are presented in Tables 1 and 2.

The pre and post development conditions have been modelled using ILSAX hydrological modelling purposes due to the size of the catchments, noting that the total site is approximately 0.124 hectares.

Table 1: Pre-Development Catchment Details

	AREA (m^2)	AREA (ha)	% OF TOTAL AREA	IMPERVIOUS %
Pavement Area	150 m^2	0.0150	12%	100%
Roof Area	290 m^2	0.0290	23%	100%
Landscaping Area	800 m^2	0.0800	65%	0%
	1240 m^2	**0.1240**		

Table 2: Post-Development Catchment Details

	AREA (m^2)	AREA (ha)	% OF TOTAL AREA	IMPERVIOUS %
Pavement Area	355 m^2	0.0355	29%	100
Roof Area to RWT	300 m^2	0.0300	24%	100
Roof Area Other	297 m^2	0.0297	24%	100
Landscaping Area	158 m^2	0.0158	13%	0%
Area Bypassing Treatment	130 m^2	0.0130	10%	52%
	1240 m^2	**0.1240**		

3.1.2. DRAINS MODELLING

A model was set up using DRAINS to analyse the pre and post development flows of the site and the on-site detention (OSD) requirements such as: Permissible Site Discharge (PSD) and Site Storage Requirements (SSR); to allow calculations to determine attenuation requirements.

The model simulated the 1%, 2%, 5% and 10% Annual Exceedance Probability (AEP) storm events with duration up to and including 2 hours. A conceptual model was set up for both the pre and post development conditions to analyse OSD requirements (PSD/SSR) for the proposed development. The analysis used an iterative approach in order to size the OSD tank. Sized to accommodate the 1%AEP, 2%AEP, 5%AEP and 10%AEP storm events in line with council guidelines.

The implementation of both a rainwater tank and an onsite detention tank installed with a suitably sized orifice plate allowed the system to achieve the "same or reduced" requirement for site discharge. See table 3 for a pre and post development flows comparison.

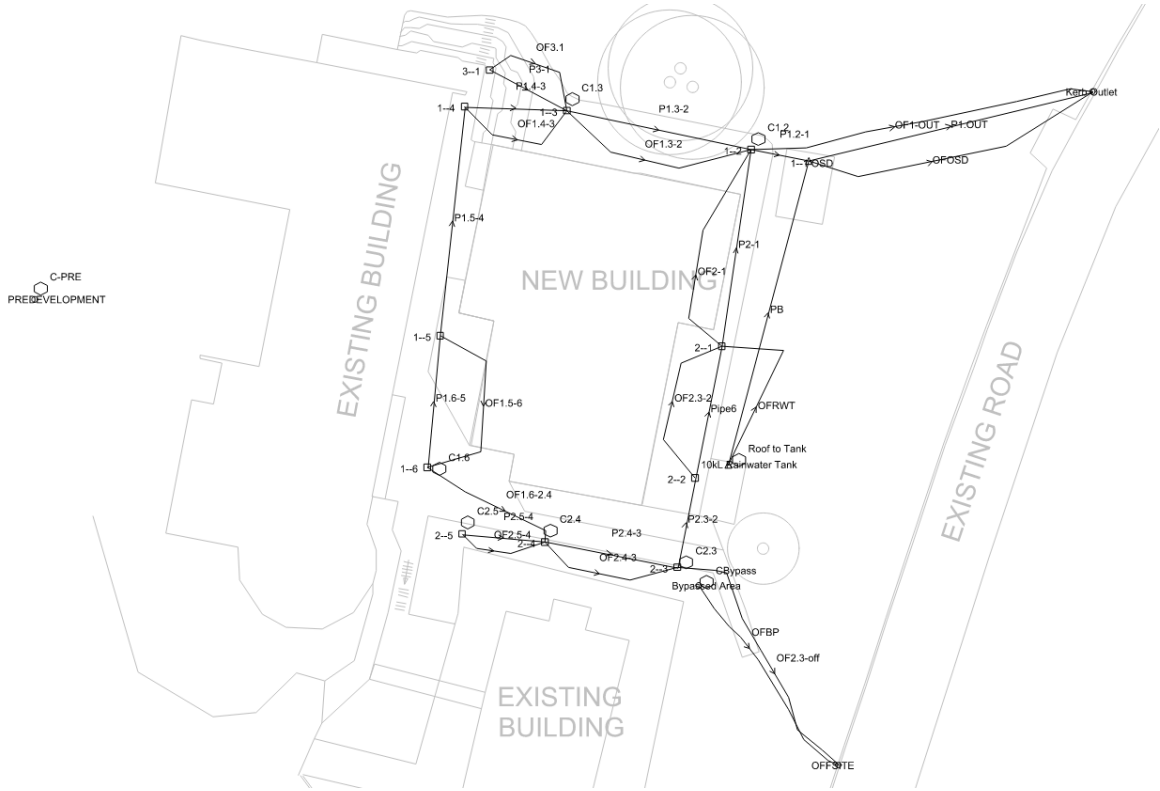

Figure 3: DRAINS Pre and Post Development Model Set Out for OSD Analysis

Table 3: Critical Storm Site Discharge Comparison

CRITICAL STORM	PRE DEV SITE	POST DEV SITE
% AEP	m^3/s	m^3/s
10	0.026	0.015
5	0.031	0.016
2	0.036	0.019
1	0.040	0.020

3.1.3. ON-SITE DETENTION (OSD) & RAINWATER REQUIREMENTS

From the DRAINS modelling the following capacity requirements were determined and sized to accommodate the 1%AEP, 2%AEP, 5%AEP and 10%AEP storm events. Regarding rainwater tank sizing the *Goulburn Mulwaree Council – Stormwater Drainage and Rainwater Collection Systems Policy 2025, Section 2.2* mandates a minimum 10,000L tank size for non-residential developments in areas with reticulated water supply

Table 4: OSD & Rainwater Summary

	PROVISION
% of Impervious Area Draining Into OSD	90% of impervious area has been specified as draining to OSD
% of Area Bypassing OSD	10% of the extents area has been specified Bypassing OSD 5.2% of the extents area bypassing is impervious area.
OSD Storage Required	OSD Storage specified 8,170L
Rainwater Tank Required (L)	10,000L rainwater tank

.

4 Water Sensitive Urban Design (WSUD)

4.1. Objectives

The site is located within the Goulburn Mulwaree Council LGA and is within the WaterNSW Catchment Area. This assessment has been prepared in accordance with the standards and guidelines listed in the references on page 3 of this report.

Water quality modelling and analysis was be undertaken in accordance with WaterNSW guidelines to achieve a neutral or beneficial (NorBE) water quality outcome using MUSIC modelling software. The criteria to achieve NorBE are:

- Post-development mean annual pollutant loads for total phosphorus (TP), total nitrogen (TN) and total suspected solids (TSS) are to be a minimum of 10% less than the pre-developed conditions.
- Post-development mean annual gross pollutant loads are to be equal to or less than the pre-developed conditions.
- Post-development pollutant concentrations for total phosphorus (TP) and total nitrogen (TN) must be equal to or less than the pre-development concentrations between the 50th and 98th percentiles where runoff occurs.

4.2. Water Quality Modelling - MUSIC

The water quality modelling and analysis will be undertaken utilising Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software using the WaterNSW guideline *Using MUSIC in Sydney's Drinking Water Catchment* and specific treatment node data provided by WaterNSW, specifically Zone 1. Figures 4, 5 and 6 show the climate zones, rainfall and evapotranspiration data source used, and the model set out. The node catchment details are as specified in tables 1 and 2.

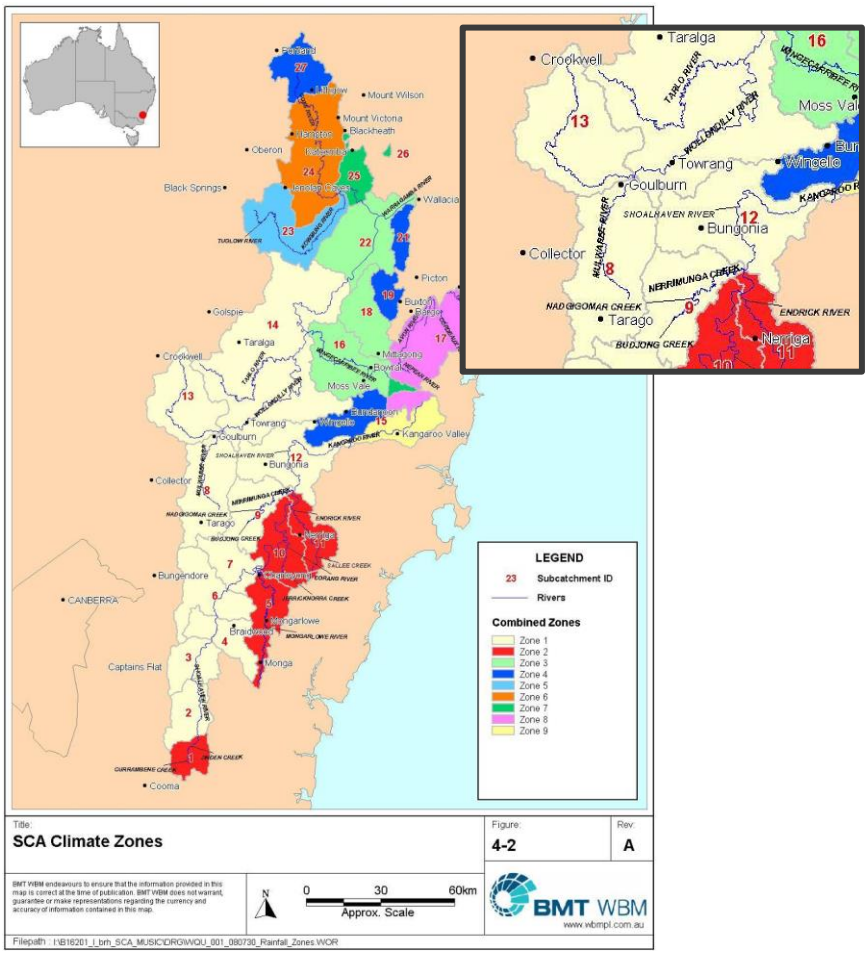

Figure 4: Climate Zones

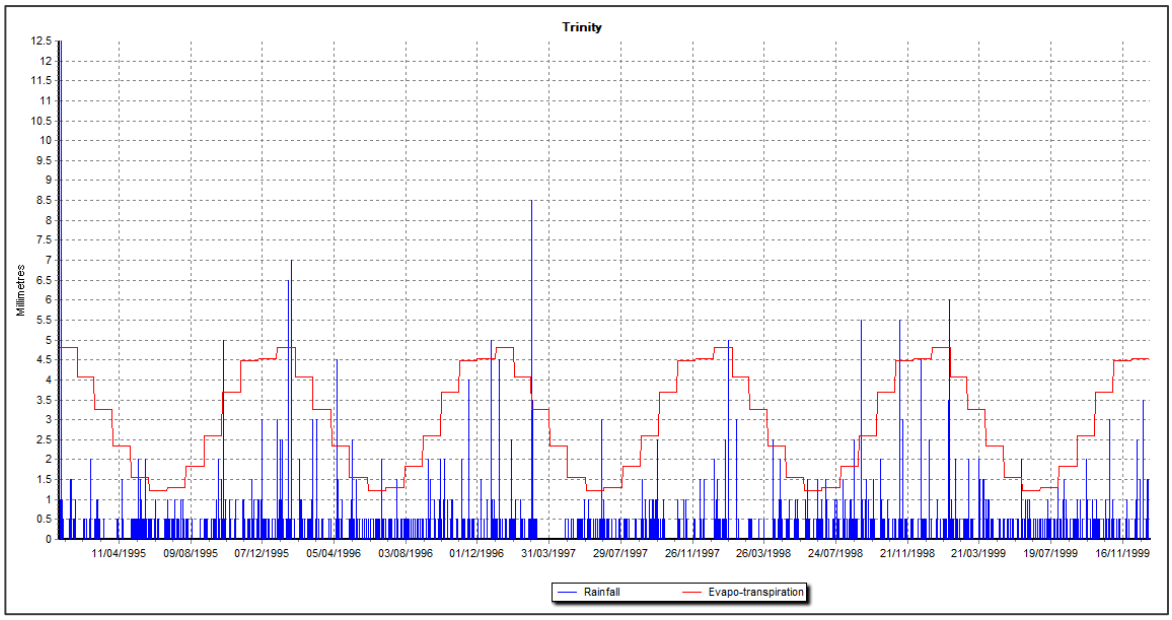

Figure 5: Rainfall and Evapo-transpiration Chart

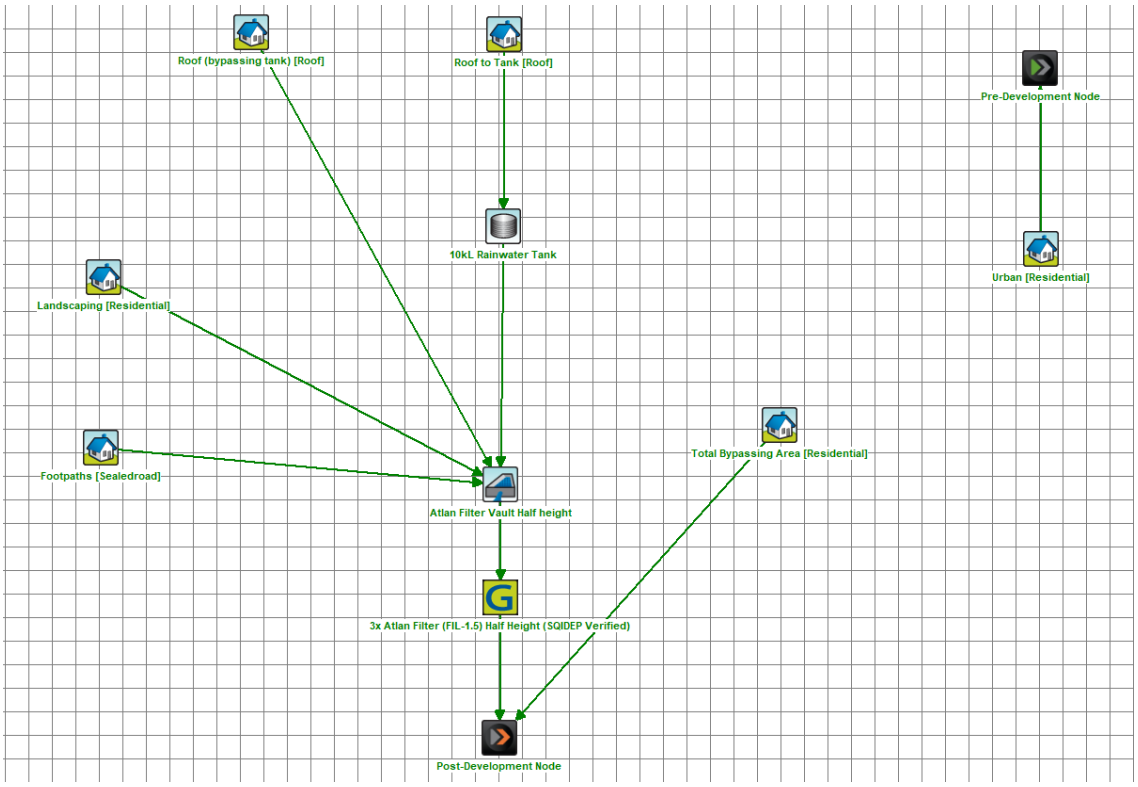

Figure 6: MUSIC Model Set Out

4.3. Treatment Measures

The treatment measures for the proposed development are:

Table 5: WSUD Treatment

TREATMENT MEASURES
10,000L rainwater tank with first flush device
3x Atlan filter cartridges in OSD tank

4.4. Treatment Effectiveness

The treatment measures and subsequent results have been compared to the requirements of NorBE as outlined in section 4.1 of this report. The results from the MUSIC modelling in accordance with the approach, catchment and treatment measures outlined and are presented in table 6.

Table 6: Treatment Train Effectiveness

DESCRIPTION	PRE DEV SITE	POST DEV SITE	% REDUCTION
Total Suspended Solids (kg/yr)	99.1	29.8	74.3%
Total Phosphorus (kg/yr)	0.160	0.0752	67.9%
Total Nitrogen (kg/yr)	1.18	0.723	56.4%
Gross Pollutants (kg/yr)	18.9	1.84	92.0%

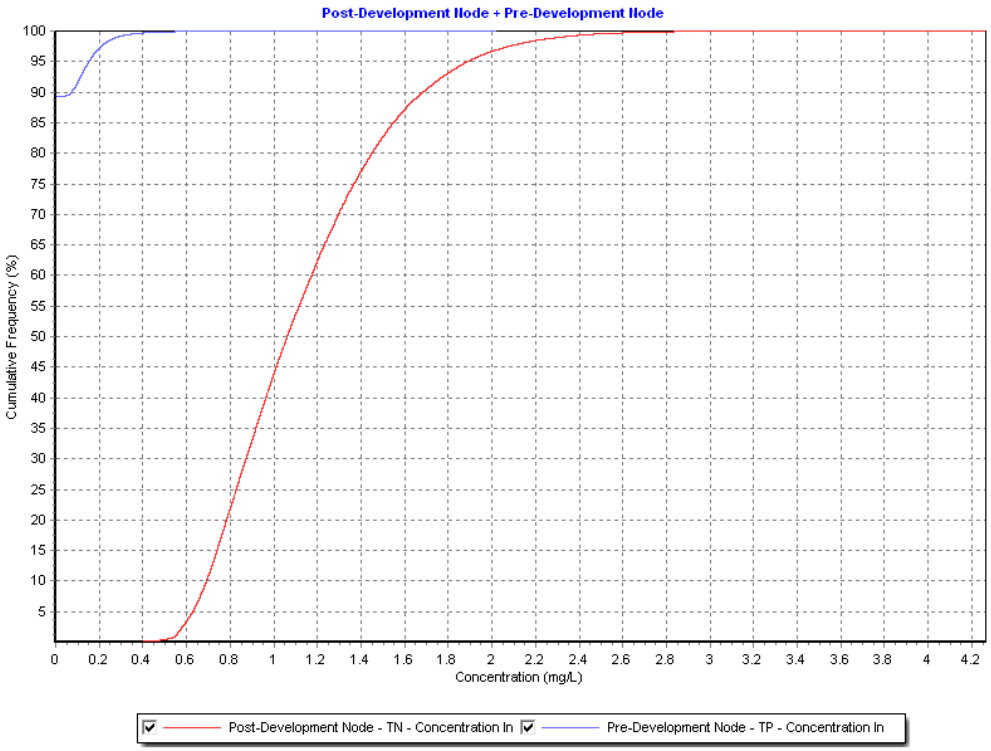

Figure 7: MUSIC - Nitrogen Concentration

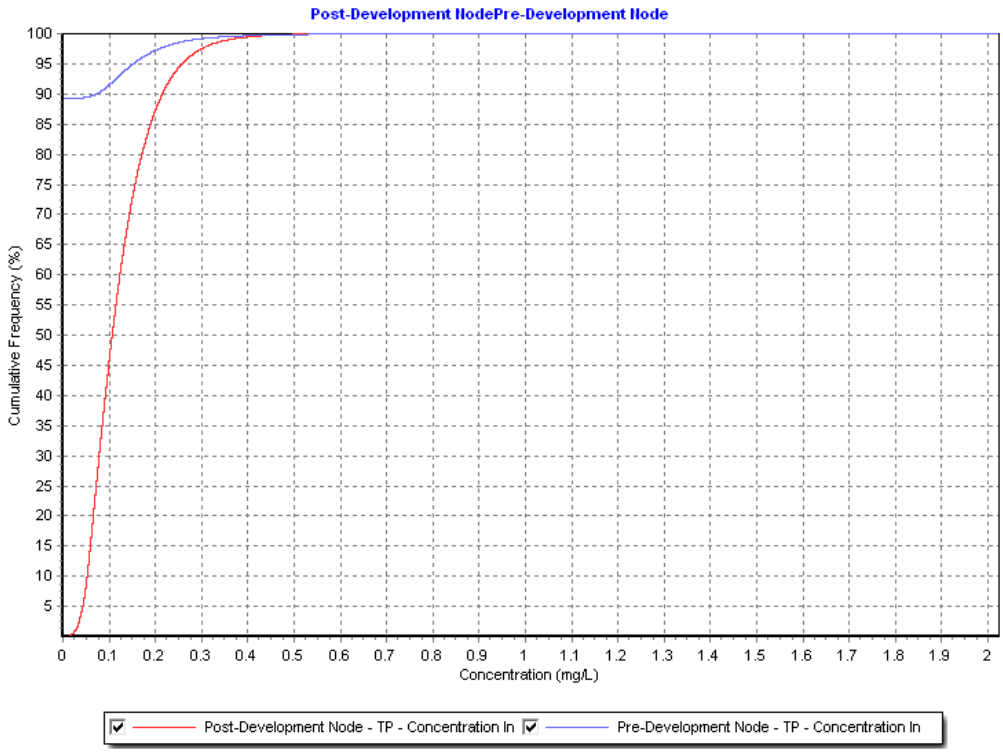

Figure 8: MUSIC - Phosphorus Concentration

5 Conclusion

In accordance with the WaterNSW guideline, NorBE Assessment Guidelines 2022, it has been demonstrated that the NorBE criteria for water quality can be achieved using treatment measures that are sympathetic to the nature of the planning proposal.

The following NorBE criteria have been met, and in the case of the treatment measures modelled and analysed, exceeded: The post-development mean annual pollutant loads for total nitrogen (TN), total phosphorus (TP) and total suspected solids (TSS) are to be a minimum of 10% less than the pre-developed conditions.

- Post-development mean annual pollutant loads for total phosphorus (TP), total nitrogen (TN) and total suspected solids (TSS) are to be a minimum of 10% less than the pre-developed conditions.
- Post-development mean annual gross pollutant loads are to be equal to or less than the pre-developed conditions.
- Post-development pollutant concentrations for total phosphorus (TP) and total nitrogen (TN) must be equal to or less than the pre-development concentrations between the 50th and 98th percentiles where runoff occurs.

In accordance with Goulburn Mulwaree Councils Engineering Design Standards, it can be concluded that all the criteria have been met, specifically the development:

- Has a slope of less than 10%.
- It appears the site is above the 1% AEP flood level, however there may be existing 1% AEP impacts throughout the site are managed locally by the school.
- There are no natural watercourses within 40m of the development.
- OSD will be provided through use of a 8.17kL tank with a nominal depth of 1.8m
- A min 10kL rainwater tanks reuse rates are in accordance with the guideline of 0.06kL/day (internal) for a smart technology RWT with a 300m^2 roof gutter network
- Water quality treatment will be via the combination of a rainwater reuse tank (primary) with overflow being treated via an OSD tank installed with 3 Atlan filters or equivalent filter device.

NORTHROP

NORTHROP.COM.AU