



Civil Engineering Design Report

Alex Avenue Public School

Proposed Lots 1 & 2 Being Part of Lot 4 DP1208329 & Lot 121 DP1203646

Farmland Drive, Schofields NSW

REPORT

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CIVIL ENGINEERING DESIGN REPORT

Activity Schedule

Date	Revision	Issue	Prepared By	Approved By
28.02.2019	A	Development Application	J. Grinsell	J. Gilligan
13.06.2019	B	SSDA	J. Grinsell	J. Gilligan

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1. EXECUTIVE SUMMARY

The development is the construction of a Primary School for the Department of Education.

Site grading and site stormwater systems was prepared in accordance with Blacktown City Council guidelines.

1.1 Site Grading

Site grading was undertaken to minimise earthworks and comply with the relevant guidelines as outlined above.

1.2 Site Stormwater Infrastructure, including Water Sensitive Urban Design

Site stormwater design was undertaken to comply with the relevant guidelines as outlined above.

2. DESIGN REPORT

2.1 General

This Civil Engineering Design Report has been prepared by Northrop Consulting Engineers Pty Ltd (Northrop). Civil Engineering design and documentation of the works will include, site grading, site stormwater infrastructure, stormwater quantity and stormwater quality facilities to be completed for the proposed development.

This Design Report is intended to clarify the Civil Engineering design aspects for this development.

2.2 Project Description

This development is proposed on Proposed Lots 1 & 2 Being Part of Lot 4 DP1208329 & Lot 121 DP1203646, Schofields NSW, which consists of a new public school. The development includes in the construction 6 building blocks and pedestrian access points along Farmland Drive.

2.3 Referenced Documents

This Design Report has been prepared with reference to the following documentation:

- Architectural Plans provided by Group GSA
- Survey Plans prepared by LTS Lockley

2.4 Civil Engineering Drawings

The drawings which accompany this report are as follows:

Document Number	Document Title	Revision
182535 – DAC01.01	Cover Sheet, Drawing Schedule and Locality Plan	3
182535 – DAC01.11	Specification Notes – Sheet 01	3
182535 – DAC01.21	General Arrangement Plan	4
182535 – DAC02.01	Sediment and Erosion Control Plan	3
182535 – DAC02.11	Sediment and Erosion Control Details	3
182535 – DAC03.01	Bulk Earthworks Cut and Fill Plan	3
182535 – DAC04.01	Siteworks and Stormwater Management Plan – Sheet 01	6
182535 – DAC04.02	Siteworks and Stormwater Management Plan – Sheet 02	5
182535 – DAC04.21	Stormwater Longitudinal Sections – Sheet 01	3
182535 – DAC04.22	Stormwater Longitudinal Sections – Sheet 02	3
182535 – DAC04.23	Stormwater Longitudinal Sections – Sheet 03	3
182535 – DAC04.31	Bioretention Basin Details – Sheet 01	3
182535 – DAC09.01	Detail Sheet 01	3

2.5 Regulatory

2.5.1 National Construction Code

Northrop's engineering designs for this project will be prepared in accordance with the requirements and regulations of all Statutory Authorities and Codes relevant to the works, including:

- The National Construction Code (Building Code of Australia) Standards Australia;
- Standards Australia
- Blacktown City Council's Development Control Plan;

3. SITE GRADING

3.1 Existing Conditions

The development area is currently an undeveloped greenfield lot. The site falls to the south towards an existing creek. The site is owned by the Department of Education which is bounded by Farmland Drive to the north, undeveloped land to the south and west, and a current development to the east. Refer to Figure 1 below for site location.



Figure 1: Site Location

3.2 Proposed Grading

The proposed site grading generally falls to a proposed bio-retention basin at the south-west corner of the site and generally minimises earthworks where possible. All pavement and landscaping around the building falls away from the building to ensure nuisance stormwater runoff is avoided. There are no upstream catchments that are directed through the site.

3.3 Sediment and Erosion Control

Sediment and erosion control is required during excavation and construction to ensure only clean water enters the existing and proposed stormwater system in rain storm events. These measures are to be installed in accordance with 'The Blue Book' (Managing Urban Stormwater Soils and Construction). Refer the Sediment and Erosion Control Plan for details.

4. SITE STORMWATER INFRASTRUCTURE

4.1 Stormwater Quantity - Hydraulic Modelling

4.1.1 Performance Criteria

The objectives of this investigation include:

- Management of 'minor' flows using piped systems for at least the 5% AEP;
- Management of 'major' flows using dedicated overland flow paths for the 1% AEP for all areas;
- Ensure stormwater quality measures are provided to comply with Blacktown City Council's WSUD policy.

4.1.2 Proposed Stormwater System

The new development is proposed to discharge into the existing creek using a network of pits and pipes and overland flow paths. The majority of the site area discharges to a bio-retention basin before discharging temporarily to a level spreader within the lot to the south. Flows are then directed to the existing creek via overland flow through the undeveloped land to the south. The ultimate design has the basin discharge connected to the trunk drainage line within the proposed extension of Pelican Drive to the west of the site.

4.1.3 Modelling of Stormwater Quantity

The piped system and overland flow paths were designed using 12d Model ILSAX Drainage Design Software. Refer Northrop's Development Application drawings for details.

The 12d Model Layout is shown below. The model can be obtained upon request.

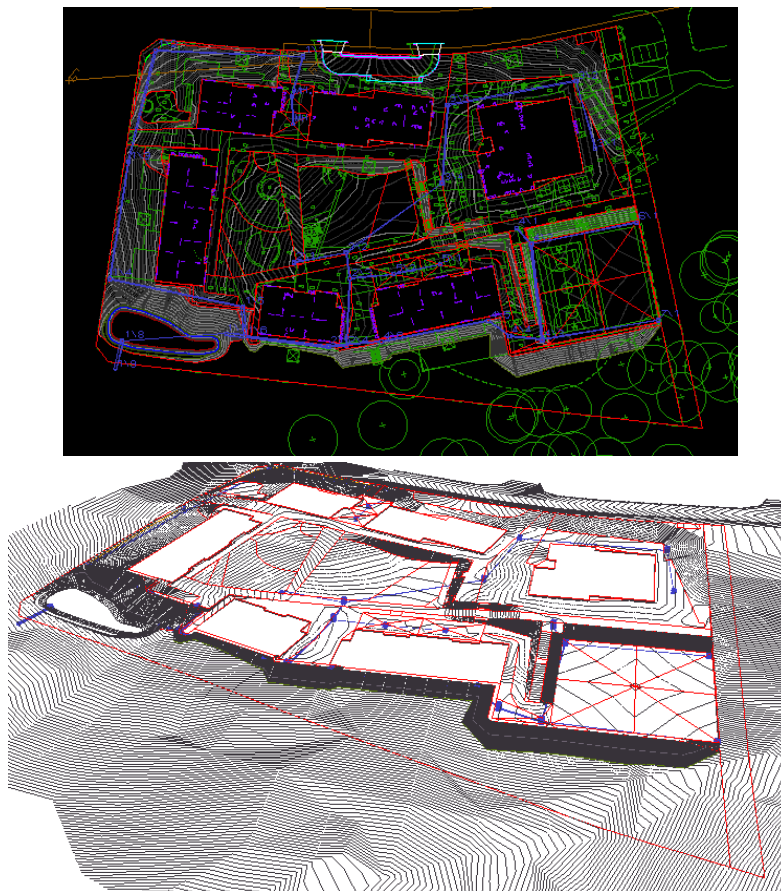


Figure 2: 12d model layout

4.2 Stormwater Quality

4.2.1 Performance Criteria

Stormwater quality treatment targets are to comply with Blacktown City Council's WSUD strategy. These targets are relative to a developed scenario:

- 85% reduction in the post development average annual Total Suspended Solids (TSS) load.
- 65% reduction in the post development average annual Total Phosphorus (TP) load.
- 45% reduction in the post development average annual Total Nitrogen (TN) load.

4.2.2 Proposed Stormwater System

The first step to preventing stormwater pollution is to reduce the risk of pollutants being entrained in stormwater runoff. Good site design is important in reducing the risk profile of runoff from all developments. Roofs have a low risk profile for stormwater pollutants, and the simplest way to protect water quality at the ground level is to direct hardstand areas (paving and paths, etc.) to landscaped areas to provide passive irrigation.

The stormwater pollutant load reduction objectives will be met by the use of a rainwater tank and also consolidating stormwater treatment devices.

BUILDING ROOF CATCHMENT

- The roof drainage system connects to an in-ground rainwater re-use tank (RWT).
- The overflow from the RWT connects to the stormwater system within the hardstand area and then is further treated through the bio-retention basin before discharging to the creek.

HARDSTAND AND LANDSCAPE CATCHMENT

- A stormwater system is designed for the hardstand and landscape areas to convey the 5% AEP storm event to a bio-retention basin in the south western corner of the lot.
- The bio-retention basin has been sized to reduce pollutant loads to a suitable level before discharging into the existing creek. The bio-retention basin has a filter area of 250m², filter depth of 400mm and an extended detention depth of 200mm. Refer Northrop's Development Application drawings for further details.

4.2.3 Modelling of Stormwater Quantity

Stormwater treatment was modelled using Modelling Urban Stormwater Improvement Conceptualisation (MUSIC) software v 6.2.1. The MUSIC model's design parameters were set using the Blacktown City Council MUSIC-LINK in accordance with Blacktown City Council's WSUD policy.

SOURCE NODE / POLLUTANT GENERATION PARAMETERS

Source node parameters for the proposed development were sourced from the Blacktown City Council's default nodes. The catchments were modelled using the following source nodes:

- Roof (roof areas) – 100% impervious
- Unsealed road (hardstand areas) – 100% impervious
- Revegetated land (landscaping areas) – 0% impervious

STORMWATER TREATMENT PARAMETERS

- Bio-retention Basin
- CDS 0708M GPT

MODEL SCHEMATIC

MUSIC Model Layout and pollutant removal performance is shown below.

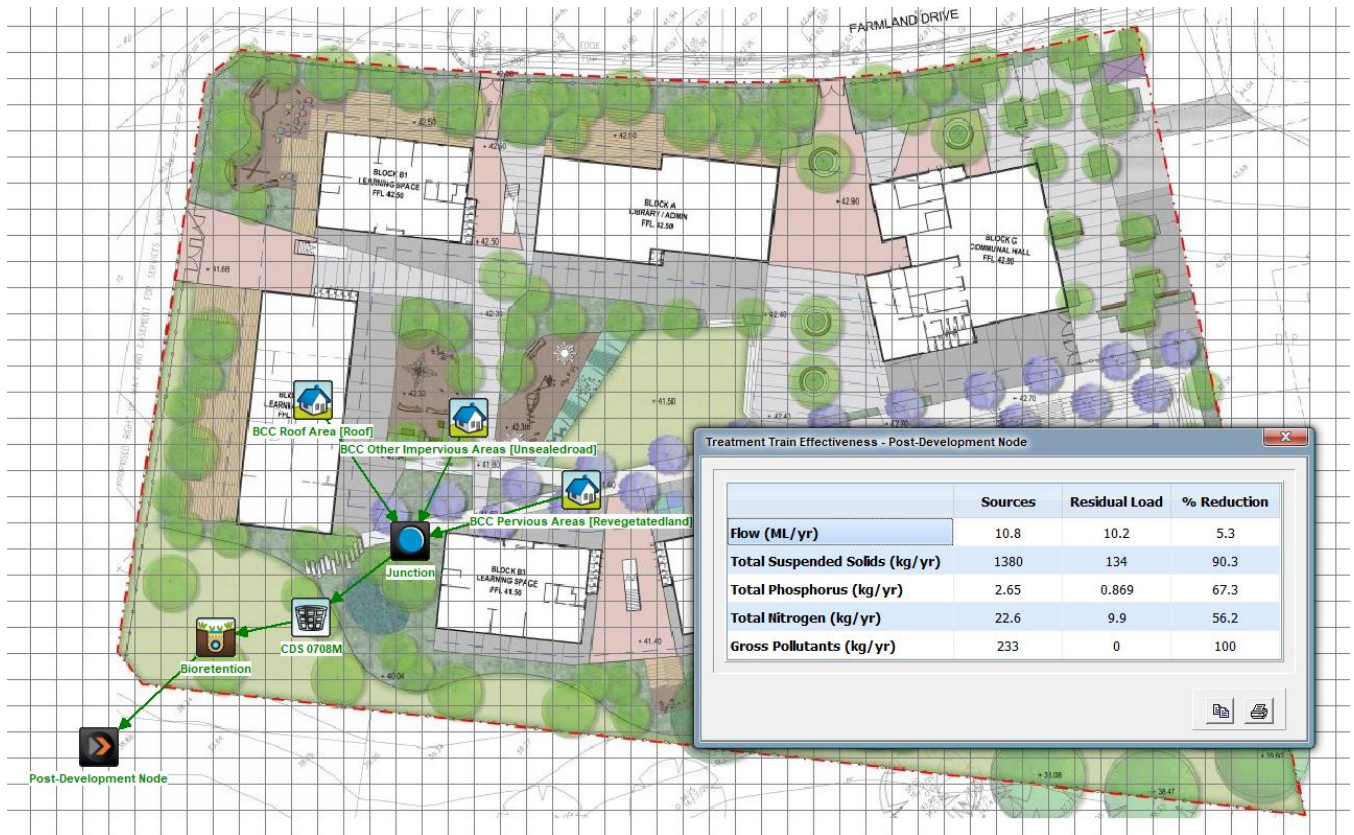


Figure 3: MUSIC model layout

Stormwater Pollutants	% Reduction in average annual load	Pollution Reduction Target (%)
Total Suspended Solids	90.3	85
Total Phosphorus	67.3	65
Total Nitrogen	56.2	45
Gross Pollutants	100	-

As shown above, the stormwater treatment targets appropriate for the site will be met by the treatment measures provided. The pollutant removal performance as predicted by MUSIC modelling exceeded the Blacktown City Council targets of 85%/65%/45% for TSS, TP and TN respectively.