



SYDNEY CHILDREN'S HOSPITAL
STAGE 1/CHILDREN'S
COMPREHENSIVE CANCER
CENTRE

SCH1/ CCCC

Stormwater Management Plan

Civil

SSD No.10831778

SCH-CIV-RPT-00000

Revision: 02

Report Amendment Register

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1. Introduction

The purpose of this Report is to support the State Significant Development Application (SSDA) for the Sydney Children's Hospital Stage 1 (SCH1)/ Children's Comprehensive Cancer Centre (CCCC) (the project) at Randwick Campus Redevelopment area. This report responds to *item 16 Stormwater Drainage* outlined in the Secretary's Environmental Assessment Requirements (SEARs) issued 2 December 2020 for State Significant Development Application (SSDA) 10831778:

- Provide:
 - o a preliminary stormwater management plan for the development that:
 - is prepared by a suitably qualified person in consultation with Council and any other relevant drainage authority
 - details the proposed drainage design for the site including on-site detention facilities, water quality measures and the nominated discharge point
 - demonstrates compliance with Council or other drainage authority requirements."
 - o stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties.
- Where drainage infrastructure works are required that would be handed over to Council, provide full hydraulic details and detailed plans and specifications of proposed works that have been prepared in consultation with Council and comply with Council's relevant standards.

This report is to be read conjunction with the civil drawing package in Appendix A.

2. Site Description

2.1. Location

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 2.1 Location.....5

2.2.

The existing Randwick Hospital Campus is bound by High St to the north, Barker St to the south, Avoca St to the east and Hospital Rd to the west. The Sydney Children's Hospital Stage 1/Children's Comprehensive Cancer Centre (SCH1/CCCC) proposed development site was identified by the precinct master planning for future expansion of the Hospital Campus. The proposed development is located to the west of the existing campus and is bound by High St to the north, Magill to the south, Hospital Rd to the east and the University of New South Wales (UNSW) Kensington campus/Botany St to the west.

The SCH1/CCCC occupies the north east portion of the Randwick Campus Redevelopment (RCR) whilst the western portion is occupied by the UNSW Health Transition Hub (HTH) development. The SCH1/CCCC site lies immediately to the west of the existing SCH. Both of these developments lie to the north of the Integrated Acute Services Building (IASB) currently under construction. Refer to Figure 2.1 and 2.2 below. The site is located within the Randwick Local Government Area.

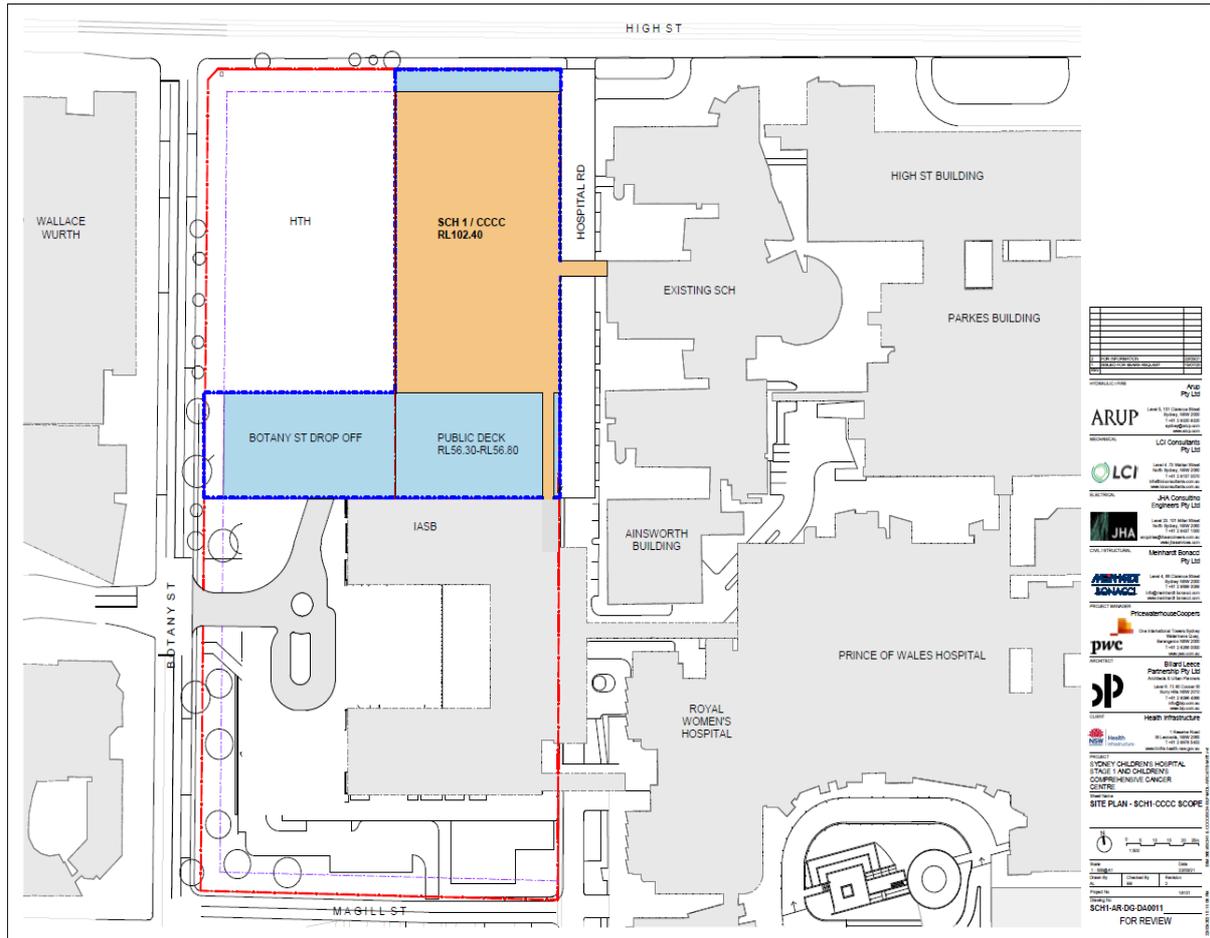


Figure 2.1 Architectural Site Plan – SCH1 – CCCC SCOPE

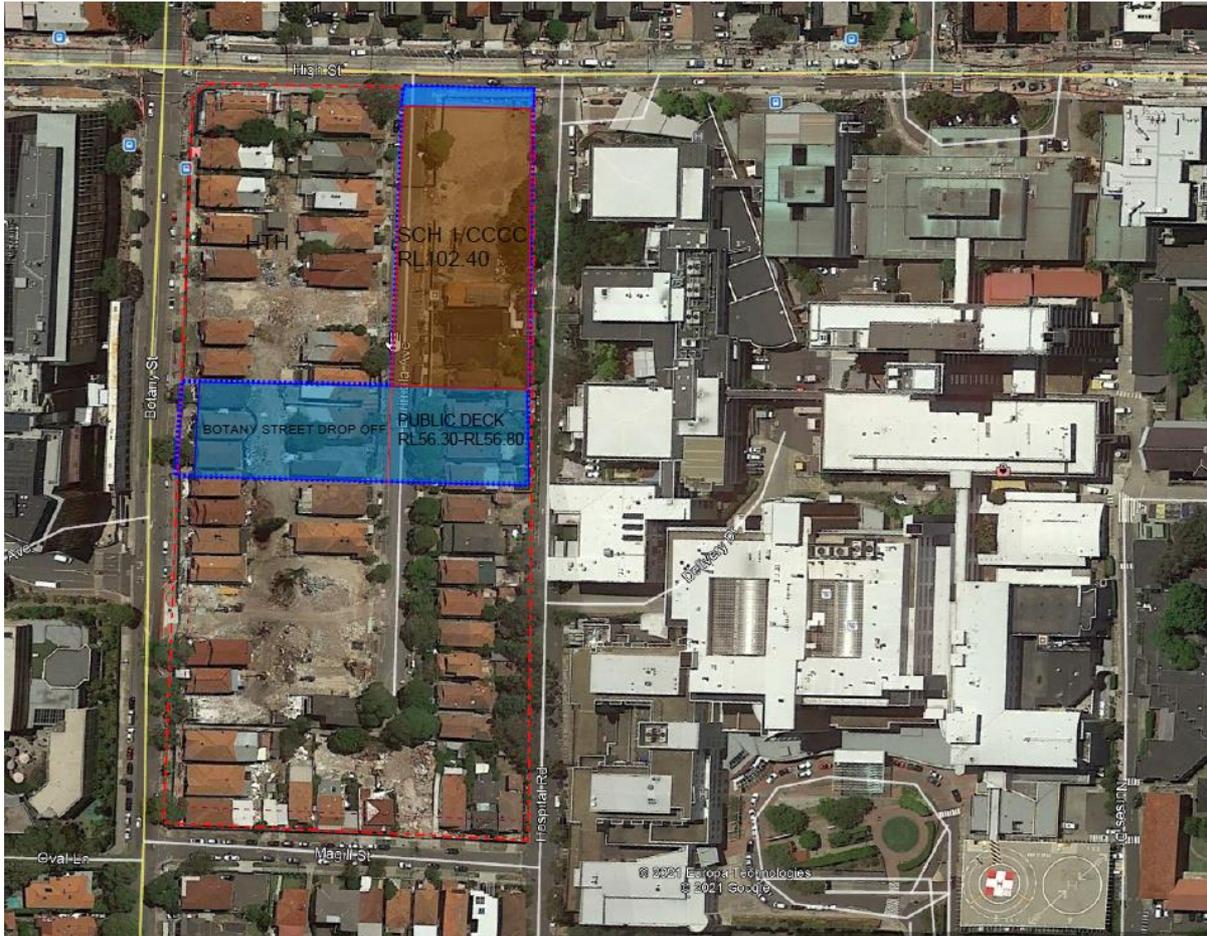


Figure 2.2 Aerial image of the site

2.3. Existing Topography and Drainage System

Multiple survey exercises have been carried out to reveal the site topography and underground services condition. The following information has been extracted from the survey investigations:

- The existing site has a general grading from northeast at RL 55.3 to southwest at RL 51.00 with an average grade of approximately 4%. Majority of the site has been stripped and the bulk excavation works for the southern IASB development has been carried out.
- There is an existing stormwater drainage culvert running west along High Street north of the site and then running along Botany Street to the south. As documented in the Early and Enabling Works package prepared by ACOR Consultant in February 2019, there are multiple pits installed with the culvert serving the purpose of intaking surface runoff and surcharging water at the desired locations.
- There is an existing 1050mm diameter stormwater drainage line running in the east-west direction close to the southern boundary within the site with pipe grading at approximately 0.8%.
- There is an existing kerb inlet pit east of the site on Hospital Road.
- There are 3 existing kerb inlet pits north of the site on High Street.

3. Proposed Development - Civil

3.1. General Description

The current site comprises land which has been cleared of residential buildings. The civil works for the project will include the excavation across the majority of the site for a basement structure, relocation or decommission of existing stormwater system and the construction of a site stormwater system which discharges into the existing infrastructures.

Preliminary civil engineering drawings are provided in Appendix A at the rear of this report.

3.2. Design Criteria

The following documents have been used as guidance for the proposed stormwater and civil works:

- Randwick City Council Private Stormwater Code (March 2013);
- Randwick City Council Development Control Plan 2013.

In addition to above, the civil and stormwater related requirements listed out in SEARs have also been considered and addressed in the sections below.

3.3. Mitigation Measures

3.3.1. Stormwater Drainage

Randwick City Council Private Stormwater Code (March 2013) outlines that the underground drainage system is designed to capture and convey stormwater for storm events up to and including 1 in 20 year Average Recurrence Interval (ARI) rainfall intensity. A significant proportion of the stormwater will be collected on the suspended podium. This will need to be constructed with suitable drainage and falls to ensure that freeboard is provided to the entrances to the new building and that any overflow is discharged away from the building and does not enter any of the buildings in the precinct. Majority of the ground level surface within the site is suspended, rainwater outlets are the main inlet system, downpipes are used to convey stormwater to detention system for water quantity control. Refer to Arup's Hydraulic Report accompanying the SSDA and drawings for drainage layout internal of the building suspended floor areas.

3.3.2. Water Quantity Control Measures

Randwick City Council requires that the most areas in the city of Randwick provide on-site detention (OSD) system for new developments. OSD system is required to ensure the stormwater discharge does not exceed the maximum Permissible Site Discharge (PSD). In consultation with Council Stormwater Engineer, any OSD and PSD calculation shall follow the method outlined in the Randwick City Council Private Stormwater Code (March 2013) as shown below.

The map below shows the areas that require OSD. The site is located within the North Ward catchment and requires OSD for any new development in the area.

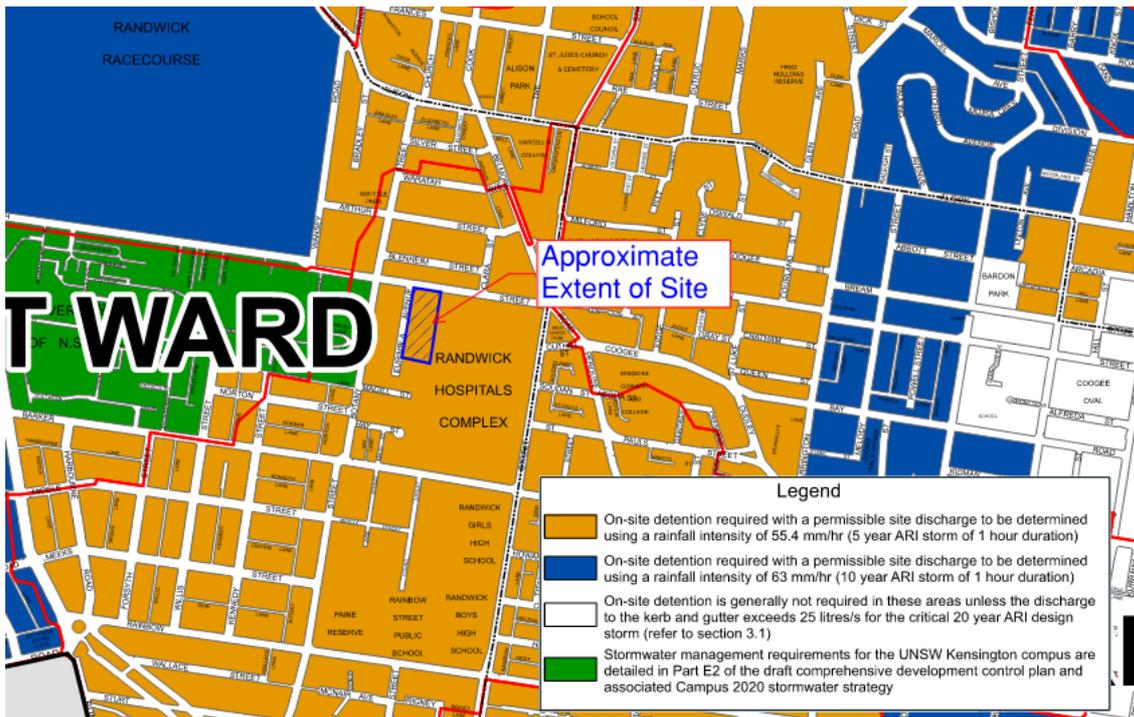


Figure 3.1 - On-Site Detention Map (Private Stormwater Code by Randwick City Council, March 2013)

In accordance with Randwick City Council's *Private Stormwater Code*, the PSD rate should be calculated using the formula below:

$$PSD = \frac{C \cdot I \cdot A}{3,600} \text{ l/s}$$

Where PSD = Permissible Site Discharge (l/s)

C = Co-efficient of Run-off (use AR & R, 1987 method. The pervious area run-off co-efficient for Randwick City is 0.6054)

A = Site Area (m²)

I = Rainfall Intensity (mm/hr) from Appendix A or B.

Based on the site area, and rainfall intensity (determined based on the location of the site as indicated in Figure 3.1) and the runoff coefficient (estimated at 0.85 based on the assumption that 80% of the existing site is impervious), the PSD is calculated as 100.9 L/s.

The minimum required volume for the detention tank storage is determined using the Mass Curve Technique detailed in Australian Rainfall and Runoff 1987, the minimum OSD storage volume is 320m³ as shown in Figure 3.2 below.

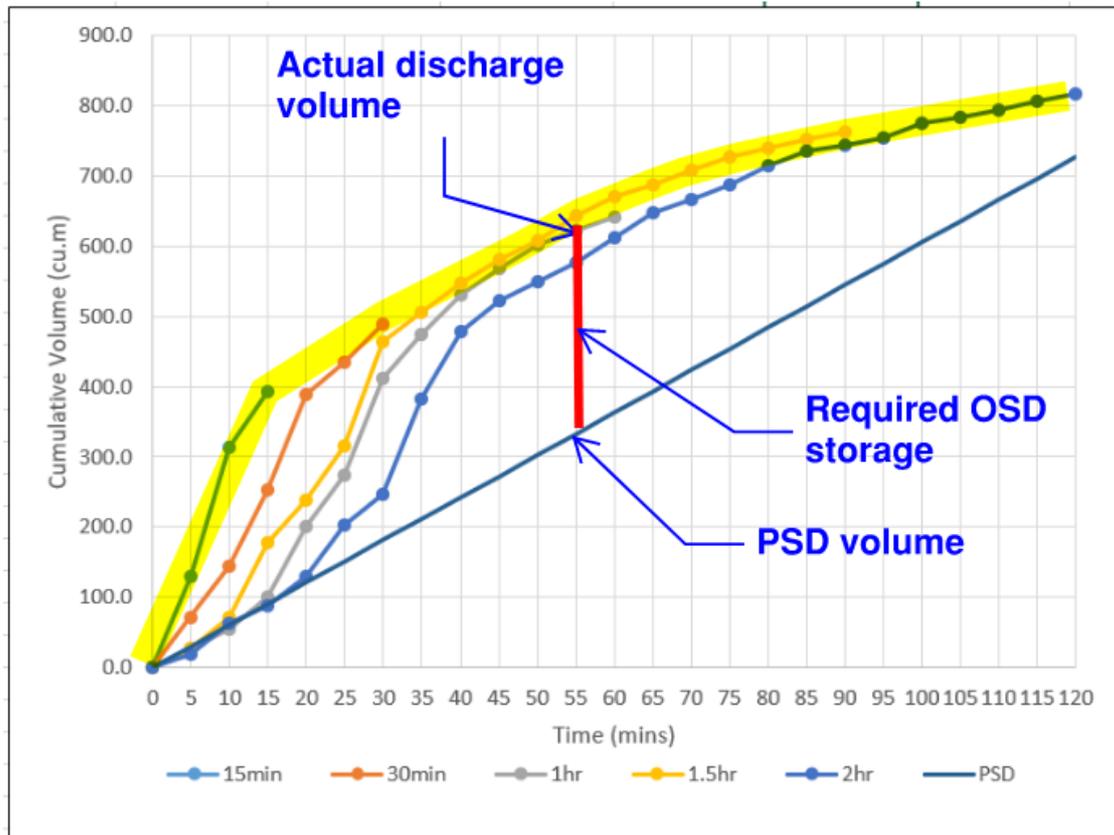


Figure 3.2 - Mass Curve Technique to Determine Minimum Required OSD Storage

In order to limit the stormwater bypassing the water quantity control system, it is proposed that 3 different OSD systems are to be placed on north, southwest and southeast of the site. See Figure 3.3 below for OSD locations and refer to Table 1 for catchment sizes for each OSD system.

The outlet from the southwest OSD basin (OSD 1) will make connection to the existing drainage system south of the site running in the east-west direction.

The outlet from the southeast basin (OSD 2) will make connection the existing drainage line on Hospital Road.

The outlet from the north basin (OSD 3) will make connection to the existing drainage line on High Street.

OSD Number	OSD Location	Catchment Size (m ²)	OSD Size (m ³)	Discharge Point	Discharge Flow Rate (l/s)
1	Southwest	4790.4	230	Existing drainage south of the site running in east-west direction towards Botany Street	37
2	Southeast	1339.7	70	Existing drainage on Hospital Road	24
3	North	2002.6	80	Existing drainage on High Street	26
Total Discharge Flow Rate - 1 in 100 Year ARI					87

Table 1 OSD Design and Post-development Flow Rates

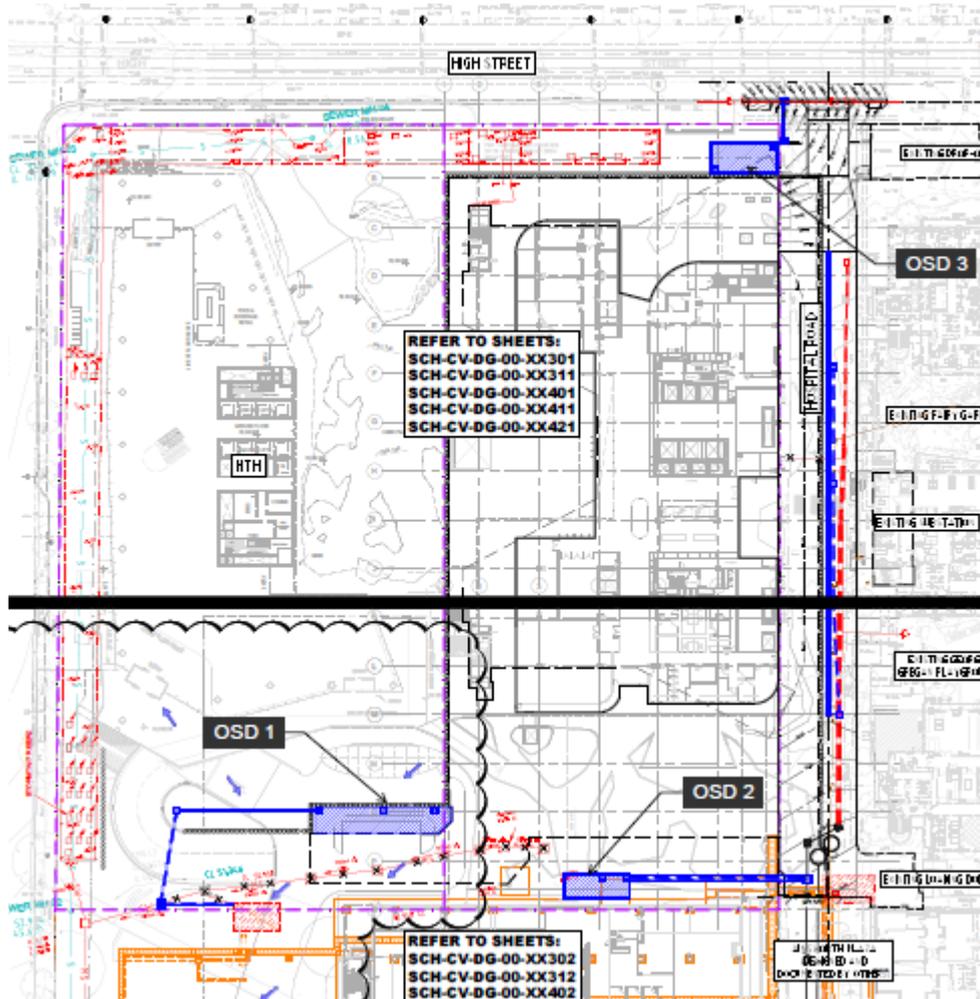


Figure 3.3 - Proposed OSD Locations and Points of Discharge

The post-development flow rates from 3 OSD systems are listed in table above. The total stormwater site discharge after mitigation with detention systems is 87 l/s which is less than the PSD 100.9 l/s. The total detention system volume is 380 m³ which is more than the minimum detention storage of 320 m³ requirement set by Council for the proposed development.

3.3.3. Water Quality Mitigation Measures

The treatment of the stormwater flows discharged from the site will be required. As no specific water quality control extent has been outlined in Randwick Council DCP, below pollutant reduction rate has been adopted for the project.

Pollutant	Applicable to Project	Reduction Target (% of the typical urban annual load).
Total Suspended Solids (TSS)	Yes	80%
Gross Pollutants	Yes	85%
Total Nitrogen (TN)	Yes	30%
Total Phosphorus (TP)	Yes	30%

Figure 3.4 - Pollutant Removal Target (CSIRO, 2005)

A model has been created in MUSIC (version 6.3) water quality treatment modelling software reflecting a simplified version of the current proposed development. The results in Figure 3.5 indicate that the treatment train proposed including 16 stormfilter cartridges, 6 Enviropods satisfy the adopted pollutant removal targets outlined in Figure 3.4. The required measures will be confirmed during design development. 16 stormfilter cartridges will be installed in the OSDs with below distribution:

- 9 stormfilter cartridges for OSD 1
- 3 stormfilter cartridges for OSD 2
- 4 stormfilter cartridges for OSD 3

The total post-development pollutant reduction rate is as shown below which satisfied the water quality treatment targets.

	Sources	Residual Load	% Reduction
Flow (ML/yr)	5.96	5.96	0
Total Suspended Solids (kg/yr)	565	101	82
Total Phosphorus (kg/yr)	1.5	0.417	72.1
Total Nitrogen (kg/yr)	14.6	7.06	51.8
Gross Pollutants (kg/yr)	175	0.233	99.9

Figure 3.5 - Water Quality Modelling Results

3.3.4. Sediment and Erosion Control Schemes

The erosion and sediment control measures for the site will be implemented during construction. The design of these measures are to be in accordance with the Landcom "Blue Book". Refer to the civil drawing package in Appendix A for the sediment and erosion control plans.

For erosion and sediment control of the site, the following measures are provided to minimise the risk of sediments laden runoff being discharged from the site, a sediment and erosion control plan will be provided in design development stage:

- A sediment fence/hoarding to be provided around the site
- Catch drain (or diversion bund) diverting external catchment away from site
- Temporary access to site with shaker pad
- An indicative stockpile area with sediment fence around it during construction. The stockpile must be located out of water flow paths (and be protected by earth banks/drains as required).
- Geotextile inlet pit filters or sandbags to be placed around existing stormwater pits.
- Water cart to spray excavated surfaces to reduce dust pollution.
- All disturbed areas are to be stabilised within 14 working days of the completion of earthworks. All disturbed areas are to be protected so that the land is permanently stabilised within six months.
- Sediment removed from any sediment trapping device shall be relocated where further pollution to downslope lands and waterways cannot occur.
- Water shall be prevented from entering the permanent drainage system unless it is sediment free. Drainage pits are to be protected in accordance with the final approved Sediment and Erosion Control Plan.
- Trapped sediment shall be removed immediately from areas subject to runoff or concentrated flow.
- Trapped sediment shall be removed where the capacity of sedimentation trapping devices fall below 60%.