ADW JOHNSON PTY LIMITED
ABN 62 129 445 398

Sydney
Level 35 One International Towers
100 Barangaroo Avenue
Sydney NSW 2000
02 8046 7411
sydney@adwjohnson.com.au

Central Coast
5 Pioneer Avenue
Tuggerah NSW 2259
02 4305 4300
coast@adwjohnson.com.au

Hunter Region
7/335 Hillsborough Road
Warners Bay NSW 2282
02 4978 5100
hunter@adwjohnson.com.au

Engineering

Working Beyond Expectations

Stormwater Management Plan, Water Sensitive Urban Design Strategy & Erosion and Sediment Control Plan

Proposed Apartment Building Development

Property:
Lot 11 DP 577062
23 Fisher Road, Dee Why

Applicant:
Hamptons By Rose Pty Ltd

Date:
September 2018

Document Control Sheet

Issue No.	Amendment	Date	Prepared By	Checked By
A	Issued for Review	3rd September 2018	BM	IB
B	Minor Wording	4th September 2018	BM	IB

Limitations Statement

This report has been prepared in accordance with and for the purposes outlined in the scope of services agreed between ADW Johnson Pty Ltd and the Client. It has been prepared based on the information supplied by the Client, as well as investigation undertaken by ADW Johnson and the sub-consultants engaged by the Client for the project.

Unless otherwise specified in this report, information and advice received from external parties during the course of this project was not independently verified. However, any such information was, in our opinion, deemed to be current and relevant prior to its use. Whilst all reasonable skill, diligence and care have been taken to provide accurate information and appropriate recommendations, it is not warranted or guaranteed and no responsibility or liability for any information, opinion or commentary contained herein or for any consequences of its use will be accepted by ADW Johnson or by any person involved in the preparation of this assessment and report.

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The Client should be aware that this report does not guarantee the approval of any application by any Council, Government agency or any other regulatory authority.

Executive Summary

ADW Johnson Pty Ltd has been commissioned by Hamptons By Rose Pty Ltd to prepare a Stormwater Management Strategy for the proposed development of Lot 11 DP 577062, also known as 23 Fisher Road, Dee Why.

This report is to accompany the DA plans and documentation to provide evidence that the proposed onsite stormwater management controls are in accordance with Northern Beaches Council specifications.

A comparison of the existing site and proposed development indicates that the amount of impervious area on site will decrease post development. As this will result in the peak discharge leaving the site decreasing, it was considered that onsite detention is not required for the development.

A water quality analysis was undertaken using the MUSIC program, to determine the water quality controls required in order to meet Council's standards. It was determined that the proposed treatment train of rainwater tanks, litter baskets and gross pollutant traps would provide adequate treatment to meet the pollutant reduction targets set out by Council.

A suitable erosion and sedimentation control plan has been incorporated with a range of controls to ensure the site is adequately protected during construction.

Table of Contents

1.0 Introduction

1.1 BACKGROUND

ADW Johnson Pty Ltd has been commissioned by Hamptons by Rose Pty Ltd to prepare a Stormwater Management Strategy for the proposed 130 apartment residential development of Lot 11 DP 577062.

This report is to accompany the DA documentation to provide evidence that the proposed on site stormwater management controls are in accordance with Northern Beaches Council specifications.

2.0 Site Description

2.1 EXISTING SITE

The proposed development site is located at 23 Fisher Road, Dee Why and is described as Lot 11 DP 577062.

The subject site, as seen in Figure 1, is approximately 1.06ha in size and is bound to the west by Fisher Road, to the south by St David Avenue and to the north and east by existing commercial development.

Figure 1 – Site Locality

A number of existing residential properties and associated hardstand areas are currently located on the site. Amongst the existing buildings is the Pacific Lodge, a heritage listed building.

Existing vegetation consists of scattered trees around the existing built form, with denser vegetation along the eastern boundary.

A ridgeline currently bisects the site in a north-south direction, directing the majority of runoff generated by the site to the east and west. Runoff flowing to the west of the site discharges to Fisher Road whilst runoff to the east discharges to Civic Parade.

The natural grades throughout the site generally range from 10-20%, with steeper grades at the northern end of the site with grades reaching up to 70% on an existing rock wall.

The existing site can be seen in **Exhibit 1**.

2.2 PROPOSED DEVELOPMENT

The proposal is to develop 130 apartments in three (2) buildings over a common two (2) level basement parking structure and associated driveway from Fisher Road. The apartment mix is 39 x 1 bedroom apartments, 70 x 2 bedroom apartments and 21 x 3 bedroom apartments. The basement will contain 190 – 195 parking spaces.

It is noted that, whilst the majority of existing buildings are to be demolished, the Pacific Lodge (heritage building) is to be retained, along with a large portion of the existing vegetation along the Eastern boundary.

The proposed development can be seen in **Exhibit 2**.

3.0 Council Requirements

Water Sensitive Urban Design (WSUD) principles for the Northern Beaches Council seek to limit the impact of urbanisation on the water cycle. WSUD principles include:

- Minimise the volume of stormwater runoff;
- Reduce the run-off and peak flows from urban developments by local detention basins and minimising impervious areas;
- Treating urban stormwater to best practice standards for reuse and/or discharge to receiving waters;
- Reducing potable water demand through water efficiency, stormwater harvesting and wastewater reuse;
- Minimising wastewater generation and treatment of wastewater so that it can be reused;
- Integrating vegetated stormwater treatment into the landscape, so as to provide increased biodiversity, amenity and micro-climate benefits which can reduce the heat island effect; and
- Providing green infrastructure and green links to improve habitat corridors.

3.1 STORMWATER QUANTITY

Generally, stormwater quantity controls are required on developments to ensure the post developed peak flows are less than or equal to the pre developed flows and that overland flows are managed in a safe manner.

In the event of blockages within the system, emergency flow paths will be designed to cater for the major storm event (1 in 100 year ARI) with adequate freeboard to adjacent habitable floor levels without causing risk to property or people.

It is noted that an analysis of the pre and post developed catchments indicates that on site detention is not required for the development. This is discussed further in section 4.

3.2 STORMWATER QUALITY

The intent of the water quality targets are to improve the quality of stormwater runoff, which will also improve the health of creeks and waterways, and enhance urban amenity.

The guidelines for stormwater quality treatment objectives are expressed as mean annual reductions of pollutant loads. The target objectives were obtained from Northern Beaches Council WSUD guidelines (Section 2.2.1) and are shown below in Table 1.

Table 1 – Water Quality Treatment Objectives

Pollutant	Retention Criteria
Suspended Solids	**85%** reduction in the post development mean annual load
Total Phosphorus	**65%** reduction in the post development mean annual load
Total Nitrogen	**45%** reduction in the post development mean annual load
Gross Pollutants	**90%** reduction in the post development mean annual load (for pollutants greater than 5mm in diameter)

3.3 STORMWATER RETENTION

The intent of stormwater retention requirements defined by Northern Beaches Council is to mimic the pre-developed runoff losses such that the post development and pre-development runoff hydrographs are similar in terms of volume, peak and shape for the full range of design events. This can be achieved through implementing rainwater tanks to capture and retain runoff from impervious surfaces (whether roof, paving or road carriageway), retain it for a relatively long time, and slowly release it elsewhere in the water cycle.

The use of rainwater tanks which are connected for internal use (toilet flushing and washing machine) and external reuse (garden irrigation) are encouraged for all developments within the Northern Beaches Council.

Rainwater tanks shall comply with the following:

- Be fitted with a first-flush device that causes initial rainwater run-off to bypass the tank and must drain to a landscaped area. The first flush device will not be permitted to connect to the stormwater system;
- Have a sign affixed to the tank stating the contents is rainwater;
- Be constructed or installed in a manner that prevents mosquitoes breeding, such as the use of mesh to protect inlets and overflows;
- Have its overflow connected to an existing stormwater drainage system that does not discharge to an adjoining property, or cause a nuisance to adjoining owners;
- Pumping equipment must be housed in a soundproof enclosure;
- Where the rainwater tank is interconnected to a reticulated water supply, it must be installed in accordance with Plumbing Code of Australia, particularly backflow/cross connection prevention requirements.

3.4 EROSION AND SEDIMENTATION CONTROL

Erosion and sedimentation control measures need to be implemented during any construction activities on the proposed development to minimise the risk of erosion to disturbed areas and limit the transport of sediments from the construction site to downstream drainage.

4.0 Stormwater Quantity

A stormwater drainage concept plan has been prepared to demonstrate how the stormwater runoff for the catchment is captured and transported to the downstream drainage infrastructure. The concept stormwater plan can be seen in **Exhibit 2.**

4.1 CATCHMENT ANALYSIS

An analysis of both the pre developed and post developed catchments was undertaken to determine the total amount of impervious area for both scenarios. The analysis included all roof and paved areas over the entire site area.

The analysis of the pre developed catchment was undertaken using information from a detail survey of the site. The survey shows that there a number of existing buildings and paved areas over a large portion of the site. It was found that the existing site has approximately 5,375 m^2 of roof and paved areas. The existing impervious areas can be seen in **Exhibit 1**.

The proposed development will involve the construction of a number of impervious areas associated with the proposed apartment buildings and associated hardstand. The analysis of the post developed site was undertaken using the architectural plans.

A number of impervious areas found on eastern portion of the site, including the 'Pacific Lodge' will also remain as part of the development. It was found that the post developed site will have approximately 5,250m^2 of impervious area. The post developed impervious areas can be seen in **Exhibit 3**.

As the post developed site will have less impervious area than the pre-developed site, it is considered that the post developed peak discharge will be equal to, or less than, the pre-developed site discharge. As such, it is considered that the provision of onsite detention controls for the proposed development is not required.

5.0 Stormwater Quality

The proposed stormwater system, as detailed in Section 4, uses a combination of pit and pipe networks and water sensitive urban design elements to convey stormwater runoff from the site. It is intended to use a combination of treatment devices within the drainage system to remove nutrients and sediments from the stormwater prior to the runoff leaving the site.

5.1 TREATMENT DEVICES

The stormwater design for the proposed subdivision proposes to use a combination of at source and conveyance controls to treat the stormwater runoff from the site. The treatment train will be modelled for demonstration of compliance with Council's key performance objectives.

At Source

Rain Water Tanks – The roof runoff for each of the future apartment buildings will be captured by a rainwater tank, where the stormwater will receive at source treatment via a first flush system. The rainwater tank used within the MUSIC model has been modelled as a 30kL tank.

The re-use values were calculated based on Table 6.2 of the NSW MUSIC Modelling Guidelines. Water reuse was calculated for toilets and washing machine use, based on an average of 2.35 occupants per dwelling. This resulted in a water re-use value of 124 litres/day/dwelling – a total of 16.12kL per day between the 130 apartments.

An extract of Table 6.2 from the NSW Music Modelling guidelines has been provided below.

Table 6-2 Typical Water Demands for Multi-residential Dwellings (derived from data provided by Sydney Water, 2015)

Water Use	Multi-residential dwellings (litres/day/dwelling)				
	Number of occupants				
	1	2	2.35	3	4
Indoor Uses					
Toilets	27	54	63	81	108
Toilets + Washing Machine	53	105	124	158	210
Toilets + Washing Machine + Hot Water	101	202	238	304	405
All uses	157	315	370	472	629
Outdoor Uses					
All uses	88	88	88	88	88

Litter Basket – It is proposed to locate a 200µm ECOSOL litter basket, or approved equivalent, within all stormwater pits located within the Norther open space catchment as well as all pits located within the proposed driveway. The litter basket allows for flows from minor storm events to be treated whilst providing a high flow bypass for the major storm events to minimise the potential for blockages.

Gross Pollutant Traps – It is proposed to provide ECOSOL GPT's, or approved equivalents, prior to the connection to the existing public stormwater network in Fisher Road.

5.2 MODELLING

The water quality model adopted for this investigation is MUSIC (Model for Urban Stormwater Improvement Conceptualisation), which was developed by the CRC for Catchment Hydrology (CRCCH). MUSIC is suitable for catchment areas from 0.01km^2 to 100km^2. The modelling approach is based on continuous simulation, operating at time steps to match the scale of the catchment and treatment devices. The adopted time step for this investigation was six (6) minutes.

The MUSIC model can be seen in **Appendix B**.

5.2.1 MUSIC inputs

Rainfall

In accordance with Section 3.1.1 of the Northern Beaches Council MUSIC modelling guidelines, rainfall data from Sydney Observatory Hill weather station, for the period of 1981-1985 was adopted for the MUSIC model.

Evapotranspiration

The Average Sydney Potential Evapotranspiration (PET) data used within the MUSIC was also adopted form the Northern Beaches Council MUSIC modelling guidelines. A Copy of the PET data can be seen below.

Table 3: Monthly Evapotranspiration for Sydney Region

Month	J	F	M	A	M	J	J	A	S	O	N	D
PET (mm)	180	135	128	85	58	43	43	58	88	127	152	163

Pollutant Loads

Pollutant loads for the multiple different source nodes were adopted from the Northern Beaches Council MUSIC modelling guidelines.

Source Nodes

Separate source nodes were set up in order to accurately represent each catchment. The proposed site was split into three (3) separate catchment types, being roof areas, residential mixed areas and paved areas.

It is noted that the eastern portion of the site is not proposed to be modified for the proposed development and as such, it has not been considered in the MUSIC modelling. It has been assumed that the Pacific Lodge building drains to the West and has therefore been included in the Western catchment.

A summary of the catchment areas can be seen in **Table 2** overleaf, whilst the catchments can be seen in **Exhibit 4**.

Table 2 – Catchment Areas

Catchment	Total Area (ha)	Impervious Area (ha)	Pervious Area (ha)
Roof A	0.206	0.206	0
Roof B	0.082	0.082	0
Roof C	0.179	0.179	0
Driveway	0.038	0.038	0
Driveway Upstream	0.062	0	0.062
West	0.189	0.047	0.142

Results

A summary of the MUSIC modelling results can be seen below in **Table 3**. **Table 3** shows the pollutant loads leaving the developed site with and without the proposed pollutant control measures.

Table 3 – Total Pollutant Loads and Reductions

Concentration Parameter (kg/yr)	Post Development No Control	Post Development Treated	% Reduction	% Reduction Target
TSS	410	37.3	90.9	85
TP	1.39	0.488	65	65
TN	15.5	5.9	62.1	45
GP	179	0.016	100	90

From **Table 3**, it can be seen that the proposed treatment train effectively treats the runoff leaving the site and not only meets, but exceeds the targets set by council.

6.0 Erosion and Sedimentation Control

Erosion and sedimentation control measures are required during the construction phase of the project to ensure only clean run off enters the downstream receiving waters. A suitable erosion and sedimentation control plan should incorporate a range of controls to ensure the site is adequately protected during construction.

It is noted that the erosion and sedimentation control plan included with this report is indicative only and the contractor will be required to prepare a detailed plan prior to construction commencing.

Refer to **Exhibit 5** for an erosion and sedimentation control plan.

7.0 Conclusion

This Stormwater Management Strategy has been prepared to accompany the DA plans and documentation to provide evidence that all stormwater requirements within Northern Beaches Council specifications are met for the proposed development.

A comparison of the existing site and proposed development indicates that the amount of impervious area on site will decrease post development. As this will result in the peak discharge leaving the site decreasing, it was considered that onsite detention is not required for the development.

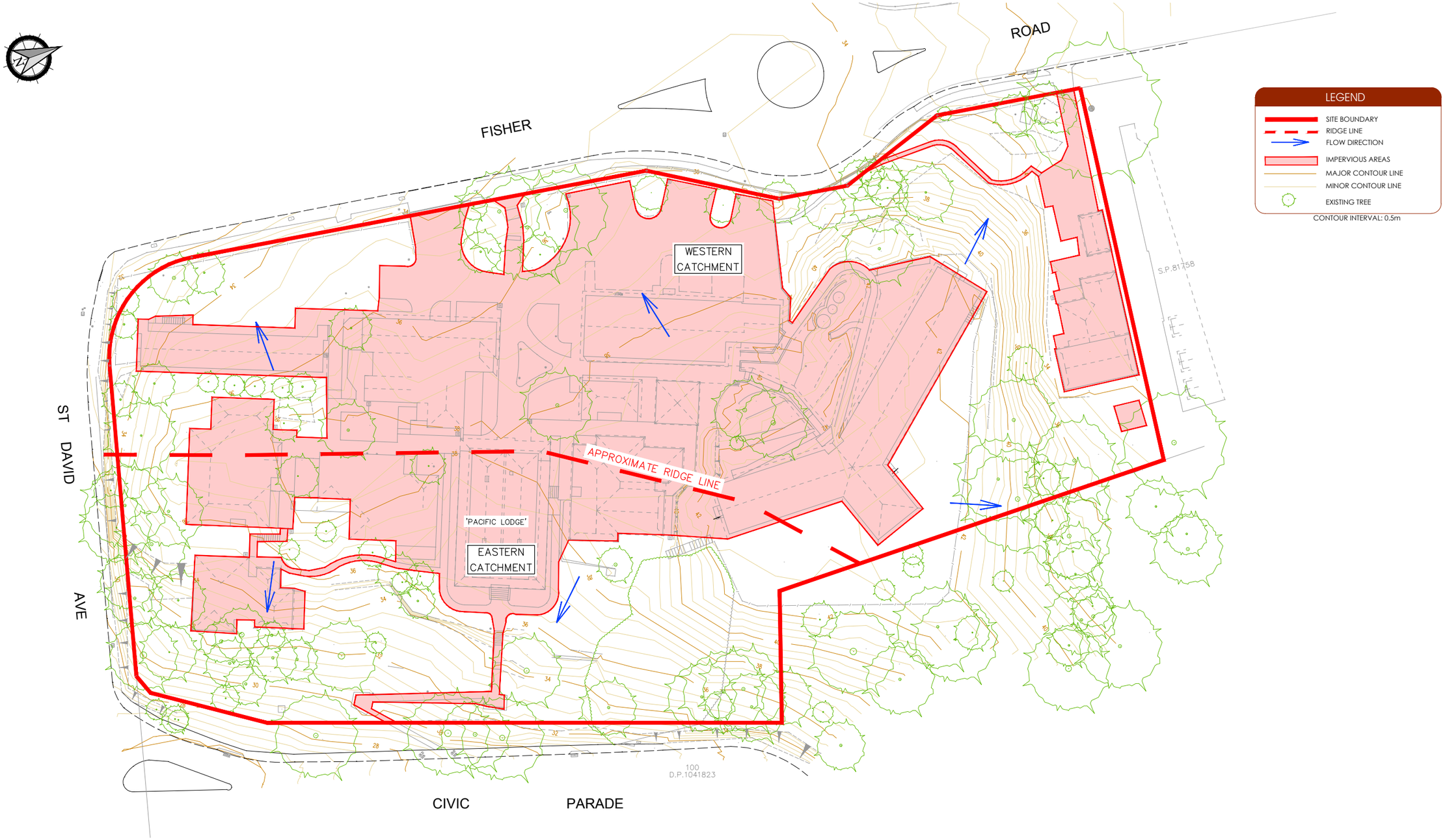
A water quality analysis was undertaken using the MUSIC program, to determine the water quality controls required in order to meet Council's standards. It was determined that the proposed treatment train of rainwater tanks, litter baskets and gross pollutant traps would provide adequate treatment to meet and exceed the pollutant reduction targets set out by Council.

A suitable erosion and sedimentation control plan has been incorporated with a range of controls to ensure the site is adequately protected during construction. This plan ensures that only clean run off enters the downstream receiving waters.

This report indicates that, from a stormwater management perspective, the development should be approved.

Exhibits

190401-EX-001



EXISTING SITE PLAN

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drawing title:

EXHIBIT 1 -
EXISTING SITE

location: FISHER ROAD, DEE WHY

council: NORTHERN BEACHES

dwg ref: 190401E-EX-001

client:

HAMPTONS BY ROSE

adw johnson

central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411

www.adwjohnson.com.au

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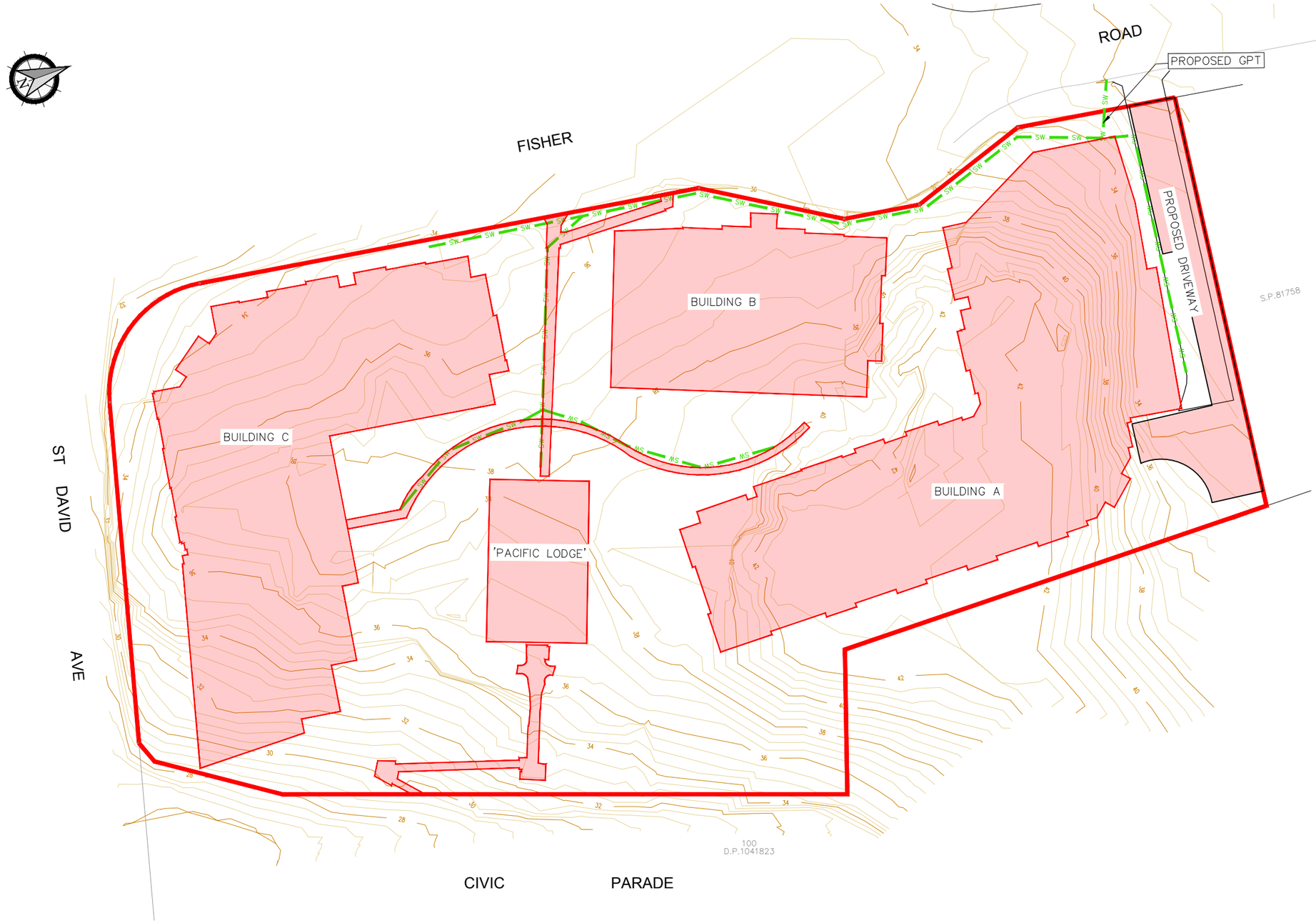

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drawing title:
EXHIBIT 2 - PROPOSED DEVELOPMENT

location: FISHER ROAD, DEE WHY

council: NORTHERN BEACHES

dwg ref: 190401E-EX-002

client:
HAMPTONS BY ROSE

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

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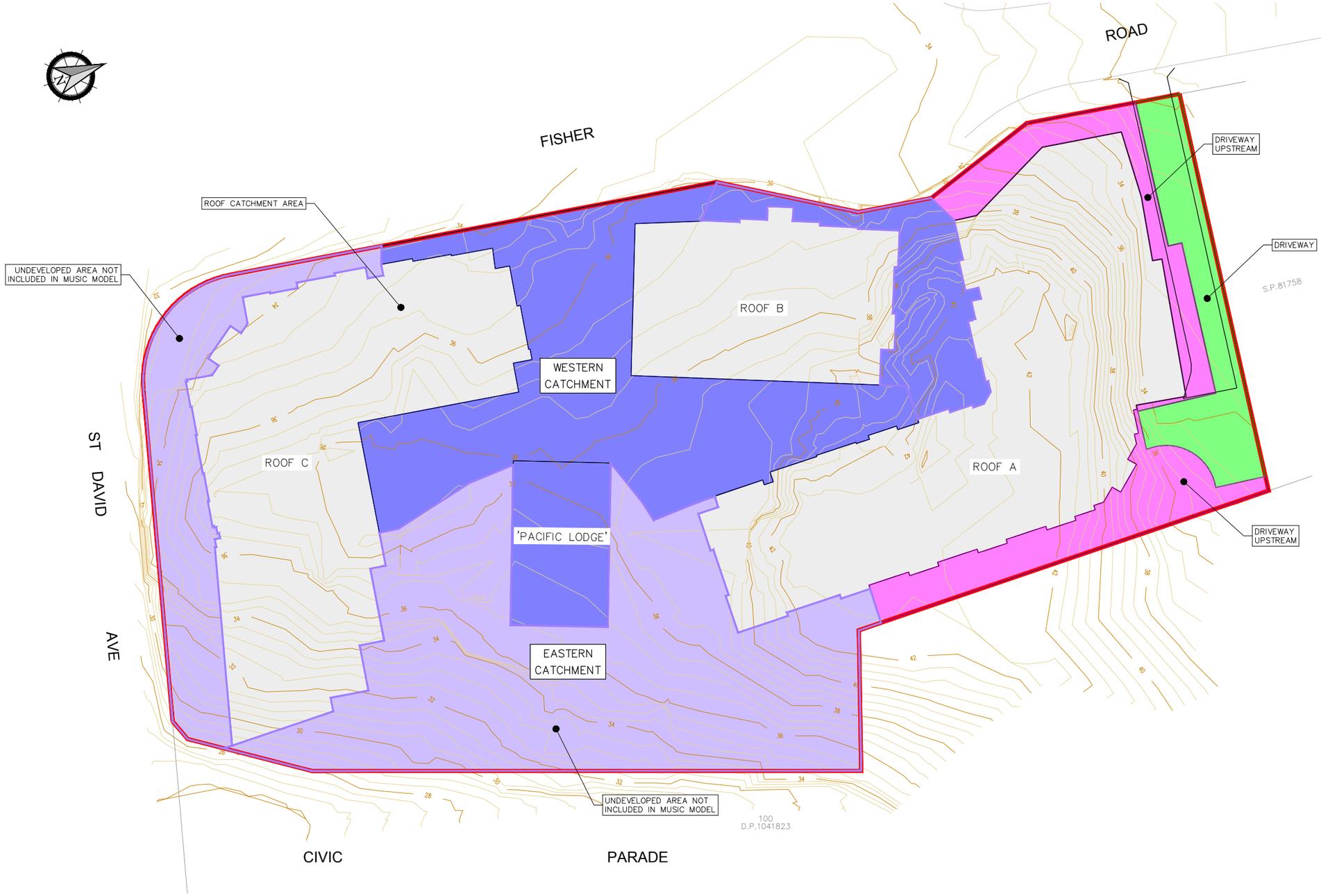
190401-EX-003



EXISTING SITE PLAN

SCALE 1:300

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
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drawing title:

EXHIBIT 3 -
MUSIC CATCHMENTS

location: FISHER ROAD, DEE WHY

council: NORTHERN BEACHES

dwg ref: 190401E-EX-003

client:

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adw johnson

central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411

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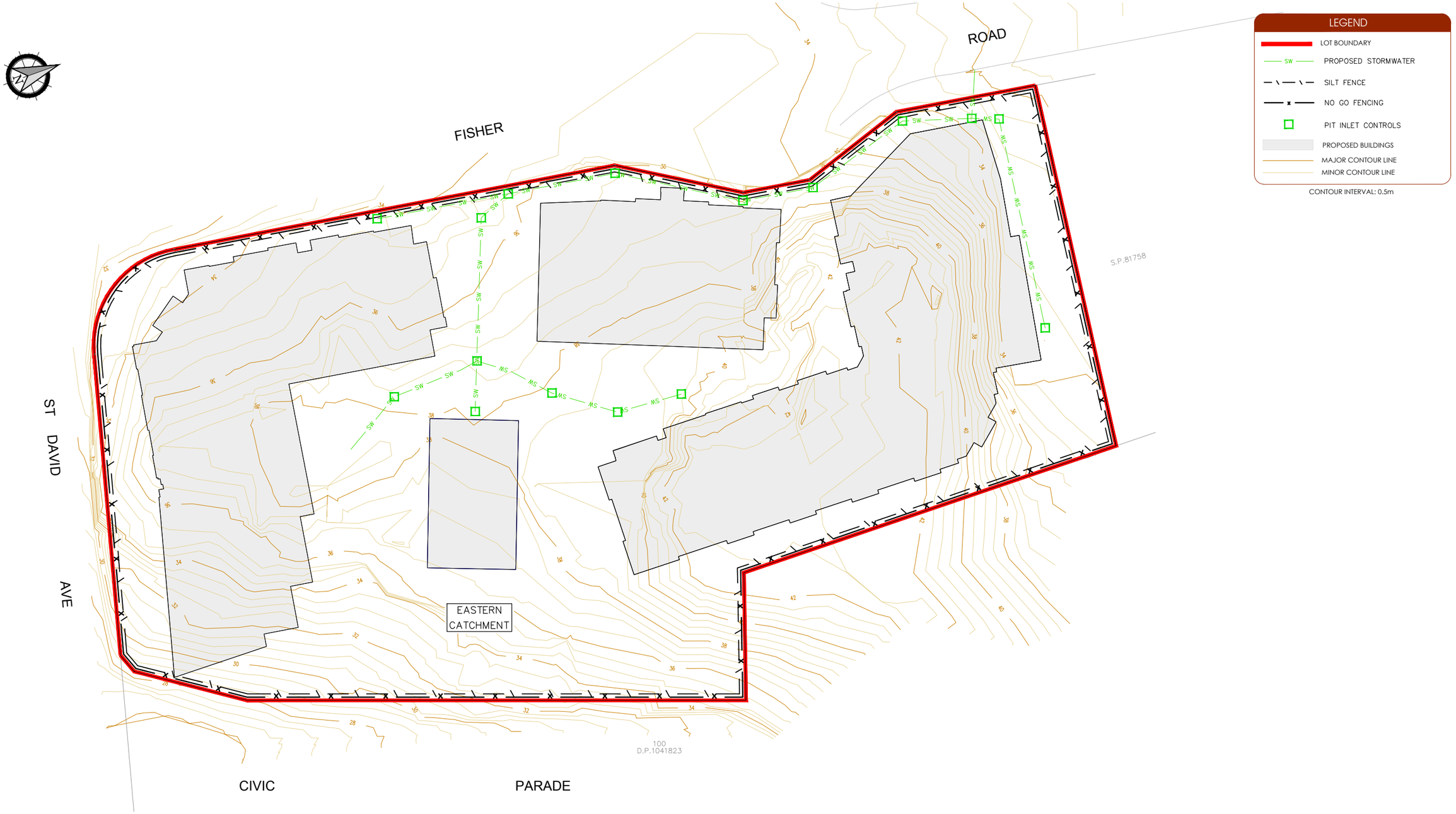

LEGEND

- LOT BOUNDARY
- SW — PROPOSED STORMWATER
- SILT FENCE
- NO GO FENCING
- PIT INLET CONTROLS
- PROPOSED BUILDINGS
- MAJOR CONTOUR LINE
- MINOR CONTOUR LINE

CONTOUR INTERVAL: 0.5m

working beyond expectations

drawing title:
EXHIBIT 4 - EROSION & SEDIMENT CONTROL PLAN

location: FISHER ROAD, DEE WHY

council: NORTHERN BEACHES

dwg ref: 190401E-EX-004

client: HAMPTONS BY ROSE

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	04.09.18	CLIENT AMENDED	BM	IB	DATUM: N/A CONTOUR INTERVAL: N/A	0 6.0 12.0 15.0m SCALE: 1:300 (FULL)	

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

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Plotted By: Ben Myles Plot Date: 04/09/18 10:37:53AM Cad File: S:\190401\DRAWINGS\GENERAL\REPORT DRAWINGS\190401-EX-004.DWG

This plan includes coloured information. If you have a black and white copy you do not have all of the information. This note is coloured RED.

Appendix A

MUSIC MODEL