STORMWATER SSDA REPORT (SSD 10352)

MORIAH COLLEGE REDEVELOPMENT

JHA

JHASERVICES.COM

DOCUMENT CONTROL SHEET

Project Number	190310
Project Name	Moriah College Redevelopment
Description	Stormwater SSDA Report (SSD 10352)
Key Contact	Michael Chavet

Prepared By

Company	JHA
Address	Level 23, 101 Miller Street, North Sydney NSW 2060
Phone	61-2-9437 1000
Email	michael.chavet@jhaengineers.com.au
Website	www.jhaservices.com
Author	Michael Chavet
Checked	Michael Chavet
Authorised	Michael Chavet

Revision History

Issued To	Revision and Date						
Aver	REV	P1					
	DATE	30/08/2019					
Aver	REV	P2					
	DATE	09/09/2019					
Aver	REV	P3					
	DATE	11/09/2019					
Aver	REV	P4					
	DATE	03/10/2019					

CONTENTS

1 INTRODUCTION

1.1 OVERVIEW

This stormwater report has been prepared by JHA Consulting Engineers on behalf of the Moriah College / Aver Management Pty Ltd (the Applicant).

The stormwater report accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD 10352) for the new Moriah College Redevelopment on Lot 3 DP 701512 (3 Queens Park Road) and Lot 22 DP 879582 (101 York Road) in Queens Park, NSW.

The proposal seeks consent for the demolishing of five existing buildings and a tennis court to accommodate two new buildings. The two new buildings will consist of a four-storey STEAM building and a three storey new ELC. The proposed works will be undertaken over multiple stages with Phase 1 involving the STEAM building and Phase 2 involving the ELC building.

The purpose of this stormwater report is to demonstrate compliance with the SEARs. This report shall be read in conjunction with the architectural design drawings and other consultant design reports submitted as part of the application. The objective of this stormwater assessment is to determine the necessary stormwater strategies and measures to mitigate stormwater impacts to downstream properties

1.2 STANDARDS AND REGULATIONS

In addition to complying with the brief, the design is in accordance with the following relevant Codes and Standards:

- AS/NZS 3500.3- 2015 Plumbing and Drainage – Stormwater Drainage
- Australian Rainfall and Runoff 2019
- Waverley Development Control Plan 2012
- Waverly Council Water Management Technical Manual 2014
- Secretary's Environmental Assessment Requirements (SEARs) for SSD 10352
- Soils and Construction - Managing Urban Stormwater 2004

1.3 RESPONSE TO SEARS

The stormwater report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) for SSD 10352. Table 1 identifies the relevant SEARs requirements.

Table 1 SEARs and Relevant Reference

SEARs Item	*SEARs Deliverable*	*Report Reference*
8. Ecologically Sustainable Development (ESD) *Include a framework for how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low-carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy.* *Provide a statement regarding how the design of the future development is responsive to the CSIRO projected impacts of climate change, specifically:* • *Hotter days and more frequent heatwave events* • *Extended drought periods* • *More extreme rainfall events* • *Gustier wind conditions* • *How these will inform landscape design, material selection and social equity aspects (respite/shelter areas).*	*Ecologically Sustainable Development Report to be prepared.*	The water sensitive urban design component of this item is shown in Section 2.4
14. Utilities *Prepare an Integrated Water Management Plan detailing any proposed alternative water supplies, proposed end uses of potable and non-potable water, and water sensitive urban design.*	*Integrated Water Management Plan to be prepared. To review existing drainage and flooding conditions – provide an assessment of proposed impacts/ changes.*	The water sensitive urban design, existing drainage and flooding components of this item are shown in Section 2
16. Drainage *Detail measures to minimise operational water quality impacts on surface waters and groundwater.* *Stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties.*	*To be addressed in the Integrated Water Management Plan.*	Section 2.3 and 2.4

17. Flooding		
Identify flood risk on-site (detailing the most recent flood studies for the project area) and consideration of any relevant provisions of the NSW Floodplain Development Manual (2005), including the potential effects of climate change, sea level rise and an increase in rainfall intensity. If there is a material flood risk, include design solutions for mitigation.	*To be addressed in the Integrated Water Management Plan.*	Section 2.2
19. Sediment, Erosion and Dust Controls		
Detail measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and fine particles.	*Sediment and Erosion Control Plan to be provided.*	Section 3

2 STORMWATER DRAINAGE

2.1 EXISTING STORMWATER DRAINAGE

2.1.1 DEVELOPMENT SITE

Moriah College is located south of Queens Park Road adjacent to Centennial Park. Based on 2013 NSW Spatial Services LiDAR data, the main centre of the school (within the main semi-circle of buildings) is a generally large flat and high area which then slopes away from the centre towards all the surrounding roads. York Road at the southern end of the site slopes to the east at 3% and Baronga Avenue slopes to the south at about 1-2%. This results in a sag point in Baronga Avenue adjacent to the southern tennis courts with a number of sag pits in the street. There is a crest in Queens Park Road near Alt Street which slopes to the west at about 3% and to the east at about 4%. York Road in the west slopes to the north at about 3% with a sag in the road adjacent to Building U. Refer to Figure 1 for ground surface models based on LiDAR data.

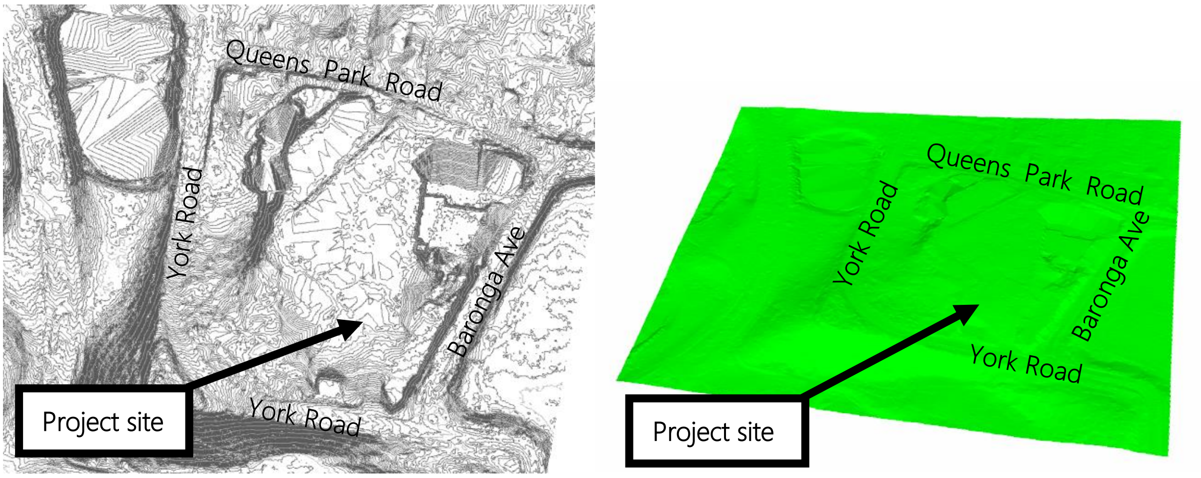

Figure 1 Kensington and Centennial Park Critical Duration Analysis 1% AEP Event (Randwick City Council, 2019)

2.1.2 SITE INSPECTION

The stormwater services at the project site at Moriah College were visually inspected for their existing conditions. Areas inspected include the southern carpark, southern tennis courts, York Rd and Baronga Ave intersection and the areas surrounding buildings A, B, C, D, E, F, G and Z.

Drainage features inspected include drainage pits, pipes, detention tanks, dish drains, trench drains and the site topography for overland flow drainage. Available site survey, LiDAR, flood information and old design drawings were also reviewed.

Generally, drainage pits appeared to be located suitably throughout the site. No ground surface ponding was evident at the site, and most pits inspected were in an acceptable condition and appeared to be functioning properly.

However the pit in one of the southern tennis courts and a pit between building E and building A need to be cleared of the debris which is blocking the connecting pipes (refer to Figure 2 and Figure 3 below). It is noted that this pit will be removed as part of the works as Building A, Block D, and the tennis courts are demolished. The downstream pipes at these two pits should be investigated for damage once cleared of debris to ensure that the pipes are not damaged. If blockage issues continue at these pits and there is no damage evident in the pipes, the issue may be that the pipes do not grade adequately, in which case they will need to be redesigned and reconstructed to achieve a suitable free draining solution.

Figure 2 Blocked pit in southern tennis court

Figure 3 Blocked pit between buildings E and A

Some pits adjacent to buildings G, F, C and B to the south were up to three metres deep and were too deep to view connecting pipes. We cannot comment on the condition of any stormwater drainage pipes as CCTV investigations would need to be carried out for this. It is recommended that CCTV investigations of the stormwater drainage network be undertaken as part of construction certificate drawings.

An underground on-site stormwater detention (OSD) tank was also apparent from the inspection risers located at the southern end of the site in the proposed mini-bus drop-off and delivery zone in the car park.

2.1.3 SURVEY AND OLD STORMWATER DRAINAGE DRAWINGS

The 2017 and 2019 surveys has picked up the 2-dimensional geometry of all stormwater pits and also provided some pit invert levels. Full survey for the site should include all buildings and utilities. Survey of existing stormwater drainage networks should include 3-dimensional geometry of all pits at the surface as well as the invert levels, direction and diameters of all connecting pipes to properly inform the design.

Old stormwater drainage drawings for the College by Arup in 1990 were sourced by JHA from the school's archives (refer to Figure 4 below).

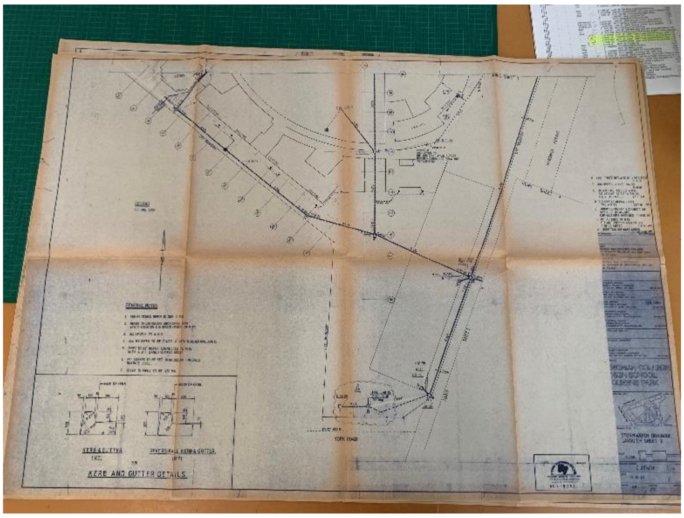

Figure 4 Stormwater Drawings for Moriah College (Arup, 1990)

2.1.4 EXISTING DRAINAGE AND THE PROPOSED DEVELOPMENT

Existing stormwater drainage within proposed building footprints will need to be decommissioned. Existing stormwater drainage lines outside of building footprints have been retained where possible. Some existing drainage lines have been proposed to be replaced and upgraded as they do not meet current standards.

2.2 EXISTING FLOOD BEHAVIOUR

A review of available flood information has not shown any information that would indicated that the site is affected by major flooding or overland flow paths (refer to Figure 5 below).

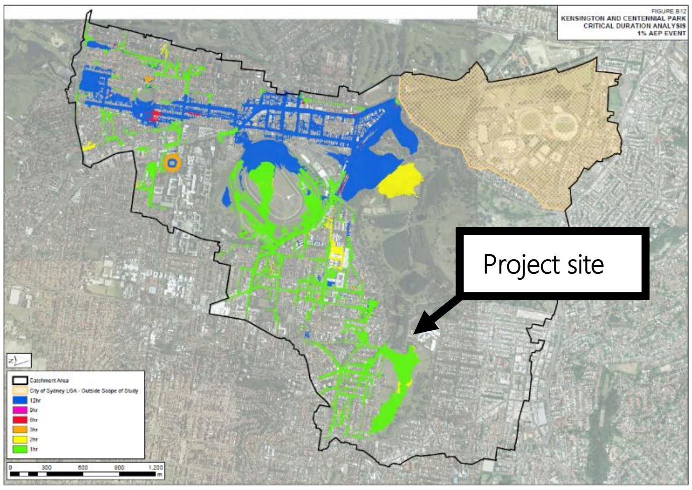

Figure 5 Kensington and Centennial Park Critical Duration Analysis 1% AEP Event (Source: Kensington – Centennial Park

2.3 PROPOSED DRAINAGE STRATEGY

Since the proposed development will not result in any increase in impervious area, it is unlikely that this project will increase stormwater flows from the site when compared to the existing scenario.

However, Waverly Council's Water Management Technical Manual notes that the OSD requirement is triggered by any of the following conditions:

1. New development
2. Increase in impervious area ≥ 50m2
3. Additional storey or part of
4. Total cost of Development is more than $100,000

This project would still require OSD under Waverly Council specifications as it falls under conditions 1, 3 and 4 above. Therefore, the stormwater drainage design has incorporated an OSD system in order to satisfy Council specifications and has been located at the downstream portion of the site prior to discharging offsite.

The stormwater drainage system has been designed for the critical 1% AEP storm and overland flow paths have been checked for the peak 1% AEP storm. The OSD system has been designed to reduce the critical 1% AEP flow for the development site to less than the pre-development 20% AEP critical flow for the development site, as required by Waverly Council (refer to Table 2). The drainage system has been modelled in 12d incorporating all hydrological and hydraulic components.

Table 2 Pre and Post Development Stormwater Discharges

Pollutant	Stormwater discharge (m^3/s)
Pre-development critical 20% AEP	$0.541m^3$
Post-development critical 1% AEP	$0.514m^3$

The stormwater drainage system comprises of a number of surface inlet pits to collect surface runoff from the site before connecting via an in-ground pipe network to the Council stormwater drainage system in Baronga Avenue. Allowances for downpipe connections have also be made. For details of the building's roof drainage and basement drainage design, refer to the hydraulic drawings.

The stormwater drainage design will be coordinated with all existing and proposed utilities to resolve all potential clashes at future design stages.

The geotechnical assessment report authored by Douglas Partners in August 2019 has noted that the Acid Sulphate Soil Risk Map for Botany Bay published by the Department of Conservation and Soil Management indicates that the site is in an area of no known occurrence of acid sulphate soils.

2.4 PROPOSED STORMWATER QUALITY IMPROVEMENT STRATEGY

The proposed development includes a SPEL Vortceptor SVI.055.M.L gross pollutant trap and a Humeceptor STC 27 oil water separator, which have been modelled in MUSIC to ensure the proposed stormwater treatment targets as shown below in Table 3 have been met. These devices are provided at the end of the stormwater drainage line for the site, prior to discharge to the street drainage system. It is noted that the SEARs and Waverly Council do not specify specific stormwater treatment targets, so the stormwater treatment targets proposed in the ESD report by Northrop in September 2019 have been adopted.

Table 3 Proposed Stormwater Treatment Targets for Development

Pollutant	Performance Target Reduction Loads	Project Reduction Loads
Gross pollutants	85% reduction in the post development mean annual load of total gross pollutants (greater than 5mm)	94.4% reduction in the post development mean annual load of total gross pollutants (greater than 5mm)
Total suspended solids	80% reduction in the post development mean annual load of Total Suspended Solids (TSS)	87.9% reduction in the post development mean annual load of Total Suspended Solids (TSS)
Total phosphorus	30% reduction in the post development mean annual load of Total Phosphorus (TP)	46.4% reduction in the post development mean annual load of Total Phosphorus (TP)
Total nitrogen	30% reduction in the post development mean annual load of Total Nitrogen (TN)	30.2% reduction in the post development mean annual load of Total Nitrogen (TN)
Total petroleum hydrocarbons	60% reduction in the post development mean annual load of Total Petroleum Hydrocarbons	99% removal efficiency for > 100ppm
Free oils	90% reduction in the post development mean annual load of Free Oils	99% removal efficiency for > 100ppm

3 SEDIMENT AND EROSION CONTROL

3.1 GENERAL

A Soil and Water Management Plan has been provided in accordance with Landcom's Soils and Construction Managing Urban Stormwater (2004).

3.2 EROSION CONTROL

Erosion control is the most fundamental aspect of managing stormwater during construction, since erosion is the cause of sedimentation. Maintaining the existing ground cover is the simplest form of erosion control, and involves limiting ground disturbance only to the areas where required, and limiting the duration of the ground disturbance to the time required to undertake the work.

Boundary fencing is a key erosion control measure that should be installed around the project site in order to clearly delineate the worksite, and reduce the likelihood of any works or stockpiling outside of the boundary fence. The boundary fencing also allows vehicular access to the site to be limited to just one stabilised access way. Traffic control should be utilised, and vehicle traffic and parking should be confined to proposed or existing roads where possible. Within the boundary fencing, earthworks should be kept to only the areas where it is required, and areas not to be disturbed should be marked off.

Runoff from the catchment upstream of the works area should be diverted away from the project site in order to reduce the amount of water that flows through the site, thus minimising the erosion potential.

Stockpiling shall be proposed in a location that provides easy access and minimal traffic through the site. Stockpiles should be protected with a diversion bund on the upstream side so that the amount of stormwater impacting the stockpiles is minimised. Erosion can also be caused by wind and can cause dust impacts. Stockpiles and other areas with exposed soil should be sprayed with water to keep them damp, but should not be saturated to the point of causing water runoff.

3.3 SEDIMENT CONTROL

Sedimentation control is required as it is not practical to prevent all erosion. Since the disturbed area of the site is expected to be greater than 2,500m^2, a temporary sedimentation basin is required. The minimum required volume of the sedimentation basin depends on various factors including the site area, slope, soil type and rainfall and is to be a 118m^3 earth basin - wet. The basin is to be located at the downstream portion of the site. Catch drains should be provided to ensure that the site drains to the sediment basin(s). Sediment fences should be provided on the downstream side of the site, as well as on the downstream side of stockpiles and the sediment basin.

Truck wash facilities should be provided at the site access point to clean all vehicles exiting the site to ensure materials and mud is not transported and deposited off site. Water from any wash bay should be diverted to the sediment basin prior to discharge.

4 SUMMARY AND CONCLUSIONS

This report forms part of the documentation package to be submitted to the Department of Planning as part of the State Significant Development Application.

This report establishes that stormwater drainage has been designed to a suitable level, avoids any stormwater impacts to downstream properties through the use of an on-site stormwater detention system, stormwater quality improvement devices and sediment and erosion control measures. The proposed development is likely to result in improved stormwater drainage conditions, particularly considering that considerable sections of the existing site drainage is being upgraded to meet current standards. It has also been shown that available flood information for the site indicates that it is not affected by major flooding.

An integrated water management plan will be provided in conjunction with future design issues that will incorporate all the stormwater elements proposed in this report, as well as those proposed in the future hydraulic design package.