



Civil Engineering Design Report

Alex Avenue Public School

Proposed Lot 2/DP1244925 and northern portion of
Lot 1/DP1244925

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
31.05.2019	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. The construction and installation of the OSD tank only is part of a separate approval.

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 Lot 2 in DP1244925 and the northern portion of Lot 1 in DP1244925, 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 and Pelican Road.

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_C01.01	COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN	8
182535_C01.11	SPECIFICATION NOTES - SHEET 01	D
182535_C01.12	SPECIFICATION NOTES - SHEET 02	3
182535_C01.13	SPECIFICATION NOTES - SHEET 03	3
182535_C01.21	GENERAL ARRANGEMENT PLAN	7
182535_C02.01	SEDIMENT AND SOIL EROSION CONTROL PLAN	H
182535_C02.11	SEDIMENT AND SOIL EROSION CONTROL DETAILS	E
182535_C03.01	BULK EARTHWORKS PLAN	K
182535_C03.21	BULK EARTHWORKS CUT AND FILL SECTIONS - SHEET 01	J
182535_C03.22	BULK EARTHWORKS CUT AND FILL SECTIONS - SHEET 02	H
182535_C04.01	SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 01	6
182535_C04.02	SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 02	8
182535_C04.03	SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 03	2
182535_C04.21	STORMWATER LONGITUDINAL SECTIONS - SHEET 01	6
182535_C04.22	STORMWATER LONGITUDINAL SECTIONS - SHEET 02	5
182535_C04.23	STORMWATER LONGITUDINAL SECTIONS - SHEET 03	6
182535_C06.01	SITEWORKS SETOUT CONTROL PLAN	4
182535_C06.11	SITEWORKS SETOUT CONTROL TABLES	2
182535_C07.01	RETAINING WALL SETOUT PLAN - SHEET 01	6
182535_C07.02	RETAINING WALL SETOUT PLAN - SHEET 02	7
182535_C07.11	RETAINING WALL ELEVATIONS - SHEET 01	5
182535_C07.12	RETAINING WALL ELEVATIONS - SHEET 02	6
182535_C07.13	RETAINING WALL ELEVATIONS - SHEET 03	6
182535_C07.14	RETAINING WALL ELEVATIONS - SHEET 04	6
182535_C07.15	RETAINING WALL ELEVATIONS - SHEET 05	5
182535_C07.16	RETAINING WALL ELEVATIONS - SHEET 06	4
182535_C07.17	RETAINING WALL ELEVATIONS - SHEET 07	2
182535_C08.01	PAVEMENT PLAN - SHEET 01	4
182535_C08.02	PAVEMENT PLAN - SHEET 02	4
182535_C09.01	DETAILS - SHEET 01	5
182535_C09.02	DETAILS - SHEET 02	4
182535_C09.03	DETAILS - SHEET 03	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 the south-west corner of the site and 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. The site boundary is to be modified on the western boundary to allow a bus bay to be built on Pelican Road.

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' and 'major' flows using piped systems to direct stormwater to the OSD tank for up to the 1% AEP event;
- Management of flows above the 1% AEP using dedicated overland flow paths;
- Ensure stormwater quality measures are provided to comply with Blacktown City Council's WSUD policy.
- For the purpose of modelling the stormwater network and OSD, the area to the south which will not be developed due to tree conservation will not be considered as site area. An easement is to be placed on this area to prevent development of the land.

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 an OSD tank before discharging to the existing creek via a piped network and a headwall with level spreader at the edge of the creek. The construction and installation of the OSD tank only is part of a separate approval.

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.

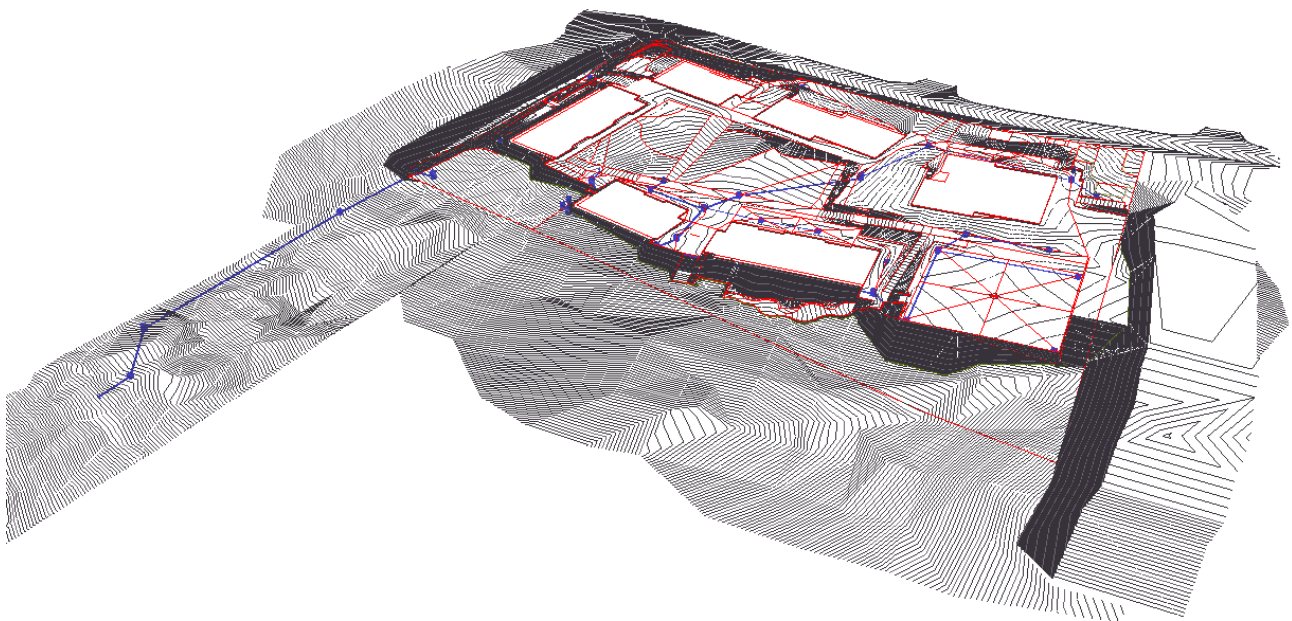


Figure 2: 12d model layout

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 by the ZPG Stormfilters within the water quality chamber of the OSD tank before discharging to the creek.

HARDSTAND AND LANDSCAPE CATCHMENT

- A stormwater system is designed for the hardstand and landscape areas to convey the 1% AEP storm event to a water quality chamber within an OSD tank in the south western corner of the lot.
- Each surface inlet pit is to be fitted with OceanGuard pit inserts to collect gross pollutants and pre-treat the stormwater before it is directed to the water quality chamber within the OSD tank.
- The water quality chamber is fitted with 15 ZPG Stormfilters to complete the treatment train.

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

- Ocean Protect ZPG Stormfilters
- Ocean Protect 'Oceanguard' pit inserts

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	89.7	85
Total Phosphorus	67.6	65
Total Nitrogen	45	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.