
















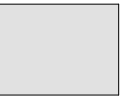


PHARMACY/COMMERCIAL SIGNAGE					
Sign ID	Location	Height	Length	Description	Elevation
S1.1	South Elevation	2,900	6,450	Flush Mounted Panel	
S1.2	West Elevation	2,900	6,413	Flush Mounted Panel	
S1.3	West Elevation	2,900	5,163	Flush Mounted Panel	
S1.4	West Elevation	2,900	9,135	Flush Mounted Panel	
S1.5	North Elevation	2,900	2,930	Flush Mounted Panel	
S1.6	North Elevation	600	2,950	Flush Mounted Panel	
S1.7	West Elevation	600	9,155	Flush Mounted Panel	
S1.8	West Elevation	600	5,163	Flush Mounted Panel	
S1.9	West Elevation	600	6,433	Flush Mounted Panel	
S1.10	South Elevation	600	6,470	Flush Mounted Panel	
S1.11	Under Awning-West	400	1,800	Hanging Blade Signage	
S1.12	East Eleavtion	1,600	4,863	Flush Mounted Panel	
S1.13	North Eleavtion	2,400	2,930	Flush Mounted Panel	

CHILDCARE SIGNAGE					
Sign ID	Location	Height	Length	Description	Elevation
S2.1	West Elevation	2,000	5,140	Flush Mounted Panel	
S2.2	West Elevation	2,000	2,240	Flush Mounted Panel	

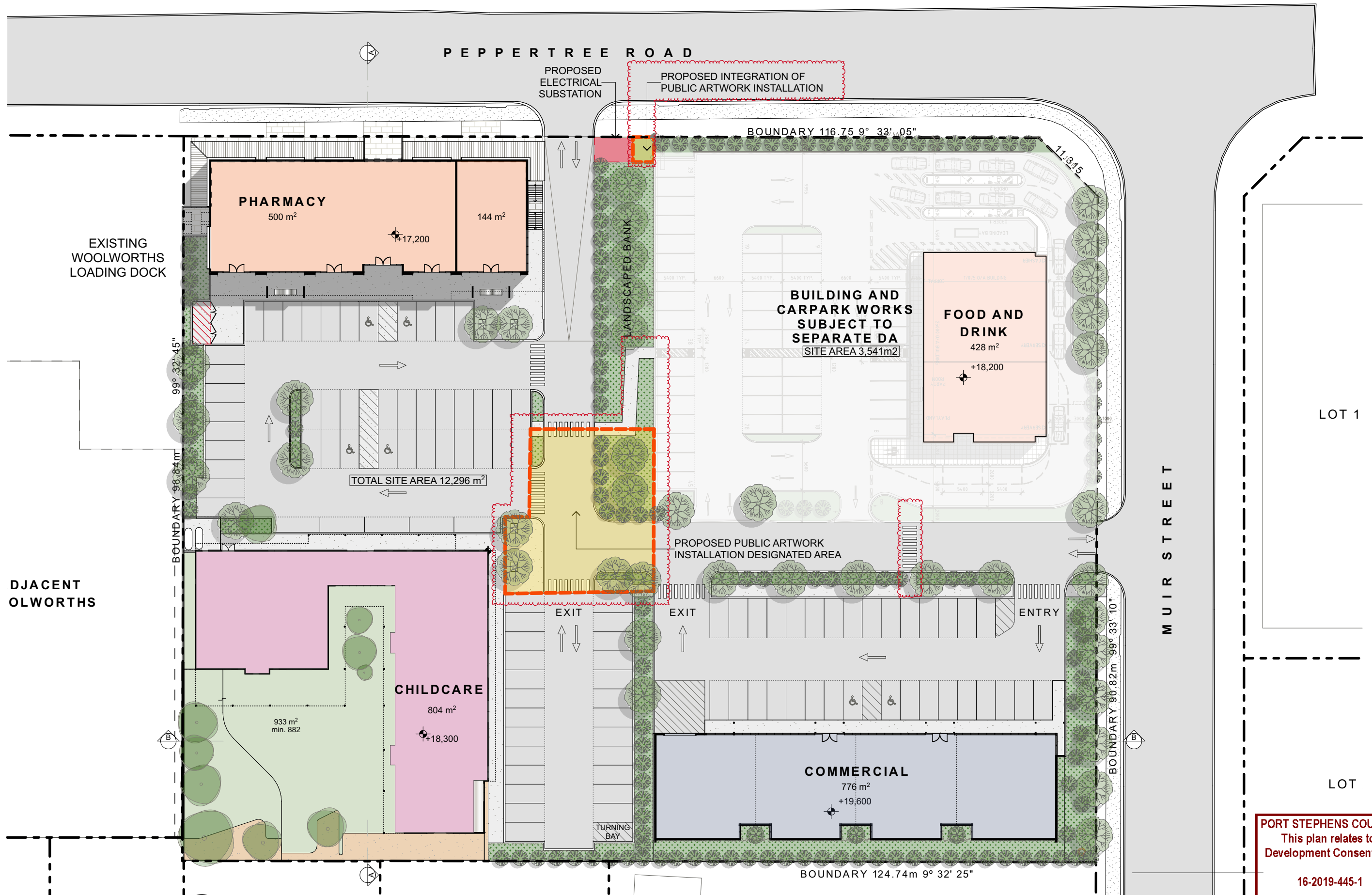
COMMERCIAL SIGNAGE					
Sign ID	Location	Height	Length	Description	Elevation
S3.1	West Elevation	1,600	3,700	Flush Mounted Panel	
S3.2	West Elevation	3,350	3,750	Flush Mounted Panel	
S3.3	North Elevation	3,350	4,425	Flush Mounted Panel	

PORT STEPHENS COUNCIL
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Development Consent No.

16-2019-445-1

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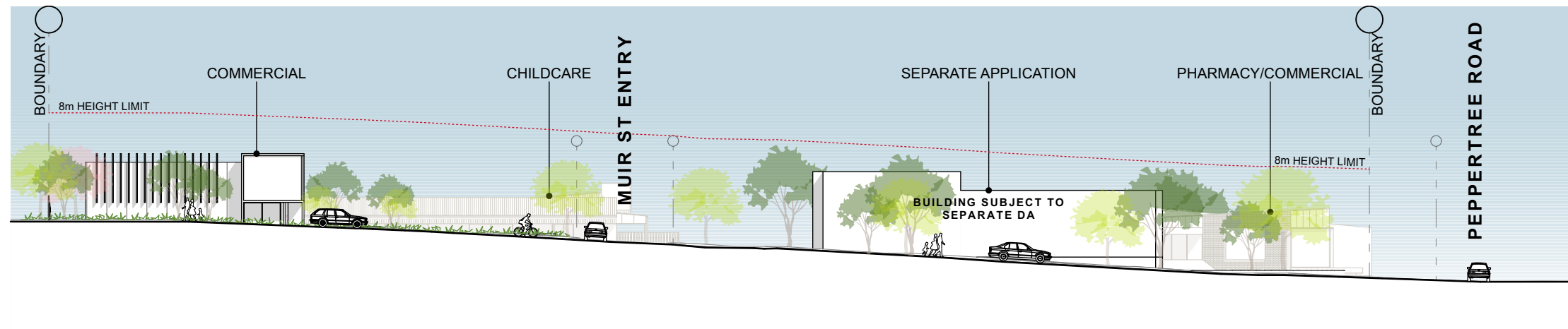
Development Application



1 Site Plan
SCALE 1:500 @ A3

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Development Application



1 Muir St Elevation
SCALE 1:400 @ A3



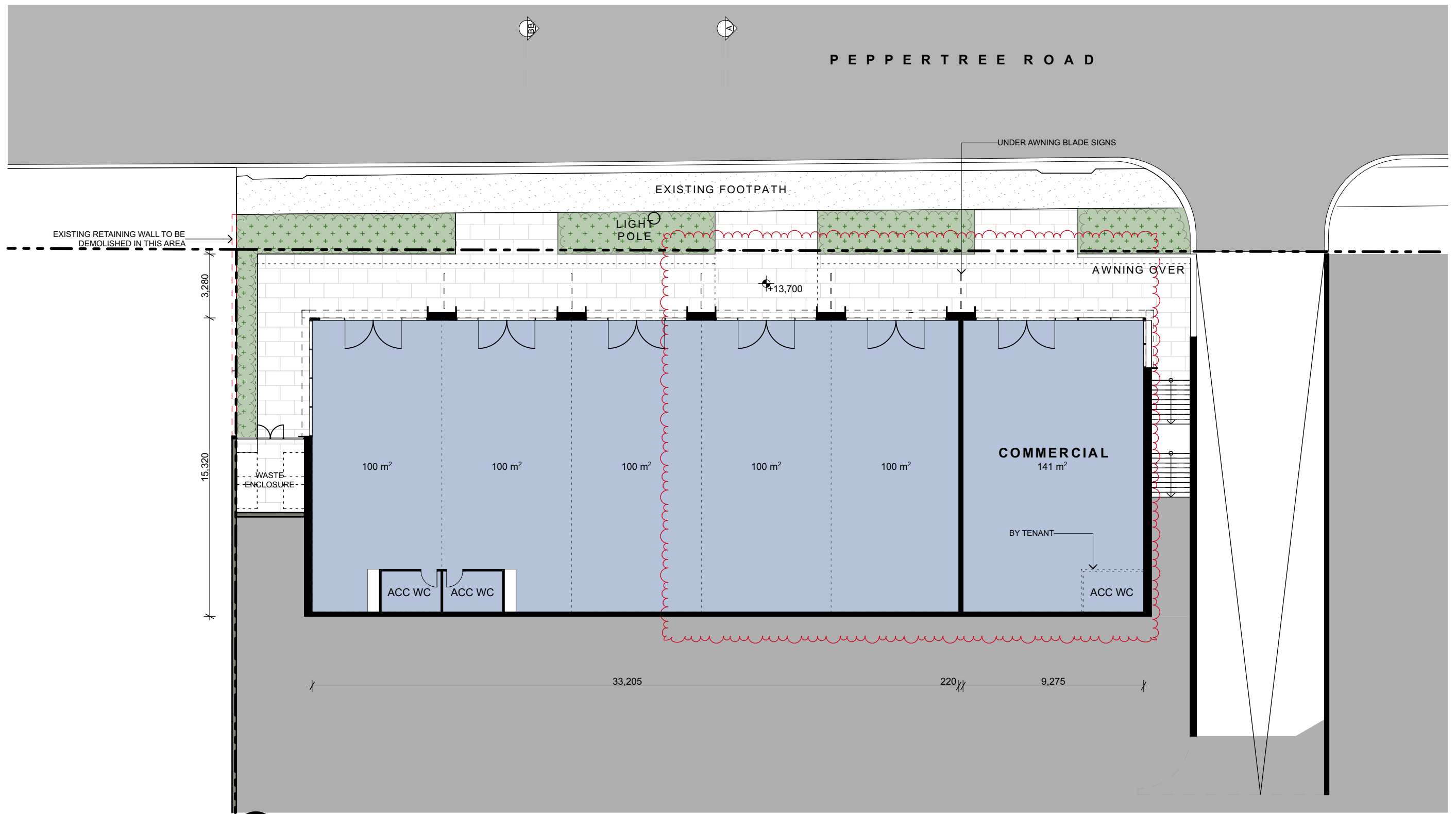
2 Peppertree Rd Elevation
SCALE 1:400 @ A3

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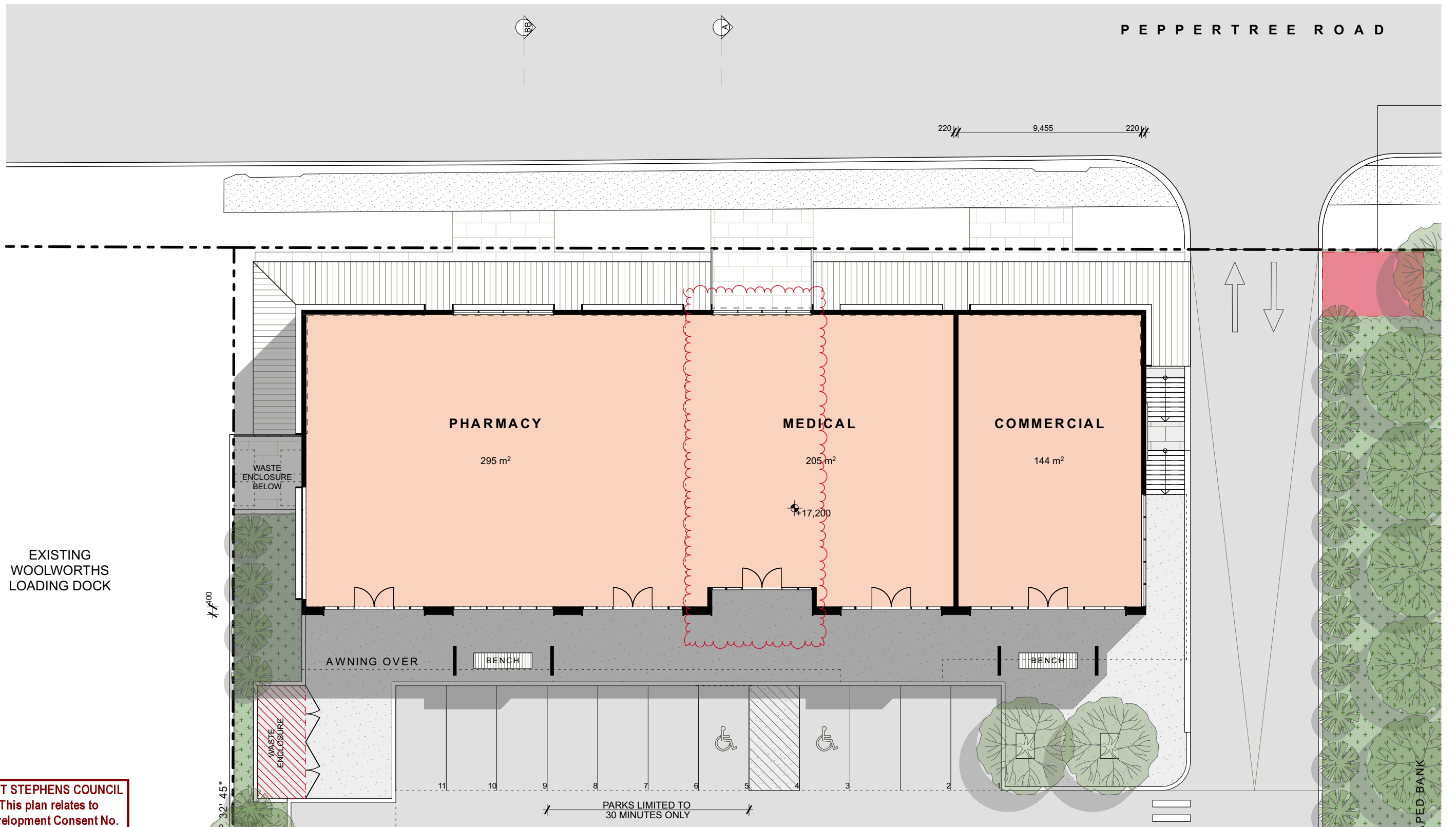
1 Gym/Commercial Lower
SCALE 1:200 @ A3

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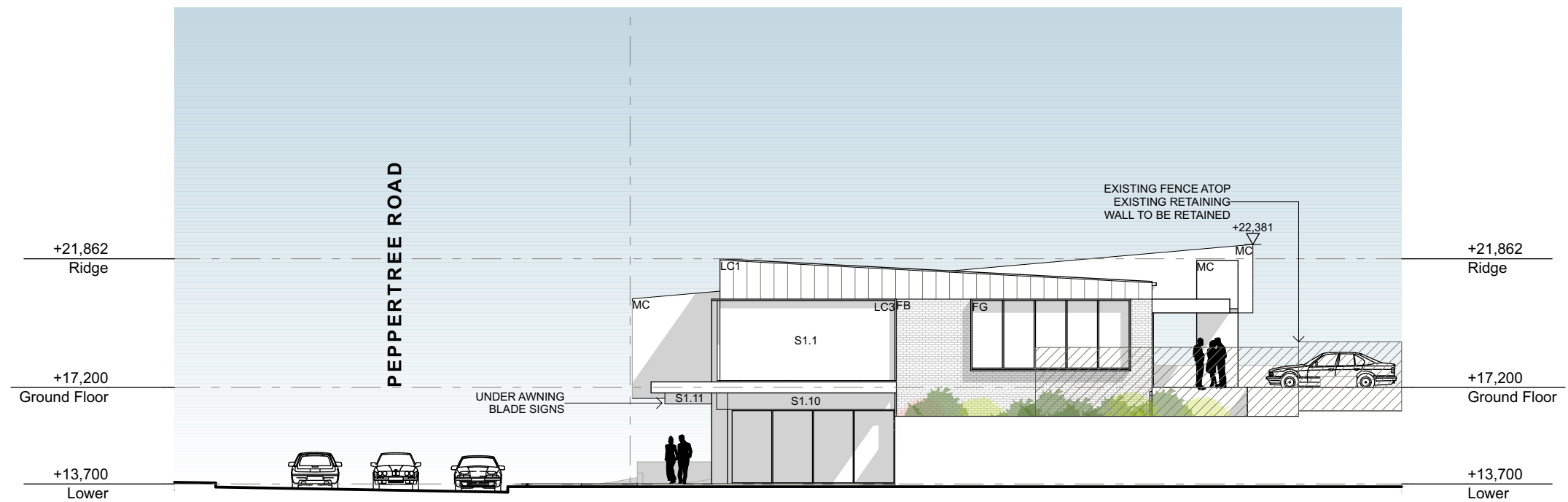
16-2019-445-1

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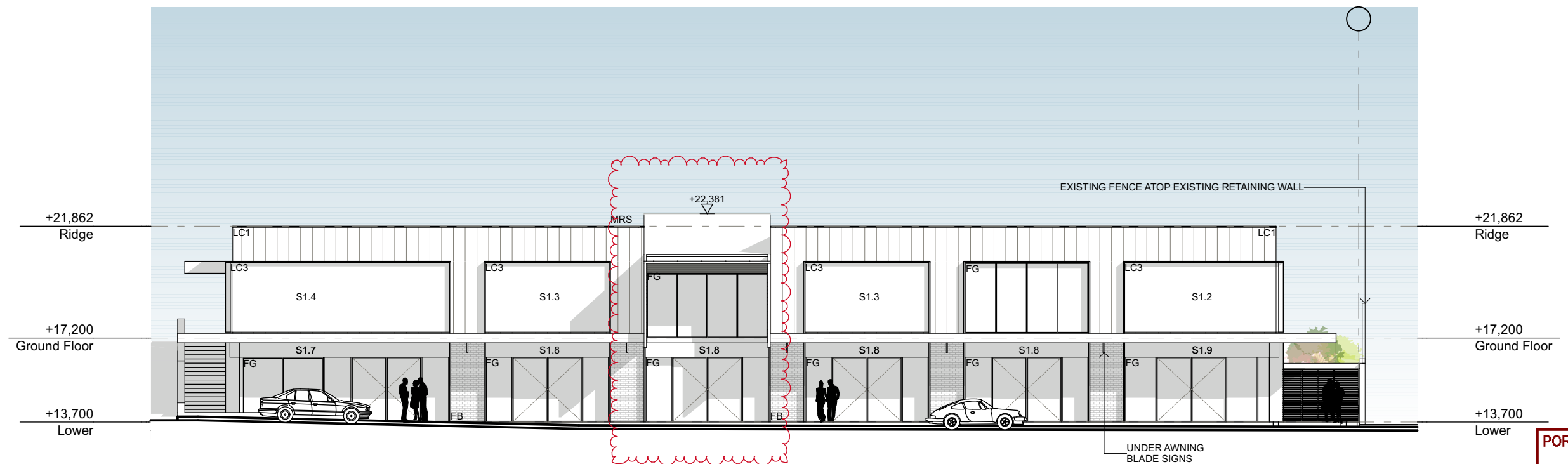
1 Pharmacy/Commercial Ground Floor Plan
SCALE 1:200 @ A3

Development Application





1 Pharmacy/Commercial South Elevation
SCALE 1:200 @ A3



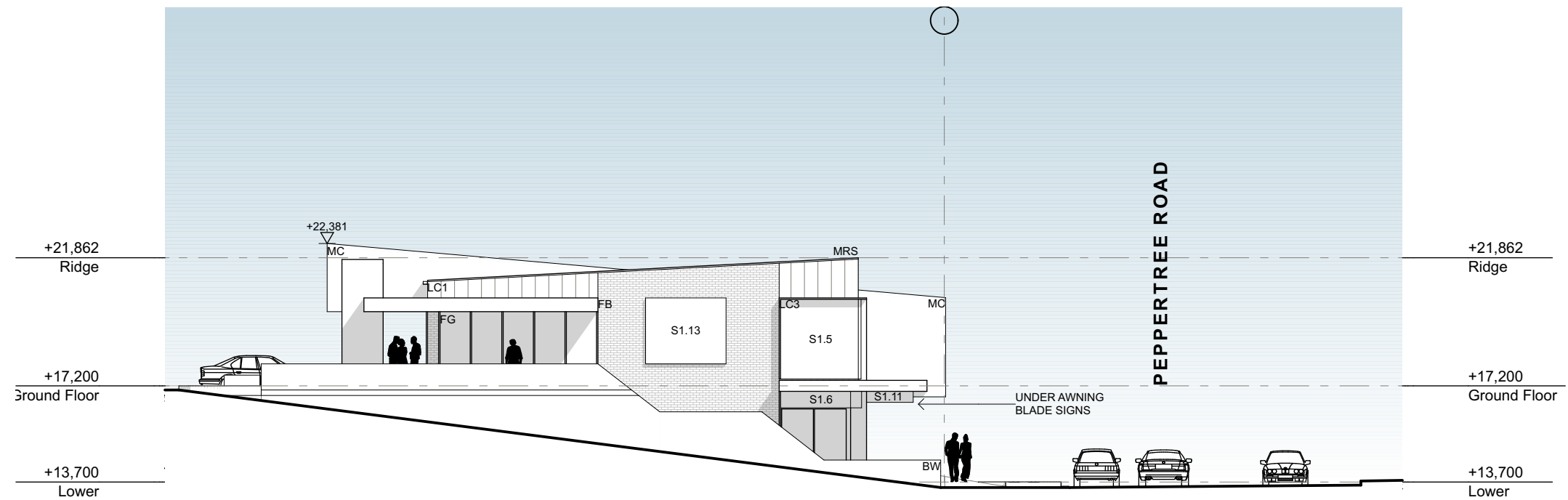
2 Pharmacy/Commercial West Elevation
SCALE 1:200 @ A3

PORT STEPHENS COUNCIL
This plan relates to
Development Consent No.

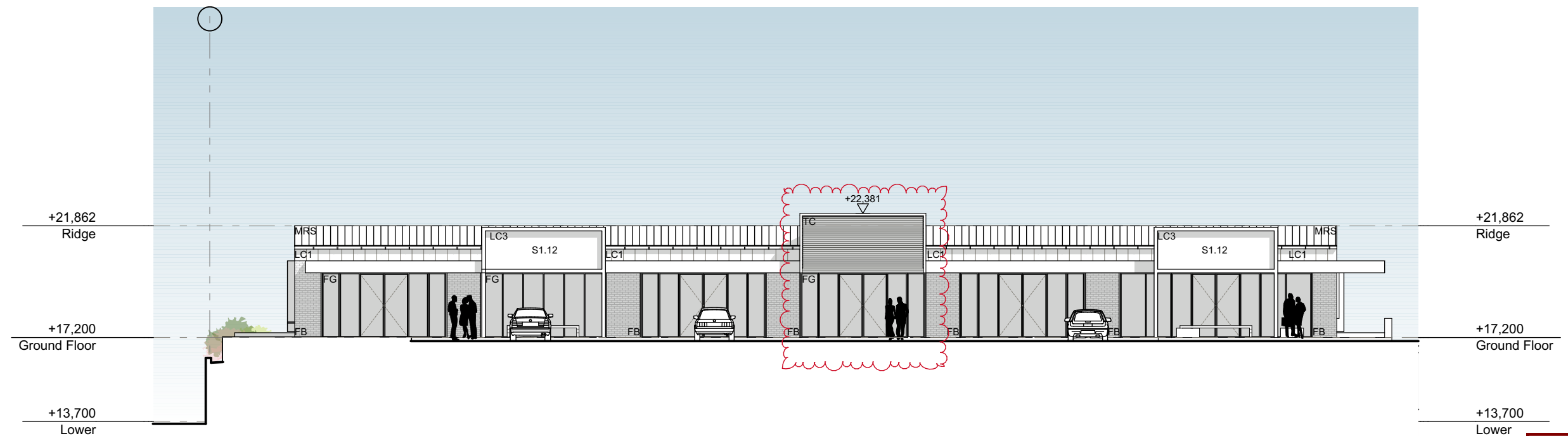
16-2019-445-1

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Development Application



1 Pharmacy/Commercial North Elevation
SCALE 1:200 @ A3



2 Pharmacy/Commercial East Elevation
SCALE 1:200 @ A3

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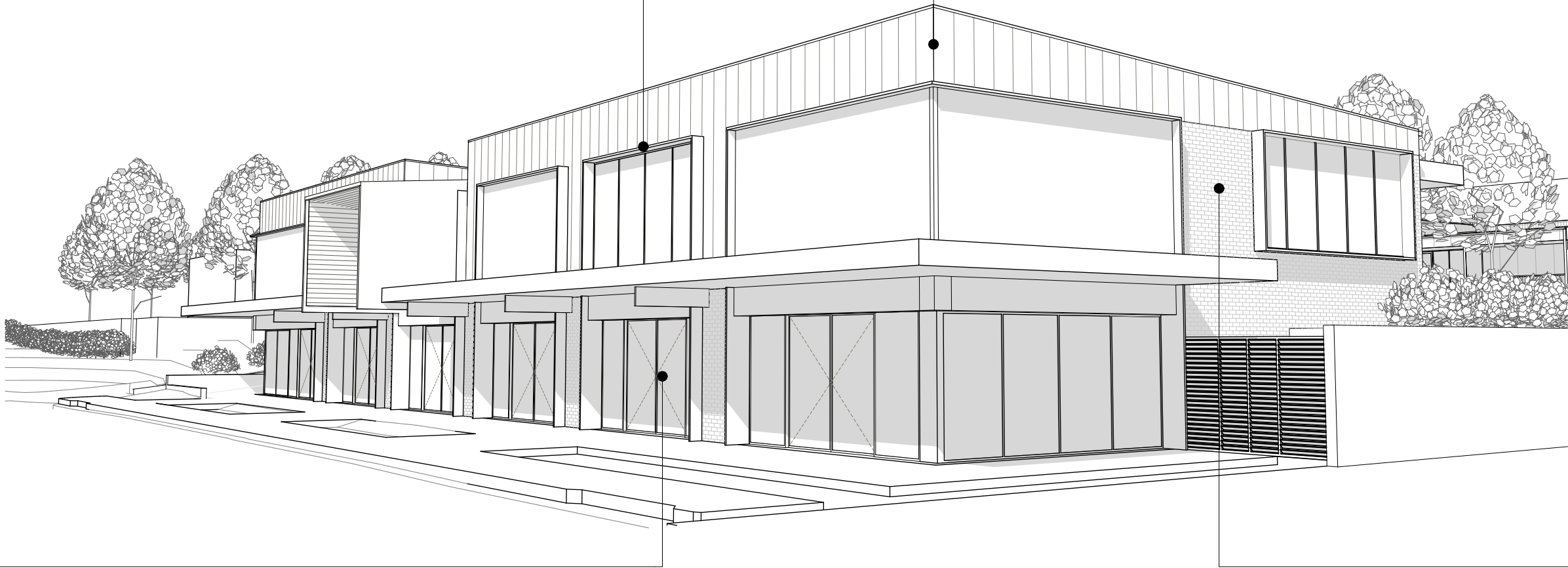
HOODS AND AWNINGS

-LIGHTWEIGHT METAL CLADDING: DARK



WALL CLADDING

-FC CLADDING WITH VERTICAL COVER BATTENS OR
LIGHT COLOURED VERTICAL TIMBER CLADDING OR SHADOWCLAD



GLAZED SHOPFRONTS

-2700 HIGH CLEAR GLASS DOORS AND SIDELIGHTS EQUALLY SPACED
WITH MULLIONS OF INDUSTRIAL CHARACTER AND DARK IN COLOUR



Pharmacy/Commercial Viewed from
Peppertree Rd

FACE BRICK

-FACE BRICK PLINTH TO WINDOW HEAD AND TOP OF SIGNAGE
HOOD DATUM



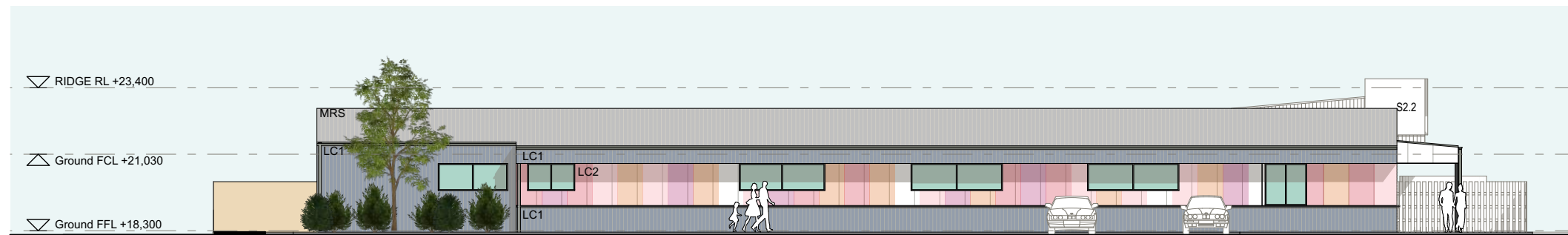
PORT STEPHENS COUNCIL
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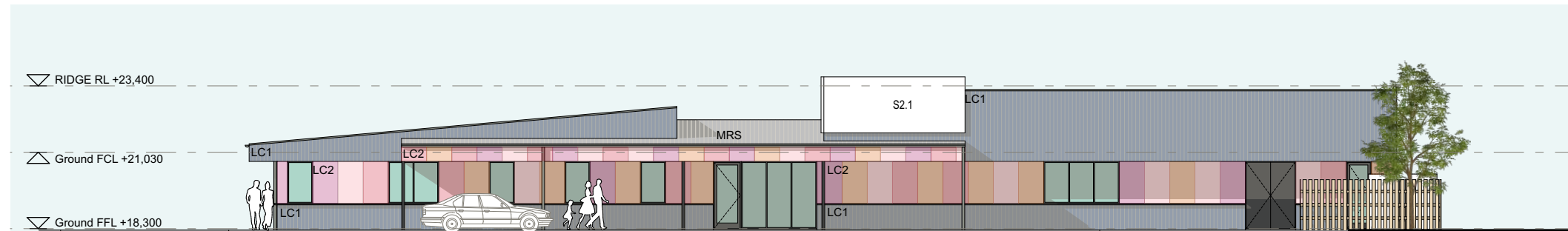
and is subject to conditions
as shown on that Consent

Development Application

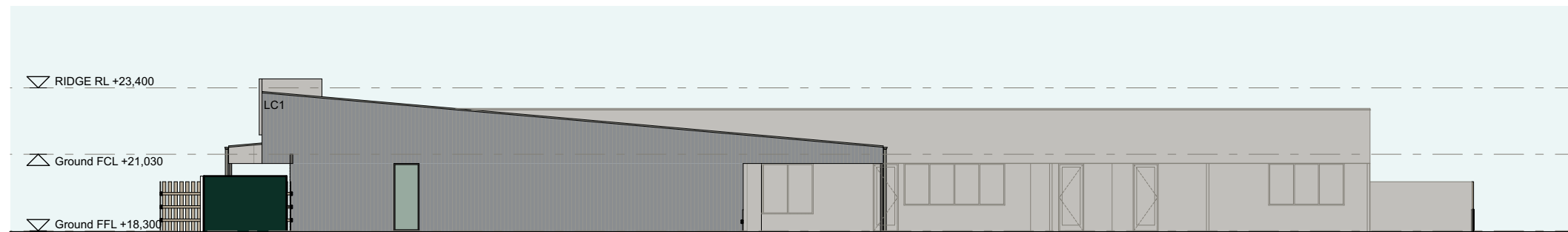




1 NORTH ELEVATION
SCALE 1:200 @ A3



2 WEST ELEVATION
SCALE 1:200 @ A3



3 SOUTH ELEVATION
SCALE 1:200 @ A3



4 EAST ELEVATION
SCALE 1:200 @ A3

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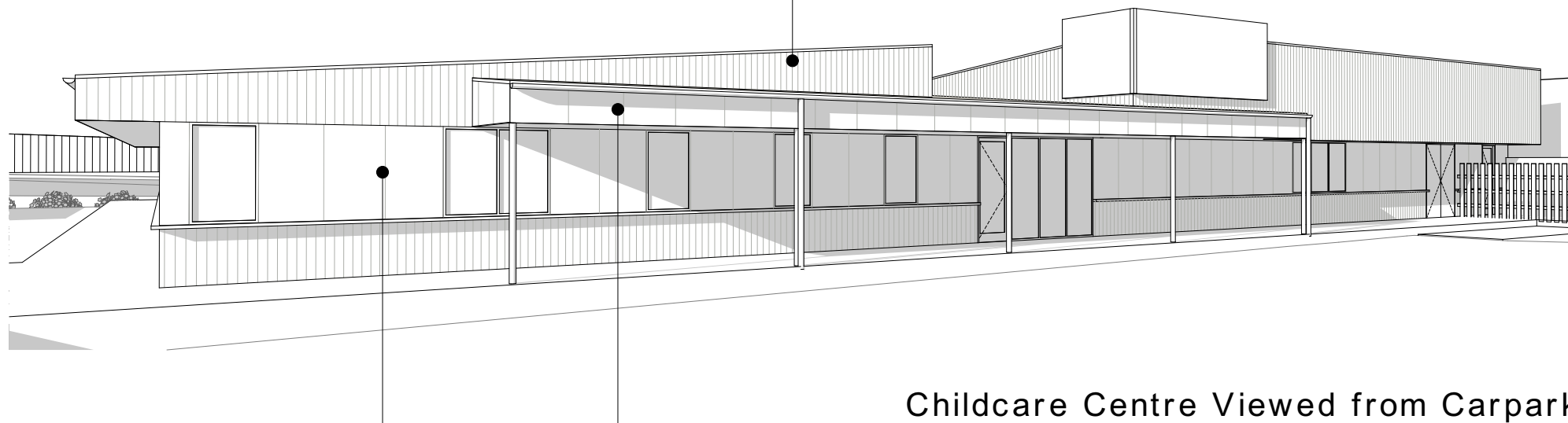
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Development Application



WALL CLADDING 1

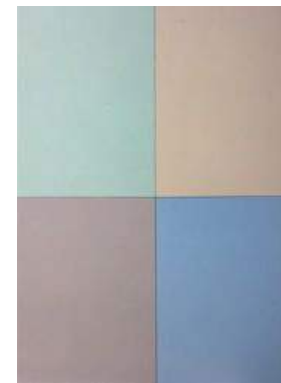
-LIGHT / NEUTRAL COLOURED FC CLADDING WITH VERTICAL GROOVES



Childcare Centre Viewed from Carpark

WALL CLADDING 2

-FC CLADDING WITH VERTICAL JOINT LINES
PAINTED



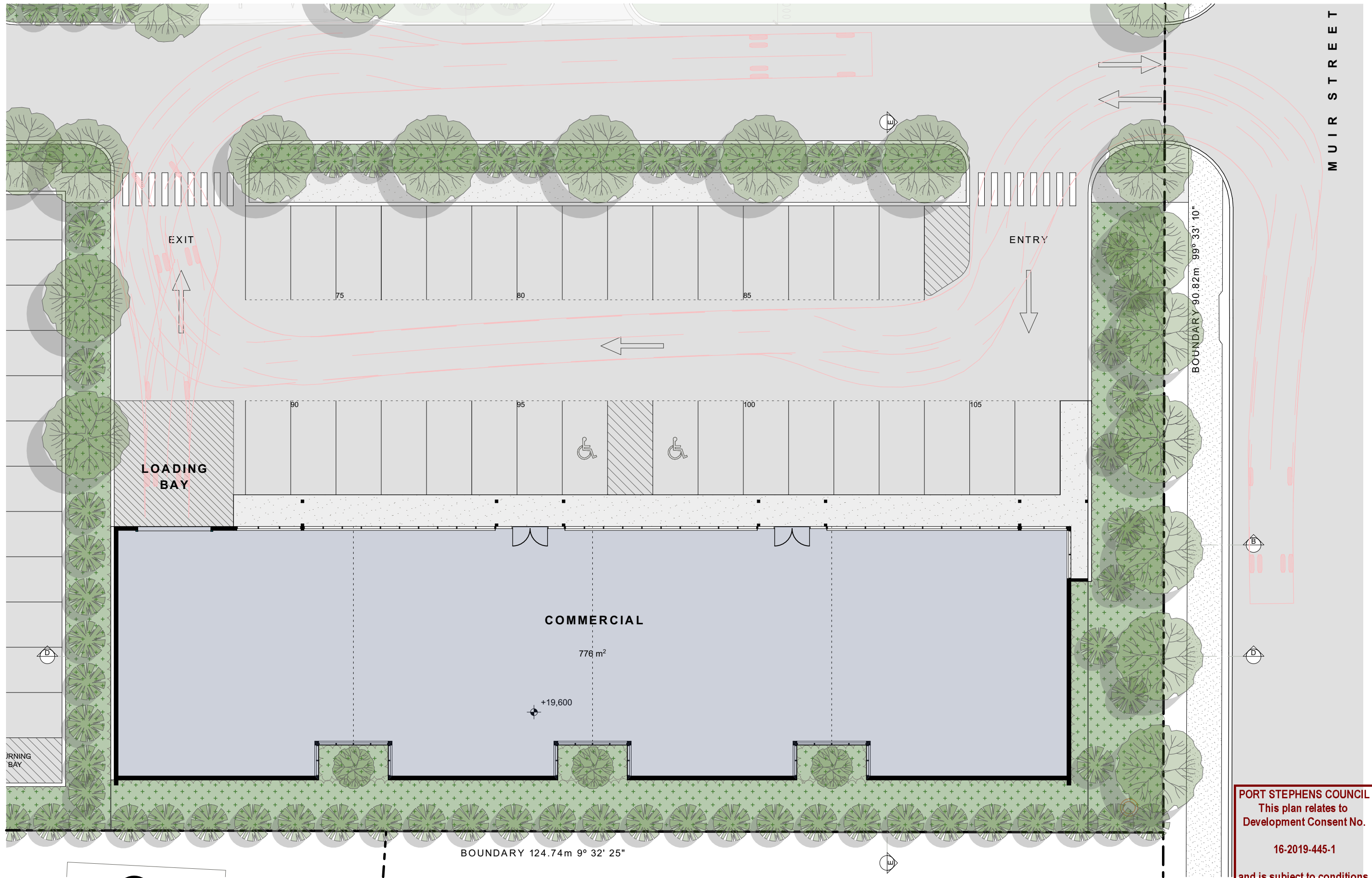
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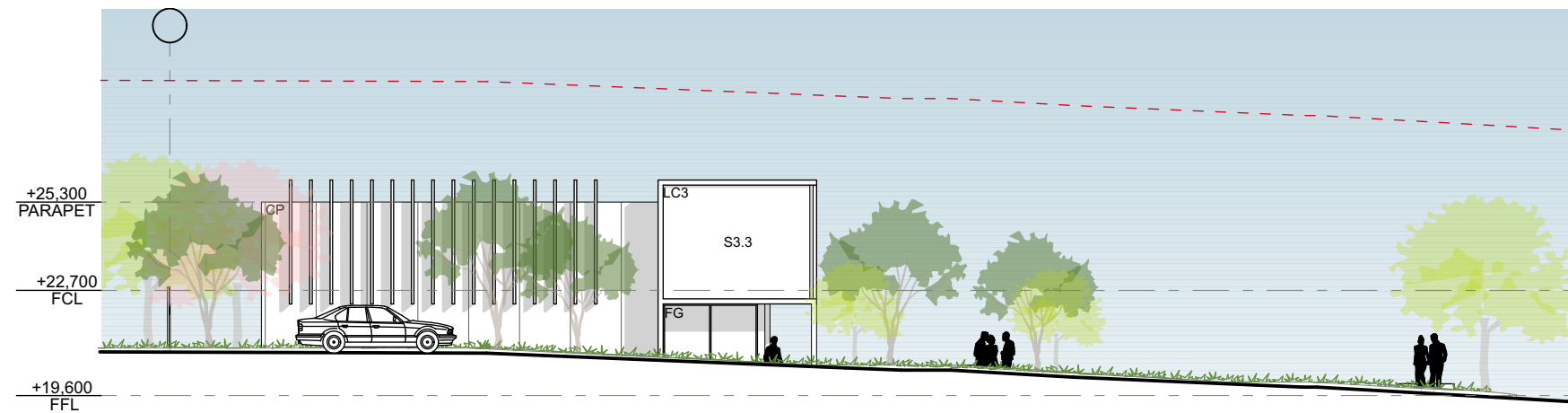
1 Retail Ground Floor Plan
SCALE 1:200 @ A3

PORT STEPHENS COUNCIL
This plan relates to
Development Consent No.

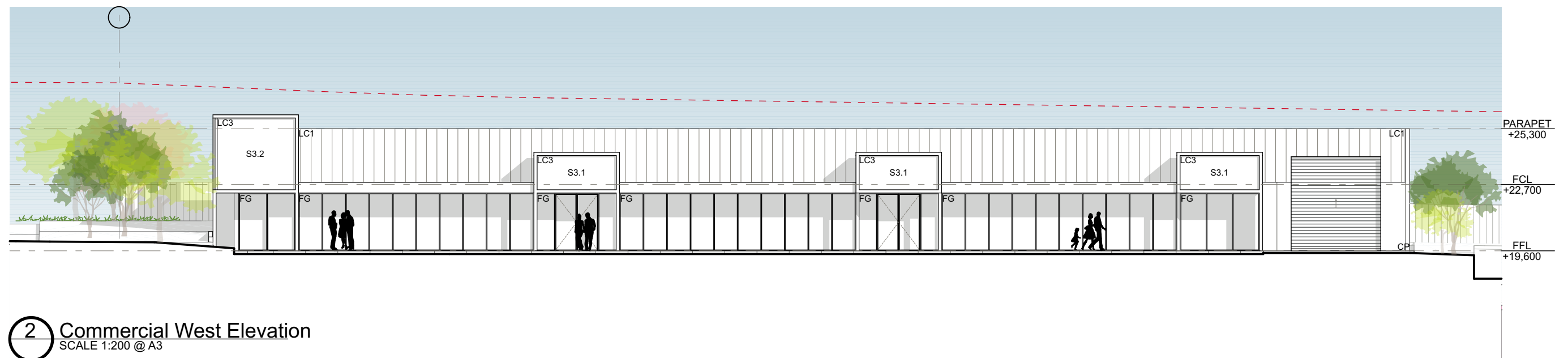
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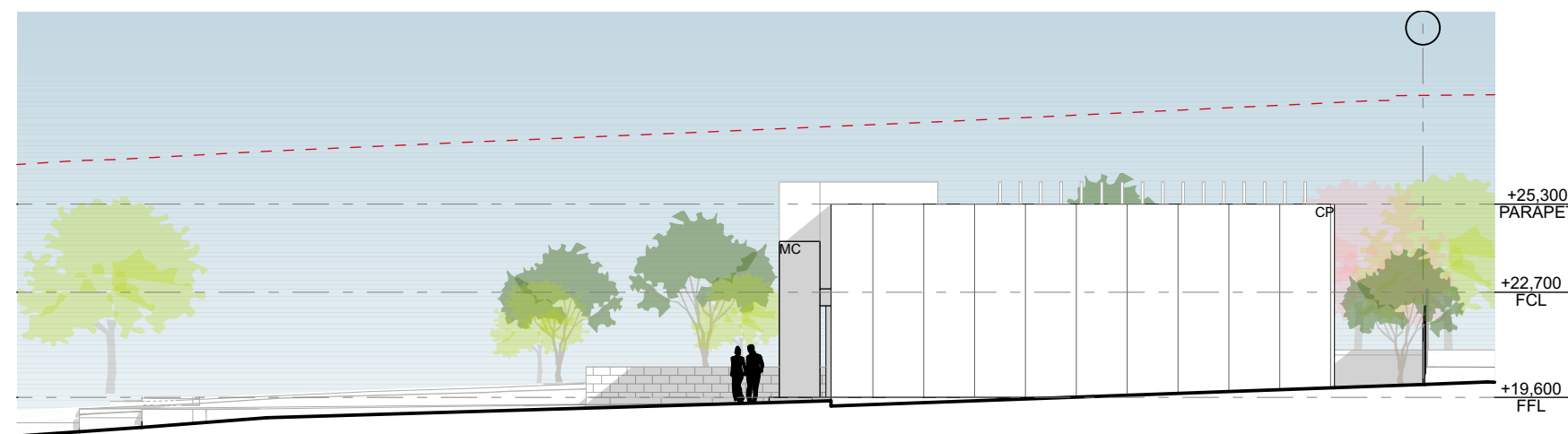
Development Application



1 Commercial North Elevation
SCALE 1:200 @ A3



2 Commercial West Elevation
SCALE 1:200 @ A3



3 Commercial South Elevation
SCALE 1:200 @ A3

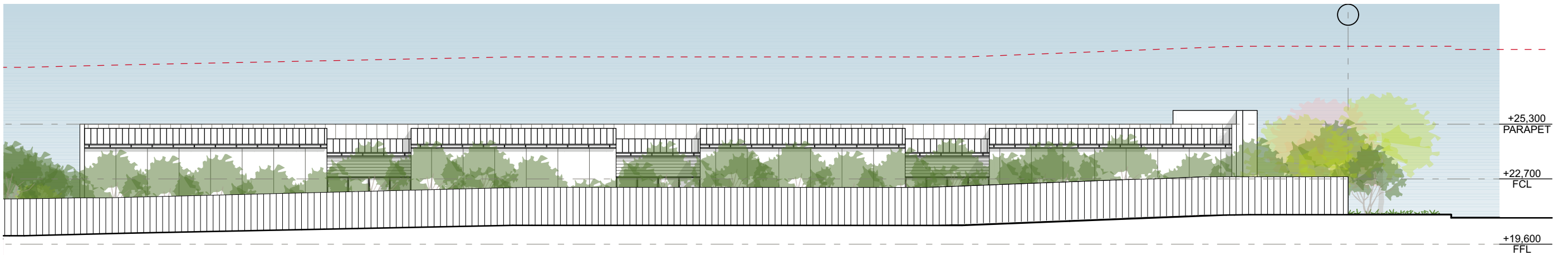
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1 Commercial East Elevation
SCALE 1:200 @ A3

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SIGNAGE HOODS AND AWNINGS
-LIGHTWEIGHT METAL CLADDING: DARK



WALL CLADDING
-FC CLADDING WITH VERTICAL COVER BATTENS OR
LIGHT COLOURED VERTICAL TIMBER CLADDING OR SHADOWCLAD



-TILT UP CONCRETE PANELS- PAINT FINISH



Retail Viewed from Muir St

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LEGEND

<div></div>	BOUNDARY LINE
<div></div>	ADJACENT BOUNDARY
<div></div>	EASEMENT

PRELIMINARY ONLY
THIS PLAN IS PRELIMINARY ONLY AND IS SUBJECT TO COUNCIL APPROVAL, FINAL DESIGN, CONSTRUCTION, FINAL SURVEY AND REGISTRATION AT THE NSW LAND REGISTRY SERVICES, SYDNEY.

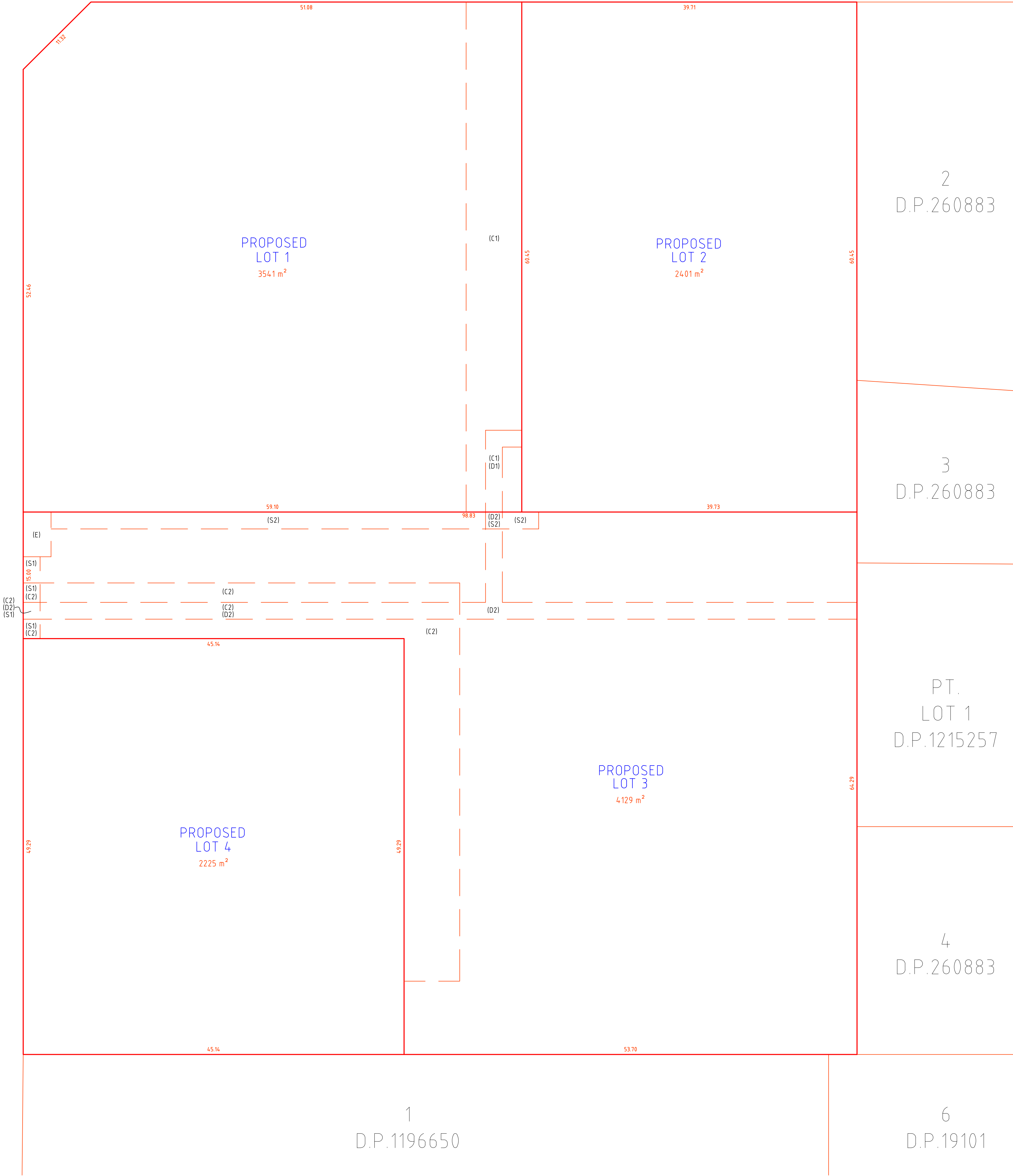


MUIR

STREET

ROAD

PEPPERTREE



NOTES:

- FEATURES SHOWN TO SCALE ACCURACY.
- THIS PLAN IS SUITABLE FOR DETAILED PLANNING AND DESIGN AT THE SCALE/S STATED. THE PLAN MAY NOT BE SUITABLE FOR ANY OTHER PURPOSE OR FOR USE AT ANY OTHER SCALE/S.
- NO SURVEY HAS BEEN MADE. DIMENSIONS AND AREAS ARE APPROXIMATE ONLY.

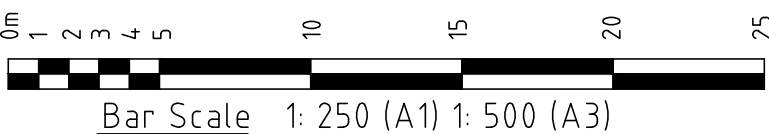
PORT STEPHENS COUNCIL

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H		
G		
F		
E		
D		
C		
B		
A	19.03.19	INITIAL ISSUE
Ed.	Date	Amendment



- (C1) PROPOSED RIGHT OF CARRIAGEWAY 6.6 WIDE BENEFITING PROPOSED LOT 2
- (C2) PROPOSED RIGHT OF CARRIAGEWAY 6.6 WIDE BENEFITING PROPOSED LOT 4
- (D1) PROPOSED EASEMENT TO DRAIN WATER 2 WIDE BENEFITING PROPOSED LOT 2
- (D2) PROPOSED EASEMENT TO DRAIN WATER 2 WIDE BENEFITING PROPOSED LOTS 1 AND 2, PT. LOT 1 D.P.1215257 AND LOT 3 D.P.260883
- (E) PROPOSED EASEMENT FOR ELECTRICITY AND OTHER PURPOSES 5.3 x 3.3 WIDE BENEFITING PROPOSED LOTS 1, 2 AND 4
- (S1) PROPOSED EASEMENT FOR SERVICES 2 WIDE BENEFITING PROPOSED LOT 4
- (S2) PROPOSED EASEMENT FOR SERVICES 2 WIDE BENEFITING PROPOSED LOT 2

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de Witt Consulting

planning ■ surveying ■ project management

HUNTER REGION

7 Canberra Street Charlestown
PO Box 850 Charlestown NSW 2290
P 02 4942 5441 F 02 4942 5301
E admin@dewittconsulting.com.au

WESTERN REGION

87 Herbert Street Gulgong
PO Box 232 Gulgong NSW 2852
P 02 6374 2911 F 02 6374 2922
ABN 23 104 067 405

TITLE

PROPOSED SUBDIVISION OF
PART LOT 1 D.P.1215257

JOB ADDRESS: 795 MEDOWIE ROAD, MEDOWIE

CLIENT:

SCALE: A1 1:250 A3 1:500

SURVEY DATE: N/A

PLAN DATE: 19.03.19

DATUM: N/A

CAD REF: N/A

ORIGIN OF LEVELS

N/A

DRAWN CJ

SURVEYOR -

CHECKED JW

APPROVED JW

DRAWING REF: 8722-PROPOSED SUBDIVISION-19.03.19

PLAN No

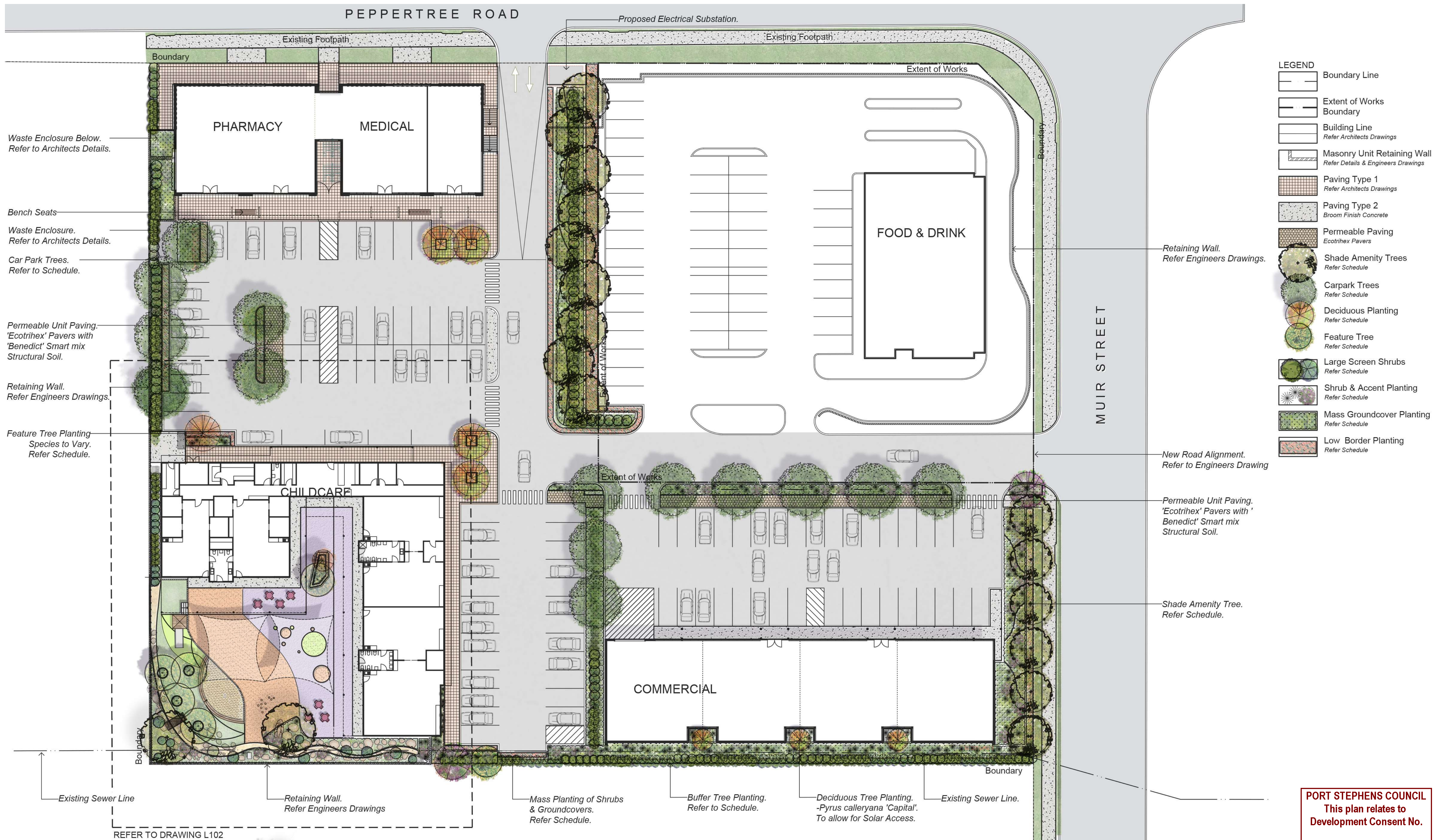
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JOB REF:

8722

SHEET No

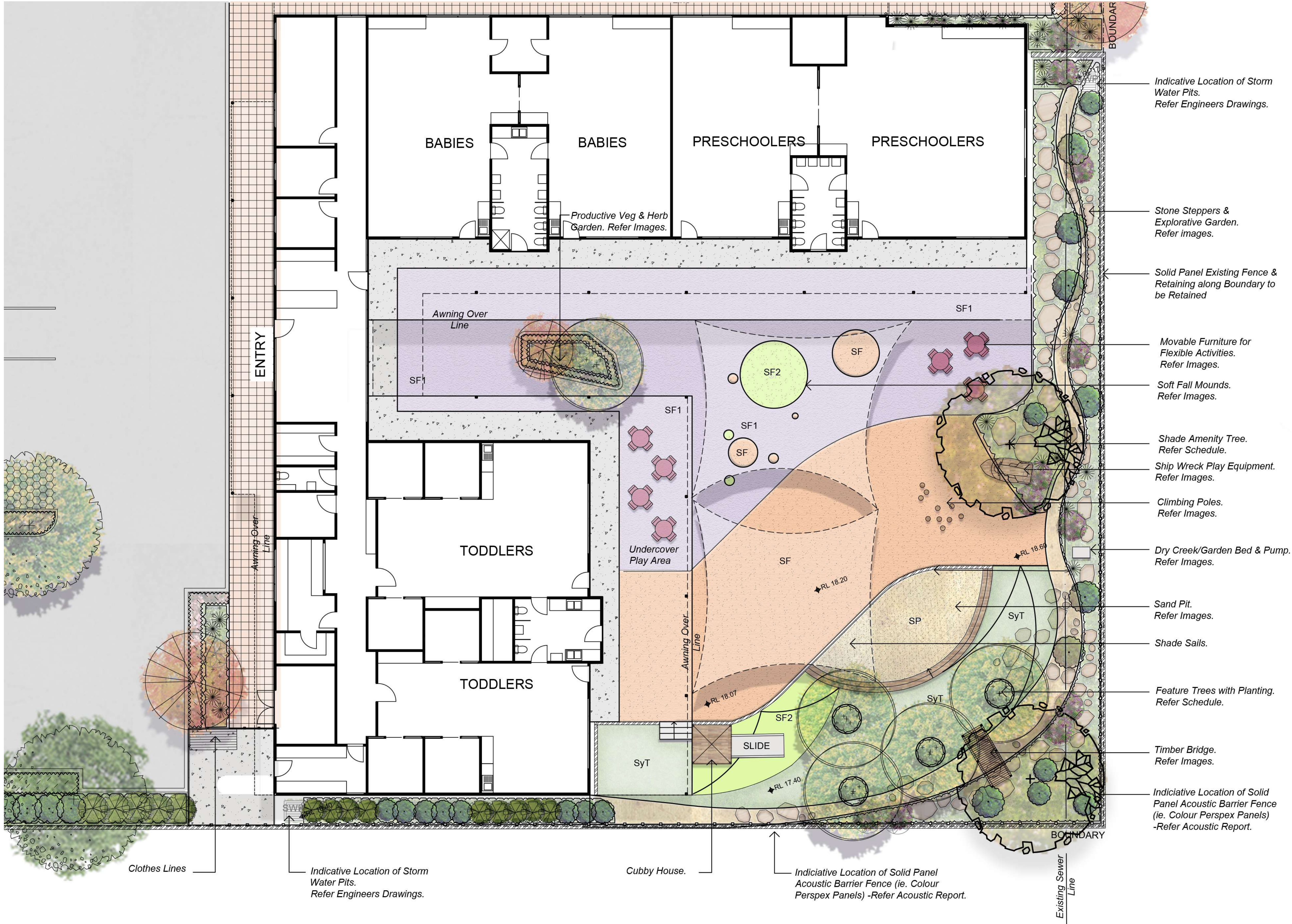
1/1



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- LEGEND**
- Boundary Line
 - Building Line
Refer Architects Drawings
 - Building Level/Roof Over
Refer Architects Drawings
 - Masonry Unit Retaining Wall
Refer Details & Engineers Drawings
 - Acoustic Barrier Fence
Refer Acoustic Report Recommendation
 - Shade Sail
 - Paving Type 1 - Feature Unit
Paving on Slab
 - Paving Type 2 - Broom
Finished Concrete Paving
 - SF1 Wetpour Rubber Softfall
-Type 1
 - SF2 Wetpour Rubber Softfall
-Type 2
 - SF3 Wetpour Rubber Softfall
-Type 3
 - SP Sand Pit
Minimum 500m Depth Sand
 - SyT Synthetic Turf
Refer Images
 - Shade Amenity Tree
Refer Schedule
 - Carpark Tree
Refer Schedule
 - Deciduous Tree
Refer Schedule
 - Small Feature Tree
Refer Schedule
 - Large Screen Shrub
Refer Schedule
 - Shrub & Accent Planting
Refer Schedule
 - Mass Groundcover Planting
Refer Schedule
 - Low Border Planting
Refer Schedule

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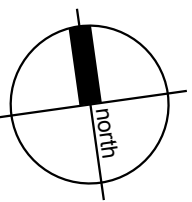
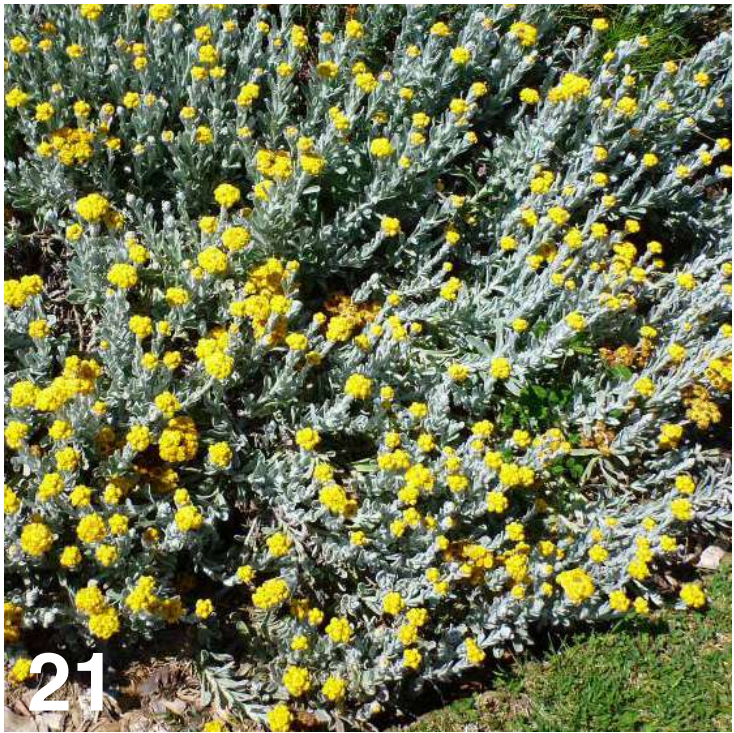
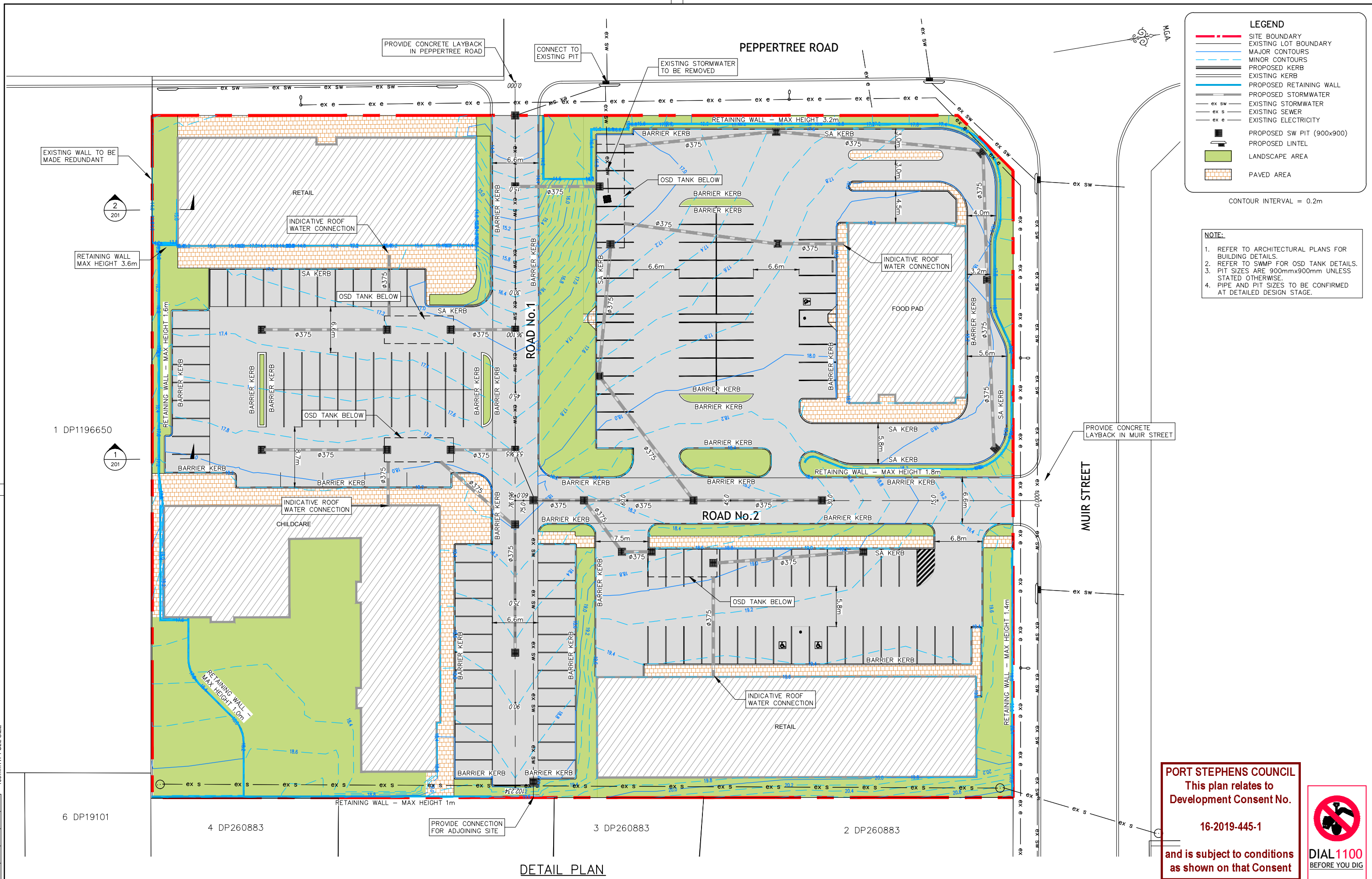


Image	Botanical Name	Common Name	Mature Height (m.)	Mature Spread (m.)	Pot Size	Comments
Car Park Trees						
01	<i>Cupaniopsis anacardioides</i>	Tuckeroo	8	7	75L	Stakes and ties
	<i>Lophostemon confertus</i>	Queensland Brush Box	18	10	75L	Stakes and ties
	<i>Melaleuca atypheloides</i>	Prickly Paper Bark	10	8	75L	Stakes and ties
Shade Amenity Trees						
02	<i>Alloxylon flammeum</i>	Tree Waratah	15	6-8	75L	Stakes and ties
	<i>Corymbia gummifera</i>	Red Bloodwood	20	18	75L	Stakes and ties
	<i>Corymbia maculata</i>	Spotted Gum	25	18	75L	Stakes and ties
	<i>Waterhousia 'Sweeper'</i>	Weeping Lilly Pilly	10	7	75L	Stakes and ties
Deciduous Trees						
03	<i>Lagerstroemia indica</i> x <i>L. fauriei</i>	Crepe Myrtle	4	3	75L	Stakes and ties
04	<i>Pyrus calleryana</i> 'Capital'	Ornamental Pear	10	2.5	75L	Stakes and ties
Small Feature Trees						
05	<i>Callestemon citrinus</i>	Crimson Bottle Brush	3	3	45L	Stakes and ties
	<i>Corymbia ficifolia</i> 'Orange Splendour'	Dwarf Flowering Gum	6	4-6	45L	
	<i>Elaeocarpus reticulatus</i>	Blueberry Ash	10	5	45L	
	<i>Tristaniopsis 'Luscious'</i>	Luscious Water Gum	8	5	75L	
Tall Screen Shrubs > 1.5m						
06	<i>Banksia robur</i>	Swamp Banksia	2	2	300mm	Stakes and ties
07	<i>Breynia cernua</i> 'Ironstone Range'	Coffee Bush	2	1.5	300mm	
	<i>Grevillea 'Honey Gem'</i>	Spider Flower Grevillea	4	3	300mm	
08	<i>Leucospermum cordifolium</i> 'Scarlet Ribbon'	Scarlet Ribbon	2	1.5	300mm	
09	<i>Syzigium australe</i> 'Pinnacle'	Pinnacle Narrow Lilly Pilly	7.5	1.5	300mm	
Shrubs < 1.5m						
10	<i>Beschorneria yuccoides</i>	Mexican Lily	1.5	1	200mm	Stakes and ties
11	<i>Callistemon 'Better John'</i>	Better John Bottlebrush	1.2	0.9	200mm	
	<i>Grevillea 'Crimson Villa'</i>	Crimson Villa	0.7	0.7	200mm	
12	<i>Raphiolepis indica</i> 'Apple Blossom'	Apple Blossom Hawthorn	1	1	200mm	
13	<i>Westringia fruticosa</i> 'Zena'	Westringia 'Zena'	1.2	1.2	200mm	
Mass Planted Groundcovers						
14	<i>Alternanthera dentata</i> 'Little Ruby'	Littly Ruby	0.5	0.5	140mm	Stakes and ties
15	<i>Convolvulus cneorum</i>	Silver Bush	0.5	1	140mm	
	<i>Dianella caerulea</i> 'Little Jess'	Little Jess Flax Lily	0.4	0.4	140mm	
16	<i>Dichondra repens</i>	Kidney Weed	0.1	1.5	100mm	
17	<i>Liriope muscari</i> 'Isabella'	Isabella Fine Leaf Liriope	0.4	0.5	140mm	
	<i>Myoporum parvifolium</i> 'Yareena'	Yareena Creeping Boobialla	0.1	1	140mm	
18	<i>Neomarica gracilis</i>	Walking Iris	0.5	0.5	140mm	
19	<i>Stachys byzantina</i>	Lambs Ears	0.5	0.5	140mm	
20	<i>Westringia 'Mundi'</i>	Westringia 'Mundi'	0.6	1.5	140mm	
Low Border Planting						
21	<i>Carex albula</i> 'Frosted Curls'	New Zealand Hair Sedge	0.6	0.6	140mm	Stakes and ties
	<i>Chrysocephalum apiculatum</i> 'Desert Flame'	Yellow Buttons	0.5	0.3	140mm	
	<i>Lomandra confertifolia</i> 'Wingarra'	Lomandra Wingarra	0.4	0.6	140mm	
	<i>Viola hederacea</i>	Native Violet	0.1	0.3	140mm	
Cascading Planting						
	<i>Casuarina glauca</i> 'Cousin It'	Cousin It	0.3	1	140mm	Stakes and ties
	<i>Hardenbergia violacea</i> 'Meema'	Meema Snake Vine	0.5	2	140mm	
	<i>Rosmarinus officinalis</i> 'Blue Lagoon'	Blue Lagoon Rosemary	0.3	1	140mm	
Shade Tolerant Planting						
23	<i>Asplenium australasicum</i>	Birds Nest Fern	1	1	140mm	Stakes and ties
24	<i>Macrozamia communis</i>	Burrawang	1	1.5	140mm	
	<i>Philodendron 'Xanadu'</i>	Xanadu Dwarf Philodendron	0.8	0.8	140mm	
	<i>Pteris tremula</i>	Tender Brake	1	0.8	140mm	
	Climbers					
25	<i>Cissus antarctica</i>	Kangaroo Vine	6		140mm	





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REV.	DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED	SCALES	CLIENT	PROPERTY DESCRIPTION	PROJECT
A	12.06.19	INITIAL ISSUE	B.M.	J.J.	B.M.	B.M.	0 5.0 10.0 12.5m	Central Coast	LOT 1 IN D.P. 1215257 MEDOWIE ROAD, MEDOWIE	PROPOSED MULTI USE DEVELOPMENT
B	21.06.19	GENERAL AMENDMENTS	B.M.	S.Z.	B.M.	B.M.	SCALE: 1:250 (FULL)	5 Pioneer Avenue, P.O. Box 3717, Tuggerah N.S.W. 2259		PLAN TITLE DETAIL PLAN
C	25.06.19	GENERAL AMENDMENTS	B.M.	P.S.	B.M.	B.M.		Phone: (02) 4305 4300		
D	09.07.19	CARPARK LAYOUT AMENDED	B.S.	S.Z.	B.M.	B.M.		Fax: (02) 4305 4399		
E	10.07.19	TURNING PATHS AMENDED	B.M.	B.M.	B.M.	B.M.		email: coast@adwjohnson.com.au		
F	31.07.19	GENERAL AMENDMENTS	M.V.	J.J.	B.M.	B.M.		www.adwjohnson.com.au		
G	14.11.19	GENERAL AMENDMENTS	B.S.	P.B.	B.S.	B.S.		ABN 62 129 445 398		
DESIGN FILE S:\190514\DESIGN\120\190514E MEDOWIE ROAD								MAVID PROPERTIES	SURVEYED ADWJ	DATUM A.H.D.
Plotted By: Patrick Buscombe Plot Date: 14/11/19 12:57:42PM Cad File: S:\190514\DRAWINGS\ENGINEERING\CIVIL\C ENG\190514-CENG-101.DWG									PROJECT No. 190514	DISCIPLINE CENG
									NUMBER 101	REV. G

190514-CENG-501

100mm AT FULL SIZE



REGRADE PLAN
SCALE 1:250

LEGEND

- SITE BOUNDARY
- PROPOSED LOT BOUNDARY
- EXISTING LOT BOUNDARY
- MAJOR CONTOURS
- MINOR CONTOURS
- PROPOSED KERB
- EXISTING KERB
- PROPOSED RETAINING WALL

CONTOUR INTERVAL = 0.2m

LEGEND (+ FILL - CUT)		Colour
Lower_value	Upper_value	
-3	to -2.5	m
-2.5	to -2	m
-2	to -1.75	m
-1.75	to -1.5	m
-1.5	to -1.25	m
-1.25	to -1	m
-1	to -0.75	m
-0.75	to -0.5	m
-0.5	to -0.25	m
-0.25	to 0	m
0	to 0.250	m
0.250	to 0.5	m
0.500	to 0.75	m
0.75	to 1	m
1	to 1.25	m
1.25	to 1.5	m
1.5	to 1.75	m
1.75	to 2	m
2	to 2.5	m
2.5	to 3	m

CUT FILL VOLUMES

CUT:	3,897m ³
FILL:	3,281m ³
BALANCE:	617m ³ EXCESS

VOLUMES ARE BASED ON DIFFERENCE BETWEEN STRIPPED SURFACE LEVEL, 200mm BELOW THE EXISTING SURFACE TAKEN FROM SURVEY INFORMATION SUPPLIED BY ADWJ & PROPOSED DESIGN LEVELS MINUS 300mm FOR ALLOWANCE OF BUILDING PAD & CARPARK SLAB THICKNESS. NO ALLOWANCE FOR TRENCH SPOIL.

- NOTE:**
- REFER SHEETS 511 & 512 FOR SITE SECTIONS.
 - PAVEMENT DESIGN TO BE CONFIRMED AT CONSTRUCTION CERTIFICATE STAGE.

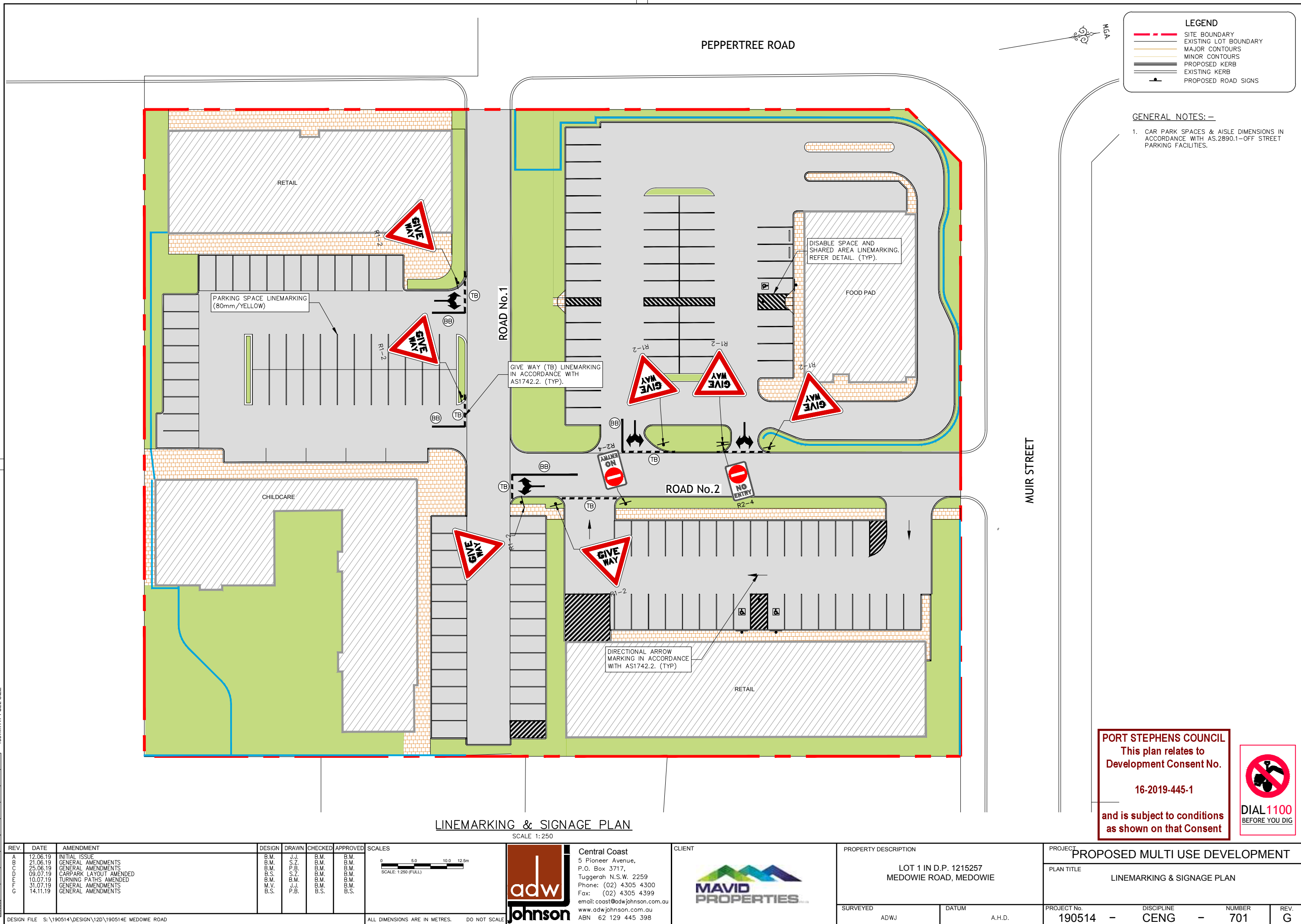
PORT STEPHENS COUNCIL
This plan relates to
Development Consent No.

16-2019-445-1

and is subject to conditions
as shown on that Consent



REV.				DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED	SCALES	PROJECT			
A	B	C	D	12.06.19	INITIAL ISSUE	B.M.	J.J.	B.M.	B.M.	0 5.0 10.0 12.5m	PROPOSED MULTI USE DEVELOPMENT			
				21.06.19	GENERAL AMENDMENTS	B.M.	S.Z.	B.M.	B.M.	SCALE: 1:250 (FULL)	PLAN TITLE			
				25.06.19	GENERAL AMENDMENTS	B.M.	P.B.	B.M.	B.M.		SITE REGRADE PLAN			
				09.07.19	CARPARK LAYOUT AMENDED	B.S.	S.Z.	B.M.	B.M.		PROJECT No.			
				10.07.19	TURNING PATHS AMENDED	B.M.	B.M.	B.M.	B.M.		190514 -			
				31.07.19	GENERAL AMENDMENTS	M.V.	J.J.	B.M.	B.M.		DISCIPLINE			
				14.11.19	GENERAL AMENDMENTS	B.S.	P.B.	B.S.	B.S.		CENG -			
DESIGN FILE S:\190514\DESIGN\120\190514E MEDOWIE ROAD											NUMBER			
Plotted By: Patrick Buscombe Plot Date: 14/11/19 12:58:06PM Cad File: S:\190514\DRAWINGS\ENGINEERING\CIVIL\C ENG\190514-CENG-501.DWG											501			
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Stormwater Management Report

Proposed Multi Use Development

Property:

Lot 1 DP1215257
795 Medowie Road, Medowie

Applicant:**Date:**

November 2019

PORT STEPHENS COUNCIL
This document relates to
Development Consent No.

16-2019-445-1

and is subject to conditions
as shown on that Consent

Project Management • Town Planning • Engineering • Surveying
Visualisation • Social Impact • Urban Planning

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Document Control Sheet

Issue No.	Amendment	Date	Prepared By	Checked By
A	Preliminary Issue	July 2019	BS	BM
B	Minor Wording	November 2019	BS	BM

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.

This document is solely for the use of the authorised recipient. It is not to be used or copied (either in whole or in part) for any other purpose other than that for which it has been prepared. ADW Johnson accepts no responsibility to any third party who may use or rely on this document or the information contained herein.

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 has been commissioned by Mavid Properties Pty Ltd to prepare a Stormwater Management Report for the proposed multi use development of Lot 1 in DP 1215257, known as 795 Medowie Road, Medowie.

The proposed stormwater system has been designed to safely and efficiently convey the minor and major flows generated by the proposed development to the existing downstream stormwater infrastructure.

In accordance with Port Stephens Council's requirements, stormwater detention has been provided to ensure that the post developed peak discharges are attenuated back to pre-developed levels. As the development is to be a Torrens title development, detention tanks have been provided within each of the proposed lots with a total detention volume of 159 m³ being required.

A treatment train process of litter baskets and filtration cartridges have been designed to effectively reduce the nutrients and gross pollutants from stormwater runoff from the proposed development.

An erosion and sedimentation control plan will be implemented to minimise the risk of erosion to disturbed areas and limit the transport of sediments from the development site to the receiving waters during construction.

The SWMP for the proposed development meets all of the objectives and requirements outlined in Port Stephens Council's DCP.

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EXHIBITS

Exhibit 1.0	Existing Site Plan
Exhibit 2.0	Proposed Development Plan
Exhibit 3.0	Erosion & Sediment Control Plan
Exhibit 4.0	OSD Tank Plan & Section

APPENDICES

Appendix A	RAFTS MODEL
Appendix B	WATER QUALITY INFORMATION
Appendix C	MUSIC MODEL

1.0 Introduction

ADW Johnson has been commissioned by Mavid Properties Pty Ltd to prepare a Stormwater Management Report for the proposed multi use development of Lot 1 in DP 1215257, known as 795 Medowie Road, Medowie.

This report addresses the stormwater impact of the proposed development and has been prepared to accompany a Development Application (DA) for the proposed development.

This report documents the proposed stormwater system required to efficiently and effectively capture and convey stormwater from the proposed development and ensure there is no adverse effects from the proposed development on any downstream properties or infrastructure.

This report also details the design of onsite detention and water quality treatments for the development.

2.2 PROPOSED DEVELOPMENT

The proposed development will transform the subject site into a mixed-use commercial development site consisting of a number of commercial facilities and associated car parking.

As part of the development it is proposed to split the subject site into a number of Torrens title lots. Accordingly, each of the individual lots will be required to provide their own stormwater detention and water quality treatment prior to runoff leaving the individual lots.

To enable each lot to drain to the public drainage system in Peppertree Road, a trunk stormwater drainage network has been provided by Port Stephens Council within the main east west access road. The location and design of this main has been coordinated with ADW Johnson to ensure conformity with the future development design. The proposed Torrens lots will each discharge into this trunk drainage line.

In addition to providing a connection for each of the proposed lots, the trunk drainage system also caters for the existing lots fronting Medowie Road. As such, the existing lots are not catered for within the modelling outlined in this report.

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

3.0 Council Requirements

Port Stephens Council outlines the engineering requirements for stormwater management within the Port Stephens Development Control Plan 2014. Parts B4 and B5 of the DCP relate specifically to drainage, flooding and water quality.

3.1 CONCEPT STORMWATER DESIGN

A concept stormwater design is required to demonstrate that stormwater runoff generated by the development can be effectively and efficiently conveyed from the subject site to the existing downstream drainage infrastructure.

3.2 STORMWATER QUANTITY

To ensure that there is no adverse impact on downstream properties or infrastructure, the post development peak flow from the proposed development shall not exceed the pre-development peak flow for a number of storm events up to and including the 1% AEP.

3.3 STORMWATER QUALITY

The stormwater drainage system must effectively remove the nutrients and gross pollutants from the site prior to the runoff entering the existing downstream infrastructure.

The guidelines for stormwater quality treatment objectives are expressed as mean annual reductions of pollutant loads. The target objectives for developments within the PSC LGA are shown in **Table 1** below.

Table 1 – Post Development Water Quality Targets

Pollutant	Stormwater Treatment Objectives
Suspended Solids	90% retention of the average annual load
Total Phosphorus	60% retention of the average annual load
Total Nitrogen	45% retention of the average annual load
Gross Pollutants	90% reduction of litter and vegetation larger than 5mm

It is however noted that the proposed development is within Hunter Water's drinking water catchment and is therefore required to provide a Neutral or Beneficial Effect (NorBE) in relation to water quality.

In accordance with PSC's DCP the proposed development will provide a NorBE or comply with PSC stripping targets, depending on which provides the best environmental outcome.

3.4 EROSION AND SEDIMENTATION CONTROL

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

4.0 Concept Stormwater Design

A stormwater drainage concept plan has been prepared to demonstrate how the runoff generated by the proposed development is captured and conveyed to the existing downstream stormwater infrastructure.

The pit and pipe network will generally be designed to cater for the minor storm event without any surcharging within the system and minimising flow widths and ponding.

The carpark will be graded to ensure major flows (1% AEP) are contained within the carpark and safely conveyed from the subject site to Peppertree Road without impacting the proposed buildings or any existing private property downstream of the subject site.

In order to adequately attenuate post developed peak flows back to pre-developed levels, it is proposed to provide underground OSD tanks within each lot.

Water quality treatment will be provided within each lot through the provision of litter baskets and proprietary "Stormfilter" cartridges provided within the OSD Tanks.

The concept stormwater design can be seen in **Exhibit 2**.

5.0 Water Quantity

To ensure there are no adverse impacts on downstream properties and stormwater infrastructure, the stormwater system will be designed to ensure that the post-development peak flows leaving the site are less than the existing peak flows for the 1EY, 20%, 10% and 1% AEP design storm events.

To ensure the post developed peak flows are attenuated back to pre-developed levels, OSD tanks are to be provided as part of the development on each individual lot.

5.1 MODELLING

The quantity of required storage to reduce the post developed discharge from the site to less than or equal to the existing discharge for various storm events was analysed using the 'DRAINS' software, which uses the runoff routing method.

The DRAINS model was set up in accordance with AR&R 2019. The following sections outline the parameters adopted in the DRAINS model. A screenshot of the DRAINS model can be seen in Appendix A.

5.1.1 Rainfall Data

The IFD rainfall data adopted within the model was sourced from the Bureau of Meteorology website, using the online IFD data tool.

5.1.2 DRAINS Parameters

The parameters adopted in the DRAINS model were based upon experience on similar sites and guidance provided in AR&R 2019. The adopted parameters can be seen in **Table 2** below.

Table 2 – DRAINS Parameters

Condition	Depression Storage (mm)
Paved (Impervious)	1
Supplementary	0
Grassed (Pervious)	5
Soil Type	3

5.2 CATCHMENTS

Catchments were derived from a combination of detailed survey and the proposed layout. To ensure each lot only detains what it is required too, pre developed catchments for each lot were assumed to be the same area as the post developed catchments.

5.2.1 Pre-Developed Catchment

The pre developed catchments were derived from a combination of the detailed survey and the proposed layout.

The catchment data used in the pre developed model can be seen in **Table 3** below whilst the pre developed catchments can be seen in **Exhibit 1**.

Table 3 - Pre-Developed Catchment Parameters

Catchment	Area (ha)	% Impervious
1	0.36	5
2	0.24	5
3	0.22	5
4	0.40	5

5.2.2 Post Developed Catchment

The post developed catchment parameters were measured based upon the proposed layout and concept grading. The catchment data used in the post developed model can be seen in **Table 4** below whilst the post developed catchment can be seen in **Exhibit 2**.

Table 4 - Post Developed Catchment Parameters

Catchment	Area (ha)	% Impervious
1	0.32	90
1A*	0.04	100
2	0.24	85
3	0.22	80
4	0.32	70
4A*	0.09	50

* Catchments 1A and 4A bypass the proposed detention tanks.

5.3 ONSITE DETENTION (OSD) TANKS

As mentioned in section 5, it is proposed to provide an OSD tank underneath the proposed carpark in each Torrens title lot. Using the DRAINS model with the parameters listed in the sections above, the proposed tank was sized and concept outlet configurations designed to enable modelling of the development to demonstrate that the post developed peak flows are adequately attenuated back to pre-developed levels.

Due to the differing parameters of each lot, tanks were sized accordingly resulting in four (4) separate tanks.

The details for the proposed detention tanks are shown in **Table 5-8** below, whilst an indicative OSD tank can be seen in **Exhibit 4**.

Table 5 –Detention Tank Data – CATCHMENT 1

Tank Parameter	Detail
Tank Dimensions	4m W x 12m L x 1.0m D
Outlet Controls	Pipe – DN150 with 0.14m orifice plate – IL RL 0m*
	Cutout – 0.10m H x 0.55m L - IL RL 0.56m*
	Weir – 0.60m length - IL RL 0.75m*
Total Storage at 1% AEP Stage	48 m ³

* Invert levels relative to tank invert. AHD levels to be provided once detail design complete

Table 6 –Detention Tank Data – CATCHMENT 2

Tank Parameter	Detail
Tank Dimensions	4m W x 10m L x 1.0m D
Outlet Controls	Pipe – DN150 with 0.12m orifice plate – IL RL 0m*
	Cutout – 0.10m H x 0.35m L - IL RL 0.5m*
	Weir – 0.4m length - IL RL 0.75m*
Total Storage at 1% AEP Stage	40 m³

* Invert levels relative to tank invert. AHD levels to be provided once detail design complete

Table 7 –Detention Tank Data – CATCHMENT 3

Tank Parameter	Detail
Tank Dimensions	3.5m W x 10m L x 1.0m D
Outlet Controls	Pipe – DN150 with 0.12m orifice plate – IL RL 0m*
	Cutout – 0.10m H x 0.35m L - IL RL 0.5m*
	Weir – 0.30m length - IL RL 0.8m*
Total Storage at 1% AEP Stage	35 m³

* Invert levels relative to tank invert. AHD levels to be provided once detail design complete

Table 8 –Detention Tank Data – CATCHMENT 4

Tank Parameter	Detail
Tank Dimensions	4m W x 9m L x 1.0m D
Outlet Controls	Pipe – DN150 with 0.14m orifice plate – IL RL 0m*
	Cutout – 0.10m H x 0.55m L - IL RL 0.54m*
	Weir – 0.54m length - IL RL 0.8m*
Total Storage at 1% AEP Stage	36 m³

* Invert levels relative to tank invert. AHD levels to be provided once detail design complete

5.4 RESULTS

The pre and post developed peak flows were calculated using the DRAINS model for the 1EY, 20%, 10% and 1% AEP storm events. A summary of the modelling results can be seen in **Tables 9 & 10** below.

Table 9 - Pre vs post (no detention)

Storm Event (ARI)	Pre-Development Peak Flow (m³/s)				Post-Development Peak Flow Without Detention (m³/s)			
	Catchment				Catchment			
	1	2	3	4	1	2	3	4
1	0.035	0.024	0.022	0.040	0.073	0.045	0.043	0.066
5	0.094	0.064	0.058	0.105	0.131	0.085	0.079	0.129
10	0.135	0.092	0.083	0.151	0.166	0.110	0.101	0.175
100	0.242	0.164	0.150	0.270	0.290	0.193	0.177	0.304

Table 10 Pre vs post with detention

Storm Event (ARI)	Pre-Development Peak Flow (m ³ /s)				Post-Development Peak Flow With Detention (m ³ /s)			
	Catchment				Catchment			
	1	2	3	4	1	2	3	4
1	0.035	0.024	0.022	0.040	0.034	0.021	0.021	0.037
5	0.094	0.064	0.058	0.105	0.091	0.060	0.057	0.103
10	0.135	0.092	0.083	0.151	0.129	0.078	0.072	0.137
100	0.242	0.164	0.150	0.270	0.240	0.162	0.147	0.269

From the results, it can be seen that the inclusion of OSD tanks on each individual lot with the parameters outlined in Section 5.3, ensures that the post developed flows are adequately attenuated back to pre-developed levels. A screenshot of the DRAINS model can be seen in **Appendix A**.

6.0 Water Quality

The proposed stormwater system, as detailed in Section 5, uses a combination of pit and pipe networks and water quality devices 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.

6.1 TREATMENT DEVICES

The stormwater design for the proposed subdivision will consist of a combination of conveyance and end of line controls to treat the stormwater runoff generated on the site.

Conveyance

It is proposed to provide an Ecosol (or approved equivalent) Litter Baskets directly within all stormwater pits to capture litter and other gross pollutants. Further information regarding the Litter Baskets can be seen in **Appendix B**.

End of Line

It is proposed to provide Stormwater 360 "Stormfilter Cartridges" (or approved equivalent) within the proposed detention tanks to provide end of line treatment.

Further information regarding the Stormwater 360 treatment devices can be seen in **Appendix B**.

6.2 MODELLING

The effectiveness of the proposed treatment train was modelled using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). MUSIC is well regarded as industry best practice for analysis of the effectiveness of treatment mechanisms on the quality of stormwater runoff from a development site of this size.

The MUSIC model parameters were adopted using the MUSIC-LINK feature, whilst treatment node parameters were based upon a combination of Council's guidelines and information provided by individual device providers.

6.2.1 Catchment Data

To accurately model the pollutant loads generated by the proposed development, the catchments were split into multiple sub catchments representing roof, carpark and open space areas. Catchment data for each lot can be seen in **Table 11** below.

Table 11 - Sub catchment areas

Catchment	Sub catchment	Total Area (ha)	Impervious %
1	Roof	0.04	100
	Carpark	0.235	100
	Open Space	0.04	10
1A	Roof	0.0	100
	Carpark	0.04	100
	Open Space	0.0	10
2	Roof	0.08	100
	Carpark	0.12	100
	Open Space	0.05	10
3	Roof	0.07	100
	Carpark	0.1	100
	Open Space	0.06	10
4	Roof	0.08	100
	Carpark	0.13	100
	Open Space	0.11	10
4A	Roof	0.0	100
	Carpark	0.04	100
	Open Space	0.05	10

6.3 RESULTS

As mentioned in Section 3.3, as the proposed development is within the Hunter Water drinking catchment, it is required to provide a NorBE or meet council's stripping targets, whichever is greater.

The MUSIC model was set up and run using the parameters mentioned above to analyse the effectiveness of the treatment train and to determine if it meets the required targets.

A summary of the modelling results can be seen in **Tables 12 - 13** below.

Table 12 – Pre developed vs Post developed - Site Pollutant Loads

Pollutant	Pre developed	Post developed
Total Suspended Solids (kg/yr)	951	250
Total Phosphorus (kg/yr)	1.66	0.90
Total Nitrogen (kg/yr)	12.5	12.5
Gross Pollutants (kg/yr)	37.9	1.38

Table 13 – Site Pollutant Loads and Reductions

Pollutant	Source Load	Residual Load	Modelled Reduction (%)	Target (%)
Total Suspended Solids (kg/yr)	2740	250	90.9	90
Total Phosphorus (kg/yr)	4.93	0.902	81.7	60
Total Nitrogen (kg/yr)	26.9	12.5	53.5	45
Gross Pollutants (kg/yr)	279	1.38	99.5	90

As can be seen from **Table 12 and 13** above, the MUSIC modelling indicates that the proposed treatment train not only meets the stormwater quality requirements of Port Stephens Council but also provides a Neutral or Beneficial effect. A screenshot of the MUSIC model can be seen in **Appendix C**.

As mentioned above, a key part of the treatment train is the “Stormfilter Cartridges”, which are to be supplied within the detention tanks. A summary of the cartridges required for each tank can be seen in **Table 14** below.

Table 14 – Proposed Stormfilter Cartridges

Catchment	Number of Cartridges	Cartridge Size (mm)
Catchment 1	4	690
Catchment 2	4	690
Catchment 3	3	690
Catchment 4	4	690

Further details surrounding the Stormfilter cartridges and their inclusion within the detention tanks can be seen in **Exhibit 4**.

7.0 Erosion and Sedimentation Control

Erosion and sedimentation control measures need to be implemented during construction works to minimise the risk of erosion to disturbed areas and limit the transport of sediments from the construction site to downstream waterways. An Erosion and Sedimentation Control Plan can be seen in **Exhibit 3**. It should be noted that the attached Erosion and Sedimentation Control Plan is indicative only and will be amended during the detailed design and construction phases of the project.

8.0 Conclusion

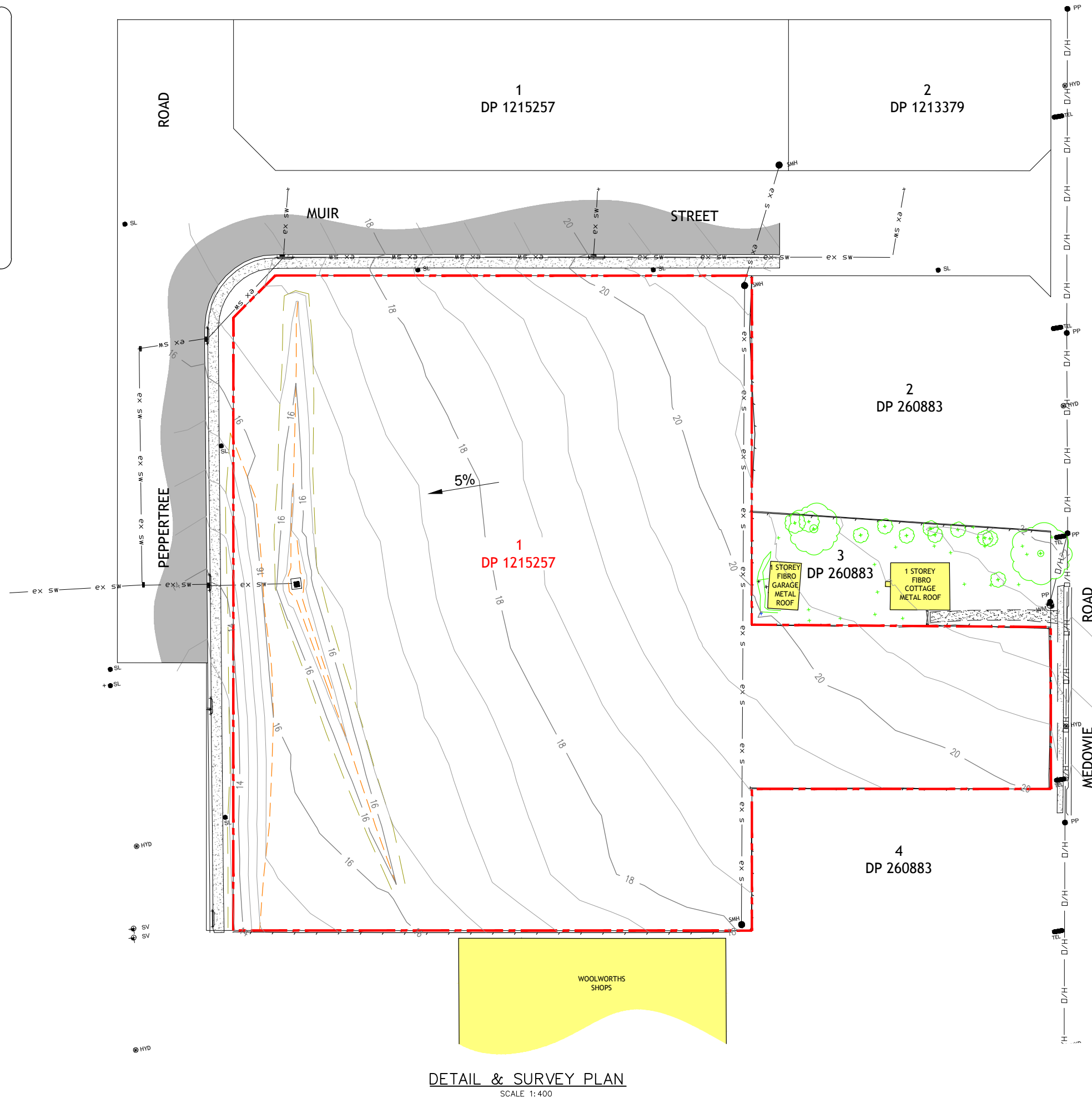
The proposed stormwater system has been designed to safely and efficiently convey the minor and major flows generated by the proposed development, to the downstream stormwater infrastructure.

Stormwater detention, provided by a number of OSD tanks, has shown that the peak post developed discharges can be adequately attenuated back to pre-developed levels in accordance with PSC requirements.

A treatment train process of litter baskets and filtration cartridges have been designed to effectively reduce the nutrients and gross pollutants from stormwater runoff from the proposed development.

An erosion and sedimentation control plan will be implemented to minimise the risk of erosion to disturbed areas and limit the transport of sediments from the development site to the receiving waters during construction.

Exhibits



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• project management • civil engineering • infrastructure • superintendency • economic analysis • social impact • town planning • surveying • development feasibility • visualisation • urban design

1 DP1196650

6 DP19101

4 DP260883

3 DP260883

2 DP260883

STORMWATER CATCHMENT PLAN

SCALE 1:250

PEPPERTREE ROAD

MUIR STREET

LEGEND

- SITE BOUNDARY
- PROPOSED BUILDING STAMP
- MAJOR CONTOURS
- MINOR CONTOURS
- PROPOSED KERB
- EXISTING KERB
- PROPOSED STORMWATER
- EXISTING STORMWATER
- PROPOSED RETAINING WALL
- PROPOSED SW PIT
- PROPOSED LINTEL
- CATCHMENT 1
- CATCHMENT 1A
- CATCHMENT 2
- CATCHMENT 3
- CATCHMENT 4
- CATCHMENT 4A

CONTOUR INTERVAL = 0.2m

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	31.07.19	INITIAL ISSUE	AE	BMc	DATUM: AHD CONTOUR INTERVAL: 0.2m	0 5.0 10.0 12.5m SCALE: 1:250 (FULL)	

- project management
- civil engineering
- infrastructure
- superintendency
- economic analysis
- social impact
- town planning
- surveying
- development feasibility
- visualisation
- urban design

drawing title:

PROPOSED CATCHMENTS

location: MEDOWIE COMMERCIAL

council: MAITLAND

dwg ref: 190514-EX-002

client:

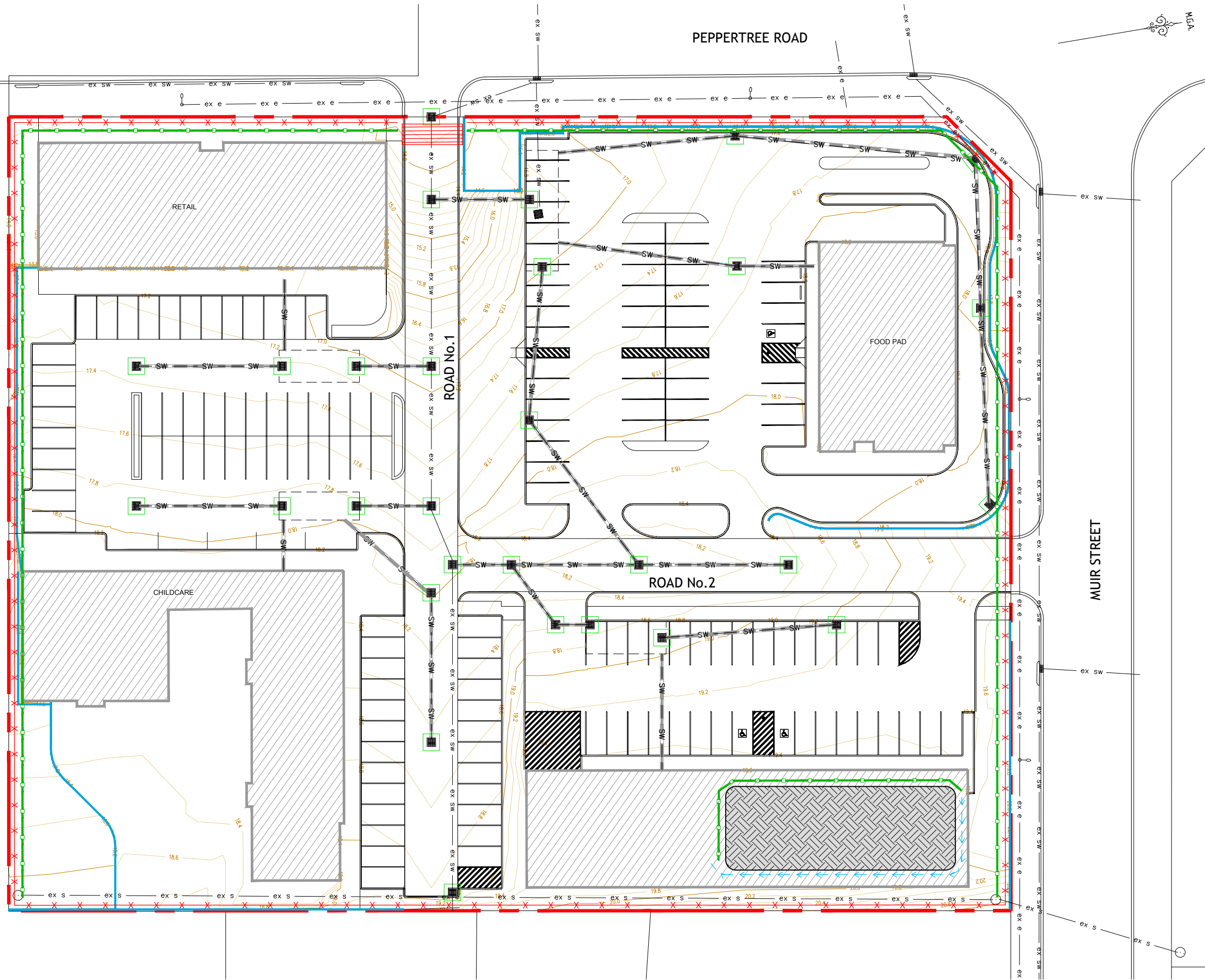
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LEGEND

- SITE BOUNDARY
- PROPOSED LOT BOUNDARY
- EXISTING LOT BOUNDARY
- FUTURE LOT BOUNDARY
- MAJOR CONTOURS
- MINOR CONTOURS
- PROPOSED KERB
- EXISTING KERB
- PROPOSED RETAINING WALL
- EXTENTS OF BATTER
- PROPOSED STORMWATER
- EXISTING STORMWATER
- EXISTING SEWER
- EXISTING ELECTRICITY
- PROPOSED SW PIT
- PROPOSED LINTEL
- SEDIMENT/SILT FENCING
- NO-GO FENCING
- PROPOSED PIT INLET FILTER
- PROPOSED LINTEL INLET FILTER
- DIVERSION DRAIN
- STOCKPILE LOCATION
- SITE ACCESS/SHAKER RAMP

CONTOUR INTERVAL = 0.2m

NOTE:

1. DETAIL EROSION & SEDIMENT CONTROLS TO BE SPECIFIED AT DETAILED DESIGN STAGE.

EROSION & SEDIMENT CONTROL PLAN
SCALE 1:250

drawing title:
EROSION AND SEDIMENT CONTROL PLAN

location: MEDOWIE COMMERCIAL

council: MAITLAND

dwg ref: 190514-EX-003

client:

MAVID PROPERTIES

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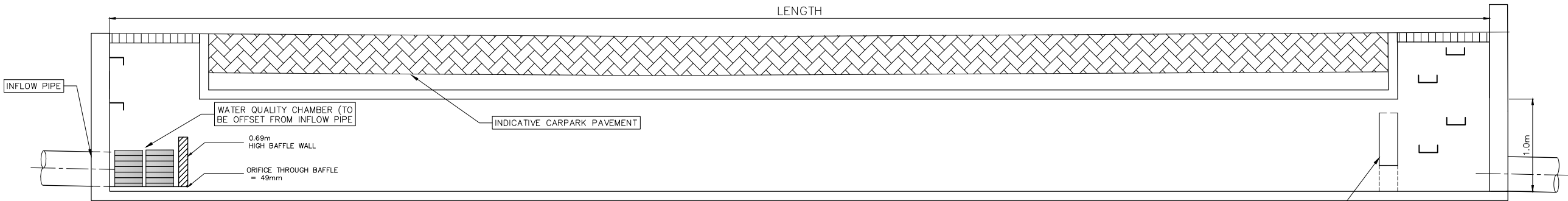
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ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
C	14.11.19	GENERAL AMENDMENTS	PB	BMc	DATUM: AHD CONTOUR INTERVAL: 0.2m	0 5.0 10.0 12.5m SCALE: 1:250 (FULL)	

NOTE:
1. REFER TO REPORT FOR INDIVIDUAL
TANK DIMENSIONS AND DETAILS.



INDICATIVE OSD TANK
SCALE 1:100



INDICATIVE TANK SECTION
SCALE 1:25

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
A	09.07.19	INITIAL ISSUE	AE	BMc	DATUM: AHD CONTOUR INTERVAL: N/A	<div><div>02.55.0</div><div>SCALE: 1:100 (FULL)</div></div> <div><div>0.250.50.751.001.25</div><div>SCALE: 1:25 (FULL)</div></div>	
• project management • civil engineering • infrastructure • superintendency • economic analysis • social impact • town planning • surveying • development feasibility • visualisation • urban design							

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OSD TANK PLAN & SECTION

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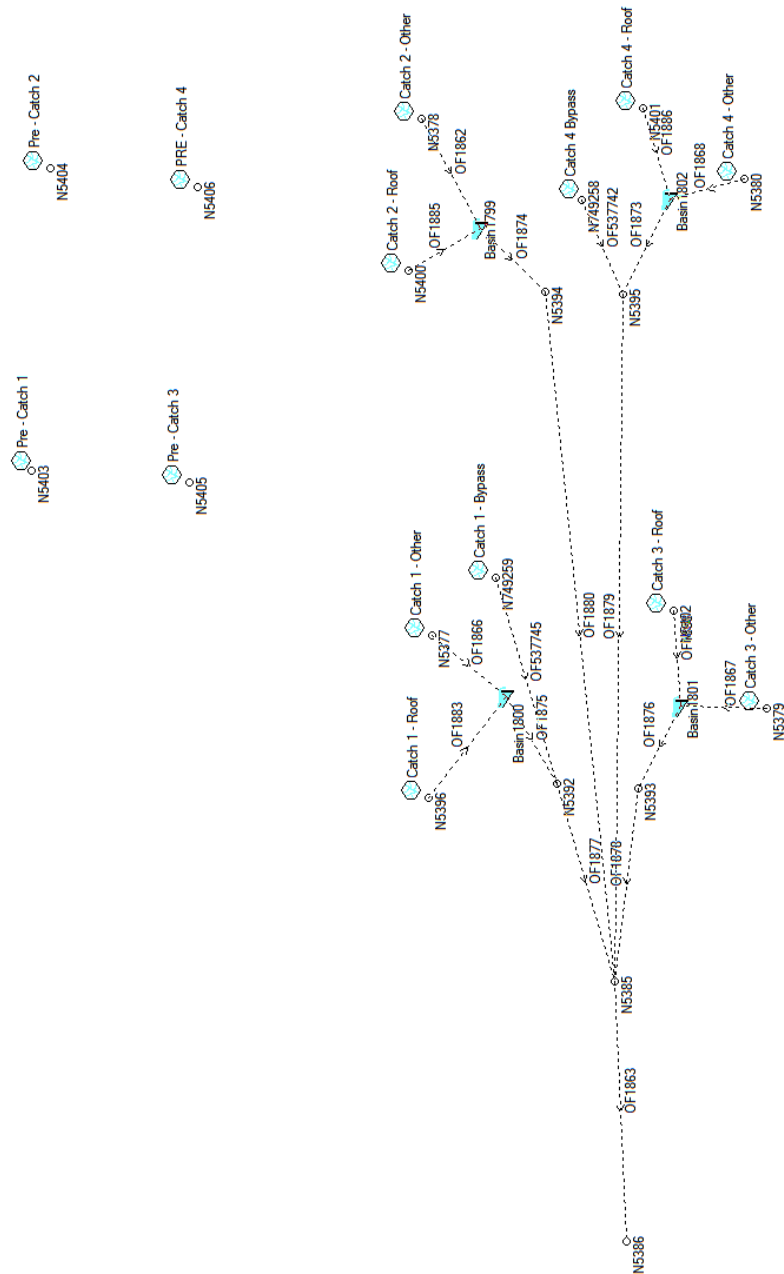
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APPENDIX A

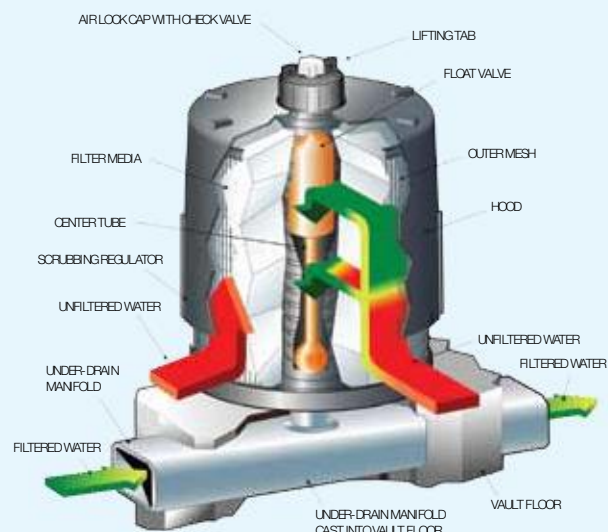
DRAINS MODEL



APPENDIX B

WATER QUALITY INFORMATION

The Stormwater Management StormFilter



Removing the most challenging target pollutants

The Stormwater Management StormFilter is a best management practice (BMP) designed to meet stringent regulatory requirements. It removes the most challenging target pollutants – including fine solids, soluble heavy metals, oil, and total nutrients (inc. soluble) – using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and through product enhancements the design continues to be refined for ease of use.

Why StormFilter is the best filter available

Superior hydraulics

- External bypass – protects treatment chamber from high flows and ensures captured pollutants are not lost during low frequency, high intensity storm events
- Multiple cartridge heights – minimises head loss to fit within the hydraulic grade line and shrink system size, reducing installation costs
- Multiple StormFilter configurations in use across the country

Reliable longevity

- One-of-a-kind self-cleaning hood – prevents surface blinding, ensures use of all media, and prolongs cartridge life
- Customised maintenance cycles – fewer maintenance events compared to similar products, which reduces costs over the lifetime of the system
- 12 years of maintenance experience – predictable long-term performance comes standard

Proven performance

- Only filter on the Australian market tested within Australia achieving best practice guidelines, for TSS, TP and TN
- Qualifies for a minimum 2 EMI 5 Green star credits
- Achieve water quality goals with confidence – easy approval speeds development assessment process
- 8th generation product – design refined and perfected over two decades of research and experience

Maximising your land use and development profitability

StormFilter systems are utilised in below ground systems. The advantages this offers over above ground systems includes:

- Land space saving that enable an increase in development density and reduce sprawl
- The potential to add car parking, increase building size, and develop out parcels

In addition, StormFilter's compact design reduces construction and installation costs by limiting excavation.

Media options

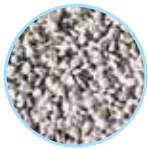
Our filtration products can be customised using different filter media to target site-specific pollutants. A combination of media is often recommended to maximise pollutant removal effectiveness.



PhosphoSorb™ is a lightweight media built from a Perlite-base that removes total phosphorus (TP) by adsorbing dissolved-P and filtering particulate-P simultaneously.



Perlite is naturally occurring puffed volcanic ash. Effective for removing TSS, oil and grease.



Zeolite is a naturally occurring mineral used to remove soluble metals, ammonium and some organics.



GAC (Granular Activated Carbon) has a micro-porous structure with an extensive surface area to provide high levels of adsorption. It is primarily used to remove oil and grease and organics such as PAHs and phthalates.

	PhosphoSorb	Perlite	ZPG	Zeolite	GAC
Sediments	•	•	•		
Oil and Grease	•	•	•		
Soluble Metals	•		•	•	
Organics			•	•	•
Nutrients	•	•	•	•	•
Total Phosphorus	•		•		

Note: Indicated media are most effective for associated pollutant type. Other media may treat pollutants, but to a lesser degree.

ZPG™ media, a proprietary blend of zeolite, perlite, and GAC.

Cartridge options

With multiple cartridge heights available, you now have a choice when fitting a StormFilter system onto your site.

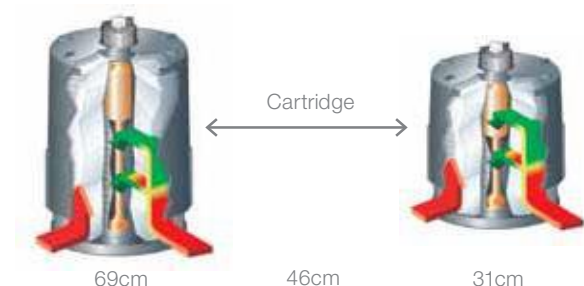
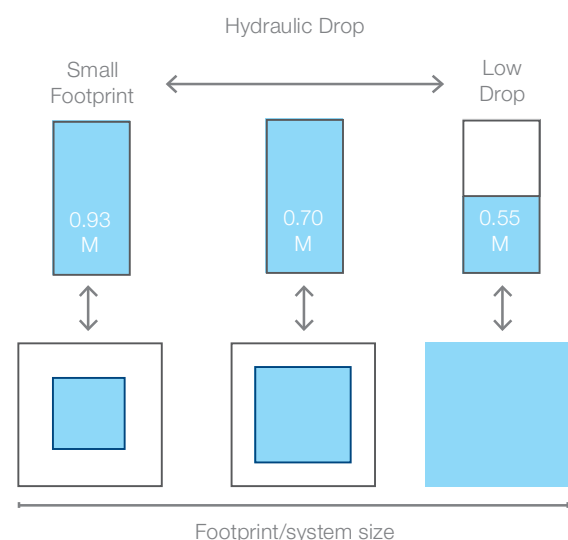
The 69cm cartridge provides 50% more treatment than the previously standard 46cm cartridge, which enables you to meet the same treatment standards with fewer cartridges, and via a smaller system.

If you are limited by hydraulic constraints, the low drop cartridge provides filtration treatment with only 0.55m of headloss.

Cartridge flow rates

Cartridge Type	Hydraulic Drop	Treatment Capacity (l/sec)	
		0.7 l/s/m²	1.4 l/s/m²
StormFilter 69cm	0.93 m	0.71	1.42
StormFilter 46cm	0.70 m	0.47	0.95
StormFilter Low Drop	0.55 m	0.32	0.63

Selecting cartridge height



Configurations and applications

The StormFilter technology can be configured to meet your unique site requirements. Here are a few of the most common configurations, however many other configurations are available. A Stormwater360 engineer can assist you evaluate the best options for your site or you can find out more by downloading the StormFilter Configuration Guide from www.stormwater360.com.au

Upstream treatment configurations

The following suite of StormFilter configurations are easily incorporated on sites where WSUD is recommended. These low-cost, low-drop, point-of-entry systems also work well when you have a compact drainage area.

GullyFit StormFilter

Combines a gullypit, a high flow bypass device, and a StormFilter cartridge in one shallow structure.

- Treats sheet flow
- Uses drop from the inlet grate to the conveyance pipe to drive the passive filtration cartridge
- No confined space required for maintenance



Gully inlet

- Accommodates kerb inlet openings from 900 to 3000mm long
- Uses drop from the kerb inlet to the conveyance pipe to drive the passive filtration cartridges



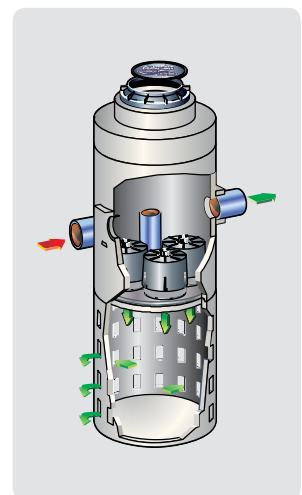
Linear grate

- Can be designed to meet volume based sizing requirements
- Can be installed in place of and similar to a typical gullypit
- No confined space entry required for maintenance
- Accommodates up to 29 StormFilter cartridges



Infiltration/retrofit configuration infiltration

- Provides treatment and infiltration in one structure
- Available for new construction and retrofit applications
- Easy to install
- Re-charge groundwater and reduces run-off



Roof runoff treatment configuration

Down pipe

- Easily integrated into existing gutter systems to treat pollution from rooftop runoff
- Fits most downpipe configurations and sizes; single or dual-cartridge models available
- Treats up to 1300m² of rooftop area per dual-cartridge system



Downstream treatment configurations

Conventional stormwater treatment involves collecting, conveying and treating stormwater runoff with an end-of-pipe treatment system before discharging off-site. StormFilter configurations suitable for these applications are listed below and can be engineered to treat a wide range of flows.

Peak diversion

- Provides off-line bypass and treatment in one structure
- Eliminates material and installation cost of additional structures to bypass peak flows
- Reduces the overall footprint of the treatment system, avoiding utility and right-of-way conflicts
- Internal weir allows high peak flows with low hydraulic head losses
- Accommodates large inlet and outlet pipes (up to 900mm) for high flow applications



Vault / manhole

- Treats small to medium sized sites
- Simple installation – arrives on-site fully assembled
- May require off-line bypass structure



High flow

- Treats flows from large sites
- Consists of large, precast components designed for easy assembly on-site
- Configurations available, include, Panel Vault and Cast-In-Place



Volume

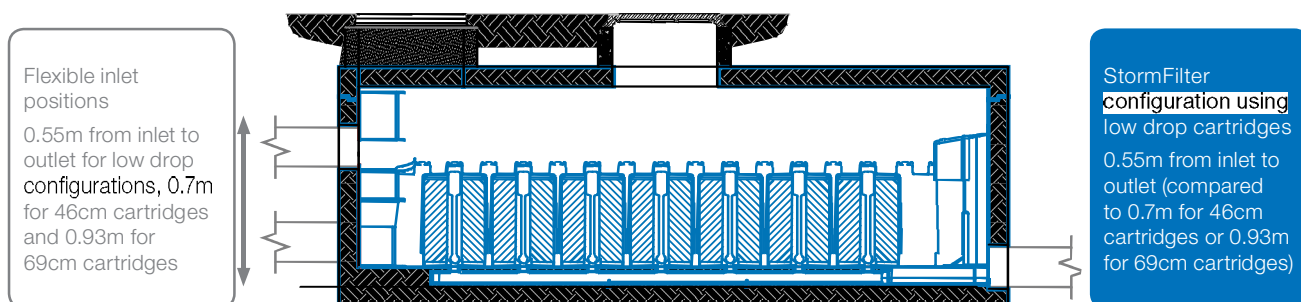
- Meets volume-based stormwater treatment regulations
- Captures and treats specific water quality volume (WQv)
- Provides treatment and controls the discharge rate
- Can be designed to capture all, or a portion, of the WQv



Filtration for low drop sites

Designing for limited drop

In some cases, site constraints limit the hydraulic drop that is available to drive the passive filtration cartridges. Following are a variety of solutions to either create the required drop or work around the limited drop without impacting the performance of the system.



Solutions for Low Drop Sites	
Site modifications	Treatment system modifications
<p>Reduce pipe slope</p> <p>Use an alternate pipe material with a lower Manning's n value for a portion of the site and reduce the pipe slope.</p> <hr/> <p>Reduce pipe cover</p> <p>Use controlled density fill (CDF) at the front-end of the conveyance system to minimise pipe cover and raise the conveyance system. CDF, a method of pouring concrete with fine aggregate (sand vs. gravel) around pipe, allows the use of most pipe materials with limited cover.</p> <hr/> <p>Drain inlet treatment</p> <p>Substitute several shallow inlet configurations for the single end-of-pipe system. Shallow options include the Catchpit/Gullypit StormFilter, CurbInlet StormFilter, Manhole StormFilter and the Linear StormFilter. These systems still require the normal drop (0.7m for 46cm cartridges) but utilise the drop into the conveyance system to drive the cartridges.</p> <hr/> <p>Provide pumping system</p> <p>Stormwater360 offers the Integrated Pumping System (IPS), which can be designed in tandem with filtration system sizing.</p>	<p>Use low drop cartridges</p> <p>The StormFilter can be configured with low drop cartridges that activate at 31cm, reducing the overall head loss to only 0.55m, compared to 0.7m for the 46cm cartridge or 0.93m for the 69cm cartridge.</p> <hr/> <p>Surcharge the inlet pipe</p> <p>Backing-up water into the conveyance system can create the necessary drop to drive the StormFilter cartridges. This will affect the HGL and increase the volume of water required to activate the cartridges, which could have a detrimental effect on system longevity. The following design modifications mitigate these risks:</p> <ul style="list-style-type: none"> • Confer with a Stormwater360 design engineer before surcharging the inlet pipe • Verify this is an acceptable practice in your local jurisdiction • Modify the overall system design to accommodate the increased HGL • Calculate the additional treatment volume and consider using more cartridges

APPENDIX C

MUSIC MODEL

