



# Water Management Plan

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16-20 Carrington Road, 2-12 Middleton  
Avenue, 4-6 Fishburn Crescent & 25-31  
Sexton Avenue, Castle Hill

## Issue A

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Prepared For ARADA

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## REVISION TABLE

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# 1 Executive Summary

This document details the water management statement for the proposed residential development proposed at 16-20 Carrington Road, 2-12 Middleton Avenue, 4-6 Fishburn Crescent & 25-31 Sexton Avenue, Castle Hill.

ARADA are proposing to develop the site into a mixed-use development. The ground floor plan is illustrated in Figure 1.1 below.



**Figure 1.1 Ground Floor Plan**

The stormwater strategies adopted achieve current industry best practice and respond to The Hills Shire Council requirements as stipulated in council DCP Part B – Appendix B council water cycle management strategy.

The stormwater strategies adopted for the development are as follows: -

- On-Site Detention (OSD).
- Stormwater Quality measures using On-Site Retention (RWT).
- Bio-retention Basins; and
- Storm-Filter Chambers (Storm-filter Cartridges)



## 2 Introduction

### 2.1 Brief

S&G Consultants Pty Ltd (SGC) have been engaged by ARADA to prepare the water management statement for the proposed residential development at 16-20 Carrington Road, 2-12 Middleton Avenue, 4-6 Fishburn Crescent & 25-31 Sexton Avenue, Castle Hill.

The following tasks were carried out:-

- Supplied documents and previous studies were reviewed;
- A concept stormwater drainage design has been prepared including supporting modelling, calculations; and
- This report has been compiled.

### 2.2 Limitations

This report is intended solely for ARADA as the Client of SGC and no liability will be accepted for use of the information contained in this report by other parties than this client.

This report is limited to visual observations and to the information including the referenced documents made available at the time when this report was written.

### 2.3 Reference Documents

The following documents have been referenced in this report: -

1. Site survey prepared by East Coast Positioning ref. ECP2896.D.01B dated 17/05/24;
2. Architectural plans prepared by Turner Architects.
3. Engineers Australia, *Australian Rainfall & Runoff* (AR&R 1999); and
4. The Hills Shire Council DCP.
5. Appendix B – Water Sensitive Urban Design.
6. The Hills Shire Council Planning Certificate under Section 10.7(2) & (5).  
Environmental Planning and assessment ACT 1979 - Certificate No. 78338

### 3 Natural & Built Environment

The site is located at 16-20 Carrington Road, 2-12 Middleton Avenue, 4-6 Fishburn Crescent and 25-31 Sexton Avenue Castle Hill legally described as DP247890, refer to Figure 3.1 Site Location below. The land is located in the Local Government Area of The Hills Sire Council.

The site is bounded by Carrington Road to the North, Fishburn Crescent to the South, Middleton Avenue to the West and Sexton Avenue & adjoining properties in the West. The use of the site has been previously for residential purposes as separate houses.

The site has an irregular shape and is characterised by a natural gradient in towards the Northwestern corner of the site.

Figure 3.1 shows the location of the site.



**Figure 3.1 Locality Plan**

## 4 On-Site Water Management

### 4.1 Objectives

The management of the stormwater on site covers several aspects of the design. It is divided into the following sections:

- Internal drainage design including provision of on-site detention and discharge into Council's infrastructure.
- Landscape drainage to Bio-retention Basins.
- Roof water collection to Rainwater tank.
- Stormwater management and treatment.

These components have been designed to address the requirements of The Hills Shire Council.

### 4.2 Authorities Requirements

The council requirements for water management are provided in the Hills Shire Council Development Control Plan details these requirements as follows: -

- The peak/volume impact of stormwater on infrastructure is to be reduced by detaining/retarding it on site;
- Part B, Section 2 C.5.3.3 Surface Water Runoff.
- Part B, specifically Section B5-Clause 3.17 Stormwater Management,
- Appendix B, Water Sensitive Urban Design.
- Stormwater quality shall be maintained through the use of treatment measures.

### 4.3 BASIX & Water Conservation

The BASIX Compliance Evaluation provided by the developer is stipulating the use of rainwater tanks to achieve the water conservation target of 40%.

As such, a rainwater tank is proposed as part of the stormwater management for the proposed development. Minimum tank required is 20kL – water reuse only for irrigation 8k square meter landscape and 2k square meter of Roof to be collected.

## 4.4 Internal Drainage

### 4.4.1 Roof Drainage

The roof drainage system follows a conventional design using rainwater outlets and downpipes, sized to handle a 20-year ARI storm event. The system consists of a series of outlets and downpipes, which will be coordinated with the architectural layout in future detailed design stages.

The roof drainage from the towers generally flows into the Storm-filter chamber, except for 1,750 square meters of the roof area, which will be directed to the rainwater reuse tanks before overflowing into the storm filter chamber as part of the WSUD system.

### 4.4.2 Surface Drainage

The internal drainage system will be generally designed in accordance with Council's guidelines.

The internal drainage system is typically designed to accommodate a 20-year (ARI) storm event. For storms exceeding this design threshold, an overland flow path is provided. In cases where the system is designed for a higher capacity, it is built to handle a 100-year ARI storm event.

On-site Detention (OSD) is required. The site drains to Cattai Creek and shall use the amended parameters for the Hawksbury River Catchment.

The OSD catchment areas are divided into two main sections as follows:

- **Catchment 1 (North catchment area)**, excluding the SP2 infrastructure: 7,940 sqm
- **Catchment 2 (South catchment area)**, excluding the site boundary dedication: 5,257 sqm

This division is based on the land acquisition plan provided by the Hills Shire Council.

The proposed impervious areas cover approximately most of the site except the surrounding landscape areas around the basement 01 parameter walls. Because these areas between the buildings are proposed over the basement car park, they are also considered impervious for the purpose of the stormwater drainage analysis. Thus, an impervious fraction of 0.9 has been adopted.

The runoff from the buildings to be directed as following:

#### **Catchment 1 (North catchment area)**

- (Roof 1,750 square meters) to be drained to the Rainwater tank and to be overflow to the Storm filter chambers 01(with Psorb storm filter cartridges) / OSD tank 01
- The rest of the roof area and Podium over the basement (COSs) will be directed to the Storm filter chambers 01(with Psorb storm filter cartridges) / OSD tank 01
- Landscape areas around the buildings including the planters in front of the units to be directed to Bio-retention Basins.



### **Catchment 2 (South catchment area)**

- Roofs, upper levels and Podium over the basement to be drained to the Storm filter chambers 02(with Psorb storm filter cartridges) / OSD tank 02
- Landscape areas around the buildings including the planters in front of the units to be directed to Bio-retention Basins.

The water quality treatment measures will be implemented prior to discharging into the receiving street infrastructure. Where possible, conventional pit/pipe systems have been proposed, along with natural bio-retention basins, to mimic a natural environment. This approach aligns with a more sustainable stormwater drainage network and follows the principles of the current Water Sensitive Urban Design (WSUD) strategy.

The subsoil discharge and any runoff from the basement car park ramps will be collected in pump-out pits inside the Basement 02 prior to being pumped into the WSUD systems. The design of pump out systems will be in accordance with council DCP.

## **4.5 Stormwater Management & Treatment**

It is proposed to collect and convey the roof and the surface water from the proposed development in a new stormwater system to cater for the 20-yr ARI storm event. The stormwater system from all areas with no failsafe overland flow path will be designed to cater for the 100-yr storm event.

A treatment train approach has been adopted to meet the water quality requirements set by the Hills Shire Council. The water quality management strategy is designed to achieve the following targets:

- Runoff from the roof area will be directed to the rainwater tank, with the overflow from the tank, along with surface runoff, directed to the Storm filter chambers featuring Psorb storm filter cartridges.
- Runoff from the landscape areas outside the Basement 01 perimeter walls will be directed to bio-retention basins before being discharged to the legal discharge point.
- The bio-retention basins will capture and remove fine nutrients and suspended solids, ensuring improved water quality.

**Table 4.1 Target Pollutant Reduction**

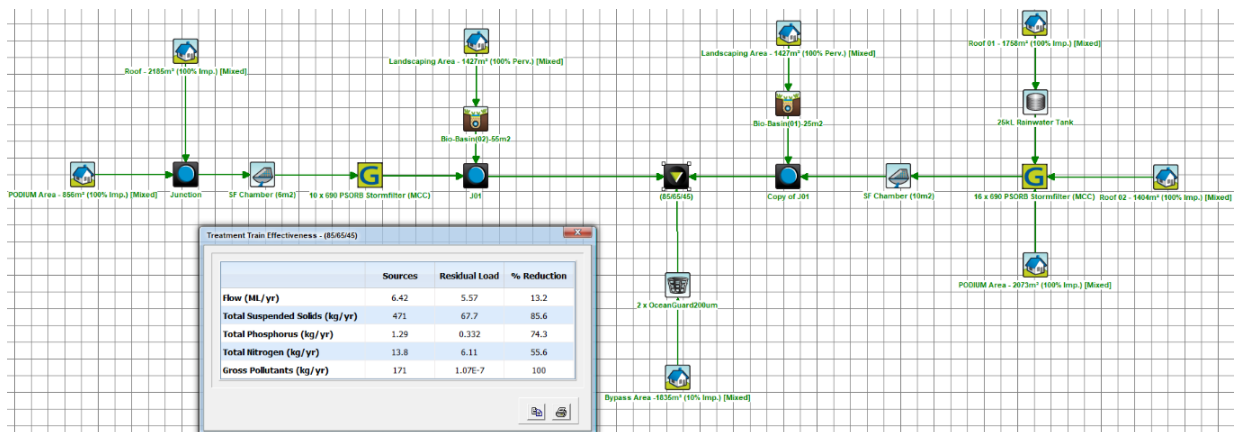
Pollutant	Reduction
Gross Pollutants	90%
Total Suspended Solids (TSS)	85%
Total Phosphorus (TP)	65%
Total Nitrogen (TN)	45%

A MUSIC model has been setup to determine if the proposed measures are adequate to treat the runoff from the catchment.

The MUSIC model diagram is included below for reference. The proposed measures achieve the requirements of council as detailed in the following table: -

**Table 4.2 MUSIC Model Results**

Pollutant	Source Load	Residual Load	% Reduction
Gross Pollutants	171	1.07E-7	100
Total Suspended Solids (TSS)	471	67.7	85.6
Total Phosphorus (TP)	1.29	0.332	74.3
Total Nitrogen (TN)	13.8	6.11	55.6



**Figure 4.1 MUSIC Diagram**



## 4.6 Stormwater Disposal

It is proposed to discharge the site's runoff into the existing kerb inlet pit located at the intersection of Carrington Road and Middleton Avenue.

This proposal is based on the Hills Shire Council Stormwater Infrastructure plan, which outlines the location, connection, and detailed levels of the existing infrastructure in the vicinity of the site. Reference is made to the concept design drawings for further details.

## 4.7 On-Site Detention

The OSD has been sized to reduce the site runoff in the proposed development to pre-development flows using Hawkesbury River Catchment Council OSD check calculation sheet, which uses the site fall to conclude the Permissible Site Discharge (PSD) and Site Storage Volume (SSV).

As per the Council DCP Clause 4.22 On-Site Stormwater Detention the Local Government Area of The Hills Shire drains two main catchments, these being the Upper Parramatta River Catchment and the Hawkesbury River Catchment. The on-site stormwater detention (OSD) requirements are different for each catchment.

The subject site is located in Hawkesbury River Catchments, Using the same principles as Upper Parramatta River Catchment Trust (UPRCT), where a proposed development drains to the Hawkesbury River Catchment OSD will be required.

The Permissible Site Discharge (PSD) and Site Storage Volume (SSV) requirements shall be derived from Table 4.3 - PSD and SSV Requirements for the Hawkesbury River Catchment for that portion of the Hawkesbury River Catchment area that falls within the shire.

**Table 4.3 Hawkesbury River Catchment PSD-SSV**

Site Slope	Permissible Site Discharge (l/s/ha)	Site Storage Volume (m3/ha)
Greater than 15%	136	298
Between 10% and 15%	115	336
Between 6% and 10%	104	362
Between 3% and 6%	92	396
Between 0% and 3%	87	412

using the Site slope table to provide the Permissible Site Discharge (PSD - l/s/ha) and Site Storage Volume (SSV – m3/ha).

The site slope is calculated from the site Survey plan as following:

- The maximum level on the site 106.030.
- The minimum level on the site 96.760.
- The distance between the maximum and minimum point: 142m
- The site slop is 6.53% - between 6% and 10%



The results of the OSD calculations are summarised in Figure 4.2 below.

HAWKESBURY RIVER CATCHMENT			
COUNCIL O.S.D. CHECK SHEET			
Site Address	=	20 Carrington Rd, Castle Hill NSW 2154	
File No.	=	OSD 01 - 2024.0122	
Site Area	=	0.7745 Ha	[A]
Site Slope	=	7 %	[A1]
Site Storage Volume	=	See Chart	= 362 m3/Ha [A2]
Permissible Discharge	=	See Chart	= 104 l/s/Ha [A3]
Basic Storage Volume	=	[A2] x [A]	= 280.4 m3 [B]
Basic Discharge	=	[A3] x [A]	= 80.5 l/s [C]
Area of Site Drained to Storage	=	0.7745 Ha	[D]
% of Total Site	=	[D] / [A] x 100	= 100 % [E]
Storage Per Ha.	=	[B] / [D]	= 362.0 m3/Ha [F]
Permissible Discharge	=	{([F] / 69.21) <sup>0.5</sup> (-1.368)} x 1000	= 104.0 l/s/Ha [G]
P.S.D.	=	[G] x [D]	= 80.5 l/s [H]
Maximum Head to Orifice Centre	=	1.500 m	[K]
Selected Orifice Dia.	=	{(0.464x[H]/1000) <sup>0.5</sup> / [K] <sup>0.5</sup> } x 1000	= 175 mm [J]
Maximum Discharge	=	[H]	= 80.6 l/s [L]
Head for High Early Discharge	=	1.400 m	[M]
High Early Discharge	=	{[L] x ([M]/[K]) <sup>0.5</sup> }	= 77.9 l/s [N]
Approx. Ave. Discharge	=	{([L] + [N]) / 2}	= 79.2 l/s [P]
Ave. Discharge per Ha.	=	[P] / [D]	= 102.3 l/s/Ha [Q]
Storage Volume	=	69.21 x ([Q] / 1000) <sup>0.731</sup>	= 366.3 m3/Ha [R]
Site Storage Volume	=	[R] x [D]	= 283.7 m3 [S]
<u>OSD 01 CALCULATION</u>			
HAWKESBURY RIVER CATCHMENT			
COUNCIL O.S.D. CHECK SHEET			
Site Address	=	20 Carrington Rd, Castle Hill NSW 2154	
File No.	=	OSD 02 - 2024.0122	
Site Area	=	0.4156 Ha	[A]
Site Slope	=	7 %	[A1]
Site Storage Volume	=	See Chart	= 362 m3/Ha [A2]
Permissible Discharge	=	See Chart	= 104 l/s/Ha [A3]
Basic Storage Volume	=	[A2] x [A]	= 150.4 m3 [B]
Basic Discharge	=	[A3] x [A]	= 43.2 l/s [C]
Area of Site Drained to Storage	=	0.4156 Ha	[D]
% of Total Site	=	[D] / [A] x 100	= 100 % [E]
Storage Per Ha.	=	[B] / [D]	= 362.0 m3/Ha [F]
Permissible Discharge	=	{([F] / 69.21) <sup>0.5</sup> (-1.368)} x 1000	= 104.0 l/s/Ha [G]
P.S.D.	=	[G] x [D]	= 43.2 l/s [H]
Maximum Head to Orifice Centre	=	1.100 m	[K]
Selected Orifice Dia.	=	{(0.464x[H]/1000) <sup>0.5</sup> / [K] <sup>0.5</sup> } x 1000	= 138 mm [J]
Maximum Discharge	=	[H]	= 43.3 l/s [L]
Head for High Early Discharge	=	1.000 m	[M]
High Early Discharge	=	{[L] x ([M]/[K]) <sup>0.5</sup> }	= 41.2 l/s [N]
Approx. Ave. Discharge	=	{([L] + [N]) / 2}	= 42.3 l/s [P]
Ave. Discharge per Ha.	=	[P] / [D]	= 101.7 l/s/Ha [Q]
Storage Volume	=	69.21 x ([Q] / 1000) <sup>0.731</sup>	= 368.1 m3/Ha [R]
Site Storage Volume	=	[R] x [D]	= 153.0 m3 [S]
<u>OSD 02 CALCULATION</u>			

Figure 4.2 OSDs Calculation Sheet



## A2 Appendix 2

### Council Infrastructure Plan

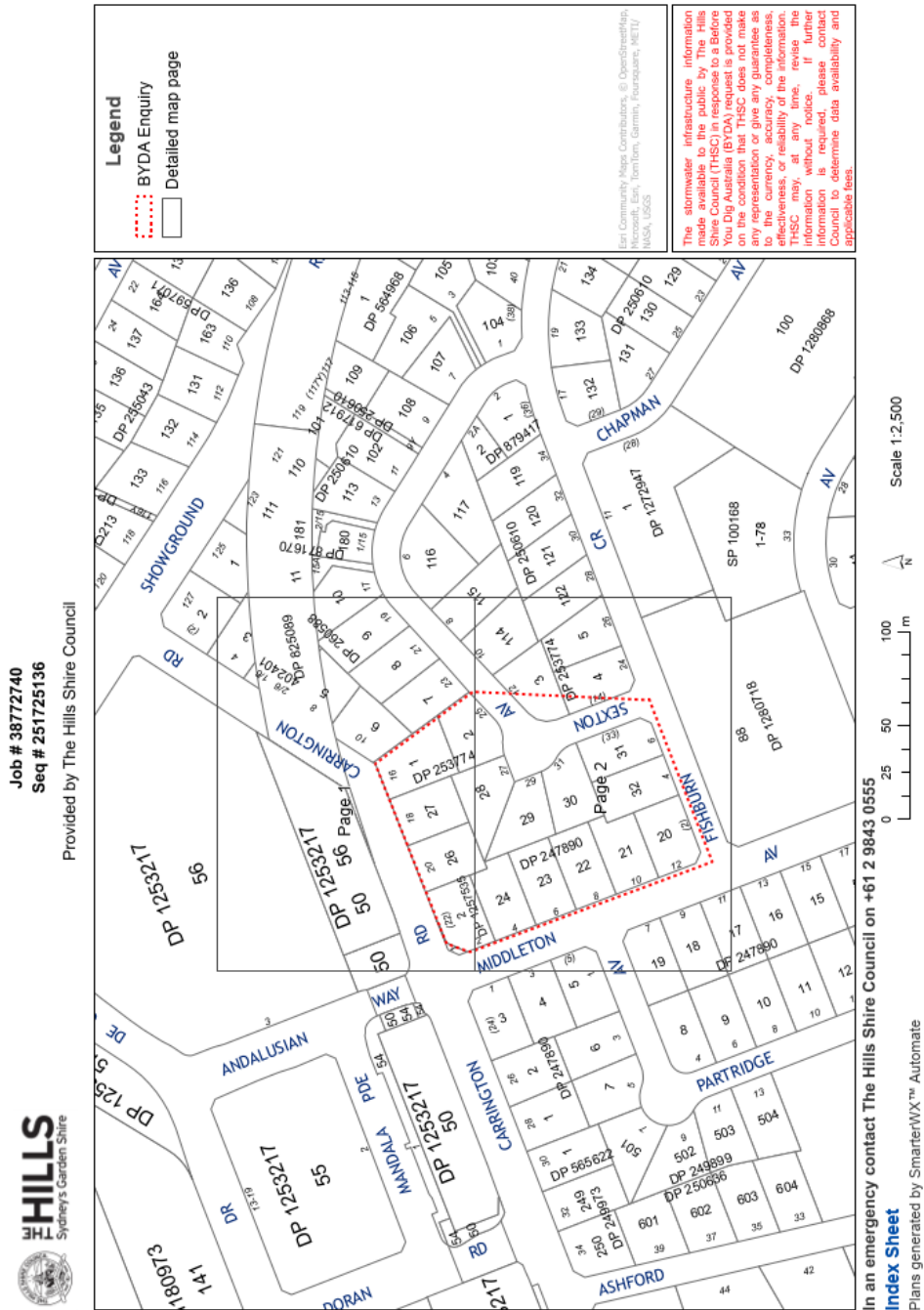


Figure A 2.1 Hills Shire Council – Stormwater Infrastructure Plan 1

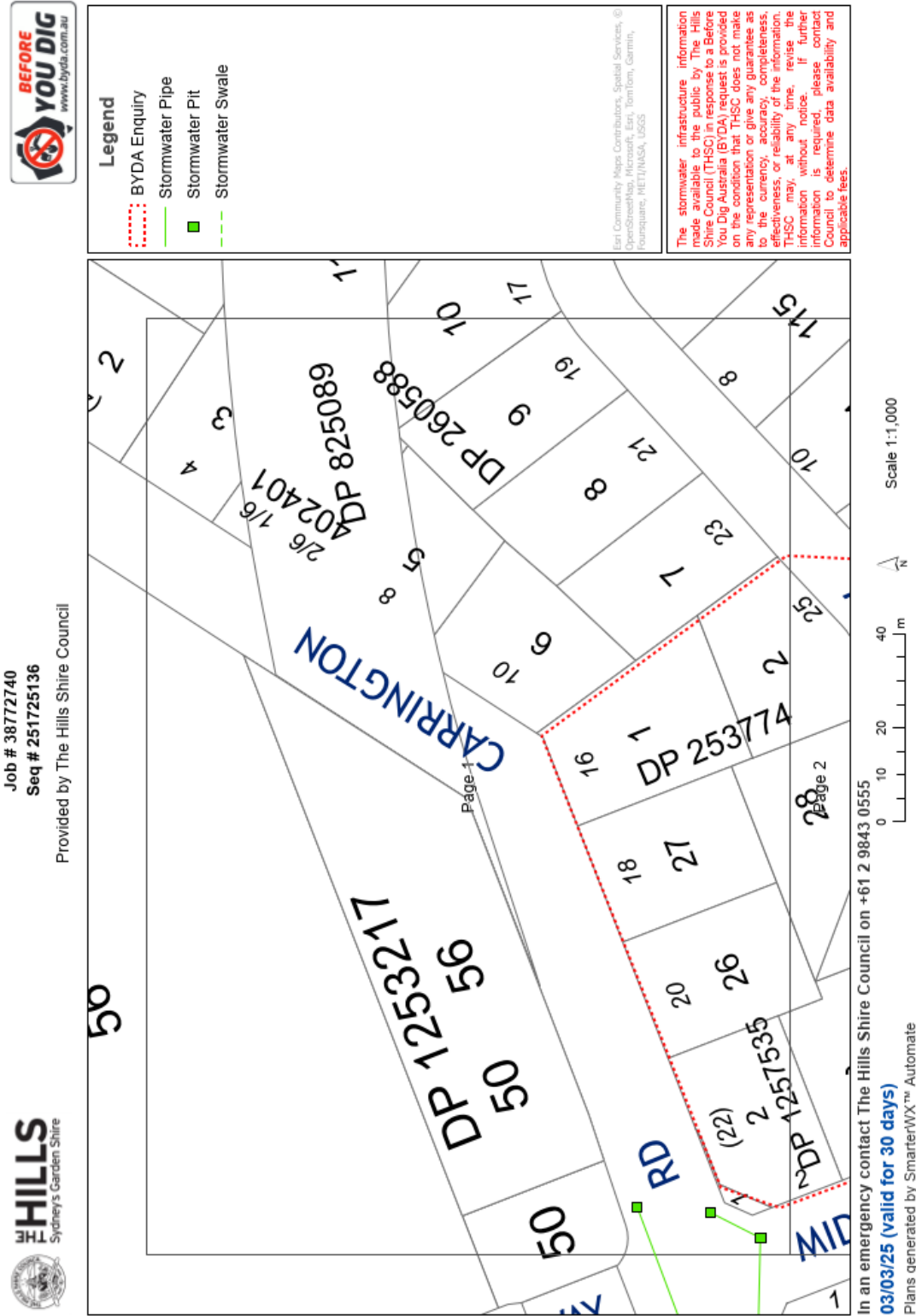


Figure A 2.2 Hills Shire Council – Stormwater Infrastructure Plan 2



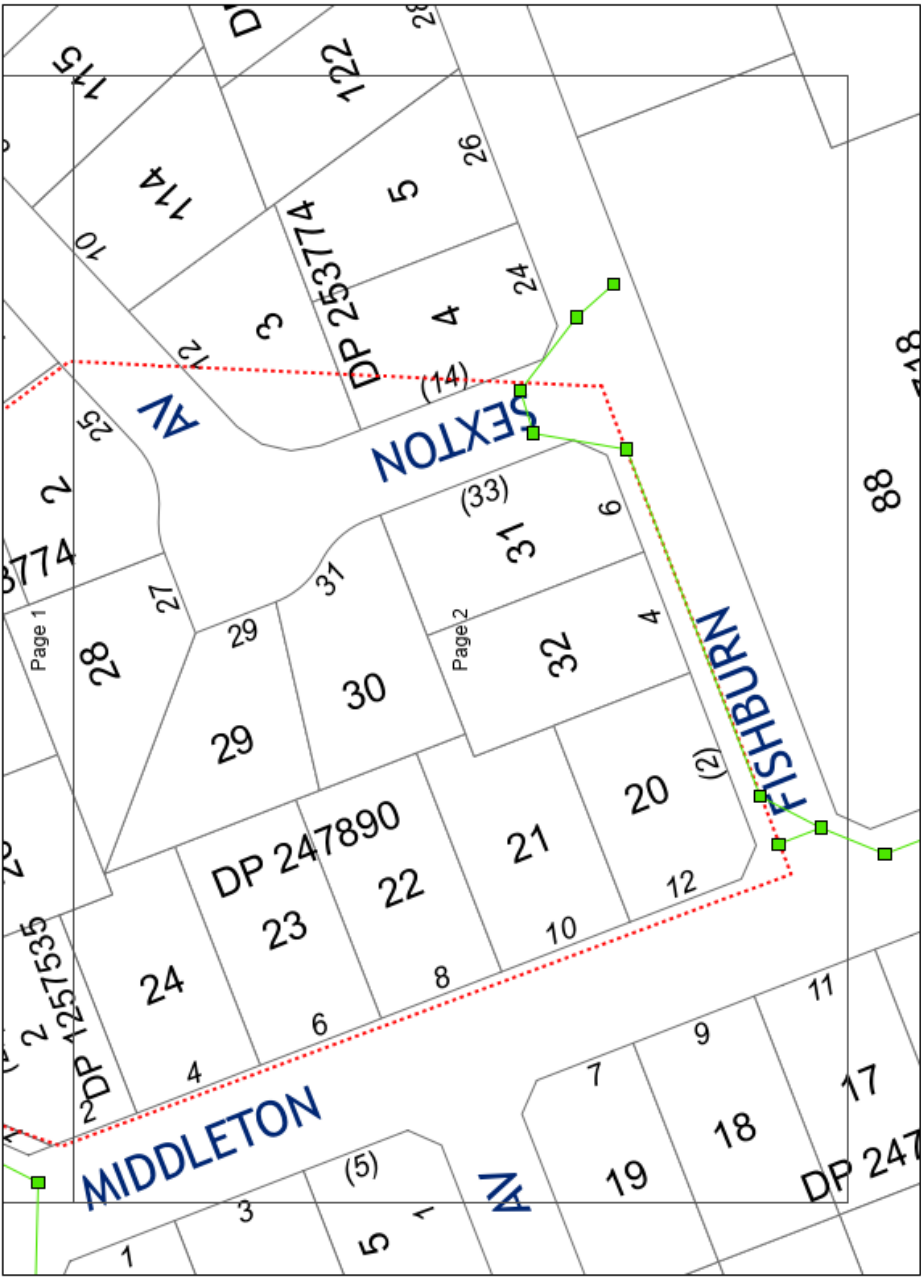
**Legend**

- ⋯ BYDA Enquiry
- Stormwater Pipe
- Stormwater Pit
- - - Stormwater Swale

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**Figure A 2.3 Hills Shire Council – Stormwater Infrastructure Plan 3**

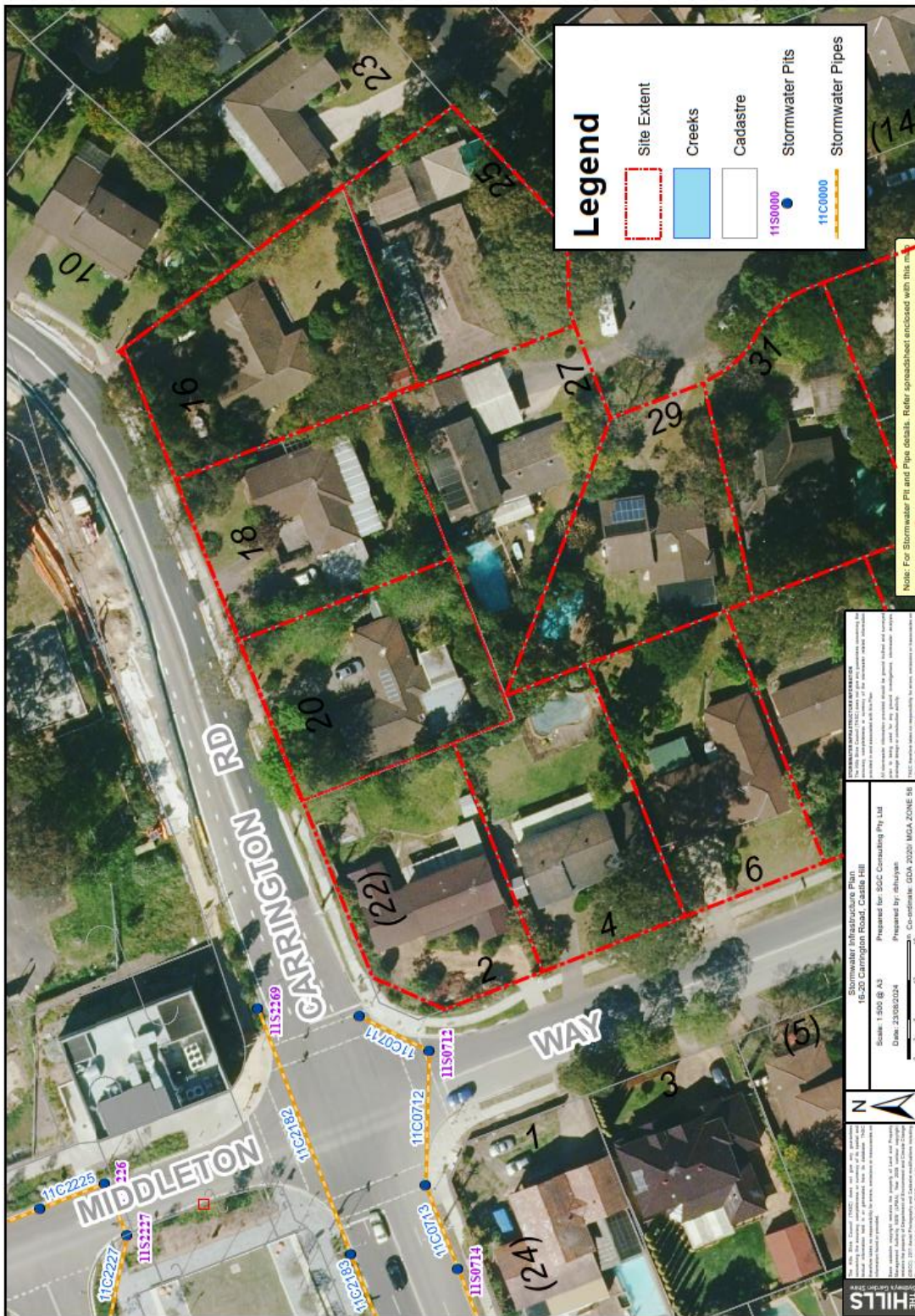


Figure A 2.4 Hills Shire Council – Stormwater Infrastructure Plan 4



## **A3 Appendix 3**

### **Architectural Plans**





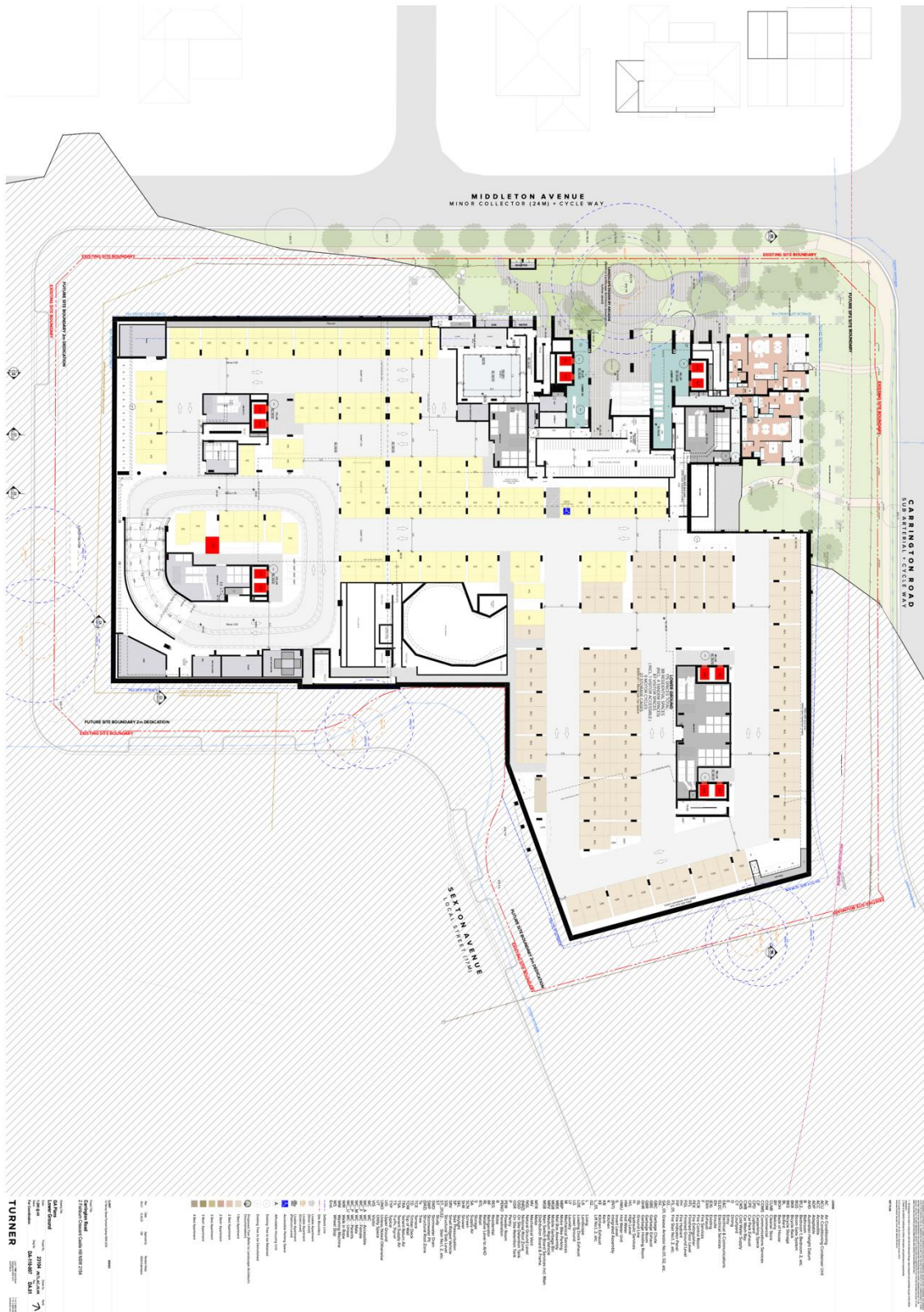


Figure A 3.3 Lower Ground Floor Plan



Figure A 3.4 Ground Floor Plan



Figure A 3.5 Upper Ground Floor Plan

## A4 Appendix 4

### OSD - WSUD catchment plans

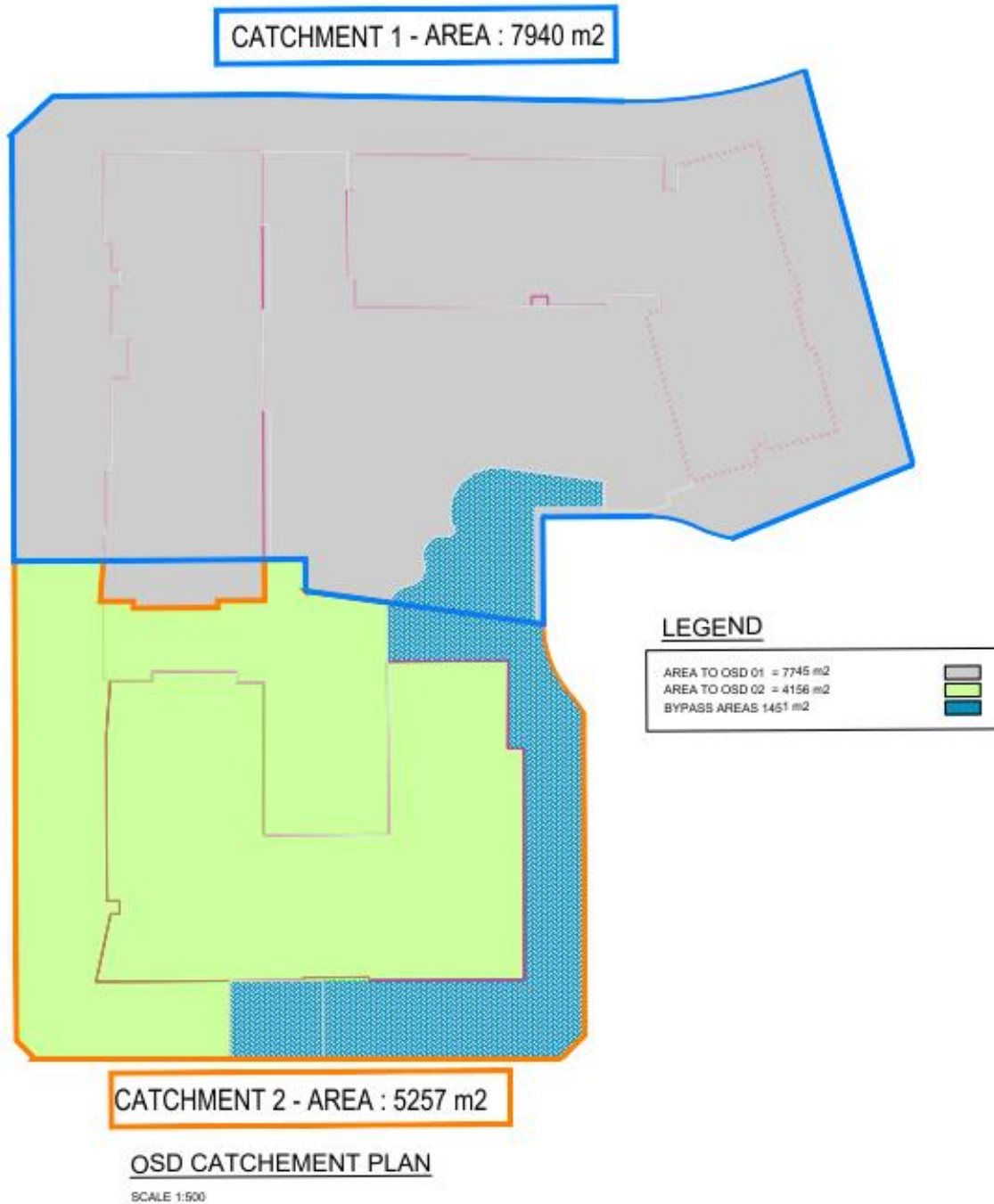


Figure A 4.1 OSD Catchment Plan

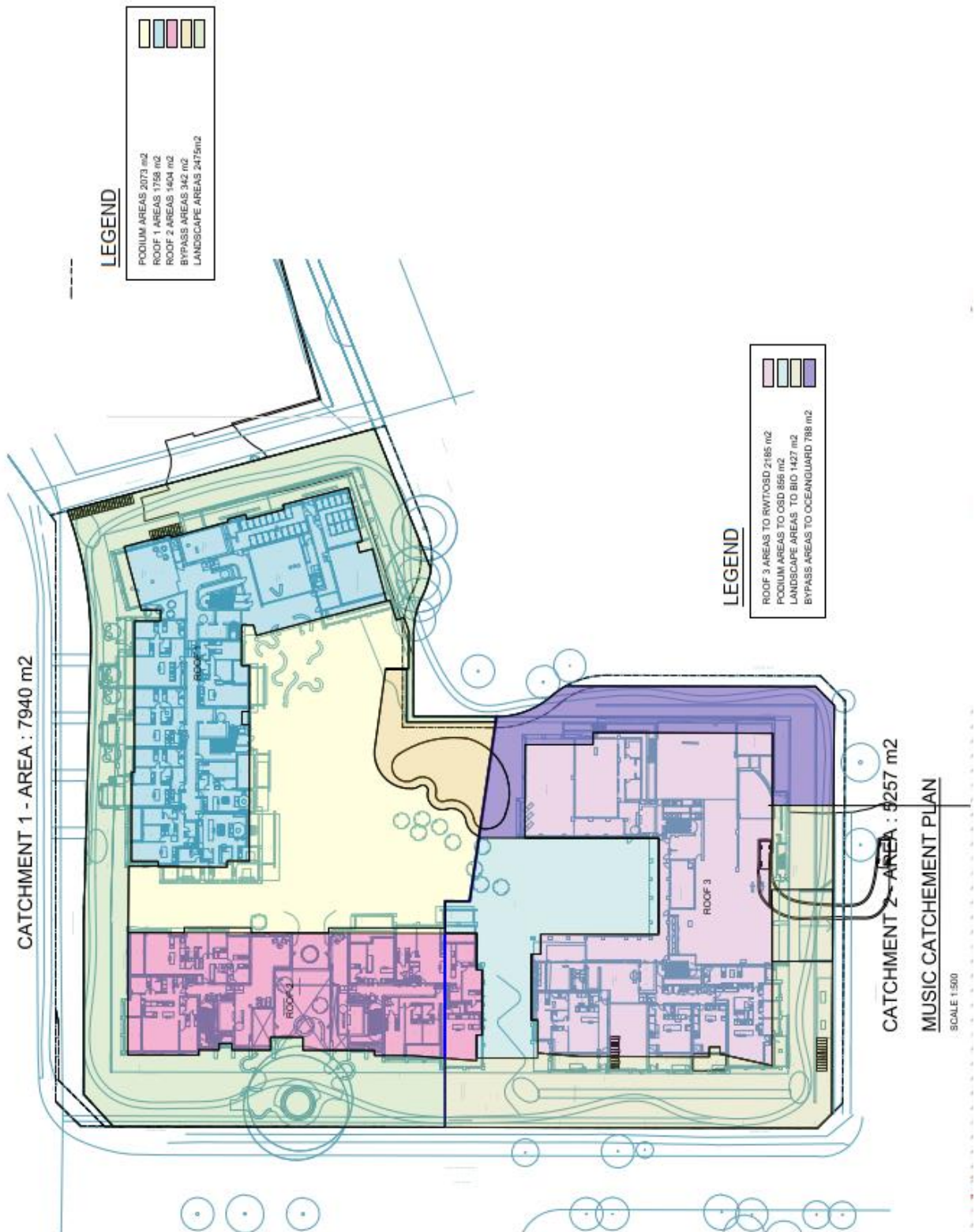


Figure A 4.2 WSUD Catchment Plan

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