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STORMWATER MANAGEMENT REPORT

OCEANGROVE
DEE WHY
14 DECEMBER 2023

COMPLEX PROBLEMS
RESOLVED SIMPLY

DOCUMENT VERIFICATION

Project Title	Seniors Living Development
Document Title	Stormwater Management Report for Planning Proposal
Project No.	TX17488.00
Description	Stormwater Management Report
Client Contact	Paolo Salotto, Marchese Partners

	Name	**Signature**
Prepared by	Joshua Ryan	JO.R
Checked by	Michael Dawson	MI.D
Issued by	Michael Dawson	MI.D
File Name	TX17488.00.01-Stormwater Management Plan - RevA	

Document History

Date	**Revision**	**Issued to**	**Format**
14 November 2023	A	Paolo Salotto, Marchese Partners	PDF
14 December 2023	B	Paolo Salotto, Marchese Partners	PDF

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1. INTRODUCTION

1.1. BACKGROUND

Triaxial Consulting (TX) has been engaged by Marchese Partners (the Client) to carry out Planning Proposal Civil Engineering design services for the proposed Seniors Living at Oceangrove, Dee Why (the Subject Site).

This Stormwater Management Plan (SMP) Report has been prepared to discuss the various components of the Stormwater Management Plan to assist Council in the assessment of the Civil Engineering Design Drawings prepared by TX which accompany this report. Specifically, the Report discusses management of stormwater from the development with regards to stormwater quality and quantity, as required by Council's Development Control Plan (DCP).

1.2. SCOPE

This report is to address relevant conditions listed in council's water management policy.
This report provides a summary of the design principles and planning objectives for the following stormwater management components of the project:

- Stormwater Quantity Management
- Stormwater Quality Management

The engineering objectives for the development are to create a site which, based on the proposed architectural layout, responds to the topography and site constraints and to provide an appropriate and economical stormwater management system which incorporates best practice in water sensitive urban design and is consistent with the requirements of relevant Australia standards and council's policies.

A set of civil engineering drawings have been prepared by TX accompanying the submission of this report to show the proposed surface levels over the site, stormwater management, water quality treatment and site discharge. It should be noted that drawings developed for this report are subject to adjustment as the design is developed to completion.

1.3. AUTHORITY JURISDICTION

The site falls within the boundaries of Northern Beaches Council.

2. DEVELOPMENT SITE

2.1. EXISTING SITE

The site is located on the northern alignment of Dee Why Parade, with a natural fall from west to east, with levels between 15.30 to 9.44 RL AHD as shown on the survey. Refer to Appendix A for detailed site survey.

Figure 1 – *Site Location*

2.2. PROPOSED DEVELOPMENT

The proposed development comprises of two new additional seniors living towers and basement parking to the existing Oceangrove seniors living village. Refer to Appendix B for the latest architectural plans.

3. PROPOSED ON SITE WATER HYDROLOGY

3.1. GENERAL DESIGN PRINCIPLES

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, Northern beaches Council's adopted design specification, `and accepted engineering practice.

Propsed drainage system has been designed in accordance with AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage and site runoff and stormwater management has be calculated in accordance with the Australian Rainfall

and Runoff (ARR) 2019, and AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage.

3.2. MAJOR/MINOR SYSTEM DESIGN

The piped stormwater drainage system has been designed to accommodate the 20-year ARI storm event (Q20). Overland flow paths which will convey all stormwater runoff up to and including the Q100 (major storm) event have been provided which will limit any risk to the public. Refer Table 1 below for the site specific Bureau of Meteorology IFD data.

Table 1 – *IFD Design Rainfall Intensity table (mm/h)*

	Annual Exceedance Probability (AEP)						
Duration	**63.2%**	**50%#**	**20%***	**10%**	**5%**	**2%**	**1%**
1 min	149	166	222	261	300	352	394
2 min	124	137	178	206	234	271	301
3 min	115	127	166	192	219	255	283
4 min	107	119	157	183	209	244	272
5 min	102	113	150	175	200	235	262
6 min	96.4	107	143	168	192	226	252
10 min	80.5	90.0	121	142	164	193	216
15 min	67.2	75.2	101	119	137	162	181
20 min	58.0	64.9	87.2	103	118	139	156
25 min	51.3	57.3	76.8	90.3	104	122	136
30 min	46.1	51.5	68.7	80.8	92.8	109	122
45 min	35.9	39.9	52.9	61.9	70.9	83.1	92.6
1 hour	29.7	33.0	43.5	50.8	58.0	67.9	75.7
1.5 hour	22.7	25.0	32.7	38.1	43.5	50.9	56.7
2 hour	18.6	20.6	26.8	31.2	35.6	41.6	46.4
3 hour	14.2	15.6	20.3	23.6	27.0	31.6	35.4
4.5 hour	10.8	11.9	15.5	18.1	20.8	24.5	27.5
6 hour	9.01	9.92	13.0	15.2	17.5	20.7	23.2
9 hour	6.98	7.72	10.2	12.0	13.9	16.5	18.6
12 hour	5.86	6.50	8.64	10.2	11.9	14.2	16.1
18 hour	4.59	5.12	6.91	8.24	9.64	11.6	13.1
24 hour	3.87	4.33	5.91	7.08	8.31	10.00	11.3
30 hour	3.38	3.80	5.23	6.28	7.38	8.89	10.1
36 hour	3.02	3.41	4.71	5.68	6.68	8.04	9.11
48 hour	2.52	2.86	3.98	4.80	5.65	6.79	7.68
72 hour	1.92	2.19	3.06	3.69	4.33	5.18	5.84
96 hour	1.56	1.78	2.48	2.98	3.49	4.16	4.67
120 hour	1.31	1.49	2.08	2.49	2.90	3.44	3.85
144 hour	1.13	1.28	1.77	2.11	2.45	2.91	3.26
168 hour	0.986	1.12	1.53	1.82	2.11	2.50	2.80

3.3. RUNOFF MODELS

The site has been broken down into 4 catchments and calculations of the runoff from storms of the design ARI has been calculated with the catchment modelling software DRAINS from storm events up to the 1% AEP. The catchment plans have been shown in Figure 3 & Figure 4 respectively and the catchment information has been summaried in Table 2 below.

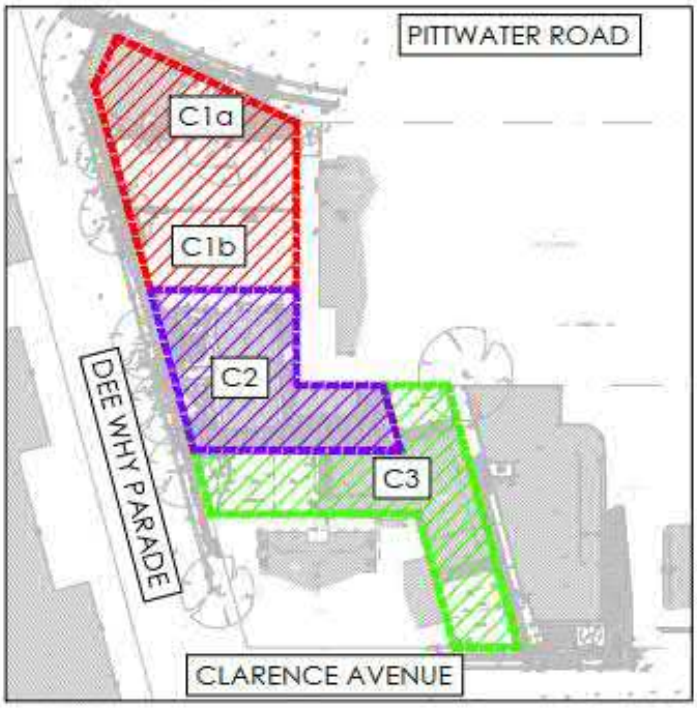


Figure 3 – *Existing Site Catchment Plan*

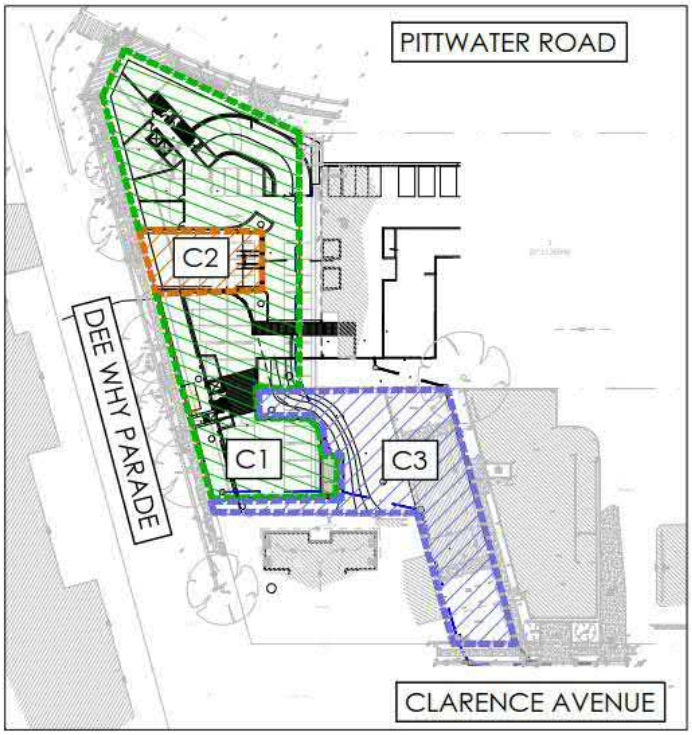


Figure 4 – *Proposed Site Catchment Plan*

Table 2 – *Catchment Summary*

Pre-Development				
Catchment (m^2)	Area (m^2)	Impervious (%)	Pervious (%)	Comments
C1a	436.7	0	100	Lot A, DP307103
C1b	464.5	0	100	Lot B, DP307103
C2	953.3	0	100	SP11488
C3	1115.5	0	100	Lot 2, DP1136948
C4a	464.1	69.1	31.9	Lot 1, DP1136948 – to existing OSD
Post-Developement				
Catchment (m^2)	Area (m^2)	Impervious (%)	Pervious (%)	Comments
C1	2087.7	48.6	51.4	To new OSD
C2	262.0	90	10	To Existing OSD
C3	1084.4	0	100	Bypass OSD

3.4. PIPE AND PIT DRAINAGE CAPACITY

UPVC plastic and reinforced concrete pipes (RCP) have been proposed in the development. Their drainage capacities has been checked against tables below by applying Colebrook-White Equations:

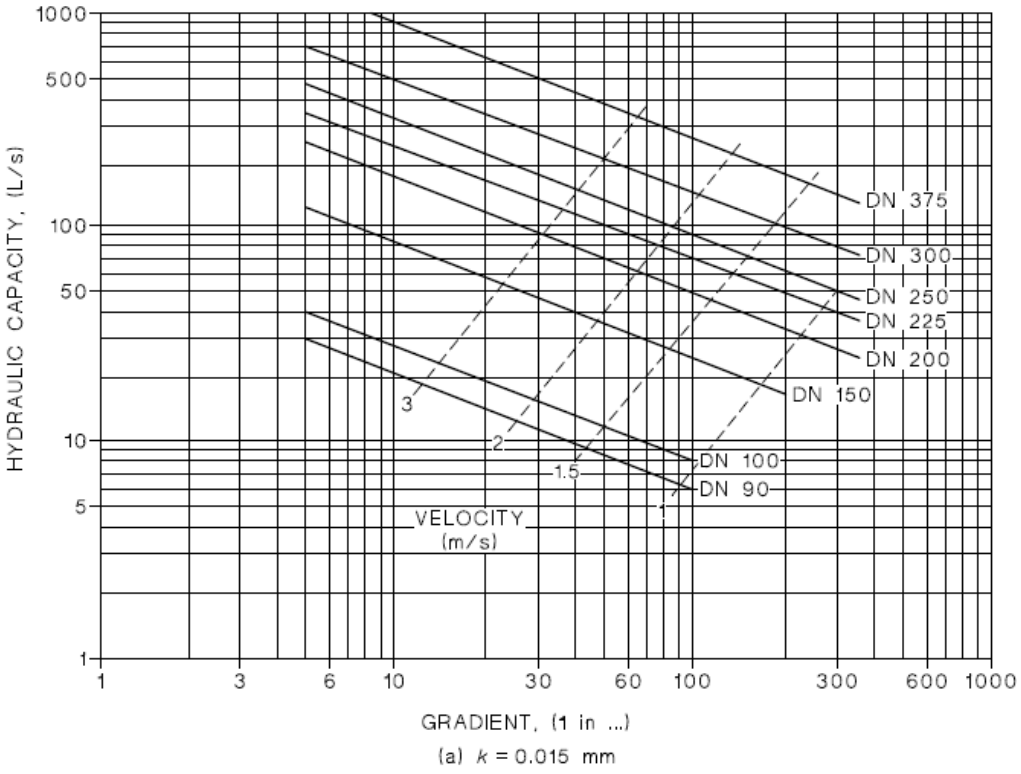


Figure 5 – *UPVC Pipe drainage capacity*

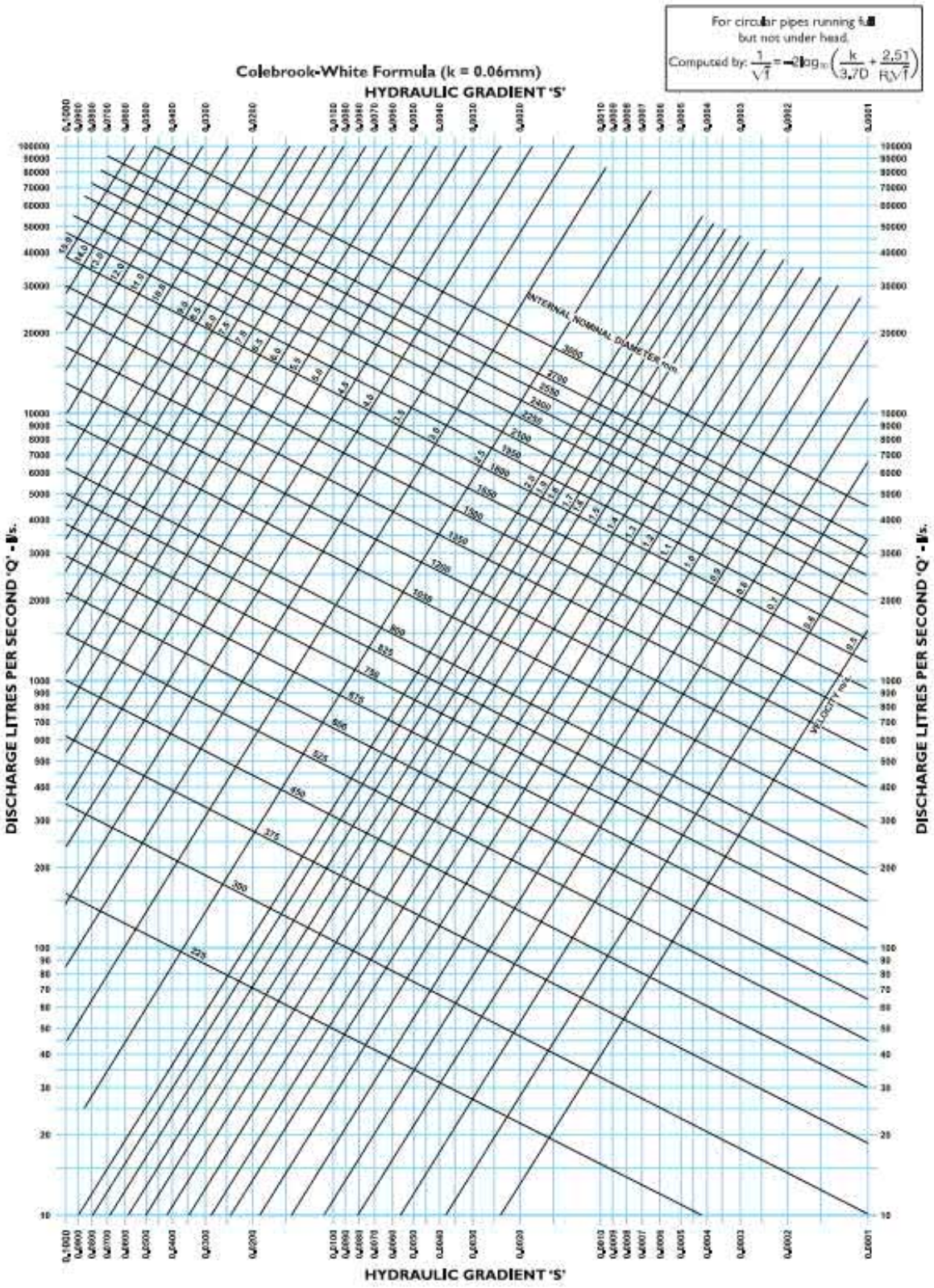


Figure 6 – *RCP Pipe drainage capacity*

Inlet pit drainage capacity is based on the formula below with assumption of weir flow:

(i) Under weir flow conditions (Figure 7.05.4):

$$Q_g = BF. \times 1.66\, L.h^{3/2} \qquad (7.04)$$

where
Q_g = flow into field inlet (m^3/s)
$BF.$ = blockage factor = 0.5
1.66 = weir coefficient
L = weir length (m) (see note below)
h = depth of water upstream of inlet (relative to weir crest) where flow velocity is low (i.e. velocity head is insignificant) otherwise use the height of energy level above the weir crest(m)

Where, h=0.05 (Max storage depth in local catchement)

Table 3 – *Sag Pit Drainage Capacity*

Grate Pit Size	Max Flow Depth (m)	Drainage Capacity (L/s)
600 x 600	0.05	22.27
900 x 900	0.05	33.40

3.5. STORMWATER DETENTION

As per Council's Water Management policy, the stormwater discharge from the site shall have adequate control measures installed that limit the post-development discharge rate, at each discharge point, to no more than the pre-development condition, for all storm events up to and including the 1% AEP storm event. The stormwater discharge from the site has been limited to pre-developed flows for storm events by the use of a discharge control chamber within the water treatment devices that incorporates a weir and orifice plate to limit the flow and a precast concrete tank for on site detention storage.

Refer to the calculations table below for the proposed new development showing the catchment area pre-development flows, post development flows, and controlled outflows from the site.

Hydraulic calculations have been carried out utilising DRAINS modelling software to ensure that all surface and subsurface drainage systems perform to or exceed the required standards.

- ILSAX Method
- Soil Type = 2.5
- Antecedent Moisture Content, AMC = 3
- Infiltration rates: Initial Paved = 1mm, Grassed 5mm

The OSD design requirement from the DRAINS model is summarised below, further results from DRAINS can be found in Appendix C.

Table 4 – *OSD Design Summary*

% AEP	Pre-Development (m^3/s)	Post-Development (m^3/s)	OSD Volume (m^3)
1	0.127	0.063	54.50
2	0.106	0.052	48.60
5	0.080	0.044	38.00
10	0.063	0.038	29.50
20	0.046	0.030	21.70

3.6. OVERLAND FLOW

The proposed stormwater system has been designed to capture and convey stormwater runoff from the peak 100-year ARI storm event to the osd tank and stormwater quality treatment system. Overland flows within the site will be drained and discharge to the east to Clarence Avenue without impacting any downstream properties.

4. WATER QUALITY CONTROLS

The stormwater quality has been designed to reduce pollutants in stormwater runoff in accordance with Northern Beaches Council's requirements.

4.1. WATER QUALITY PERFORMANCE OBJECTIVES

There is a need to target pollutants that are present in the stormwater so as to minimise the adverse impact these pollutants could have on downstream receiving waters. This design meets the requirements and targets as noted in Northern Beaches Council's water management policy. Water quality modelling has been undertaken for the site using MUSIC modelling software to demonstrate the compliance with pollutant reduction targets. Northern Beaches Council's pollutant reduction targets are as follows:

- Gross Polltants: 90% retention of the typical urban annual load
- Total Suspended Solids: 85% retention of the typical urban annual load
- Total Phosphorus: 65% retention of the typical urban annual load
- Total Nitrogen: 45% retention of the typical urban annual load

4.2. MUSIC PARAMETERS

Refer to the MUSIC model below verifying the stormwater treatment design meets the council's minimum water quality objectives. Below are the parameters used in the MUSIC model analysis. Refer to Appendix D for proprietary product information.

- The stormwater is directed through Ocean protect Oceanguards before entering the Ocean Protect Stormfilter systems.
- Twelve Ocean Protect 690 Psorb Stormfilters are proposed within OSD tank to complete the water treatment.
- All stormwater for all storm events up to 1 in 100 ARI is collect by the OSD tank before discharging downstream to council's drainage network.

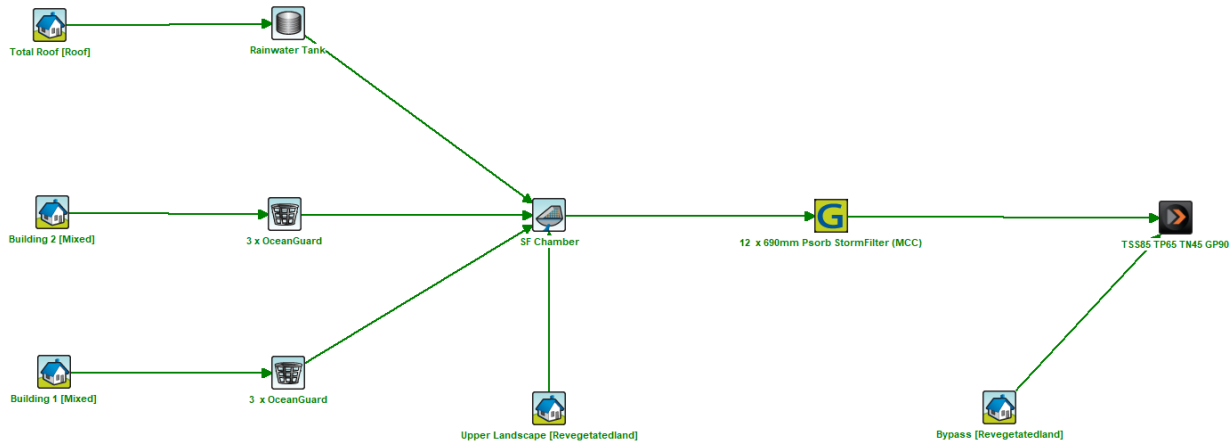
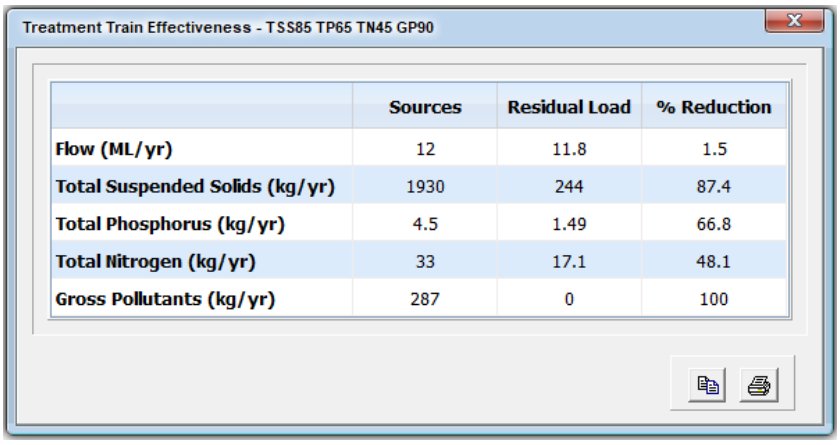


Figure 7 – *MUSIC model configuration*



	Sources	Residual Load	% Reduction
Flow (ML/yr)	12	11.8	1.5
Total Suspended Solids (kg/yr)	1930	244	87.4
Total Phosphorus (kg/yr)	4.5	1.49	66.8
Total Nitrogen (kg/yr)	33	17.1	48.1
Gross Pollutants (kg/yr)	287	0	100

Figure 8 – *MUSIC model result*

5. MAINTENANCE AND OPERATION MANAGEMENT

5.1. MAINTENANCE AND OPERATION SCHEDULE

It is important that each component of the water quality treatment train is properly operated and maintained.
The stormwater treatment measures are to be inspected at 3 months intervals for the first year of operation and at 4 months intervals for the second year of operation, details of the type and number of pollutants are to be logged, with the details kept on site. Upon completion of the first two years of operation the maintenance schedule will be able to be finalised based on the recommendations of the manufacturer and the logged data, with cleaning and removal of trapped pollutants from the devices occurring at a maximum time of 6 months intervals.

6. CONCLUSION

This Stormwater Management Report has been prepared to support the planning proposal for two new seniors living towers at Oceangrove Seniors living village, Dee Why.

A civil engineering strategy for the site has been developed which provides a best fit solution within the constraints of the existing landform and proposed architectural layout. Within this strategy a stormwater quality management plan has also been developed to reduce pollutant loads in stormwater leaving this site in accordance with the council policy and incorporating principles of WSUD.

It is recommended that the management strategies mentioned in this report be incorporated into the detailed design, which may result in future changes, however design criteria will be followed.

APPENDIX A

Detailed Site Survey

SP83379

No'S 4-16
FOUR STOREY
CONCRETE UNITS
GARAGES UNDER
METAL ROOF

RIDGE
34.26

BALUSTRADE TOP
31.28

NOTES:
1. The Boundaries shown hereon have been compiled from Plans available from the Department of Lands and are subject to survey.
2. The relationship between features and boundaries is diagrammatic only.
3. No investigation has been made of underground services on or adjacent to this land.
4. Restriction on building may apply to this land.
5. Origin of levels SSM 1706 adopted as RL 8.033 A.H.D.

M.G.A.
SCIMS

SHEETS LAYOUT

1	
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3	4
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0 1 2 3 4 5 10

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Tel 02 9929 6233
02 9955 5385
Fax 02 9929 7727
EMAIL
info@mason.net.au

PLAN SHOWING RELATIVE HEIGHT AND FEATURE OF LOT A AND B DP307103, SP11498 AND LOT 2 DP706230 BEING LAND AT DEE WHY IN THE L.G.A. OF NORTHERN BEACHES

Drawn	Surveyor	Datum	Date
RS		AHD	10.03.2023

Reduction Ratio	Size	Drawing Name	Sheet	of
1:100	A1	33463-03	1	11

SP1902

No. 2
THREE STOREY
BRICK UNITS
GARAGES UNDER
TILE ROOF

RIDGE 34.26

WINDOWS

WINDOWS

GUTTER 31.70

VIEW

ELEVATION 5

1
DP 9126

No'S 4-16
FOUR STOREY
BRICK OFFICES
GARAGES UNDER
METAL ROOF

GUTTER RL 31.42

WINDOWS TOP 30.82

23.40
28.20
WINDOW

GUTTER RL 31.42

WIN TOP
27.41

23.475
22.66
WINDOW

VIEW

ELEVATION 6

KINGSWY

PARAPET 25.83

ALL WINDOWS
23.88
22.85
20.96
19.91

SP13436

No'S 729-731
TWO STOREY
CONCRETE BUILDING
FLAT ROOF

ALL WINDOWS
23.88
22.85
20.96
19.91

PARAPET 25.83

D0.7H19

17.56

17.40

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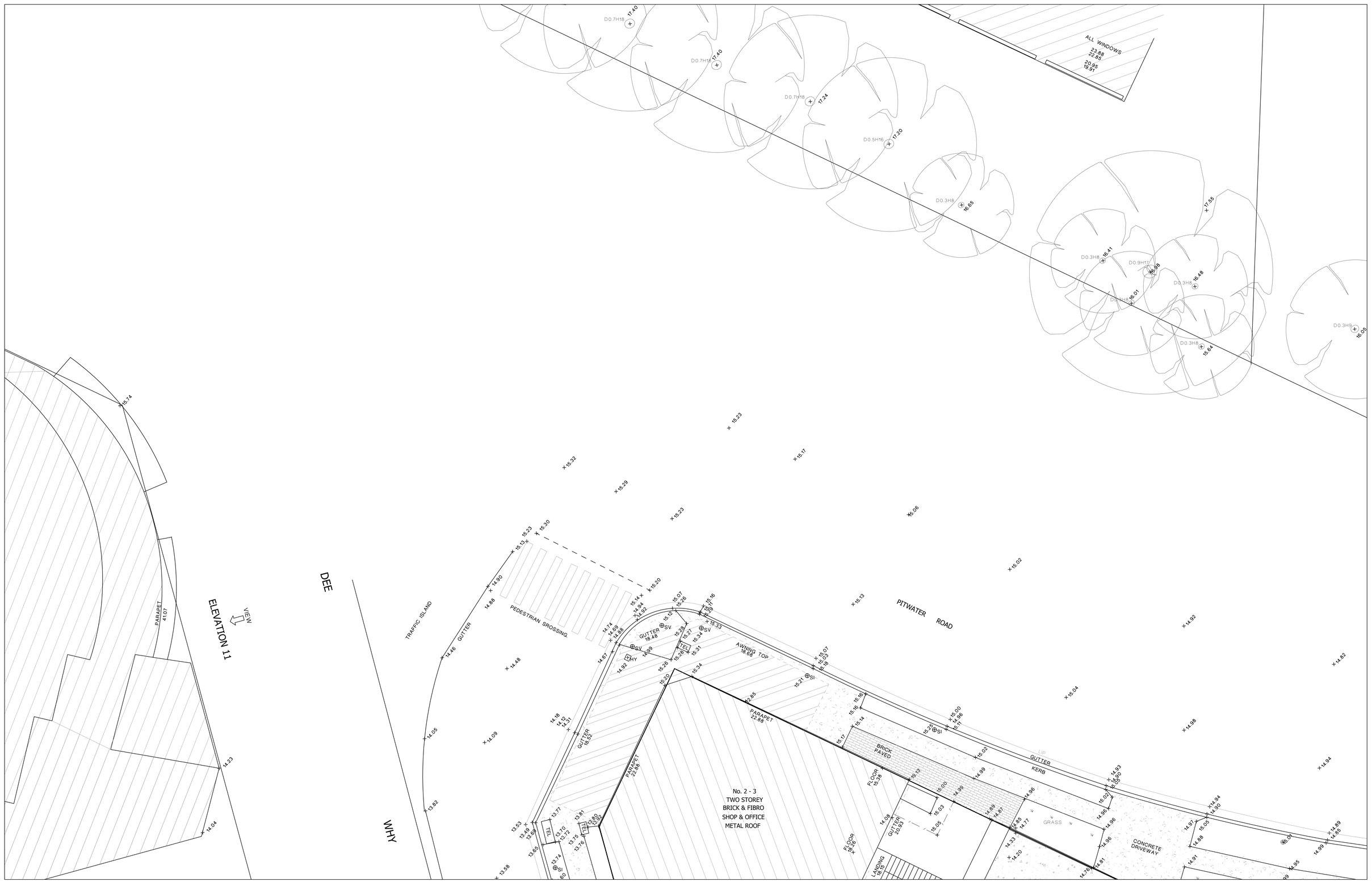

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M.G.A. SCRS

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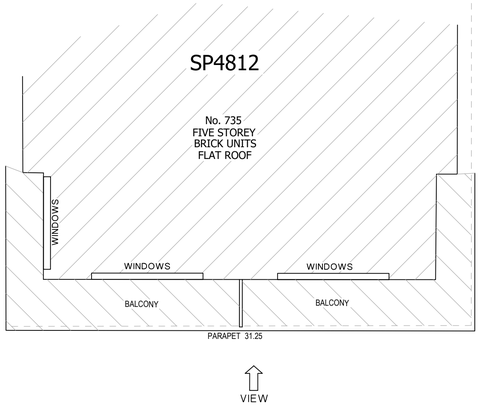
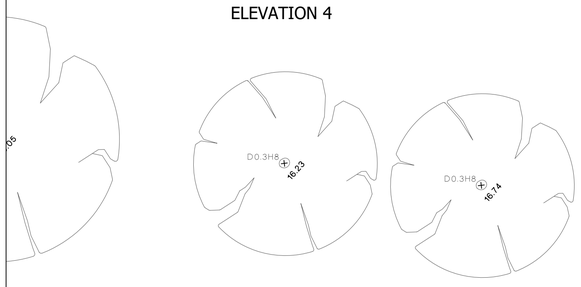
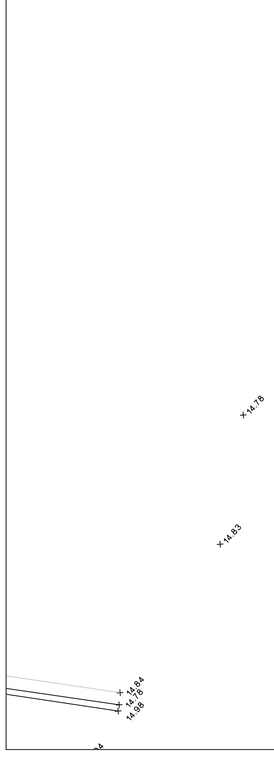


ELEVATION 4





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Reduction Ratio	Size	Drawing Name		Sheet	of
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BM SSM 195238
RL 15.04 AHD

23°

32'

111.405

15.02

25.53 22.30 19.30 16.34
23.97 21.07 18.06 15.04

No. 6
"OCEAN GROVE SENIORS LIVING VILLAGE"
FOUR STOREY CONCRETE BUILDING
FLAT ROOF

1
DP 1136948

16.29
15.03

BALCONIES
FLOOR LEVELS
L4 23.09
L3 20.11
L2 17.09
L1 14.07

1
DP 1136948

PARAPET
26.15

PARAPET
26.76

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M.G.A. SCIMS

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Reduction Ratio	Size	Drawing Name	Sheet	of
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SP20037

No. 26
ONE STOREY
CONCRETE WAREHOUSE
METAL ROOF

PARAPET 19.60

PARADE

WHY

TRAFFIC ISLAND

SIGN

31.635

No. 10 - 12
THREE STOREY
BRICK UNITS
TILE ROOF

DOOR STEP RL 11.72

RIDGE 23.57

WC

18.185

203°32'17"

16.555

BRICK GA

TOP C

14

BALCONY

CRATE

TEL

D0.9 H14

SP11488

GUTTER 20.52

BRICK WALL PALING FENCE ON TOP

23°32'30" 39.625

BLOCK WALL PALING FENCE ON TOP

GR

BACKYARD

SHADE CANOPY

2
DP706230
(1115m² By. DP)

12.765

203°33'10"

ELE

GUTTER 18.51

WINDOWS

RIDGE 20.50

No. 16
THREE STOREY
BRICK UNITS
TILE ROOF

RIDGE 21.53

HYDRANT

KERB

GUTTER

SP5228

PARAPET 19.53

NOTES:
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3. No investigation has been made of underground services on or adjacent to this land.
4. Restriction on building may apply to this land.
5. Origin of levels SSM 1706 adopted as RL 8.033 A.H.D.

M.G.A. SCIMS

SHEETS LAYOUT

1	
2	
3	4
5	6
7	8
9	10

0 1 2 3 4 5 10

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EMAIL
info@mason.net.au

PLAN SHOWING RELATIVE HEIGHT AND FEATURE OF LOT A AND B DP307103, SP11498 AND LOT 2 DP706230 BEING LAND AT DEE WHY IN THE L.G.A. OF NORTHERN BEACHES

Drawn	Surveyor	Datum	Date
RS		AHD	10.03.2023

Reduction Ratio	Size	Drawing Name	Sheet	of
1:100	A1	33463-03	7	11

NOTES:
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SHEETS LAYOUT

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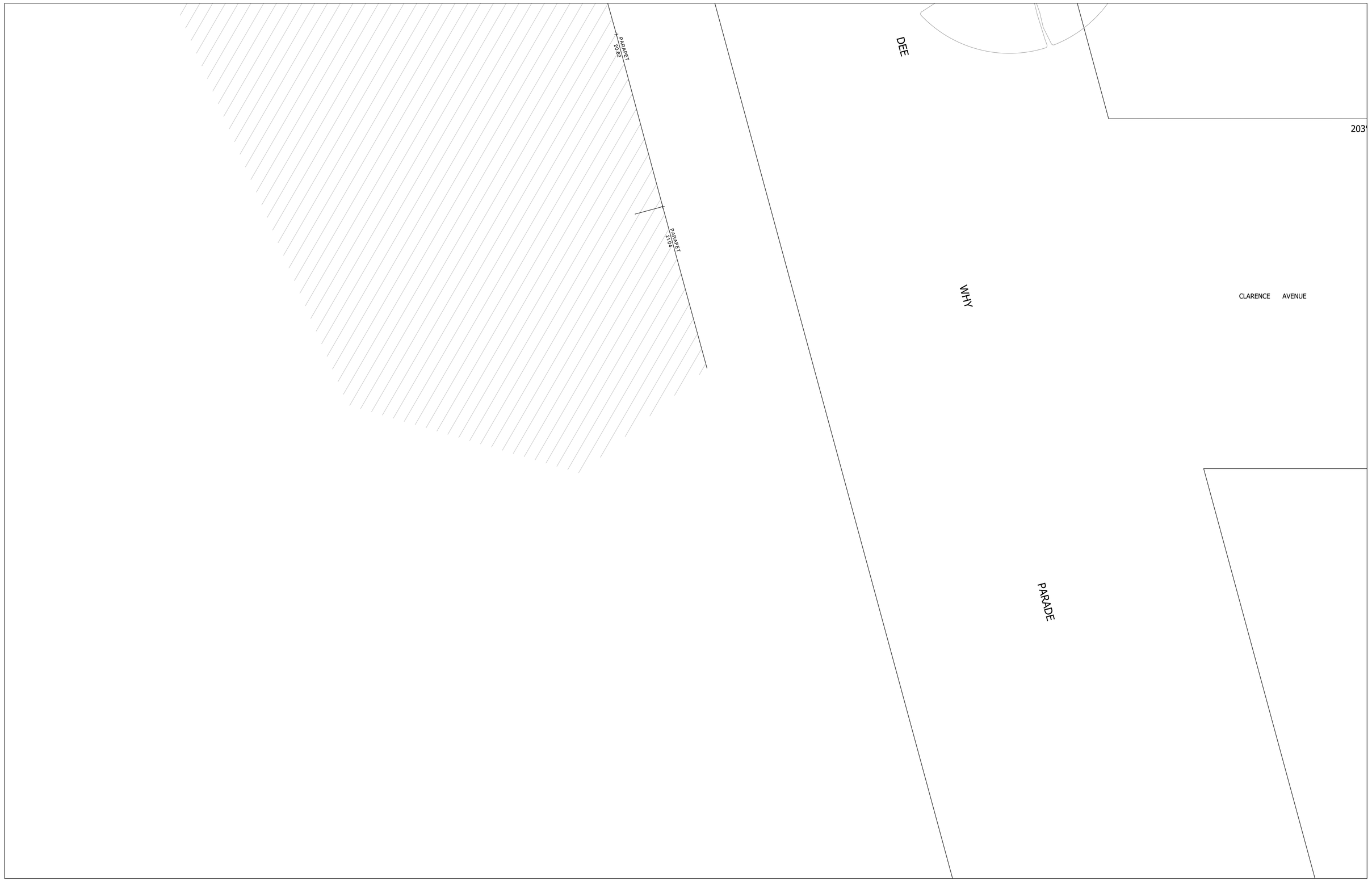
Drawn RS	Surveyor		Datum AHD	Date	10.03.2023
Reduction Ratio 1:100	Size A1	Drawing Name 33463-03		Sheet 8	of 11



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M.G.A. SCINS

SHEETS LAYOUT

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0 1 2 3 4 5 10

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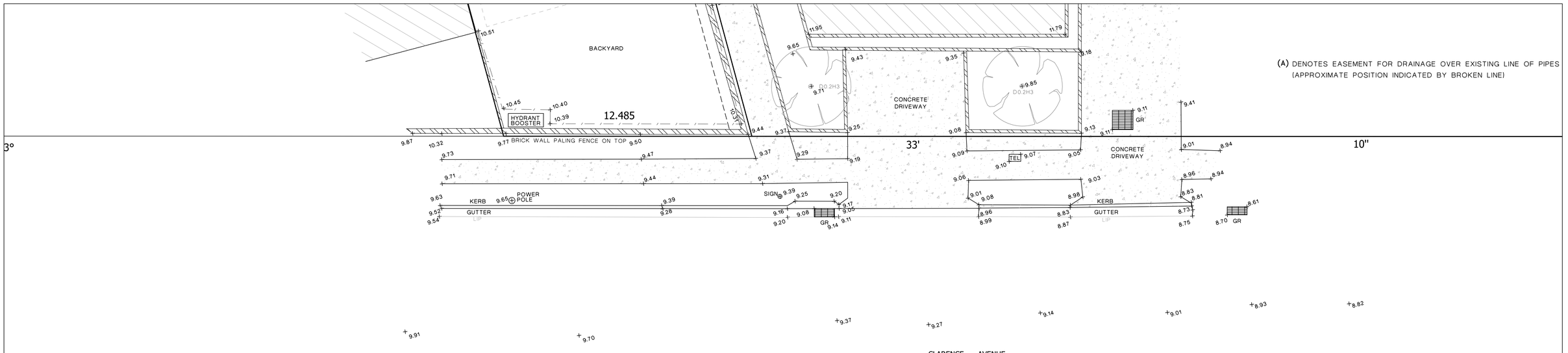
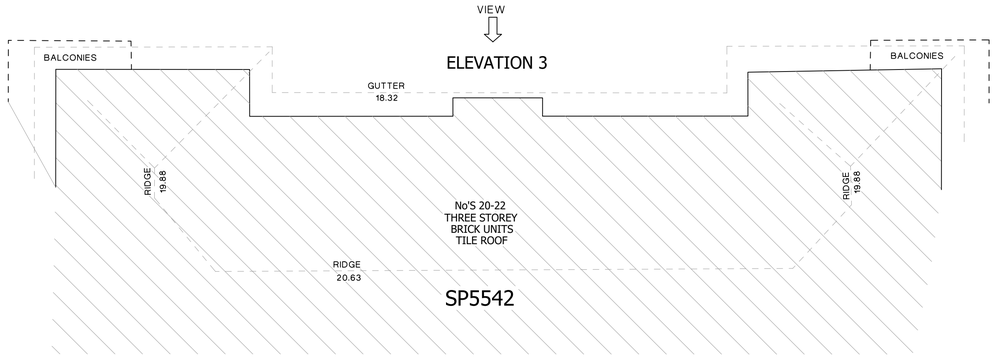
PLAN SHOWING RELATIVE HEIGHT AND FEATURE OF LOT A AND B DP307103, SP11498 AND LOT 2 DP706230 BEING LAND AT DEE WHY IN THE L.G.A. OF NORTHERN BEACHES

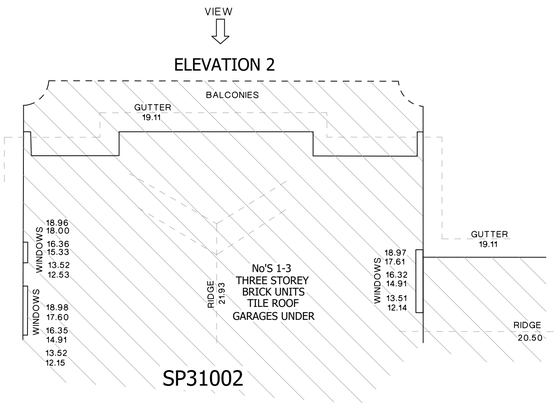
Drawn	Surveyor	Datum	Date
RS		AHD	10.03.2023

Reduction Ratio	Size	Drawing Name	Sheet	of
1:100	A1	33463-03	9	11

(A) DENOTES EASEMENT FOR DRAINAGE OVER EXISTING LINE OF PIPES (APPROXIMATE POSITION INDICATED BY BROKEN LINE)







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M.G.A. SCIMS

SHEETS LAYOUT

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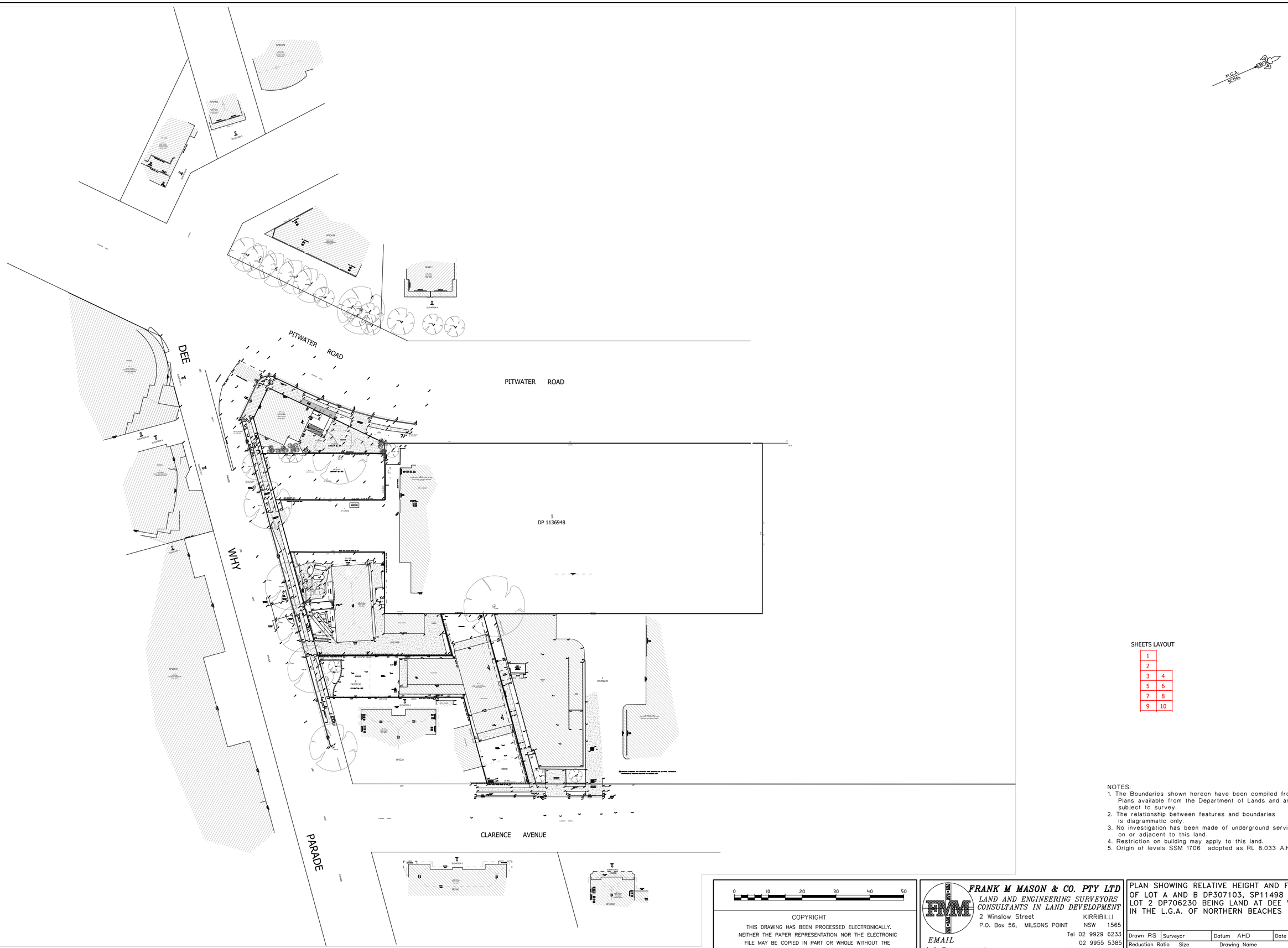
Drawn	Surveyor	Datum	Date
RS		AHD	10.03.2023

Reduction Ratio	Size	Drawing Name	Sheet	of
1:100	A1	33463-03	10	11



SHEETS LAYOUT

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9	10

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0 10 20 30 40 50

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Drawn	Surveyor	Datum	Date
RS		AHD	10.03.2023

Reduction Ratio	Size	Drawing Name	Sheet	of
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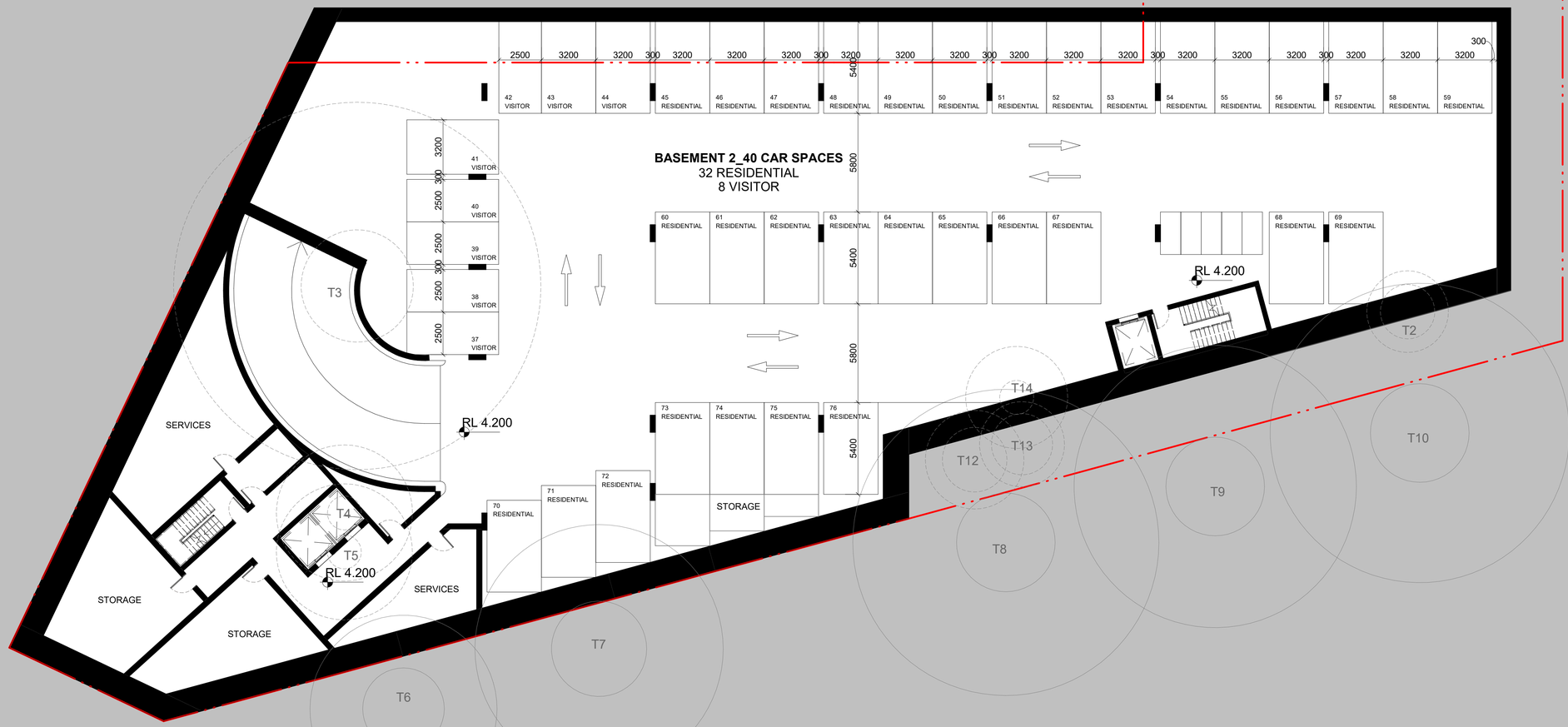
APPENDIX B

Architectural Drawings



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D	2/11/2023	FOR COORDINATION	PS
E	8/11/2023	FOR COORDINATION	PS
F	16/11/2023	FOR COORDINATION	PS
G	29/11/2023	FOR COORDINATION	PS
H	06/12/2023	FOR COMMENTS	PS
J	13/12/2023	FOR SUBMISSION	PS
K	15/12/2023	FOR APPROVAL	PS

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JOB	DRAWING	REVISION
23017	PP00.07	K

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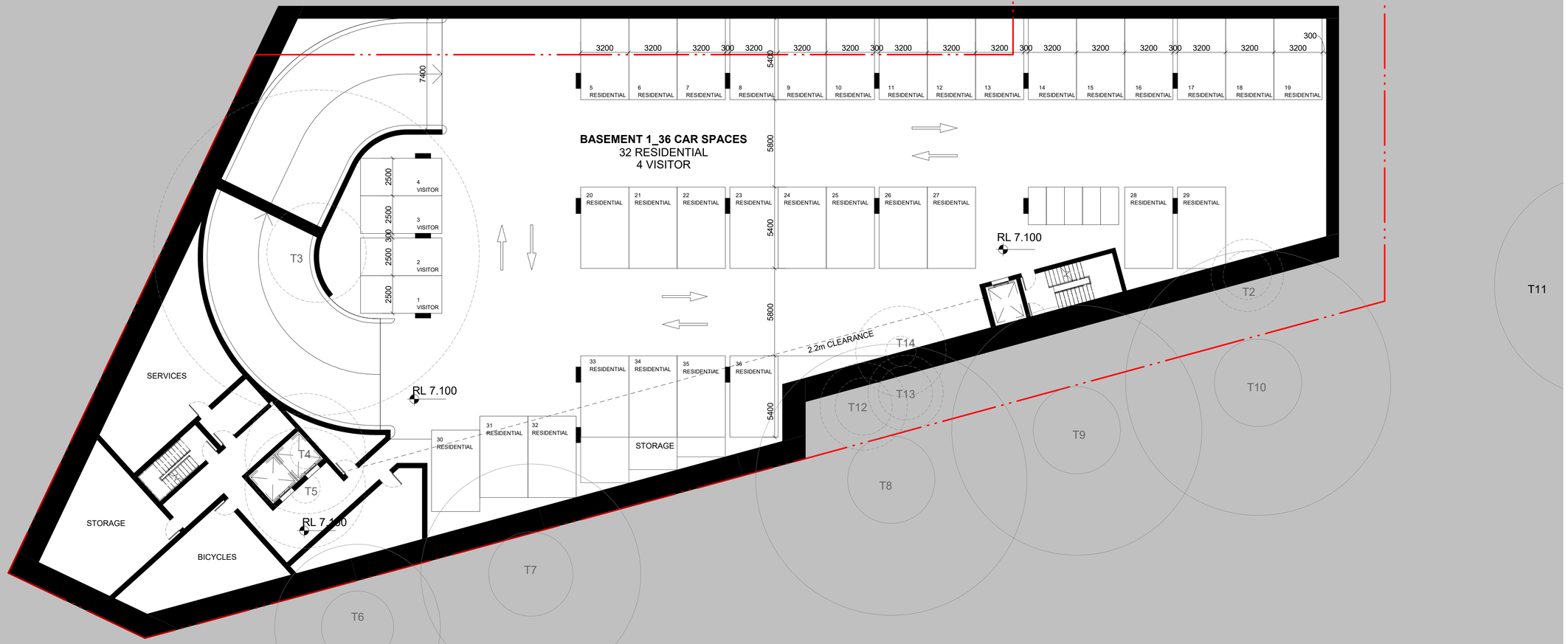

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D	2/11/2023	FOR COORDINATION	PS
E	8/11/2023	FOR COORDINATION	PS
F	16/11/2023	FOR COORDINATION	PS
G	29/11/2023	FOR COORDINATION	PS
H	06/12/2023	FOR COMMENTS	PS
J	13/12/2023	FOR SUBMISSION	PS
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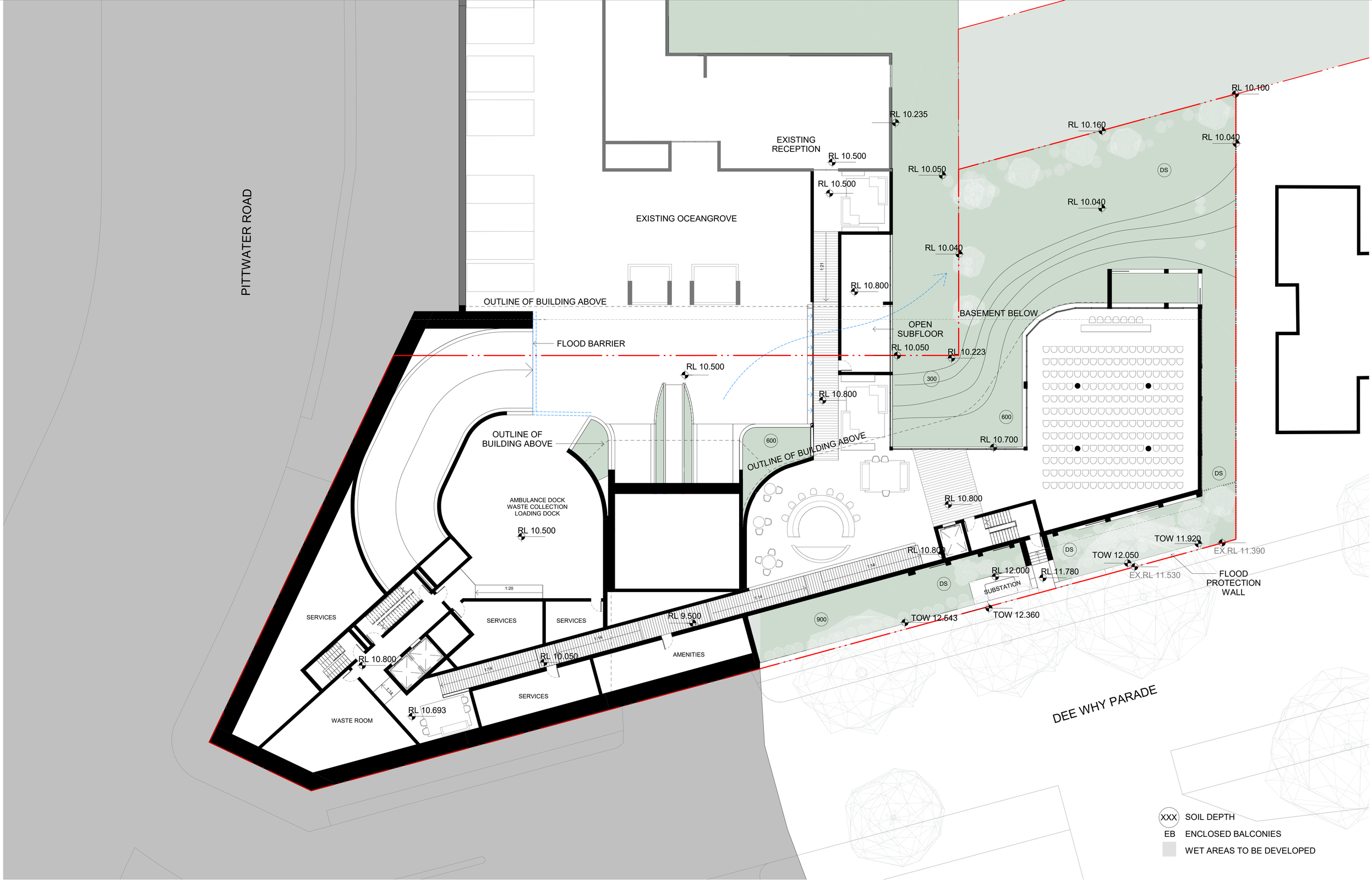
JOB	DRAWING	REVISION
23017	PP00.08	K



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F	16/11/2023	FOR COORDINATION	PS
G	29/11/2023	FOR COORDINATION	PS
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DEE WHY NSW 2099

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LOWER GROUND FLOOR

SCALE	DATE	DRAWN	CHECKED
1 : 150 @A1	15/12//2023	MH	PS

JOB	DRAWING	REVISION
23017	PP00.09	K

PITTWATER ROAD

EXISTING OCEANGROVE

9.0m

3.0m

4.5m

EB
BALCONY
58.6 m²

2B
A.00.01
106.8 m²

EB
BALCONY
21.8 m²

3B
A.00.02
138.5 m²

EB
BALCONY
12.7 m²

2B
A.00.03
134.1 m²

letterboxes

T3

T4

T5

T6

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T11

T12

T13

T14

T2

BALCONY
28.4 m²

BALCONY
15.2 m²

3B
B.00.04
143.6 m²

2B
B.00.03
97.3 m²

BALCONY
11.5 m²

BALCONY
12.7 m²

2B
B.00.02
99.4 m²

2B
B.00.01
111.0 m²

SUBSTATION

FLOOD PROTECTION WALL

DEE WHY PARADE

RL 15.200
RL 15.200
RL 15.200
RL 12.700
RL 12.317
RL 14.500
RL 11.780

TOW 12.891
TOW 12.810
TOW 12.608
TOW 12.543
TOW 12.360
TOW 12.050
TOW 11.920

EX.RL 12.390
EX.RL 12.290
EX.RL 11.900
EX.RL 11.530
EX.RL 11.390

300 3200 4100 3200 300

600 600 600 900 900

XXX SOIL DEPTH
EB ENCLOSED BALCONIES
WET AREAS TO BE DEVELOPED

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D	2/11/2023	FOR COORDINATION	PS
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F	16/11/2023	FOR COORDINATION	PS
G	29/11/2023	FOR COORDINATION	PS
H	06/12/2023	FOR COMMENTS	PS
J	13/12/2023	FOR SUBMISSION	PS
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DRAWING TITLE
UPPER GROUND FLOOR

SCALE	DATE	DRAWN	CHECKED
1 : 150 @A1	15/12//2023	MH	PS

JOB	DRAWING	REVISION
23017	PP00.10	K

XXX SOIL DEPTH

EB ENCLOSED BALCONIES

WET AREAS TO BE DEVELOPED

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F	16/11/2023	FOR COORDINATION	PS
G	29/11/2023	FOR COORDINATION	PS
H	06/12/2023	FOR COMMENTS	PS
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DEE WHY NSW 2099

DRAWING TITLE
FIRST FLOOR

SCALE	DATE	DRAWN	CHECKED
1 : 150 @A1	15/12//2023	MH	PS

JOB	DRAWING	REVISION
23017	PP00.11	K

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F	16/11/2023	FOR COORDINATION	PS
G	29/11/2023	FOR COORDINATION	PS
H	06/12/2023	FOR COMMENTS	PS
J	13/12/2023	FOR SUBMISSION	PS
K	15/12/2023	FOR APPROVAL	PS

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DEE WHY NSW 2099

DRAWING TITLE
FOURTH FLOOR

SCALE	DATE	DRAWN	CHECKED
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JOB	DRAWING	REVISION
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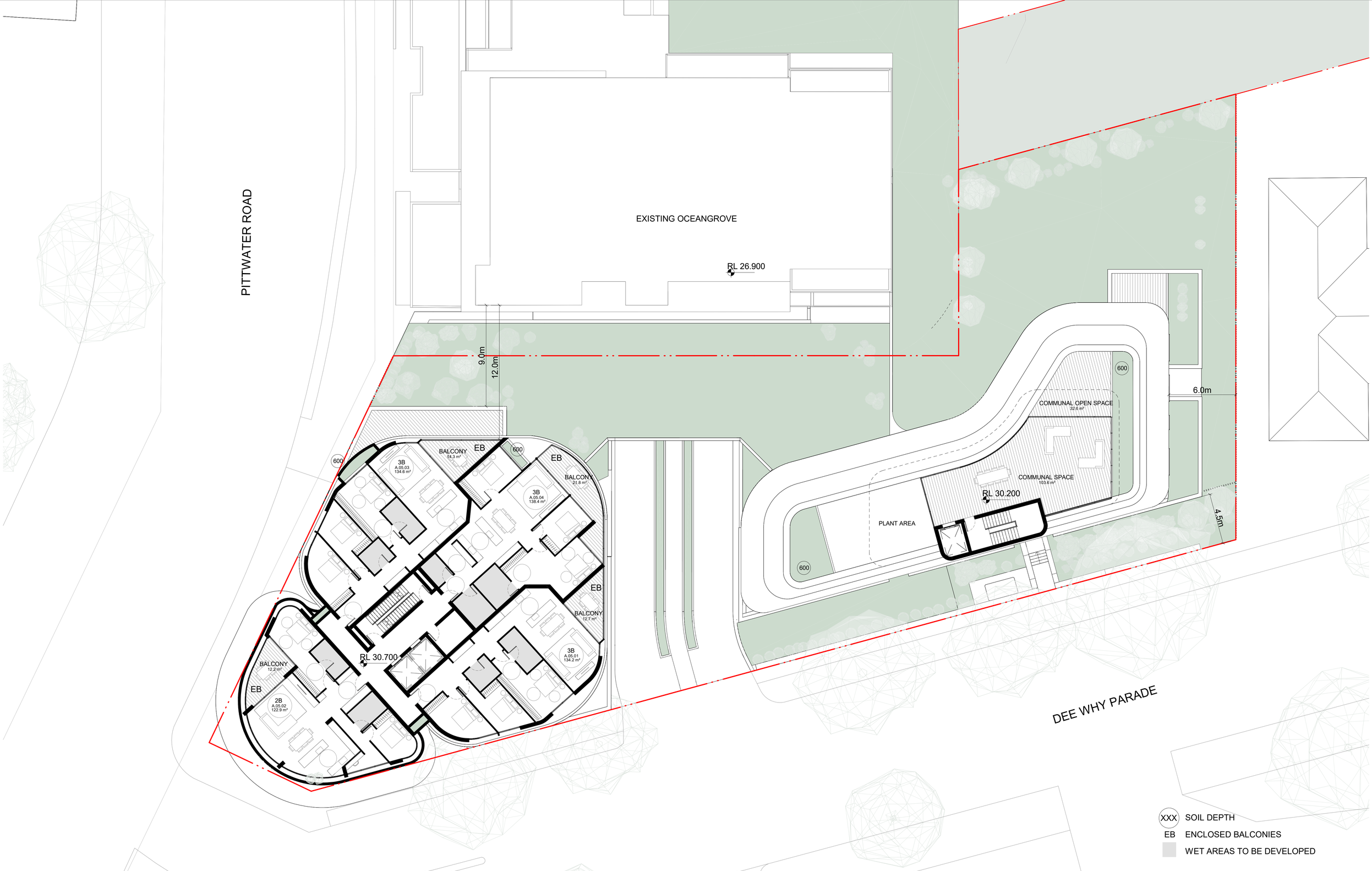

XXX SOIL DEPTH
EB ENCLOSED BALCONIES
WET AREAS TO BE DEVELOPED

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F	16/11/2023	FOR COORDINATION	PS
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H	06/12/2023	FOR COMMENTS	PS
J	13/12/2023	FOR SUBMISSION	PS
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DEE WHY NSW 2099

DRAWING TITLE
FIFTH FLOOR

SCALE	DATE	DRAWN	CHECKED
1 : 150 @A1	15/12//2023	MH	PS

JOB	DRAWING	REVISION
23017	PP00.15	K

PITTWATER ROAD

EXISTING OCEANGROVE

9.0m

15.2m

COMMUNAL OPEN SPACE
86.3 m²

COMMUNAL SPACE
172.7 m²

RL 40.025

ENCLOSED PLANT AREA

6.0m

RL 33.750

RL 33.300

RL 30.200

RL 34.600

4.5m

DEE WHY PARADE

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D	2/11/2023	FOR COORDINATION	PS
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F	16/11/2023	FOR COORDINATION	PS
G	29/11/2023	FOR COORDINATION	PS
H	06/12/2023	FOR COMMENTS	PS
J	13/12/2023	FOR SUBMISSION	PS
K	15/12//2023	FOR APPROVAL	PS

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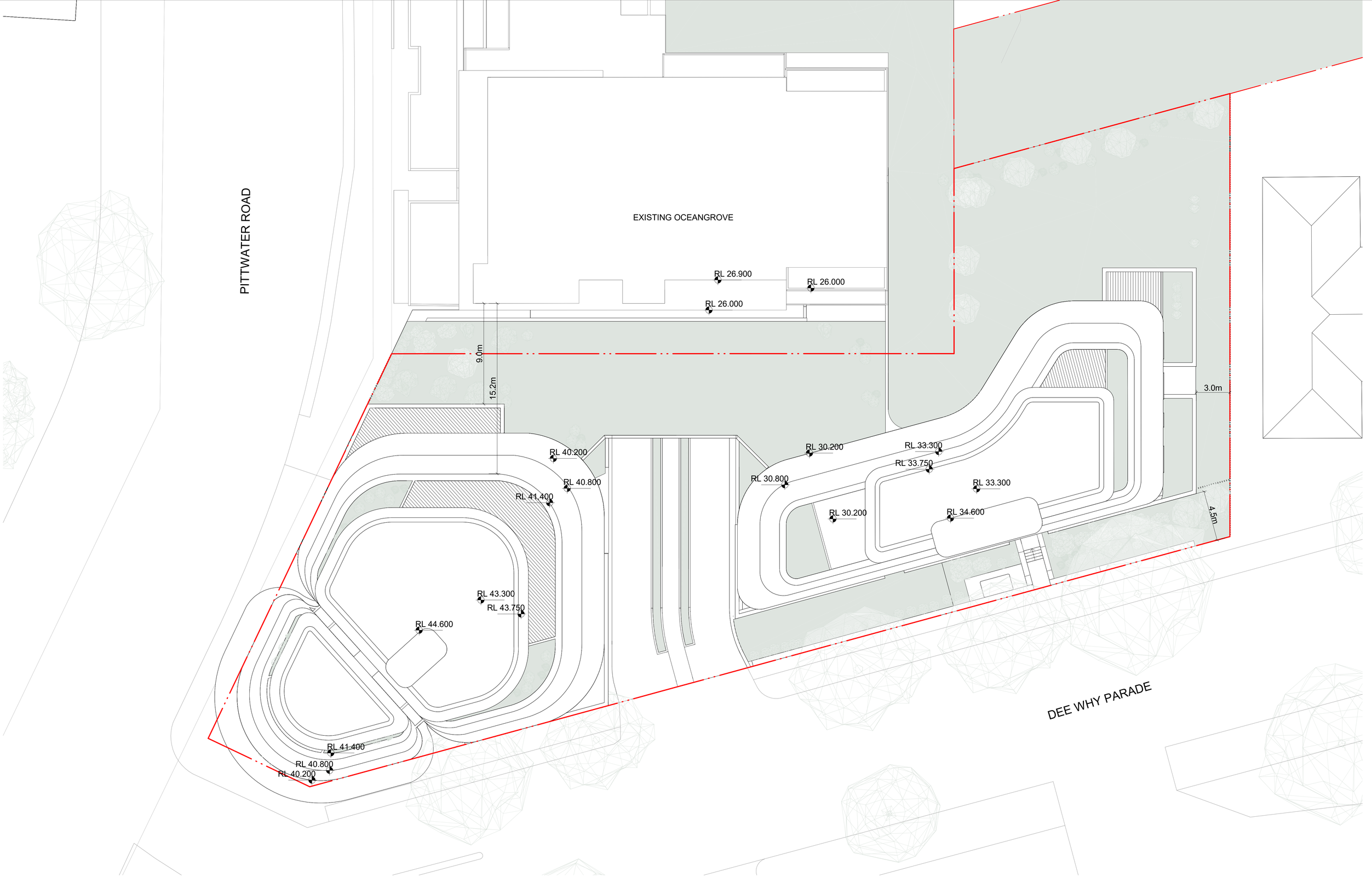
DRAWING TITLE
ROOF TERRACE

SCALE	DATE	DRAWN	CHECKED
1 : 150 @A1	15/12//2023	MH	PS

JOB	DRAWING	REVISION
23017	PP00.21	K



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REV	DATE	DESCRIPTION	BY
A	25/10/2023	FOR COORDINATION	PS
B	26/10/2023	FOR COORDINATION	PS
C	30/10/2023	FOR COORDINATION	PS
D	2/11/2023	FOR COORDINATION	PS
E	8/11/2023	FOR COORDINATION	PS
F	16/11/2023	FOR COORDINATION	PS
G	29/11/2023	FOR COORDINATION	PS
H	06/12/2023	FOR COMMENTS	PS
J	13/12/2023	FOR SUBMISSION	PS
K	15/12/2023	FOR APPROVAL	PS

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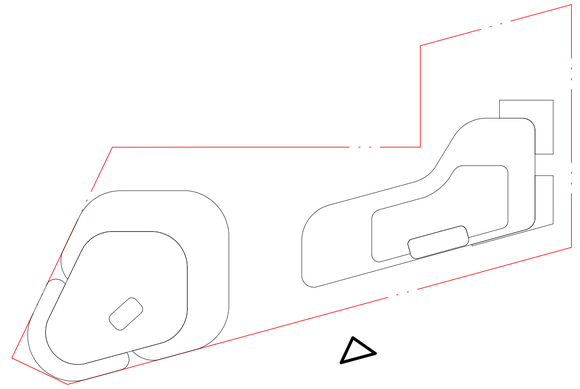
932 PITTWATER RD
DEE WHY NSW 2099

DRAWING TITLE
ROOF PLAN

SCALE	DATE	DRAWN	CHECKED
1 : 150 @A1	15/12//2023	MH	PS

JOB	DRAWING	REVISION
23017	PP00.22	K



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C	30/10/2023	FOR COORDINATION	PS
D	2/11/2023	FOR COORDINATION	PS
E	8/11/2023	FOR COORDINATION	PS
F	29/11/2023	FOR COORDINATION	PS
G	06/12/2023	FOR COMMENTS	PS
H	13/12/2023	FOR SUBMISSION	PS
J	15/12//2023	FOR APPROVAL	PS

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932 PITTWATER RD
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DRAWING TITLE
DEE WHY PARADE ELEVATION

SCALE	DATE	DRAWN	CHECKED
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JOB	DRAWING		REVISION
23017	PP03.01		J

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D	2/11/2023	FOR COORDINATION	PS
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F	29/11/2023	FOR COORDINATION	PS
G	06/12/2023	FOR COMMENTS	PS
H	13/12/2023	FOR SUBMISSION	PS
J	15/12//2023	FOR APPROVAL	PS

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DRAWING TITLE
PITTWATER ROAD ELEVATION

SCALE	DATE	DRAWN	CHECKED
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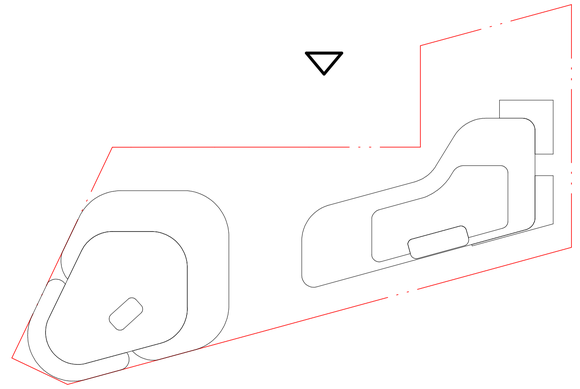
JOB	DRAWING	REVISION
23017	PP03.02	J



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D	2/11/2023	FOR COORDINATION	PS
E	8/11/2023	FOR COORDINATION	PS
F	29/11/2023	FOR COORDINATION	PS
G	06/12/2023	FOR COMMENTS	PS
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J	15/12//2023	FOR APPROVAL	PS

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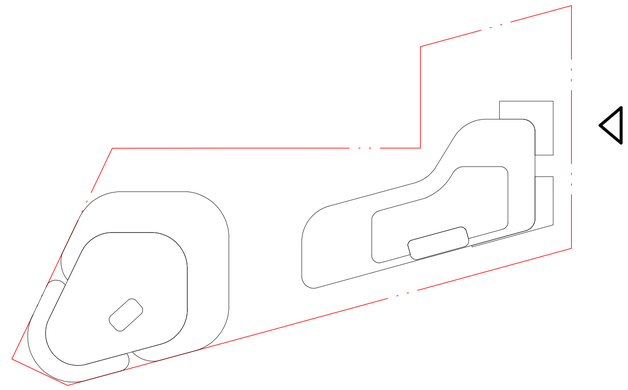
DRAWING TITLE
NORTH ELEVATION

SCALE	DATE	DRAWN	CHECKED
1:150 @A1	15/12//2023	MH	PS
JOB	DRAWING		REVISION
23017	PP03.03		J



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B	26/10/2023	FOR COORDINATION	PS
C	30/10/2023	FOR COORDINATION	PS
D	2/11/2023	FOR COORDINATION	PS
E	8/11/2023	FOR COORDINATION	PS
F	29/11/2023	FOR COORDINATION	PS
G	06/12/2023	FOR COMMENTS	PS
H	13/12/2023	FOR SUBMISSION	PS
J	15/12/2023	FOR APPROVAL	PS

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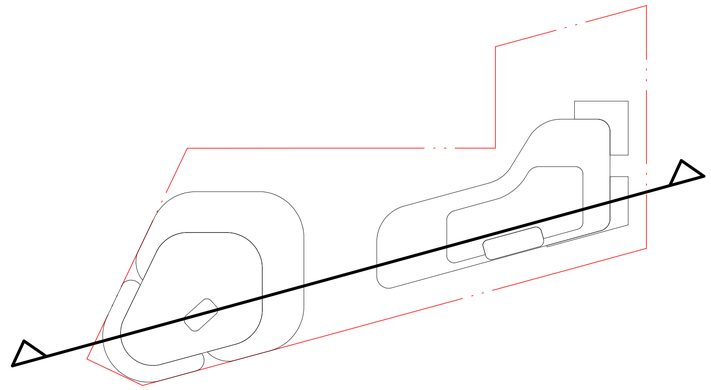
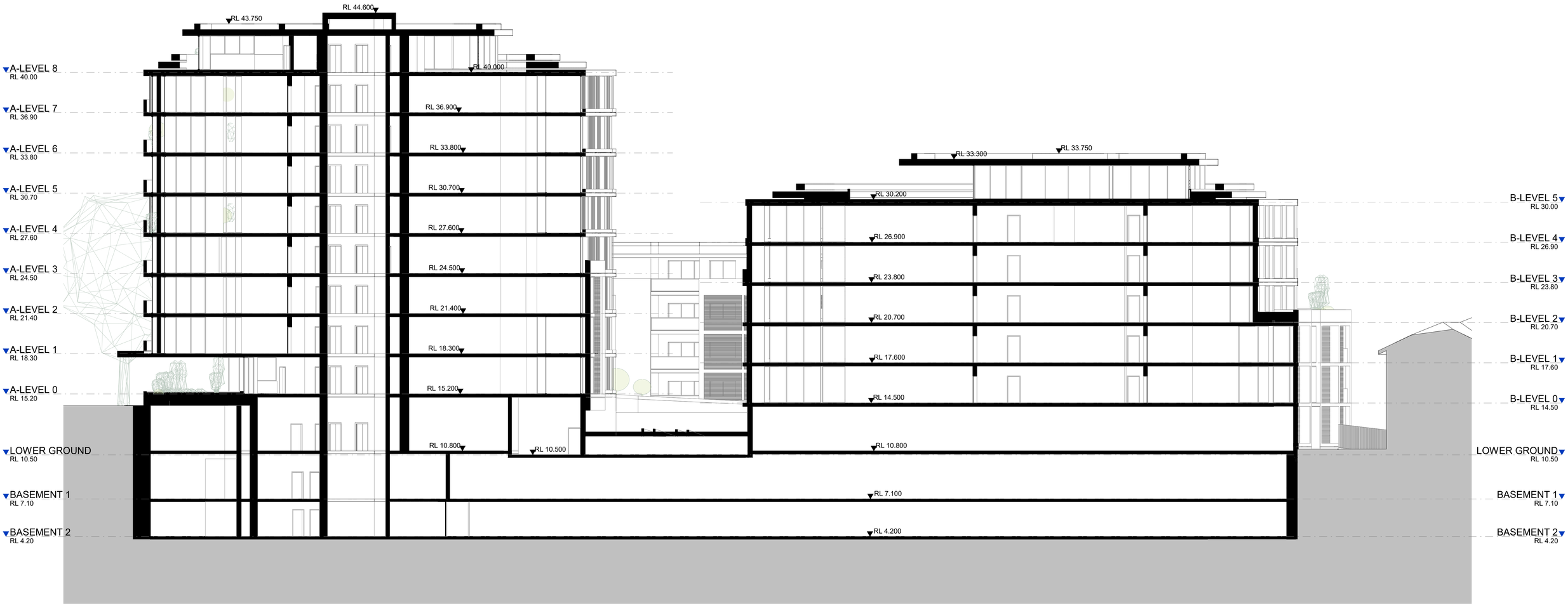
DRAWING TITLE
EAST ELEVATION

SCALE	DATE	DRAWN	CHECKED
1:150 @A1	15/12//2023	MH	PS

JOB	DRAWING	REVISION
23017	PP03.04	J





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C	30/10/2023	FOR COORDINATION	PS
D	2/11/2023	FOR COORDINATION	PS
E	8/11/2023	FOR COORDINATION	PS
F	29/11/2023	FOR COORDINATION	PS
G	06/12/2023	FOR COMMENTS	PS
H	13/12/2023	FOR SUBMISSION	PS
J	15/12//2023	FOR APPROVAL	PS

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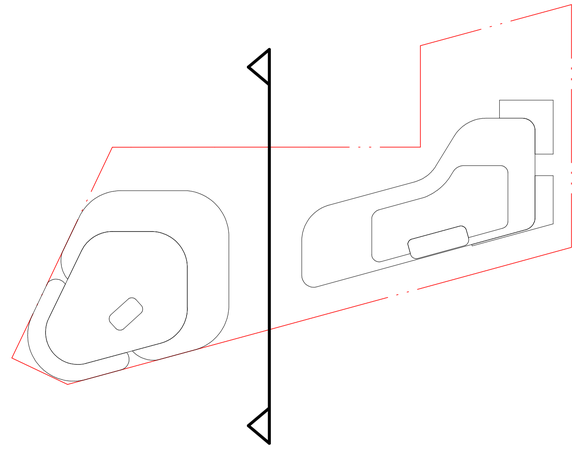
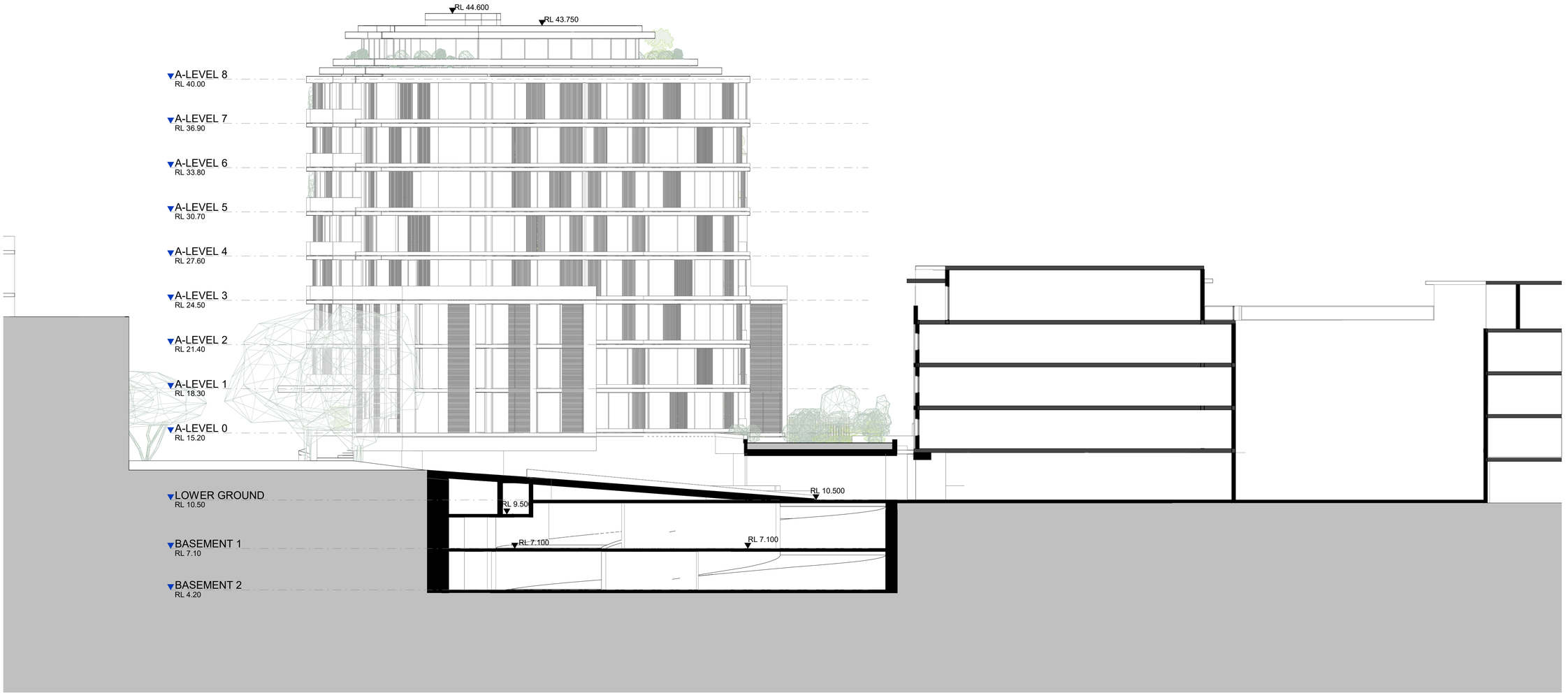
DRAWING TITLE
SECTION A-A´

SCALE	DATE	DRAWN	CHECKED
1:150 @A1	15/12//2023	MH	PS
JOB	DRAWING		REVISION
23017	PP04.01		J





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B	26/10/2023	FOR COORDINATION	PS
C	30/10/2023	FOR COORDINATION	PS
D	2/11/2023	FOR COORDINATION	PS
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F	29/11/2023	FOR COORDINATION	PS
G	06/12/2023	FOR COMMENTS	PS
H	13/12/2023	FOR SUBMISSION	PS
J	15/12//2023	FOR APPROVAL	PS

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DRAWING TITLE
SECTION B-B´

SCALE	DATE	DRAWN	CHECKED
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JOB	DRAWING	REVISION
23017	PP04.02	J

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B	15/12/2023	FOR APPROVAL	PS

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932 PITTWATER RD
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DRAWING TITLE
HEIGHT OF THE BUILDING

SCALE	DATE	DRAWN	CHECKED
	15/12//2023	MH	PS
JOB	DRAWING		REVISION
23017	PP7.33		B

APPENDIX C

DRAINS Results

DRAINS results prepared from Version 2023.06.8578.17142 **20% AEP**

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pit21672	8.54		0.025		0.84	0.001	Inlet Capacity
Pit10215	8.45		0.001		0.93	0	None
N49637	8.18		0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C1	0.047	0.032	0.016	5	7	2	20% AEP, 10 min burst, Storm 8
C3 - Bypass	0.017	0	0.017	5	7	2	20% AEP, 15 min burst, Storm 4
C1A	0.007	0	0.007	5	8	2	20% AEP, 15 min burst, Storm 4
C1B	0.007	0	0.007	5	8	2	20% AEP, 15 min burst, Storm 4
C2	0.015	0	0.015	5	8	2	20% AEP, 15 min burst, Storm 4
C3	0.017	0	0.017	5	8	2	20% AEP, 15 min burst, Storm 4

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
Pipe21502	0.016	0.85	9.401	8.543	20% AEP, 25 min burst, Storm 7
P36703	0.03	1.27	8.543	8.46	20% AEP, 15 min burst, Storm 4
Pipe21541	0.031	1.51	8.449	8.179	20% AEP, 15 min burst, Storm 4

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF18150	0	0	0.908	0	0	0	0	
OF37410	0.001	0.001	0.37	0.018	0.01	0.2	0.41	20% AEP, 15 min burst, Storm 4
OF15416	0	0	0.37	0	0	0	0	
OF30448	0.031	0.031	0.307	0.07	0.06	1.46	0.8	20% AEP, 15 min burst, Storm 4
OF18976	0.007	0.007	1.284	0.018	0.01	1.82	0.41	20% AEP, 15 min burst, Storm 4
OF18977	0.007	0.007	1.284	0.018	0.01	1.82	0.43	20% AEP, 15 min burst, Storm 4
OF29172	0.046	0.046	1.284	0.033	0.02	4	0.64	20% AEP, 15 min burst, Storm 4
OF18978	0.015	0.015	1.284	0.024	0.01	4	0.4	20% AEP, 15 min burst, Storm 4
OF18979	0.017	0.017	1.284	0.025	0.01	4	0.43	20% AEP, 15 min burst, Storm 4

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin11187	9.53	21.1	0.016	0.016	0

Run Log for 231110 TX17488.00-01.mid.OSD design
{\colortbl;\red0\green0\blue0;\red192\green0\blue0;}Run Log for 231110 TX17488.00-01.mid.OSD design.drn - DRAINS run at 13:12:49

No water upwelling from any pit.
Freeboard was adequate at all pits.

Flows were safe in all overflow routes.

DRAINS results prepared from Version 2023.06.8578.17142 **10% AEP**

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi	Max Pond Volume	Min Freeboard	Overflow (cu.m/s)	Constraint

		(cu.m/s)	(cu.m)	(m)		
Pit21672	8.56	0.034		0.82	0.001	Inlet Capacity
Pit10215	8.47	0.003		0.91	0	None
N49637	8.19	0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C1	0.062	0.047	0.021	5	7	2	10% AEP, 15 min burst, Storm 3
C3 - Bypass	0.025	0	0.025	5	7	2	10% AEP, 15 min burst, Storm 5
C1A	0.009	0	0.009	5	8	2	10% AEP, 15 min burst, Storm 6
C1B	0.01	0	0.01	5	8	2	10% AEP, 15 min burst, Storm 6
C2	0.02	0	0.02	5	8	2	10% AEP, 15 min burst, Storm 6
C3	0.024	0	0.024	5	8	2	10% AEP, 15 min burst, Storm 6

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
Pipe21502	0.018	0.73	9.556	8.565	10% AEP, 30 min burst, Storm 8
P36703	0.038	1.36	8.549	8.475	10% AEP, 15 min burst, Storm 5
Pipe21541	0.039	1.59	8.452	8.194	10% AEP, 15 min burst, Storm 5

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF18150	0	0	1.479	0	0	0	0	
OF37410	0.001	0.001	2.383	0.023	0.01	0.26	0.5	10% AEP, 15 min burst, Storm 5
OF15416	0	0	2.383	0	0	0	0	
OF30448	0.039	0.039	1.201	0.076	0.06	1.65	0.84	10% AEP, 15 min burst, Storm 5
OF18976	0.009	0.009	1.442	0.022	0.01	4	0.32	10% AEP, 15 min burst, Storm 6
OF18977	0.01	0.01	1.442	0.022	0.01	4	0.34	10% AEP, 15 min burst, Storm 6
OF29172	0.063	0.063	1.442	0.037	0.03	4	0.72	10% AEP, 15 min burst, Storm 6
OF18978	0.02	0.02	1.442	0.026	0.01	4	0.45	10% AEP, 15 min burst, Storm 6
OF18979	0.024	0.024	1.442	0.027	0.01	4	0.49	10% AEP, 15 min burst, Storm 6

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin11187	9.7	28.8	0.018	0.018	0

Run Log for 231110 TX17488.00-01.mid.OSD design
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No water upwelling from any pit.
Freeboard was adequate at all pits.

Flows were safe in all overflow routes.

DRAINS results prepared from Version 2023.06.8578.17142 **5% AEP**

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pit21672	8.58		0.041		0.8	0.003	Inlet Capacity
Pit10215	8.49		0.005		0.89	0	None
N49637	8.2		0				

SUB-CATCHMENT DETAILS

Name	Max	Paved	Grassed	Paved	Grassed	Supp.	Due to Storm

	Flow Q (cu.m/s)	Max Q (cu.m/s)	Max Q (cu.m/s)	Tc (min)	Tc (min)	Tc (min)	
C1	0.076	0.055	0.028	5	7	2	5% AEP, 15 min burst, Storm 3
C3 - Bypass	0.033	0	0.033	5	7	2	5% AEP, 10 min burst, Storm 7
C1A	0.012	0	0.012	5	8	2	5% AEP, 15 min burst, Storm 6
C1B	0.013	0	0.013	5	8	2	5% AEP, 15 min burst, Storm 6
C2	0.026	0	0.026	5	8	2	5% AEP, 15 min burst, Storm 6
C3	0.03	0	0.03	5	8	2	5% AEP, 15 min burst, Storm 6

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
Pipe21502	0.021	0.67	9.726	8.584	5% AEP, 30 min burst, Storm 8
P36703	0.044	1.35	8.562	8.491	5% AEP, 15 min burst, Storm 5
Pipe21541	0.046	1.68	8.465	8.203	5% AEP, 15 min burst, Storm 5

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF18150	0	0	0.908	0	0	0	0	
OF37410	0.003	0.003	0.37	0.028	0.02	0.33	0.55	5% AEP, 10 min burst, Storm 7
OF15416	0	0	0.37	0	0	0	0	
OF30448	0.046	0.046	0.307	0.08	0.07	1.8	0.85	5% AEP, 15 min burst, Storm 5
OF18976	0.012	0.012	1.284	0.023	0.01	4	0.36	5% AEP, 15 min burst, Storm 6
OF18977	0.013	0.013	1.284	0.023	0.01	4	0.38	5% AEP, 15 min burst, Storm 6
OF29172	0.08	0.08	1.284	0.04	0.03	4	0.8	5% AEP, 15 min burst, Storm 6
OF18978	0.026	0.026	1.284	0.027	0.01	4	0.53	5% AEP, 15 min burst, Storm 6
OF18979	0.03	0.03	1.284	0.029	0.02	4	0.53	5% AEP, 15 min burst, Storm 6

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin11187	9.89	37.2	0.021	0.021	0

Run Log for 231110 TX17488.00-01.mid.OSD design
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No water upwelling from any pit.
Freeboard was adequate at all pits.

Flows were safe in all overflow routes.

DRAINS results prepared from Version 2023.06.8578.17142 **2% AEP**

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pit21672	8.61		0.053		0.77	0.005	Inlet Capacity
Pit10215	8.52		0.008		0.86	0	None
N49637	8.22		0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C1	0.09	0.05	0.04	5	7	2	2% AEP, 10 min burst, Storm 7
C3 - Bypass	0.041	0	0.041	5	7	2	2% AEP, 10 min burst, Storm 7
C1A	0.016	0	0.016	5	8	2	2% AEP, 10 min burst, Storm 5
C1B	0.017	0	0.017	5	8	2	2% AEP, 10 min burst, Storm 4

C2	0.034	0	0.034	5	8	2	2% AEP, 10 min burst, Storm 7
C3	0.04	0	0.04	5	8	2	2% AEP, 10 min burst, Storm 7

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
Pipe21502	0.023	0.61	9.938	8.608	2% AEP, 25 min burst, Storm 9
P36703	0.052	1.29	8.575	8.515	2% AEP, 10 min burst, Storm 7
Pipe21541	0.056	1.78	8.483	8.217	2% AEP, 10 min burst, Storm 7

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF18150	0	0	1.479	0	0	0	0	
OF37410	0.005	0.005	2.383	0.036	0.02	0.41	0.66	2% AEP, 10 min burst, Storm 7
OF15416	0	0	2.383	0	0	0	0	
OF30448	0.056	0.056	1.201	0.085	0.07	1.97	0.88	2% AEP, 10 min burst, Storm 7
OF18976	0.016	0.016	1.442	0.024	0.01	4	0.42	2% AEP, 10 min burst, Storm 5
OF18977	0.017	0.017	1.442	0.025	0.01	4	0.41	2% AEP, 10 min burst, Storm 4
OF29172	0.106	0.106	1.442	0.045	0.04	4	0.88	2% AEP, 10 min burst, Storm 7
OF18978	0.034	0.034	1.442	0.03	0.02	4	0.56	2% AEP, 10 min burst, Storm 7
OF18979	0.04	0.04	1.442	0.031	0.02	4	0.62	2% AEP, 10 min burst, Storm 7

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin11187	10.13	47.7	0.023	0.023	0

Run Log for 231110 TX17488.00-01.mid.OSD design
{\colortbl;\red0\green0\blue0;\red192\green0\blue0;}Run Log for 231110 TX17488.00-01.mid.OSD design.drn - DRAINS run at 13:15:19

No water upwelling from any pit.
Freeboard was adequate at all pits.

Flows were safe in all overflow routes.

DRAINS results prepared from Version 2023.06.8578.17142 **1% AEP**

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pit21672	8.64		0.079		0.74	0.006	Inlet Capacity
Pit10215	8.54		0.019		0.84	0	None
N49637	8.24		0.001				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C1	0.102	0.056	0.046	5	7	2	1% AEP, 10 min burst, Storm 7
C3 - Bypass	0.047	0	0.047	5	7	2	1% AEP, 10 min burst, Storm 7
C1A	0.019	0	0.019	5	8	2	1% AEP, 10 min burst, Storm 4
C1B	0.02	0	0.02	5	8	2	1% AEP, 10 min burst, Storm 7
C2	0.041	0	0.041	5	8	2	1% AEP, 10 min burst, Storm 7
C3	0.048	0	0.048	5	8	2	1% AEP, 10 min burst, Storm 9

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm

Pipe21502	0.025	0.51	10.054	8.643	1% AEP, 25 min burst, Storm 6
P36703	0.063	1.3	8.594	8.543	1% AEP, 25 min burst, Storm 6
Pipe21541	0.069	1.88	8.504	8.235	1% AEP, 25 min burst, Storm 6

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF18150	0.024	0.024	1.479	0.03	0.01	4	0.39	1% AEP, 25 min burst, Storm 6
OF37410	0.006	0.006	2.383	0.04	0.03	0.46	0.69	1% AEP, 10 min burst, Storm 7
OF15416	0	0	2.383	0	0	0	0	
OF30448	0.069	0.069	1.201	0.091	0.08	2.17	0.9	1% AEP, 25 min burst, Storm 6
OF18976	0.019	0.019	1.442	0.025	0.01	4	0.46	1% AEP, 10 min burst, Storm 4
OF18977	0.02	0.02	1.442	0.026	0.01	4	0.45	1% AEP, 10 min burst, Storm 7
OF29172	0.127	0.127	1.442	0.048	0.05	4	0.96	1% AEP, 10 min burst, Storm 9
OF18978	0.041	0.041	1.442	0.032	0.02	4	0.6	1% AEP, 10 min burst, Storm 7
OF18979	0.048	0.048	1.442	0.033	0.02	4	0.66	1% AEP, 10 min burst, Storm 9

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin11187	10.26	53.3	0.048	0.025	0.024

Run Log for 231110 TX17488.00-01.mid.OSD design

{\colortbl;\red0\green0\blue0;\red192\green0\blue0;}Run Log for 231110 TX17488.00-01.mid.OSD design.drn - DRAINS run at 13:16:07

No water upwelling from any pit.
Freeboard was adequate at all pits.

Flows were safe in all overflow routes.

APPENDIX D

Ocean Protect Product Information

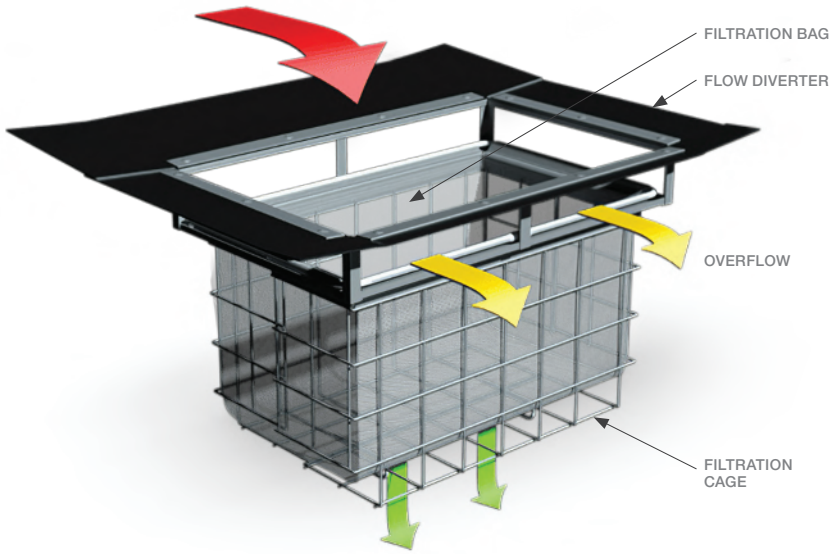
OceanGuard®

Gully Pit Basket

The OceanGuard® technology is a gully pit basket designed to fit within new and existing gully pits to remove pollution from stormwater runoff. The system has a choice of filtration liners, designed to remove gross pollutants, solids and other attached pollutants as either a stand-alone technology or as part of a 'treatment train' (with stormwater treatment assets located downstream to provide further treatment).

How does it work?

- Stormwater enters the OceanGuard® through a kerb inlet and/or grated inlet
- The flow diverter at top of the unit has a rigid high-density polyethylene (HDPE) skirt that is installed against the walls directing all incoming stormwater flows into the filtration bag
- Stormwater is filtered via direct screening through the filtration bag - 100% of incoming pollutants (greater than the opening in the filtration material) are captured and retained
- During large storm events the water elevation in the filtration bag can rise and peak flows are internally bypassed through slots created in the flow diverter which has no moving parts that may prematurely fail
- At the end of the storm event, sediment and debris settle into the base of the filtration bag
- The stored material will be stored in a dry state (until the next storm event), reducing the amount of organic decomposition



1300 354 722 enquiries@oceanprotect.com.au www.oceanprotect.com.au

OceanGuard®

Features

- Flow diverter with static bypass assembly
- Multiple filtration bags from 200micron openings
- Heavy duty filtration cage
- Multiple sizes and configurations
- Removable filtration bags

Benefits

- Superior pollutant removal with high hydraulic efficiency
- Large pollution storage capacity
- Design flexibility
- Ease of maintenance, with no confined space entry
- Retained pollution stored in a dry state, reducing organic decomposition (and possible nutrient 'leaching')

Configurations and Applications

The OceanGuard® is available in several standard sizes, designed to fit pits ranging from 450 x 450mm up to 1200 x 1200mm. Custom sizings are also available for larger pits. With the ability to be installed in kerb entry, grated drain and field gully pits, the OceanGuard® is an ideal solution for a wide range of applications such as:

- Commercial, industrial and residential development, infill and redevelopment and stormwater quality retrofit applications
- Special projects, including highways, airports, seaports and military installations
- Pre-treatment for subsequent stormwater treatment assets (e.g. StormFilter®, biofiltration)

Maintenance

To ensure that each OceanGuard® achieves optimal performance, it is advisable that regular maintenance is performed. Typically, the OceanGuard® requires two to four minor services annually, which includes inspection and removal (and disposal) of retained material. The filter bag may need to be replaced occasionally (and/or works to the support frame undertaken), as required.

Speak to the team at Ocean Protect who can help you maintain your OceanGuard®.

The Stormwater Management StormFilter®

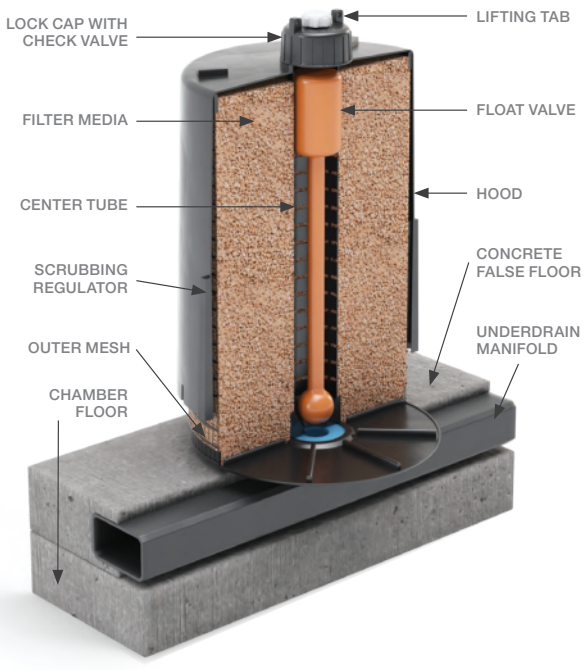
The Stormwater Management StormFilter® is a proprietary stormwater treatment asset (typically installed underground) and composed of one or more structures that house rechargeable, media-filled cartridges.

StormFilter® is typically applied to trap the most challenging pollutants within stormwater, such as total suspended solids, hydrocarbons, nutrients, metals, and other common pollutants. A range of media types are available, however, to target specific pollutants within stormwater, including PFAS (per-and poly-fluoroalkyl substances).

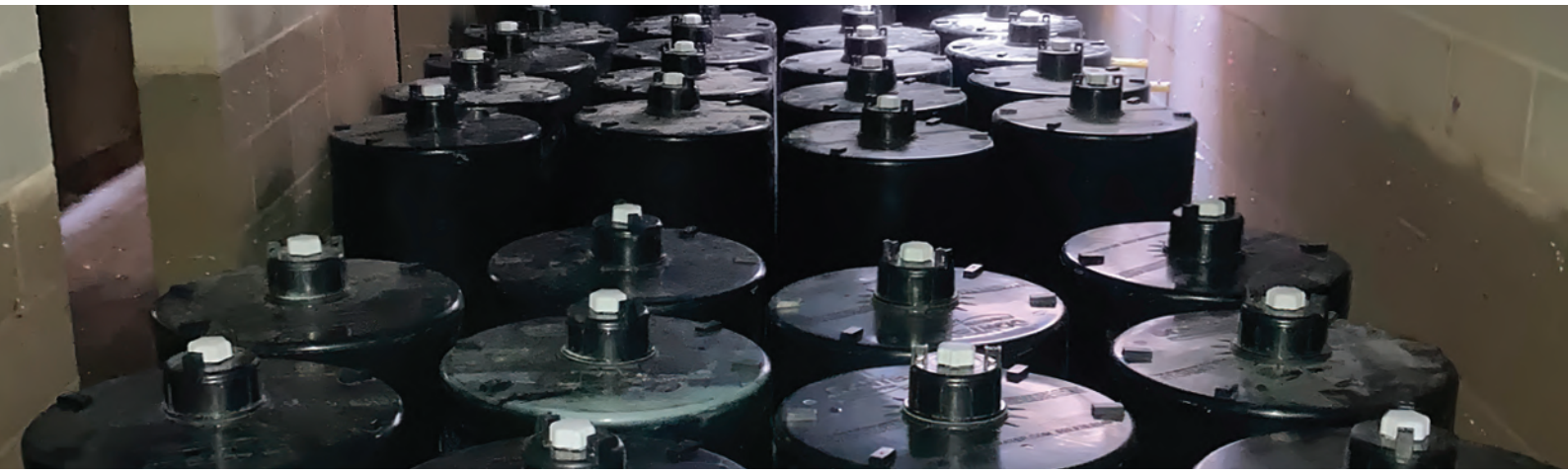
Since 2001, StormFilter® has been installed in a variety of applications to meet regulatory requirements set by authorities throughout Australia. At the start of 2022, there had already been over 30,000 StormFilter® cartridges installed within Australia and 250,000 globally.

How does it work?

- During a storm, runoff passes through the filtration media and starts filling the cartridge centre tube. The air inside the hood is purged through a one-way check valve as the water rises
- When water reaches the top of the float, buoyant forces pull the float free and allow filtered water to exit the cartridge. A siphon is established within each cartridge that draws water uniformly across the full height of the media bed ensuring even distribution of pollutants and prolonged media longevity
- After a storm, the water level in the structure starts falling. A hanging water column remains under the cartridge hood until the water level reaches the scrubbing regulators at the bottom of the hood
- Air then rushes through the regulators, breaking the siphon and creating air bubbles that agitate the surface of the filter media, causing accumulated sediment to settle on the treatment bay floor. This unique surface-cleaning mechanism prevents surface blinding and further extends cartridge life



StormFilter®

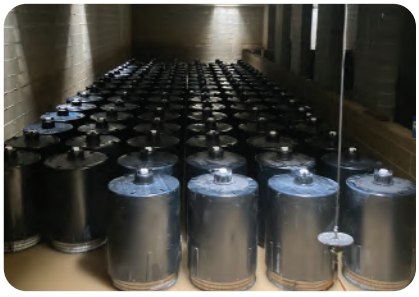


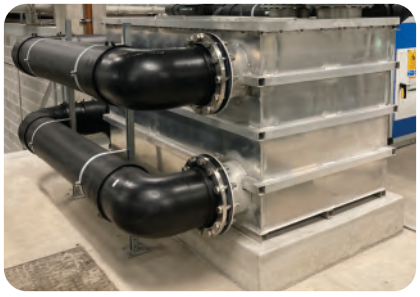
Features

- Siphon actuated, high surface area media cartridges
- Multiple cartridge heights
- Multiple media options
- Multiple configurations
- Maintenance intervals of one to five years, resulting in fewer maintenance events and reduced long-term ownership costs

Benefits

- Stormwater is drawn evenly through the filter media providing efficient, effective stormwater treatment
- Flexibility in arrangement and hydraulics to meet your sites needs
- Target specific pollutants including TSS, nutrients, heavy metals and hydrocarbons
- Lightweight, reusable cartridges





Configurations and Applications

The StormFilter® is available in a wide variety of configurations, such as precast concrete pits and tanks, custom above ground HDPE/aluminium tanks, and incorporated into on-site detention structures. When combined with the multiple cartridge heights and media options, the StormFilter® design flexibility makes it suitable for a wide range of applications such as:

- Commercial, industrial and residential development, infill and redevelopment and stormwater quality retrofit applications
- Special projects, such as highways, airports, seaports and military installations
- Treatment for subsequent infiltration and stormwater harvesting and reuse

Maintenance

To ensure optimal performance, it is advisable that regular maintenance is performed for StormFilter®. Typically, the StormFilter® requires an inspection and removal of accumulated pollution.

Speak to the team at Ocean Protect who can help inspect and maintain your StormFilter®.