



Stormwater Management Report

Redevelopment of Greenwich Hospital

Greenwich Hospital
97 – 115 River Road, Greenwich

Our Ref: CC140088

March 2018

PLANNING
PROJECT MANAGEMENT
ENGINEERING
CERTIFICATION

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1 Introduction

This report has been prepared to provide an overview of the stormwater management system proposed on the plans prepared by Barker Ryan Stewart, numbered CC10088E4-1 dated 23/02/2018, supporting a State Significant Development (SSD) Concept Development Application for the redevelopment of Greenwich Hospital.

Preliminary investigations of the stormwater management system and collection devices has been carried out in accordance with Lane Cove Councils DCP 2010 Part O Stormwater Management.

In determining the size and location of the stormwater system devices the following points have been considered:

- The existing site conditions, site constraints and the intended usage of the site.
- Lane Cove Council DCP and relevant standards

2 Site Analysis

2.1 Site Location

Greenwich Hospital is located at 97 – 115 River Road, Greenwich, the real property descriptions are Lot 3 and Lot 4 DP 584287, as shown in Figure 1. The site is roughly rectangular in shape and incorporates an area of approximately 3.376ha. The topography of the site rises towards the centre from the south-eastern and south-western property boundaries, with the south-western part of the site falling steeply away towards Gore Creek. The location of the site is shown in Figure 1 below.



Figure 1:

2.2 Proposed Development

Development consent is sought for Concept Plan approval for redevelopment of Greenwich Hospital. The concept plan is shown in architectural drawings prepared by Brickerton Masters Architecture and involves the construction of a new hospital building, seniors living apartments and residential aged care. The demolition of existing buildings and structures on site (excluding Pallister House) is required to accommodate the proposed redevelopment of Greenwich Hospital.

3 On Site Detention

3.1 Lane Cove Council Requirements

In accordance with Section O.7 of the Lane Cove Development Control Plan, all commercial developments and redevelopment where the footprint of the building is altered will require OSD.

Lane Cove Council take a prescriptive approach to on site detention design. From Section O.7.4 of the Lane Cove Development Control Plan, Council's requirements for on site detention are as follows:

- The Permissible Site Discharge (PSD) from all developments shall not exceed one hundred and forty litres per second per hectare (140l/s/ha).
- The Site Storage Requirement (SSR) shall be designed to provide for 0.025m³ for each square metre of basin catchment.
- Stormwater runoff from all new impervious areas should be routed through the OSD system. It is not necessary to route runoff from pervious surfaces through the detention system.

3.2 On Site Detention Concept Design

Considering the existing topography of the site and the proposed development, the site has been broken into four sub catchments for the purpose of the on site detention concept design:

1. The proposed hospital and seniors living apartments within existing Lot 3 D.P.584287.
2. The proposed northern seniors living villas within existing Lot 4 D.P.584287.
3. The proposed southern seniors living villas within existing Lot 4 D.P.584287.
4. Pallister House within existing Lot 4 D.P.584287. No demolition, alterations or additions are proposed to the heritage listed Pallister House and as such no alteration to the existing drainage system is proposed for the Pallister House catchment.

3.2.1 Hospital and Seniors Living Catchment

The hospital redevelopment catchment has a total catchment area of approximately 19,000 m² and drains to Gore Creek at the south west corner of the site. The south-western part of the site falls steeply away towards Gore Creek. An existing concrete dish drain intercepts storm water runoff along part of the western boundary of the site. An existing 750mm diameter storm water pipe and overland flow path convey storm water from the site to Gore Creek.

From plans approximately 13,000 m² of new impervious surfaces are proposed.

In accordance with Section O.7 and Appendix 14 of the Lane Cove Development Control Plan, the permissible site discharge and on site detention volume for the hospital redevelopment catchment are estimated in the following table:

<u>Hospital Redevelopment</u>		
Site Area	19000	m ²
Total Impervious Area	13000	m ²
Total Impervious Area Drainage to Storage Facility	13000	m ²
New Impervious Area Bypassing Storage Facility	0	m ²
<u>Permissible Site Discharge</u>		
PSD = 140 l/s/ha	0.182	m³/s
<u>Storage Volume</u>		
G = 0.0255 m ³ /m ² for all catchments	332	m³

At a meeting with Lane Cove Council on 25 October 2017, Council advised that all new impervious areas should where practical drain into the existing stormwater line. Overflow from the detention tank and runoff from pervious surfaces will be directed to the existing discharge point in accordance with Council's advice.

It is considered that there is sufficient undeveloped area at the south west of the proposed hospital buildings to allow construction of a suitable on site detention facility. Further information will be provided as part of the subsequent, detailed development application.

3.2.2 Northern Seniors Living Villas

The northern seniors living villas have a catchment area of approximately 4,000m² and drain to St Vincents Road. From plans approximately 1,000 m² of new impervious surfaces are proposed.

In accordance with Section O.7 and Appendix 14 of the Lane Cove Development Control Plan, the permissible site discharge and on site detention volume for the hospital redevelopment catchment are estimated as follows:

<u>Seniors Living (North)</u>		
Site Area	4000	m ²
Total Impervious Area	1000	m ²
Total Impervious Area Drainage to Storage Facility	1000	m ²
New Impervious Area Bypassing Storage Facility	0	m ²
<u>Permissible Site Discharge</u>		
PSD = 0.014 l/s/m ²	0.014	m³/s
<u>Storage Volume</u>		
G = 0.0255 m ³ /m ² for all catchments	26	m³

It is considered that there is sufficient undeveloped area on site to allow construction of a suitable on site detention facility, either as a separate facility or as a combined OSD and rainwater reuse tanks to facilitate the storage and treatment of stormwater on-site. Overflow from the detention system can be provided to the street kerb in St Vincents Road in accordance with the requirements of the DCP. Further information will be provided as part of the subsequent, detailed development application.

3.2.3 Southern Seniors Living Villas

The southern seniors living villas have a catchment area of approximately 2,000m² and drain to St Vincents Road. From plans approximately 750 m² of new impervious surfaces are proposed.

In accordance with Section O.7 and Appendix 14 of the Lane Cove Development Control Plan, the permissible site discharge and on site detention volume for the hospital redevelopment catchment are estimated as follows:

Seniors Living (South)		
Site Area	2000	m ²
Total Impervious Area	750	m ²
Total Impervious Area Drainage to Storage Facility	750	m ²
New Impervious Area Bypassing Storage Facility	0	m ²
<u>Permissible Site Discharge</u>		
PSD = 0.014 l/s/m ²	0.011	m³/s
<u>Storage Volume</u>		
G = 0.0255 m ³ /m ² for all catchments	19	m³

It is considered that there is sufficient undeveloped area on site to allow construction of a suitable on site detention facility, either as a separate facility or as a combined OSD and rainwater reuse tanks to facilitate the storage and treatment of stormwater on-site. Overflow from the detention system can be provided to the street kerb in St Vincents Road in accordance with the requirements of the DCP. Further information will be provided as part of the subsequent, detailed development application.

4 Pollution and Nutrient Control

4.1 Lane Cove Council Requirements

Section O.7 of the Lane Cove Development Control Plan does not provide specific water quality requirements. In the absence of specific requirements, a treatment train is proposed within each sub catchment to ensure that the water quality of stormwater discharge from the proposed development is considered high in terms of best management practice (Water Sensitive Urban Design (WSUD)).

4.2 Treatment Train

4.2.4 Hospital and Seniors Living Apartments Catchment

The following water quality treatment is proposed within the hospital and seniors living apartments redevelopment catchment:

- Runoff from roof areas will be directed to rainwater tanks for reuse on site.
- Runoff from ground level impervious areas will be directed to a cartridge stormwater filter system to provide water quality treatment prior to discharge to the on site detention tank described in Section 3.2.1.
- Additional litter and sediment removal will be provided within the on site detention tank via a debris screen and sediment control sump provided at the tank outlet in accordance with Sections 7.4.6 and 7.4.7 of the DCP

Further information will be provided as part of the subsequent, detailed development application.

4.2.5 Seniors Living Villas Catchments (North and South)

Development of the seniors living villas at the east of the site proposes to retain much of the existing vegetation and propose very few ground level impervious areas that would generate additional pollutants. It is therefore considered that specific nutrient removal treatment devices are not necessary for these catchments.

The following water quality treatment is proposed within the seniors living villas catchments:

- Runoff from roof areas will be directed to rainwater tanks for reuse on site.
- Additional litter and sediment removal will be provided within the on site detention tank via a debris screen and sediment control sump provided at the tank outlet in accordance with Sections 7.4.6 and 7.4.7 of the DCP

Further information will be provided as part of the subsequent, detailed development application.

5 Conclusion

This report recommends the following water sensitive urban design measures to provide water quality and quantity control of storm water discharge from the proposed development:

- Proposed hospital and seniors living apartment redevelopment on Lot 3 DP584287 – Installation of rainwater re-use tank/s, an on-site detention system and a cartridge stormwater filter system to provide water quality treatment; and
- Proposed Independent Living Units (ILUs) located on Lot 4 DP684287 – Installation of combined OSD and rainwater reuse tanks to facilitate the storage and treatment of stormwater on-site.

It is considered that the proposed redevelopment of Greenwich Hospital is capable of incorporating appropriate stormwater devices to provide acceptable levels of water quality and maintain pre-development site discharge. Further information will be provided as part of the subsequent, detailed development application.

Appendix A - Storm Water Retention Volume & Reuse Calculations

Appendix 14 – OSD Calculation Sheet



PART O: STORMWATER

ON-SITE DETENTION CALCULATION SHEET

DEVELOPMENT TYPE: _____

ADDRESS: _____



Site Area (m ²)	<u>19,000</u>	(A)
Total Impervious Area (roofs, driveways, hardstand etc) (m ²)	<u>13,000</u>	(B)
Total Area draining to the Storage Facility (m ²) (impervious and pervious areas)	<u>13,000</u>	(C)
New Impervious Area bypassing the Storage Facility	<u>0</u>	(D)
$\frac{(B)+(D)}{(B)} =$	<u>1.</u>	(E)

cannot be greater than 1.25.

Permitted Site Discharge (PSD) rate per m²

If (D) = 0 then	PSD = 0.014 l/sec/m ²	
If (D) ≠ 0 then	PSD = 0.014 x (E) ^{-1.37} l/sec/m ²	<u>0.014</u> (F)

PERMITTED SITE DISCHARGE (l/s) (C) x (F) **182 l/s**

Storage Volume per m²
(G) = 0.0255 m³/m² for all Catchments 0.0255 (G)

SITE STORAGE REQUIREMENT (m³) ((C) + (D)) x (G) **332 m³**

OUTLET CONTROL - using a Sharp Edged Orifice Plate

Height Difference between top water level and Centre of Orifice (m) TBC (H)

ORIFICE DIAMETER (mm)

TBC at detailed design stage

$$\text{mm} = 21.9 \sqrt{\frac{PSD}{\sqrt{H}}}$$

Should pipe and pit losses be used to control outflow, the calculations are to be attached.

Appendix 14 – OSD Calculation Sheet



PART O: STORMWATER

ON-SITE DETENTION CALCULATION SHEET

DEVELOPMENT TYPE: _____

ADDRESS: _____

Seniors Living Villas (North) Catchment

Site Area (m ²)	<u>4,000</u>	(A)
Total Impervious Area (roofs, driveways, hardstand etc) (m ²)	<u>1,000</u>	(B)
Total Area draining to the Storage Facility (m ²) (impervious and pervious areas)	<u>1,000</u>	(C)
New Impervious Area bypassing the Storage Facility	<u>0</u>	(D)
$\frac{(B)+(D)}{(B)} =$	<u>1.0</u>	(E)

cannot be greater than 1.25.

Permitted Site Discharge (PSD) rate per m²

If (D) = 0 then	PSD = 0.014 l/sec/m ²	
If (D) ≠ 0 then	PSD = 0.014 x (E) ^{-1.37} l/sec/m ²	<u>0.014</u> (F)

PERMITTED SITE DISCHARGE (l/s) (C) x (F) **14 l/s**

Storage Volume per m²
(G) = 0.0255 m³/m² for all Catchments 0.0255 (G)

SITE STORAGE REQUIREMENT (m³) ((C) + (D)) x (G) **26 m³**

OUTLET CONTROL - using a Sharp Edged Orifice Plate

Height Difference between top water level and Centre of Orifice (m) TBC (H)

ORIFICE DIAMETER (mm) **mm** = 21.9 $\sqrt{\frac{PSD}{\sqrt{H}}}$

TBC at detailed design stage

Should pipe and pit losses be used to control outflow, the calculations are to be attached.

Appendix 14 – OSD Calculation Sheet



PART O: STORMWATER

ON-SITE DETENTION CALCULATION SHEET

DEVELOPMENT TYPE: _____

ADDRESS: _____

Seniors Living Villas (South) Catchment

Site Area (m²) 2,000 (A)

Total Impervious Area (roofs, driveways, hardstand etc) (m²) 750 (B)

Total Area draining to the Storage Facility (m²) (Impervious and pervious areas) 750 (C)

New Impervious Area bypassing the Storage Facility 0 (D)

$$\frac{(B)+(D)}{(B)} = 1. \quad (E)$$

cannot be greater than 1.25.

Permitted Site Discharge (PSD) rate per m²

If (D) = 0 then PSD = 0.014 l/sec/m²

If (D) ≠ 0 then PSD = 0.014x(E)^{-1.37} l/sec/m² 0.014 (F)

PERMITTED SITE DISCHARGE (l/s) (C) x (F) **11 l/s**

Storage Volume per m²
(G) = 0.0255 m³/m² for all Catchments 0.0255 (G)

SITE STORAGE REQUIREMENT (m³) ((C) + (D)) x (G) **19 m³**

OUTLET CONTROL - using a Sharp Edged Orifice Plate

Height Difference between top water level and Centre of Orifice (m) TBC (H)

ORIFICE DIAMETER (mm)

TBC at detailed design stage **mm** = 21.9 $\sqrt{\frac{PSD}{\sqrt{H}}}$

Should pipe and pit losses be used to control outflow, the calculations are to be attached.