SECTION 5:
SPECIALIST REPORTS

239 & 241 Boundary Street, Coolangatta

Enhance
URBAN PLANNING

Statement of Landscape Intent
Acoustic Report
Engineering Services Report
Flood Code Response Report
Stormwater Management Plan
Traffic Engineering Report
Waste Management Plan

STATEMENT OF LANDSCAPE INTENT

Enhance
URBAN PLANNING

239 & 241 Boundary Street, Coolangatta

CONTENTS PAGE

SCHEMATIC DESIGN

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN MORAN LANDSCAPE ARCHITECTS

2207800 SD-01
2022-11-29 ISSUE C

Neighbouring building

Neighbouring building

Neighbouring building

Resident bike parking

Raised planter - depth 1000mm

4 STORY HOTEL

Existing retaining wall on adjoining lot

Yellow dashed line indicates building line overhead

Red dashed line indicates property boundary

Vistor bike parking

Raised planter - depth 800mm

Existing crossover to adjacent property

Existing power pole

Existing driveway to be removed and grass reinstated

Existing services

Existing bin

Existing planting area to be retained

Existing seat

Existing power pole

Existing footpath to be retained

Decorative planting in terraced raised planters - depths vary 600mm- 1000mm

Existing planting area to be retained

Water meter

Raised planter - depth 800mm

Existing crossover

WARD STREET

BOUNDARY STREET

B

B

A

A

4 VISTOR PARKING

MSB

UP

ENTRY TO BASEMENT

RL 1.90

RL 2.33

UP

PWD

UP

COMMS

RECYCLING/ BIN WASTE AREA

FCR

POOL

RECREATIONAL DECK

LOBBY RL 3.00

MAIL

PMT

+ RL 2.00

RL 3.00

+ RL 2.50

SITE PLAN - GROUND LEVEL

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

2207800 SD-02
2022-11-29 ISSUE C

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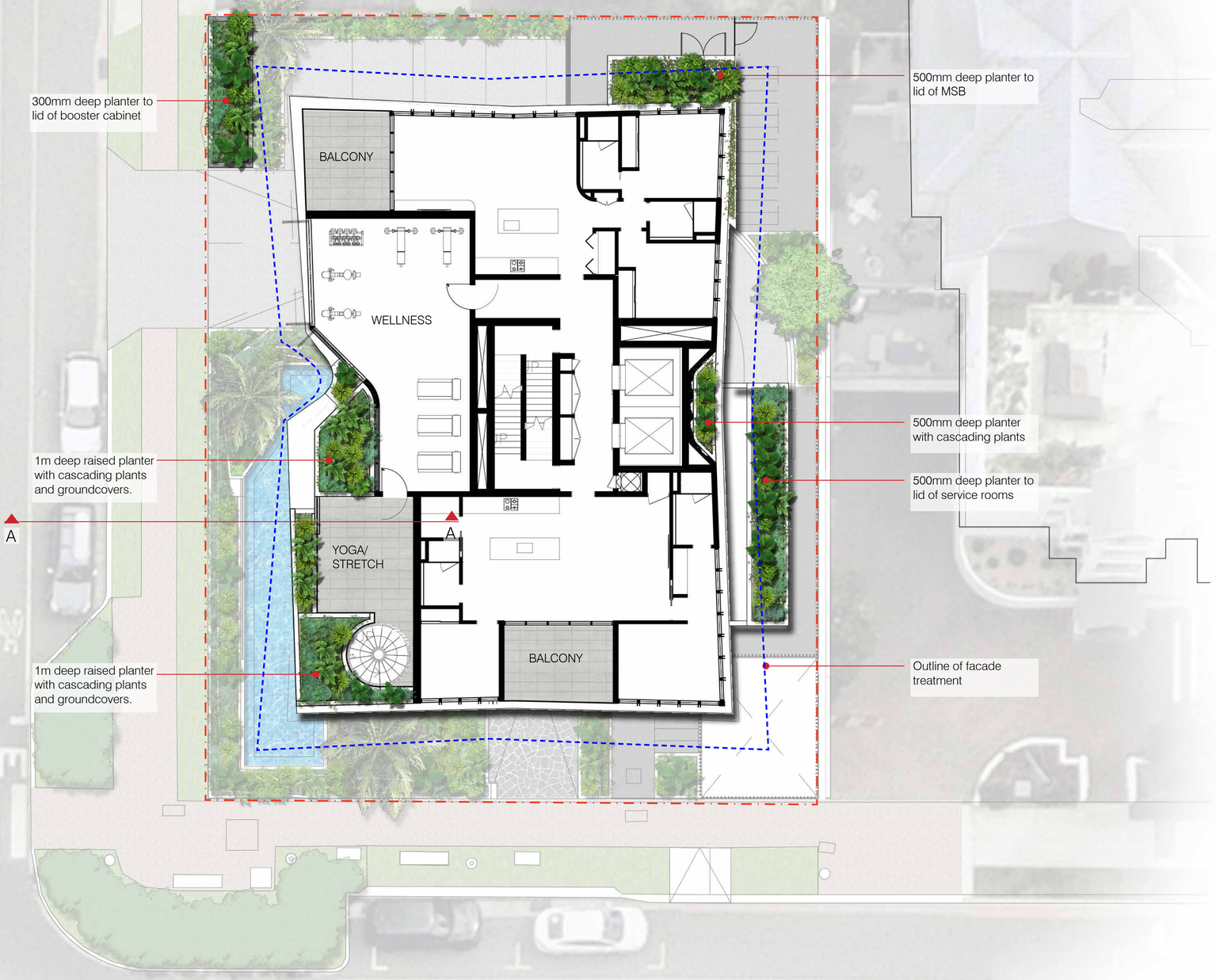

LEVEL 01

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

2207800 SD-03
2022-11-29 ISSUE C

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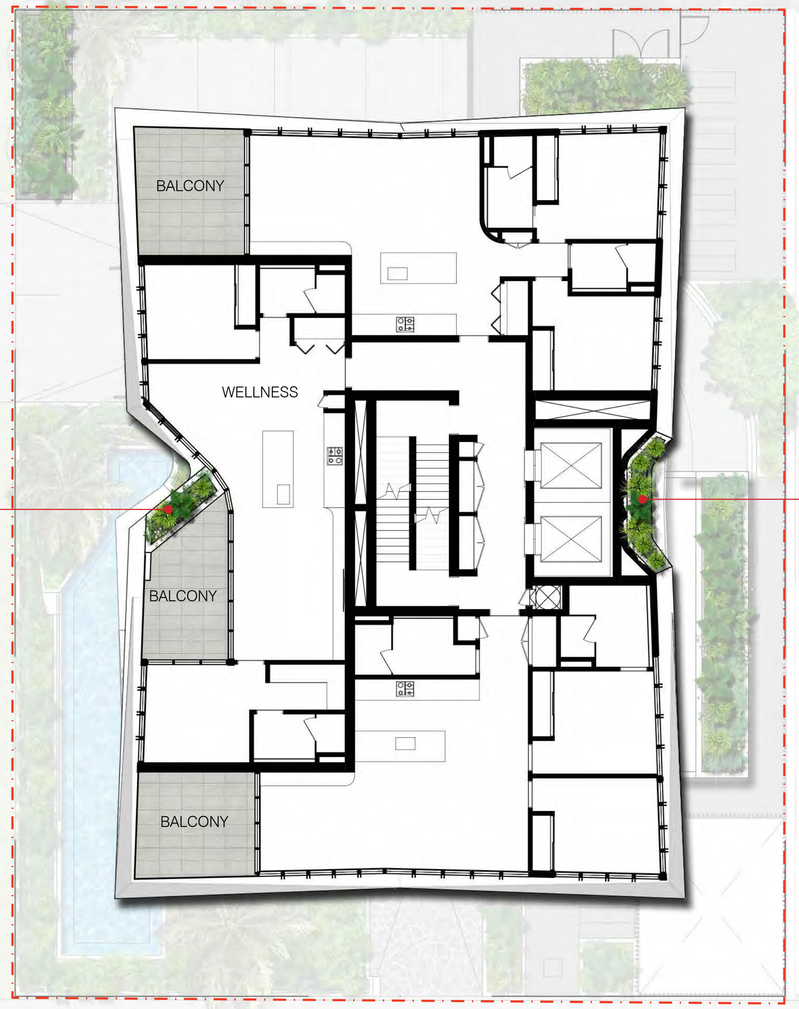

1m deep raised planter with cascading plants and groundcovers.

500mm deep planter with cascading plants

LEVEL 02-06

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

2207800 SD-04
2022-11-29 ISSUE C

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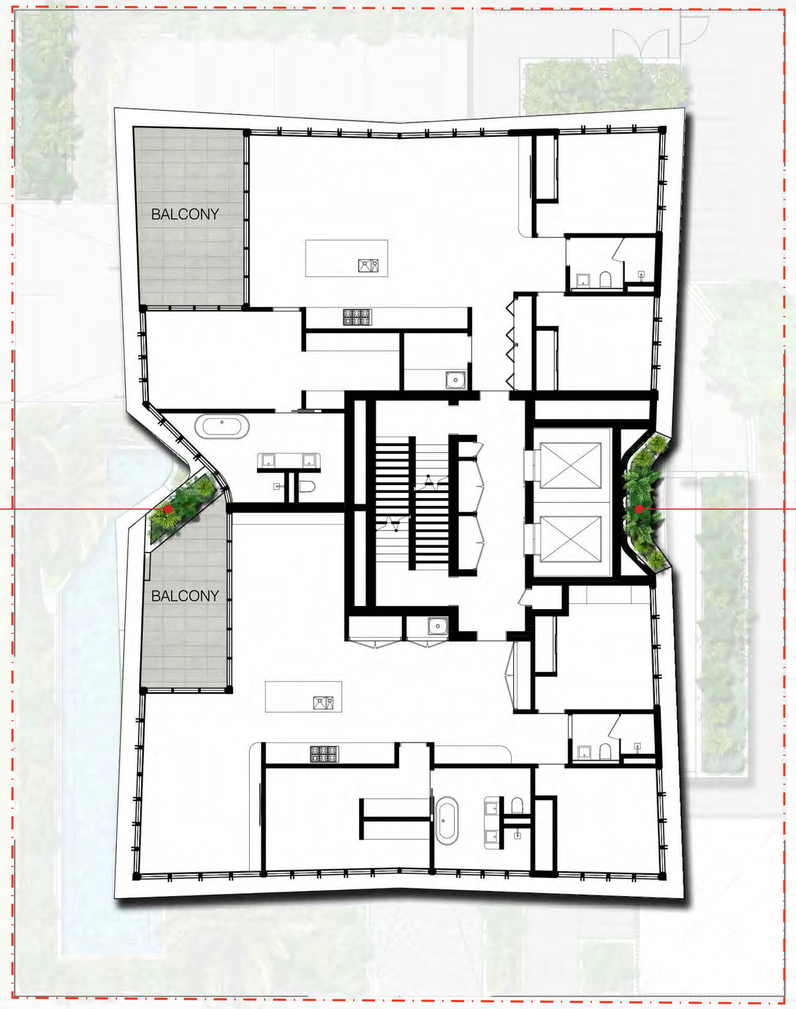

1m deep raised planter with cascading plants and groundcovers.

500m deep planter with cascading plants

LEVEL 07-14

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

2207800 SD-05
2022-11-29 ISSUE C

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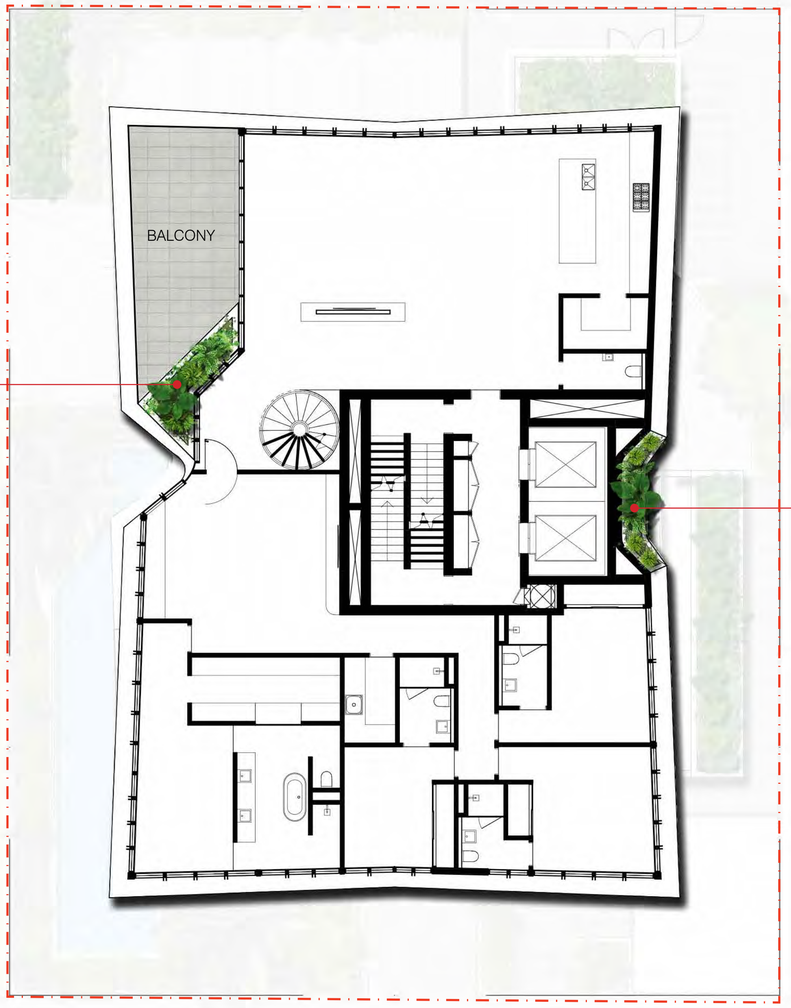

LEVEL 15

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

2207800 SD-06
2022-11-29 ISSUE C

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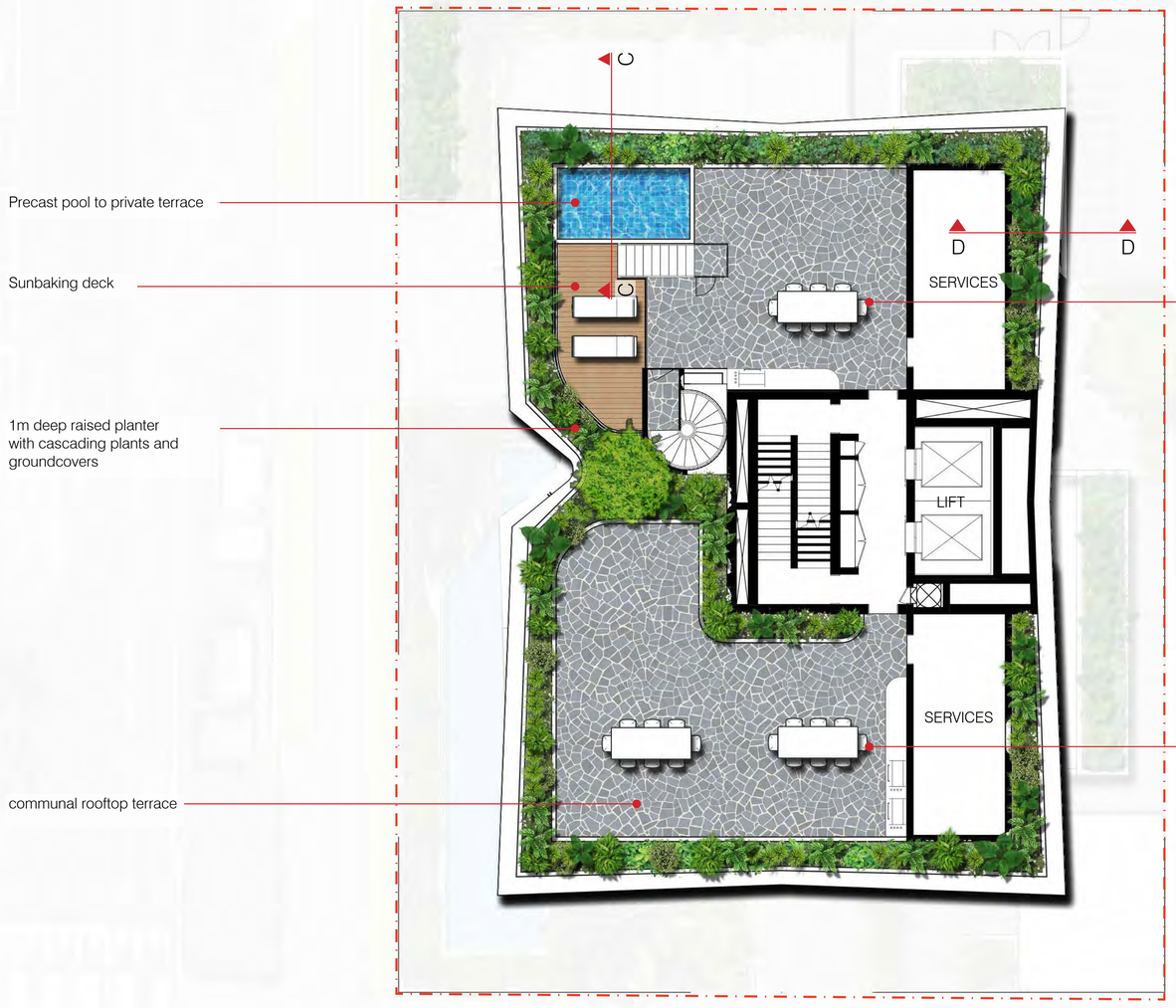

ROOF TERRACE

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

2207800 SD-07
2022-11-29 ISSUE C

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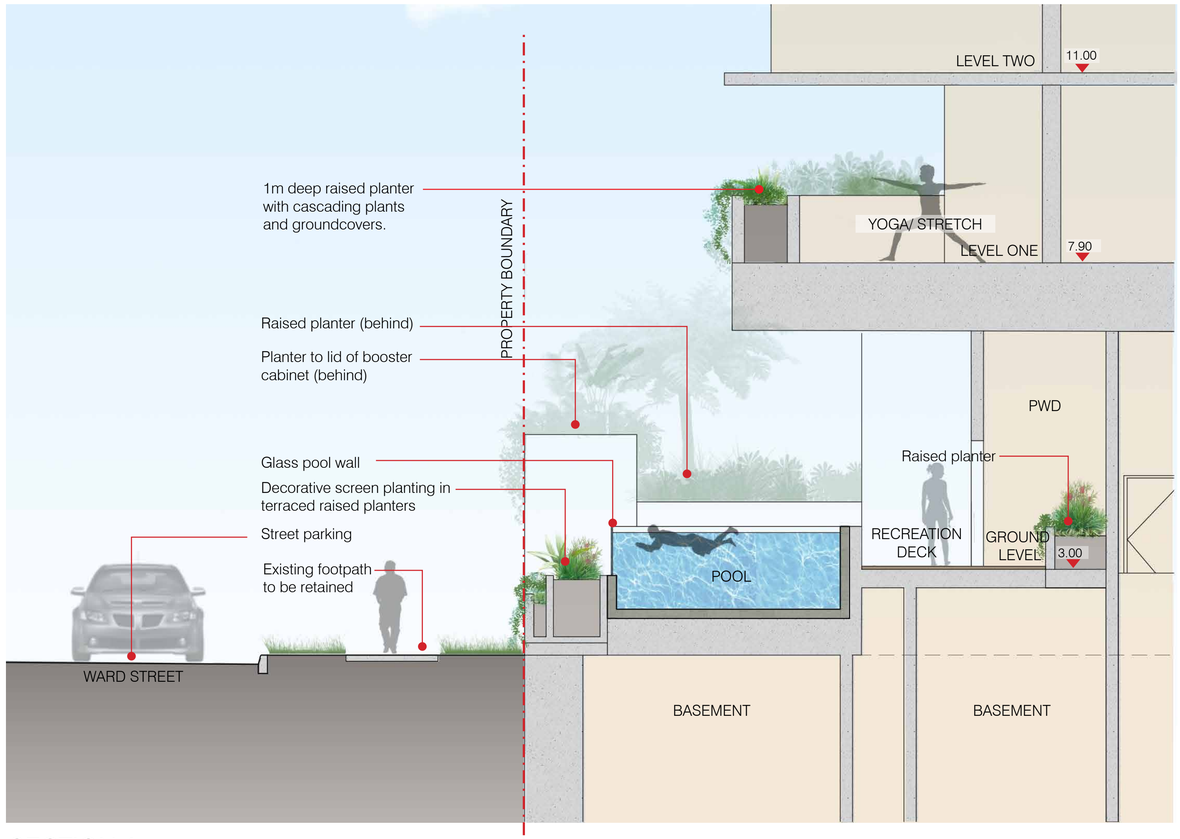

SECTION A
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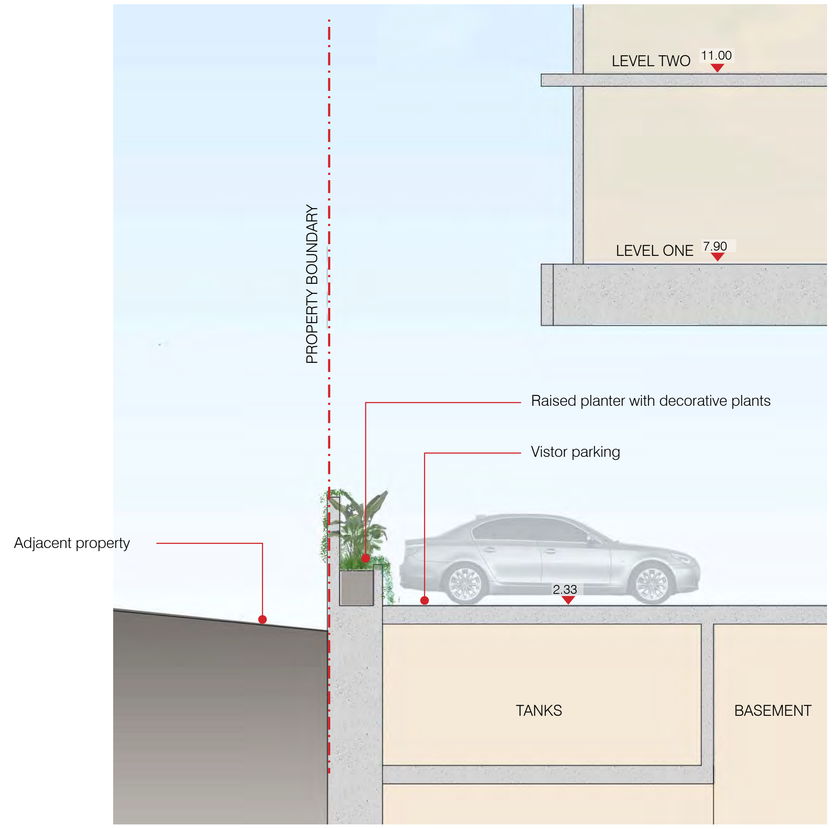

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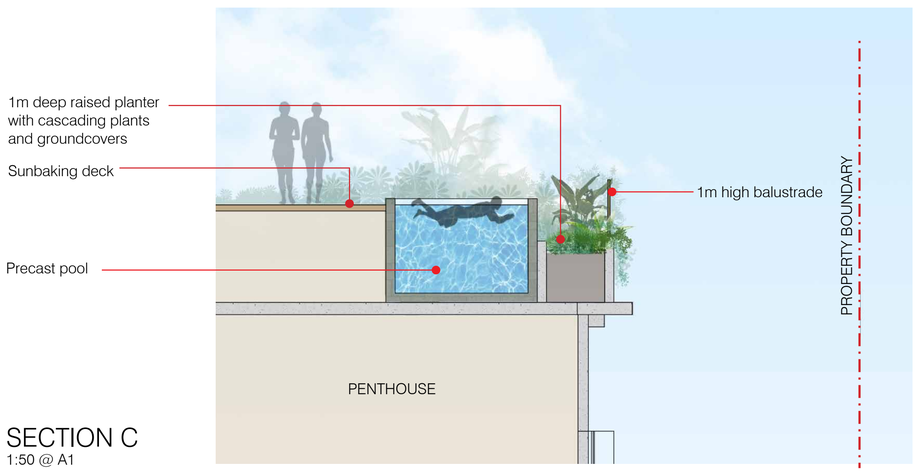

SECTION C
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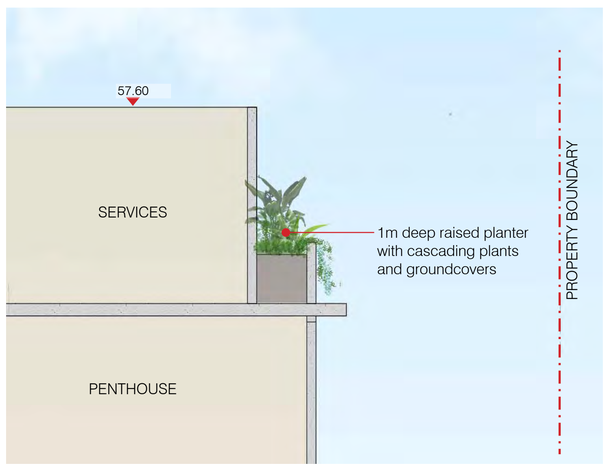

SECTION D
1:50 @ A1

LANDSCAPE SECTIONS

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

2207800 SD-08
2022-11-29 ISSUE C

0 0.5 1.0 1.5 2.0 2.5
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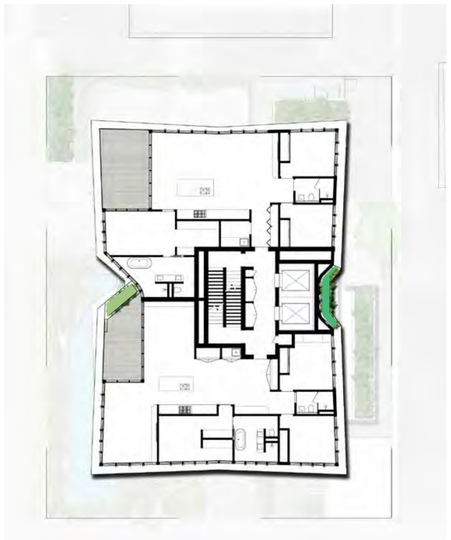
GROUND FLOOR

LEVEL 01



LEVEL 02-15

ROOF TERRACE

PLANTER DEPTH KEY

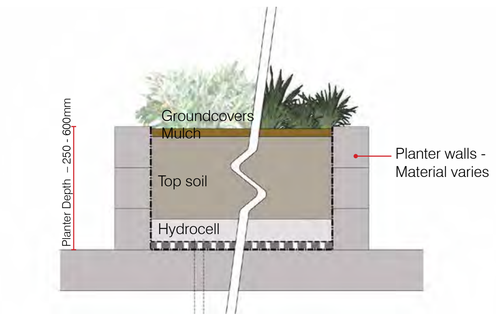
LOW PODIUM PLANTER

MEDIUM PODIUM PLANTER

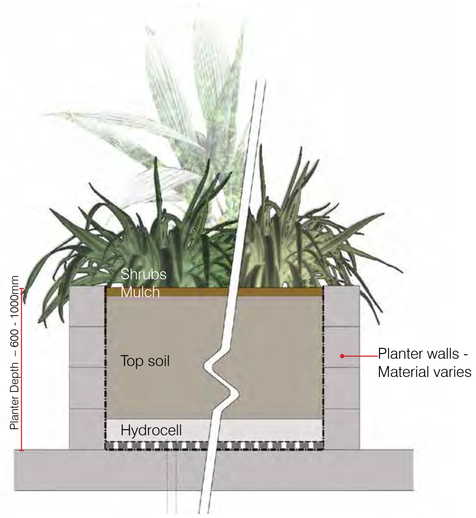
PLANTER MAINTENANCE:

Garden beds located adjacent to walkway or ground level terrace, to be maintained from adjacent on grade access points.

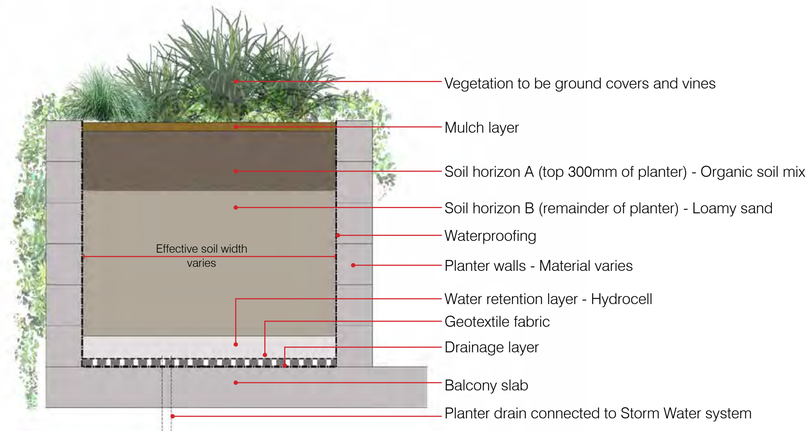
Garden beds maintained ‘off grade’ will be maintained from appropriate anchor connections safely accessed from communal ‘on grade’ areas or from an above abseil system.



LOW PODIUM PLANTER - 250-600mm



MEDIUM PODIUM PLANTER - 600-1000mm



TOP SOIL PROFILE & TYPICAL PLANTER SYSTEM

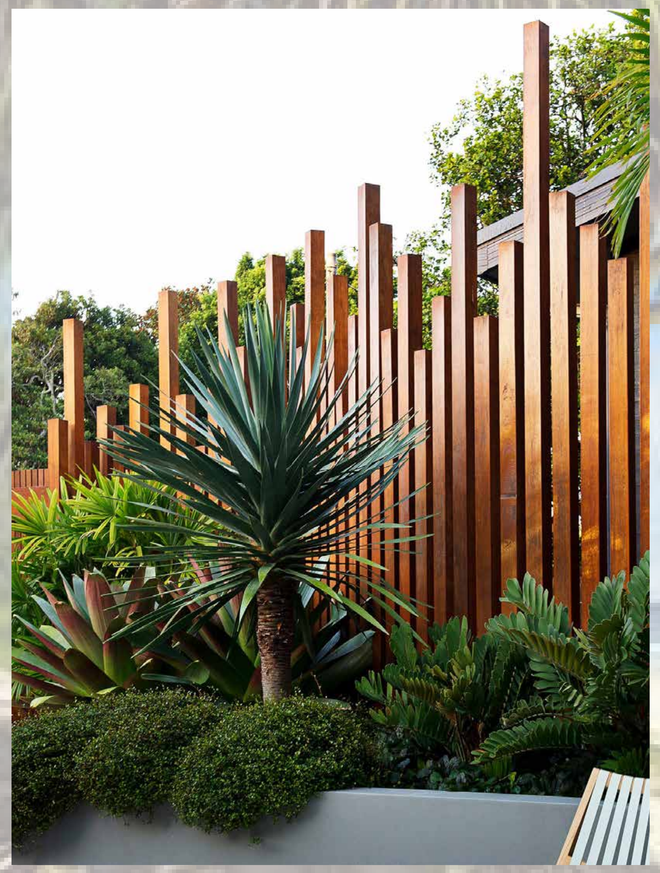
PLANTER DETAILS

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

2207800 SD-09
2022-11-29 ISSUE C

Planting Character



Plant Species

FACADE PLANTERS

APTENIA cordifolia
Heartleaf Ice Plant

CARISSA macrocarpa ‘Desert Star’
Natal Plum

CASUARINA glauca ‘Cousin It’
Shag Pile

GROUND & PODIUM PLANTERS

CHAMAEDOREA elegans
Parlour Palm

CRASSULA ovata
Jade plant

CARPOBROTUS glaucescens
Pigface

PHILODENDRON ‘Xanadu’
Xanadu Philodendron

PLECTRANTHUS australis
Swedish Ivy

ZAMIA furfuracea
Cardboard Palm

PLANTING PALETTE

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

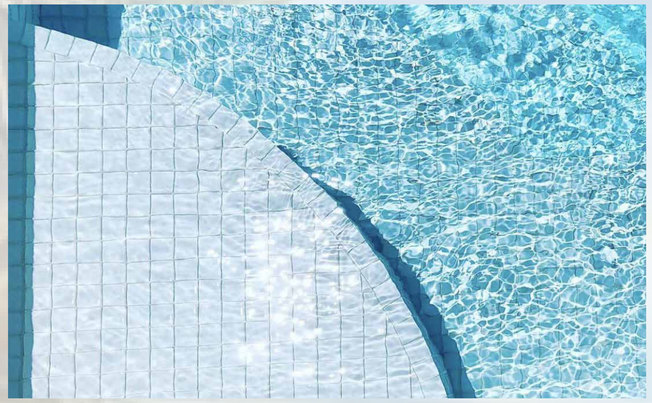
2207800 SD-010
2022-11-29 ISSUE C

Crazy pave stone tiles

Coloured broom concrete

Freeform stone wall

Timber pool deck



Pool tile

MATERIALS PALETTE

239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

DUNN + MORAN LANDSCAPE ARCHITECTS

2207800 SD-011
2022-11-29 ISSUE C

ACOUSTIC REPORT

Enhance
URBAN PLANNING

239 & 241 Boundary Street, Coolangatta

acousticworks

Proposed Residential Development
239-241 Boundary Street
Coolangatta

ACOUSTIC REPORT




Client:
Intrepid Developments (QLD) Pty Ltd

Reference:
2022328 R01C 239-241 Boundary Street, Coolangatta ENV .docx

Date Issued:
22 November 2022

Document Information

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Date	Revision	Author	Reviewer	Manager
26/09/22	R01A (DRAFT)	Kaitlyn Meldrum	Kayleigh Duce	ME
13/10/22	R01B (DRAFT)	Kaitlyn Meldrum	Kayleigh Duce	ME
22/11/22	R01C	Kaitlyn Meldrum	Kayleigh Duce	ME

Disclaimer

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FIGURE INDEX

1. Introduction

This report is in response to a request by Intrepid Developments (QLD) Pty Ltd for an environmental noise assessment of a proposed residential development to be located at 239-241 Boundary Street, Coolangatta. To facilitate the assessment, previous unattended noise monitoring was conducted in the vicinity of nearby residences to establish the criteria for onsite activities. Based on the data obtained, onsite activities were assessed to surrounding sensitive receivers with recommendations for acoustic treatments specified in this report.

2. Site Description

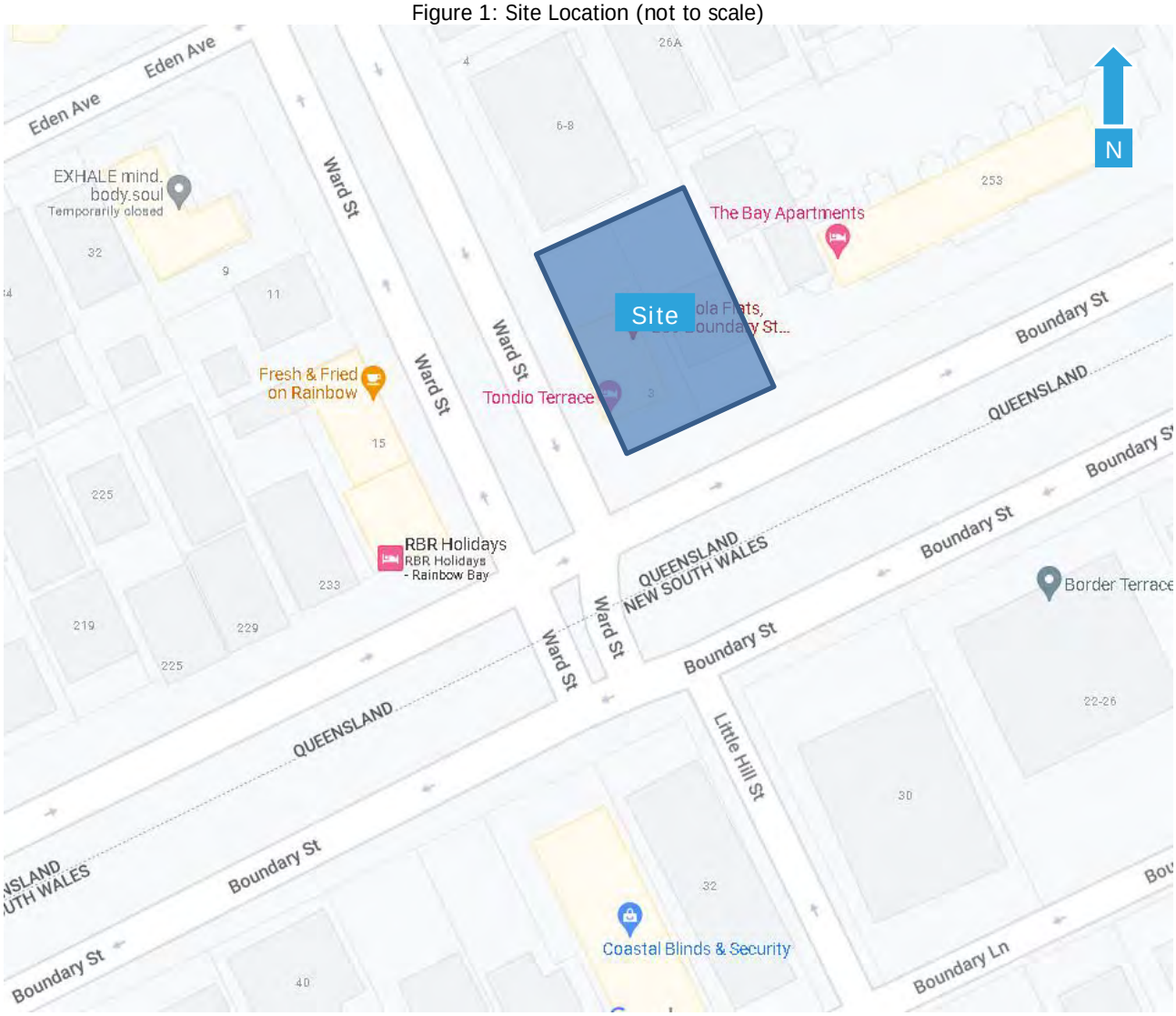
2.1 Site Location

The site is described by the following:

239-241 Boundary Street, Coolangatta
Lot 6 on RP1777 and lot 7 on RP1777

Refer to Figure 1 for site location.

Figure 1: Site Location (not to scale)



A site survey was conducted on 1 August 2022 and identified the following:

a) The site is currently occupied by a two-storey residential dwelling and a two-storey holiday accommodation building (Tondio Terrace) which will be demolished to make way for the development.
b) A four-storey residential building (The Bay Apartments) bound the site to the northeast.
c) Boundary Street bounds the site to the south and separates it from a residential land uses.
d) Ward Street is adjacent to the southwestern site boundary and separates it from a two-storey building. Ground floor is occupied by commercial land uses (Little Mali and The Bay Hair Co) and a residential dwelling occupies the second floor.
e) A four-storey residential building (Marybury) bounds the site to the north at 6-8 Ward Street.

2.2 Proposal

The proposal is to construct a residential development as follows:

- Site Area: 810m^2
- 53 total carparks:
    - 19 Residential carparking spaces on basement 3.
    - 19 residential carparking spaces on basement 2.
    - 11 residential carparking spaces on basement 1.
    - 4 visitor carparking spaces on ground floor.
- 34 residential units from levels 1 to 15.
- Pool and recreational deck on ground floor.
- Gym on level 1 and a roof top terrace.
- Vehicle access via Ward Street and pedestrian access via Boundary Street.

Refer to the Appendices for development plans.

2.3 Acoustic Environment

The site and surrounding area are primarily affected by road traffic from Boundary Street and Ward Street.

3. Equipment

The following equipment was used to record noise levels:

- Rion NL42 Environmental Noise Monitor
- BSWA Technology Co. Ltd Sound Calibrator

The Rion NL42 Environmental Noise Monitor hold current NATA Laboratory Certification and were field calibrated before and after the monitoring period, with no significant drift from the reference signal recorded.

4. Receivers and Noise Monitoring

4.1 Receiver Locations

The nearest residential receiver locations were identified as follows;

1. A four-storey residential apartment building (Marybury) located at 6-8 Ward Street bounds the site to the north.
2. A four-storey residential apartment building at 243-251 Boundary Street is located adjacent to the northeast of the site.
3. A 6-storey residential building is located to the southeast of the site at 30 Boundary Street.
4. A second floor residential dwelling southwest of the site located at 2/237 Boundary Street.

These locations were chosen as being representative of the nearest residential receivers to the proposed development. Refer to Figure 2 for these locations.

Figure 2: Receivers and noise monitoring locations

4.2 Unattended Noise Monitoring

Acoustic Works attended the site on 1 August 2022. During the site visit, a construction site near the receivers was identified which included: 217-227 Boundary Street and 11 Ward Street.

Construction noise was found to be audible at all the nearby receivers to the site. To minimise potential construction noise affecting the monitoring data previous ambient noise monitoring that was not affected by construction noise and has been utilised. The location of the monitor is detailed in the following sections.

An ARL316 environmental noise monitor was previously placed at 46 Eden Avenue to measure ambient noise levels. The monitor was located in a free field position with the microphone approximately 1.4 metres above ground surface level. The noise monitor was set to record noise levels between 22 November and 2 December 2021.

The noise monitor was set to record noise levels in "A" Weighting, Fast response using 15-minute statistical intervals. Ambient noise monitoring was conducted generally in accordance with Australian Standard AS1055:2018 *Acoustics – Description and measurement of environmental noise*.

For the unattended noise monitoring location refer to Figure 2.

5. Measured Noise Levels

The following tables present the measured ambient noise levels from the unattended noise survey. Any periods of inclement weather or extraneous noise were omitted from the measured data prior to determining the results.

The ambient levels measured at the monitoring location are as follows;

Table 1: Measured ambient noise levels - all time periods

Day	Date	L90 (dBA)		
		Day	Evening	Night
Monday	22/11/21	39	37	37
Tuesday	23/11/21	42	41	39
Wednesday	24/11/21	42	41	39
Thursday	25/11/21	41	40	35
Friday	26/11/21	41	43*	42*
Saturday	27/11/21	41	40	41*
Sunday	28/11/21	41	38	36
Monday	29/11/21	42	39	35
Tuesday	30/11/21	54*	45*	40*
Wednesday	1/12/21	43	42*	37
Thursday	2/12/21	43	-	35
Overall value		42	39	37

*Note recorded rainfall on 26 and 30 November and 1 December affected the measured noise levels and has been removed from these periods.

Refer to the appendix for a graphical representation of the noise monitoring.

6. Noise Criteria

6.1 Environmental Noise Criteria

The noise criteria as applied by City of Gold Coast are as follows;

6.1.1 Acoustic Quality Objectives

Table 2 presents the acoustic quality objectives at noise sensitive receptors as detailed in Schedule 1 of the EPP (Noise) 2008.

Table 2: Acoustic Quality Objectives at Noise Sensitive Properties

Sensitive Receptor	Time of Day	Acoustic Quality Objectives, dB(A)		
		$L_{Aeq,adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$
Dwelling (outdoors)	Day and Evening (7am – 10pm)	50	55	65
Dwelling (Indoors)	Day and Evening (7am – 10pm)	35	40	45
	Night (10pm – 7am)	30	35	40

6.1.2 Background Creep

The Background Creep criteria are as follows;

Time-varying noise:

$$L_{Aeq,adj,T,} \leq \text{Ambient } L_{A90,T} + 5\text{dB(A)}$$

Steady-state noise:

$$L_{A90,T} \leq \text{Ambient } L_{A90,T}$$

The time period (T) is a time interval of at least 15 minutes, or if the noise continues for less than 15 minutes, the duration of the noise source.

Based on the results of ambient noise monitoring, the project specific background creep noise limits are shown in Table 3.

Table 3: Background creep noise limits

Time Period	Noise Level Limits SPL dB(A)	
	$L_{Aeq,T}$	$L_{A90,T}$
Day 7am – 6pm	47	42
Evening 6pm – 10pm	44	39
Night 10pm – 7am	42	37

6.1.3 Sleep Disturbance Criteria

Criteria for sleep disturbance under the WHO Guideline is addressed is as follows:

> *"As a rule for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A) $L_{A,(Max)}$ more than 10 or 15 times per night'.*
>
> *'Where noise is continuous, the equivalent sound pressure level should not exceed 30 dB(A) indoors, if negative effects on sleep are to be avoided'."*

7. Environmental Assessment

7.1 Onsite Activities

Noise associated with the development was assessed based on previous measurements of similar activities. The calculations assume that the nominated activities are located at the closest representative point within the development site to each receiver location. Any relevant shielding, building transmission loss or recommended acoustic screens are taken into account for these activities.

7.1.1 Acoustic Quality Objectives

The average maximum noise source levels and predicted levels at the receiver locations are shown in Table 4. Note: L_{A10} and L_{A1} results are not shown in cases where the total duration of the events is less than the minimum time required e.g. $L_{A10(1hr)}$ requires noise events to occur for at least 360 seconds of an hour long period. LAeq results are not shown where the calculated total is less than 0dBA.

Table 4: Acoustic Quality Objective Noise Assessment, 1 hour

Receiver	Receivers 1. 6-8 Ward Street (N) 2. 243-251 Boundary Street (NE) 3. 30 Boundary Street (SE) 4. 2/237 Boundary Street (SW) Description	Source @1m dB(A)	Correction dB(A)*	Corrected dB(A)	No. of events per 1hr Day	No. of events per 1hr Eve	No. of events per 1hr Night	Duration per event	Distance (m)	Inc	Barrier (height (m))	Barrier screening dB	Building TL or shield dB	Topo screening dB	Dist atten. @ 6dB/dd	LAeq adj,1hr ext. dB(A) Day	LAeq adj,1hr int. dB(A) Day	LAeq adj,1hr ext. dB(A) Eve	LAeq adj,1hr int. dB(A) Eve	LAeq adj,1hr ext. dB(A) Night	LAeq adj,1hr int. dB(A) Night	LA10 adj,1hr ext. dB(A) Day	LA10 adj,1hr int. dB(A) Day	LA10 adj,1hr ext. dB(A) Eve	LA10 adj,1hr int. dB(A) Eve	LA10 adj,1hr ext. dB(A) Night	LA10 adj,1hr int. dB(A) Night	LA1 adj,1hr ext. dB(A) Day	LA1 adj,1hr int. dB(A) Day	LA1 adj,1hr ext. dB(A) Eve	LA1 adj,1hr int. dB(A) Eve	LA1 adj,1hr ext. dB(A) Night	LA1 adj,1hr int. dB(A) Night	Amenity LAeq Compliance			LA10 Compliance			LA1 Compliance		
																																				Day/ eve	Day/ eve indoor	Night indoor	Day/ eve	Day/ eve indoor	Night indoor	Day/ eve	Day/ eve indoor	Night indoor
	Criteria																																			50	35	30	55	40	35	65	45	40
	Car door closure	75	2	77	20	16	8	2	6	2					-16	41	31	40	30	37	27									47	37					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1	Car passby	69		69	20	16	8	15	12	2					-21.58	36	26	35	25	32	22									41	31	40	30	37	27	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Car start	74	2	76	20	16	8	2	6	2					-15.56	40	30	39	29	36	26									46	36					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Car on ramp	74		74	20	16	8	10	12	2		-9			-21.58	30	20	29	19	26	16									37	27	36	26	33	23	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MRV	85	2	87	4	0	0	20	16	2					-24.08	45	35												45	35					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Rec area inc pool	78	2	80	4	4	0	900	25	2					-27.96	52	42	52	42			56	46	56	46			62	52	62	52					No	No	Yes	No	No	Yes	Yes	No	Yes
	Gym	79	2	81	4	4	4	900	17			-18			-24.61	38	28	38	28	38	28	39	29	39	29	39	29	41	31	41	31	41	31	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Roof top rec and pool	78	2	80	4	4	0	900	25			-28			-27.96	24	14	24	14			24	14	24	14			24	14	24	14					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Total															54	44	53	43	43	33	56	46	56	46	39	29	62	52	62	52	43	33	**No**	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**No**	**Yes**
	Criteria																																			50	35	30	55	40	35	65	45	40
	Car door closure	75	2	77	20	16	8	2	23			-11			-28	18	8	17	7	14	4							24	14					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Car passby	69		69	20	16	8	15	11	2		-16			-20.83	21	11	20	10	17	7							26	16	25	15	22	12	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Car start	74	2	76	20	16	8	2	23			-11			-27.23	17	7	16	6	13	3							23	13					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Car on ramp	74		74	20	16	8	10	16	2		-6			-24.08	30	20	29	19	26	16							37	27	36	26	33	23	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MRV	85	2	87	4			20	30			-15			-29.54	25	15											25	15					Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	n/a
	Rec area inc pool	78	2	80	4	4		900	32			-10			-30.1	39	29	39	29			43	33	43	33			49	39	49	39					Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	n/a
	Gym	79	2	81	4	4	4	900	25			-20			-27.96	33	23	33	23	33	23	34	24	34	24	34	24	36	26	36	26	36	26	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Roof top rec and pool	78	2	80	4	4		900	24			-25			-27.6	27	17	27	17			27	17	27	17			27	17	27	17					Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	n/a
	Total															41	31	41	31	34	24	44	34	44	34	34	24	50	40	49	39	38	28	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
	Criteria																																			50	35	30	55	40	35	65	45	40
	Car door closure	75	2	77	20	16	8	2	77						-38	19	9	18	8	15	5							25	15					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Car passby	69		69	20	16	8	15	72						-37.15	20	10	19	9	16	6							25	15	24	14	21	11	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Car start	74	2	76	20	16	8	2	77						-37.73	18	8	17	7	14	4							24	14					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Car on ramp	74		74	20	16	8	10	72						-37.15	23	13	22	12	19	9							30	20	29	19	26	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MRV	85	2	87	4			20	72						-37.15	32	22											32	22					Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	n/a
	Rec area inc pool	78	2	80	4	4		900	61						-35.71	44	34	44	34			48	38	48	38			54	44	54	44					Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	n/a
	Gym	79	2	81	4	4	4	900	68			-18			-36.65	26	16	26	16	26	16	27	17	27	17	27	17	29	19	29	19	29	19	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Roof top rec and pool	78	2	80	4	4		900	60			-14			-35.56	30	20	30	20			30	20	30	20			30	20	30	20					Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	n/a
	Total															45	35	44	34	28	18	48	38	48	38	27	17	54	44	54	44	31	21	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
	Criteria																																			50	35	30	55	40	35	65	45	40
	Car door closure	75	2	77	20	16	8	2	34						-31	26	16	25	15	22	12							31	21					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Car passby	69		69	20	16	8	15	35						-30.88	27	17	26	16	23	13							32	22	31	21	28	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Car start	74	2	76	20	16	8	2	34						-30.63	25	15	24	14	21	11							31	21					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Car on ramp	74		74	20	16	8	10	44						-32.87	28	18	27	17	24	14							35	25	34	24	31	21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MRV	85	2	87	4			20	32						-30.1	39	29											39	29					Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	n/a
	Rec area inc pool	78	2	80	4	4		900	36	2	-7				-31.13	41	31	41	31			45	35	45	35			51	41	51	41					Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	n/a
	Gym	79	2	81	4	4	4	900	35			-18			-30.88	32	22	32	22	32	22	33	23	33	23	33	23	35	25	35	25	35	25	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Roof top rec and pool	78	2	80	4	4		900	0			-20			#####	28	18	28	18			28	18	28	18			28	18	28	18					Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	n/a
	Total															44	34	42	32	34	24	45	35	45	35	33	23	52	42	51	41	37	27	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

*Correction due to tonality and impulsiveness as per AS1055:2018.

Minor exceedances of the acoustic quality objective criteria are predicted at receiver 1. Recommendations to reduce noise impacts to sensitive receivers have been provided in Section 7.1.3.

7.1.2 Background Creep

Based on assessment of all time periods, the noise source levels and predicted impacts at the receiver locations are shown as follows;

Table 5: Onsite Background Creep Noise Assessment, 15min

Receiver	Receivers 1. 6-8 Ward Street (N) 2. 243-251 Boundary Street (NE) 3. 30 Boundary Street (SE) 4. 2/237 Boundary Street (SW) Description	Source Leq@1m dB(A)	Correction dB(A)*	Corrected dB(A)	No. of events per 15min Day	No. of events per 15min Eve	No. of events per 15min Night	Duration per event	Distance (m)	Barrier (height (m)) Inc	Barrier screening dB	Building TL or shield dB	Topo screening dB	Dist atten. @-6dB/dd	LAeq adj,T ext. dB(A) Day	LAeq adj,T ext. dB(A) Eve	LAeq adj,T ext. dB(A) Night	LAeq 15 min Compliance Day	Eve	Night
	Criteria																	47	44	42
	Car door closure	75	2	77	5	4	2	2	6	2				-16	41	40	37	Yes	Yes	Yes
1	Car passby	69		69	5	4	2	15	12	2				-22	36	35	32	Yes	Yes	Yes
	Car start	74	2	76	5	4	2	2	6	2				-16	40	39	36	Yes	Yes	Yes
	Car on ramp	74		74	5	4	2	10	12	2		-9		-22	30	29	26	Yes	Yes	Yes
	MRV	85	2	87	1			20	16	2				-25	45			Yes	n/a	n/a
	Rec area inc pool	78	2	80	1	1		900	25	2				-28	52	52		No	No	n/a
	Gym	79	2	81	1	1	1	900	17			-18		-25	38	38	38	Yes	Yes	Yes
	Roof top rec and pool	78	2	80	1	1		900	25			-28		-28	24	24		Yes	Yes	n/a
	Total														54	53	43	**No**	**No**	**No**
	Criteria																	47	44	42
	Car door closure	75	2	77	5	4	2	2	23			-11		-28	18	17	14	Yes	Yes	Yes
2	Car passby	69		69	5	4	2	15	11	2		-16		-21	21	20	17	Yes	Yes	Yes
	Car start	74	2	76	5	4	2	2	23			-11		-28	17	16	13	Yes	Yes	Yes
	Car on ramp	74		74	5	4	2	10	16	2		-6		-25	30	29	26	Yes	Yes	Yes
	MRV	85	2	87	1			20	30			-15		-30	25			Yes	n/a	n/a
	Rec area inc pool	78	2	80	1	1		900	32			-10		-31	39	39		Yes	Yes	n/a
	Gym	79	2	81	1	1	1	900	25			-20		-28	33	33	33	Yes	Yes	Yes
	Roof top rec and pool	78	2	80	1	1		900	24			-25		-28	27	27		Yes	Yes	n/a
	Total														41	41	34	**Yes**	**Yes**	**Yes**
	Criteria																	47	44	42
	Car door closure	75	2	77	5	4	2	2	77					-38	19	18	15	Yes	Yes	Yes
3	Car passby	69		69	5	4	2	15	72					-38	20	19	16	Yes	Yes	Yes
	Car start	74	2	76	5	4	2	2	77					-38	18	17	14	Yes	Yes	Yes
	Car on ramp	74		74	5	4	2	10	72					-38	23	22	19	Yes	Yes	Yes
	MRV	85	2	87	1			20	72					-38	32			Yes	n/a	n/a
	Rec area inc pool	78	2	80	1	1		900	61					-36	44	44		Yes	Yes	n/a
	Gym	79	2	81	1	1	1	900	68			-18		-37	26	26	26	Yes	Yes	Yes
	Roof top rec and pool	78	2	80	1	1		900	60			-14		-36	30	30		Yes	Yes	n/a
	Total														45	44	28	**Yes**	**Yes**	**Yes**
	Criteria																	47	44	42
	Car door closure	75	2	77	5	4	2	2	34					-31	26	25	22	Yes	Yes	Yes
4	Car passby	69		69	5	4	2	15	35					-31	27	26	23	Yes	Yes	Yes
	Car start	74	2	76	5	4	2	2	34					-31	25	24	21	Yes	Yes	Yes
	Car on ramp	74		74	5	4	2	10	44					-33	28	27	24	Yes	Yes	Yes
	MRV	85	2	87	1			20	32					-31	39			Yes	n/a	n/a
	Rec area inc pool	78	2	80	1	1		900	36	2	-7			-32	41	41		Yes	Yes	n/a
	Gym	79	2	81	1	1	1	900	35			-18		-31	32	32	32	Yes	Yes	Yes
	Roof top rec and pool	78	2	80	1	1		900	38			-20		-32	28	28		Yes	Yes	n/a
	Total														44	42	34	**Yes**	**Yes**	**Yes**

*Correction due to tonality and impulsiveness as per AS1055:2018.

Exceedances of the background creep are predicted at receiver 1. Recommendations to reduce noise impacts to receivers have been provided in Section 7.1.3.

7.1.3. Sleep Disturbance

The noise source levels and predicted levels of noise at the receiver locations are shown in Table Table 6.

Table 6: Maximum and average noise levels from site activities – Night-time

Receiver	Receivers 1. 6-8 Ward Street (N) 2. 243-251 Boundary Street (NE) 3. 30 Boundary Street (SE) 4. 2/237 Boundary Street (SW) Description	Max Source @1m dB(A	Correction dB(A)*	Corrected dB(A)	Distance (m)	Barrier (height (m Inc	Barrier screening dB	Building TL or shield dI	Topo screening dB	Dist atten. @-6dB/dd	LAmax adj,T int. dB(A)	Complies Night dB(A)
	Criteria											45
	Car door closure	78	2	80	6	2				-16	54	No
1	Car passby	72		72	12	2				-22	40	Yes
	Car start	77	2	79	6	2				-16	53	No
	Car on ramp	77		77	12	2		-9		-22	36	Yes
	Gym	82	2	84	17			-18		-25	31	Yes
	Car door closure	78	2	80	23			-11		-27	32	Yes
2	Car passby	72		72	11	2		-16		-21	25	Yes
	Car start	77	2	79	23			-11		-27	31	Yes
	Car on ramp	77		77	16	2		-6		-24	37	Yes
	Gym	82	2	84	25			-20		-28	26	Yes
	Car door closure	78	2	80	23	77				-27	43	Yes
3	Car passby	72		72	11	72				-21	41	Yes
	Car start	77	2	79	23	77				-27	42	Yes
	Car on ramp	77		77	16	72				-24	43	Yes
	Gym	82	2	84	25	68		-18		-28	28	Yes
	Car door closure	78	2	80	23	34				-27	43	Yes
4	Car passby	72		72	11	35				-21	41	Yes
	Car start	77	2	79	23	34				-27	42	Yes
	Car on ramp	77		77	16	44				-24	43	Yes
	Gym	82	2	84	25	35		-18		-28	28	Yes

*Correction due to tonality and impulsiveness as per AS1055:2018.

General compliance with the L_{AFmax} criteria is predicted for the night-time period with some exceedances at receiver 1. Recommendations to reduce noise impacts to receivers have been provided in Section 7.1.3.

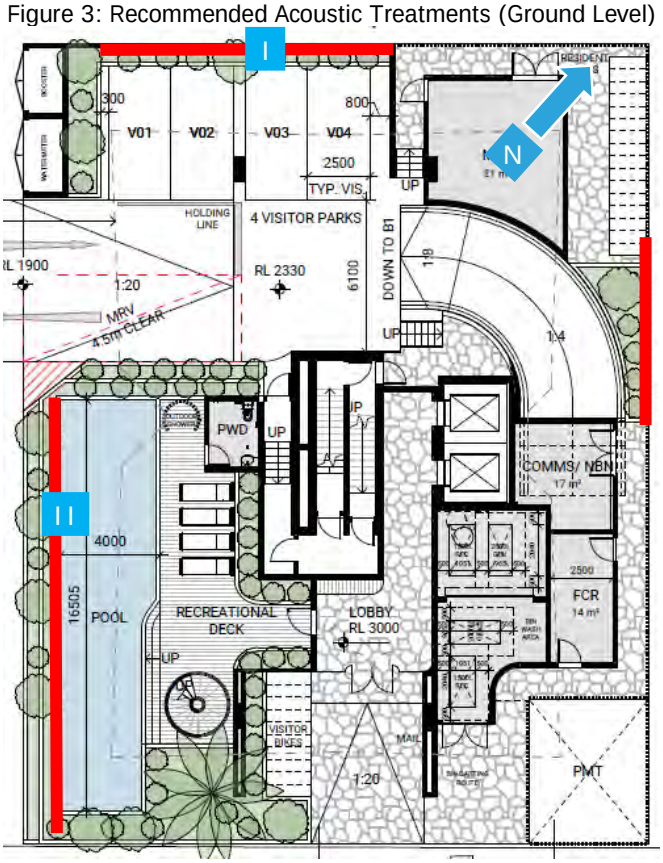
8. Recommendations

8.1 Acoustic Barrier

Acoustic barriers are recommended to be constructed along the northeast and northwest boundaries and along the finished recreational area of the development as shown in Figure 3 below. The barrier shall be at least 2m above the finished floor on ground level. Table 7 contains the approximate height requirements.

The acoustic barrier shall be constructed using materials that achieve a minimum surface density of at least 11kg/m2. Suitable materials may include lapped 19mm thick pine palings with 40% overlap, 9mm fibre cement sheet, masonry, aerated concrete, 6.38mm laminate glass or other materials which satisfy the minimum surface density requirement. The barriers shall be free of gaps and holes.

Figure 3: Recommended Acoustic Treatments (Ground Level)



Acoustic barrier 2.0m high above the finished ground level

Figure 4: Recommended Acoustic Barrier Height

Reference Point	Approximate Finished Ground Level (m)	Approximate Barrier Height (m)	Approximate Finished Top Barrier Level (m)
I	2.33	2.0	4.33
II	3.00	2.0	5.00

8.2 Onsite Activities

General compliance is predicted with the assessment criteria on the condition the following recommendations are implemented:

- Construct the recommended acoustic barriers in 8.1.
- Pools on the ground level and rooftop terrace hours of operation are to be between 7am to 10pm.
- MRV service truck are recommended to be conducted during the daytime (7am-6pm) only.

8.3 Gym Recommendations

We recommend that the following acoustic treatments be incorporated into the development to mitigate onsite gym noise:

- An acoustic floor material for the gym would be necessary to reduce vibration into the building structure. Such a system may include Regupol 4080 or other similar materials. Exercise machines where possible should be installed incorporating resilient mounts and/or be installed on resilient flooring.

- The gym has provision of air-conditioning to allow windows and doors to be kept closed when necessary.

- Gym glazing is recommended to be 6.38 mm laminated glass with acoustic seals.

8.4 Ramp and Carpark Surfaces

Carpark and ramp finished surfaces should consist of materials which provide low tyre squeal characteristics. Any traversable drainage grates must be securely fastening.

8.5 Deliveries and Waste Collection

Deliveries are recommended to be conducted during the daytime (7am-6pm) only. Waste collection should be conducted in accordance with surrounding residents and/or businesses in order to reduce the potential for disturbance.

8.6 Onsite Mechanical Plant

No information regarding mechanical services was available at the time of the assessment. We recommend that any new mechanical plant is designed to comply with the criteria stated and an assessment by qualified acoustic consultant to be conducted prior to installation.

9. Conclusion

An environmental noise assessment was conducted for the proposed residential development located at 239-241 Boundary Street, Coolangatta. On the condition the recommendations detailed in Section 8 are implemented, compliance is predicted with City of Gold Coast assessment criteria.

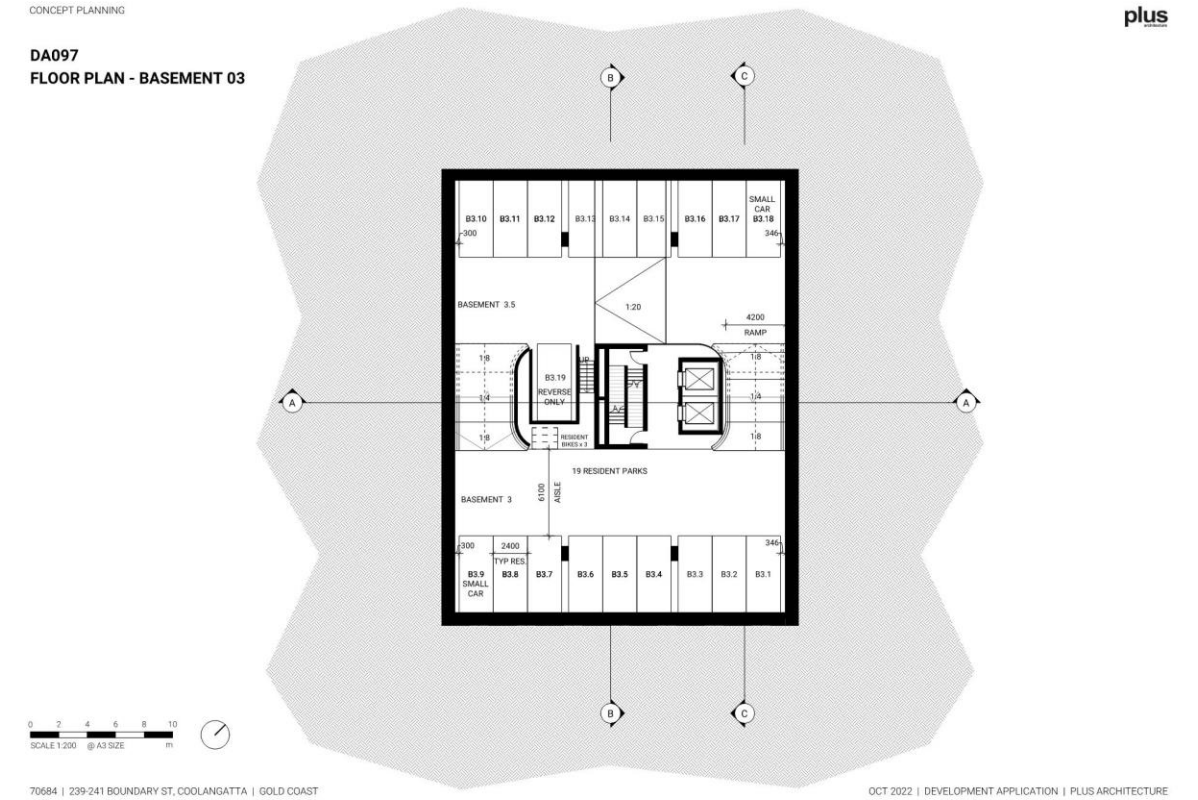
If you should have any queries please do not hesitate to contact us.

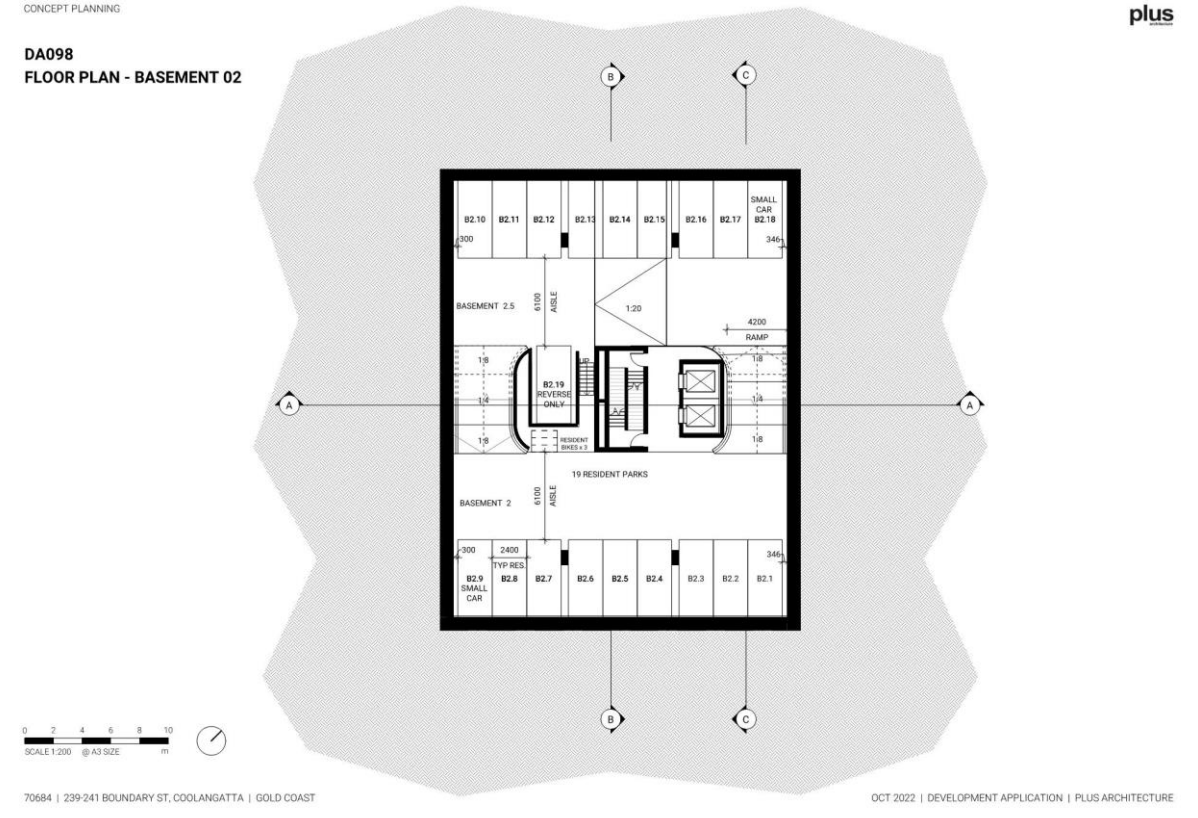
Report Prepared By

Kaitlyn Meldrum
Acoustic Consultant
acousticworks)))

10. Appendices

10.1 Development Plans

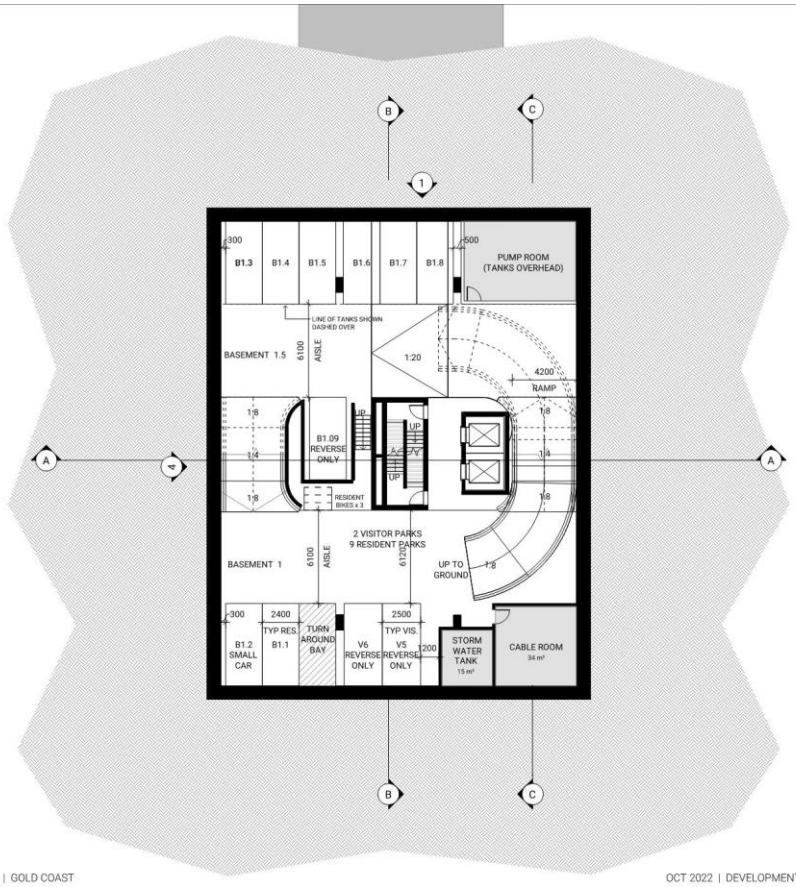




CONCEPT PLANNING

plus

DA099
FLOOR PLAN - BASEMENT 01



SCALE 1:200 @ A3 SIZE

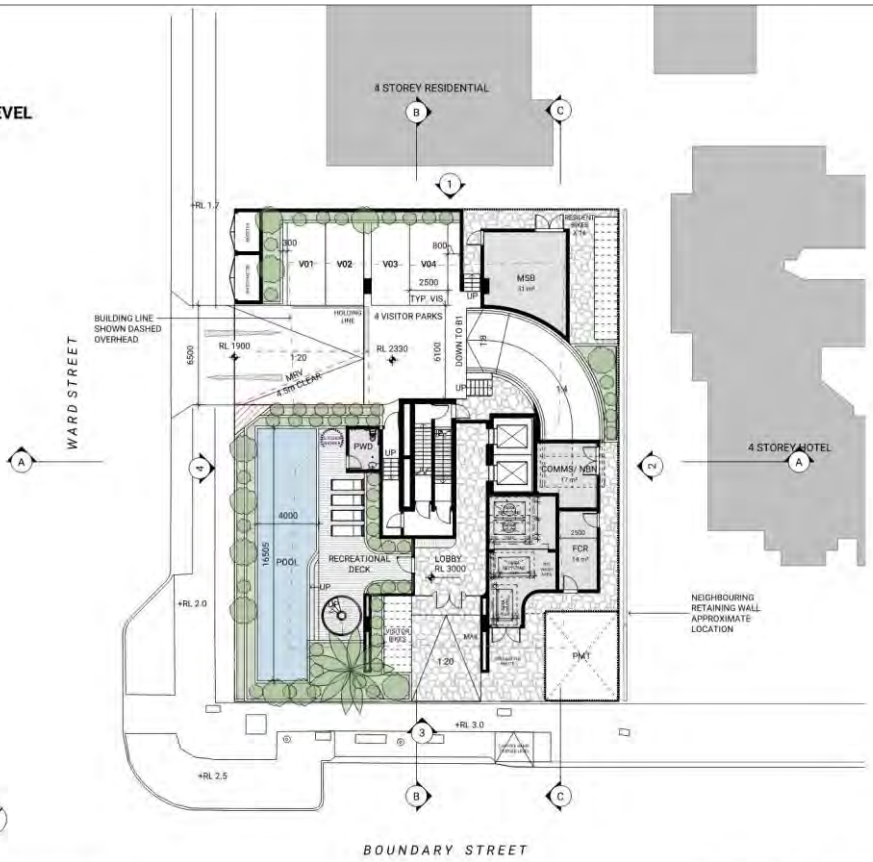
70684 | 239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

OCT 2022 | DEVELOPMENT APPLICATION | PLUS ARCHITECTURE

CONCEPT PLANNING

plus

DA100
FLOOR PLAN - GROUND LEVEL



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70684 | 239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

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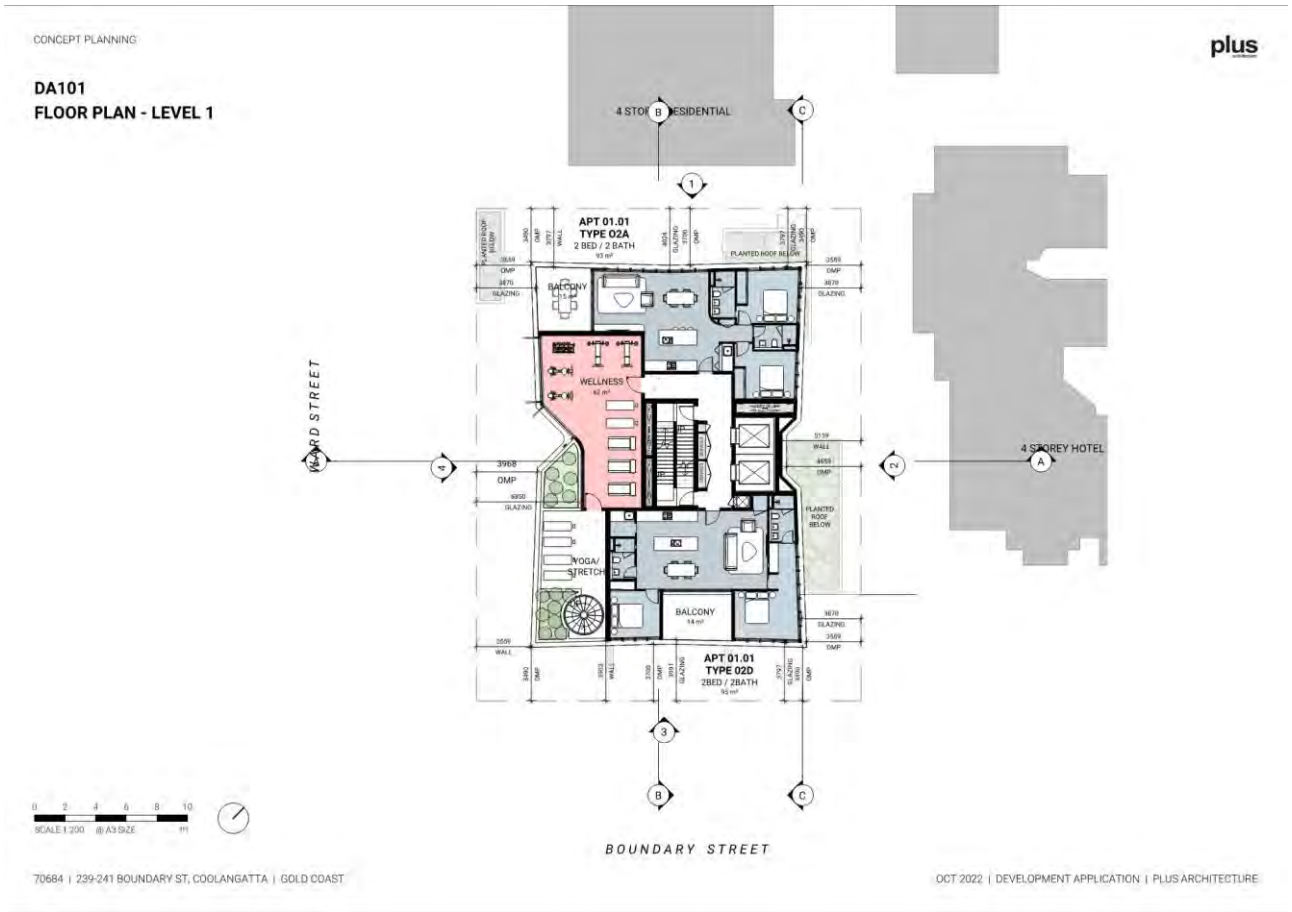
CONCEPT PLANNING
plus
DA101
FLOOR PLAN - LEVEL 1
4 STOREY RESIDENTIAL
APT 01.01
TYPE 02A
2 BED / 2 BATH
BALCONY
WELLNESS
YOGA/
STRETCH
APT 01.01
TYPE 02D
2BED / 2BATH
4 STOREY HOTEL
WARD STREET
BOUNDARY STREET
SCALE 1:200 @ A3 SIZE
70684 | 239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST
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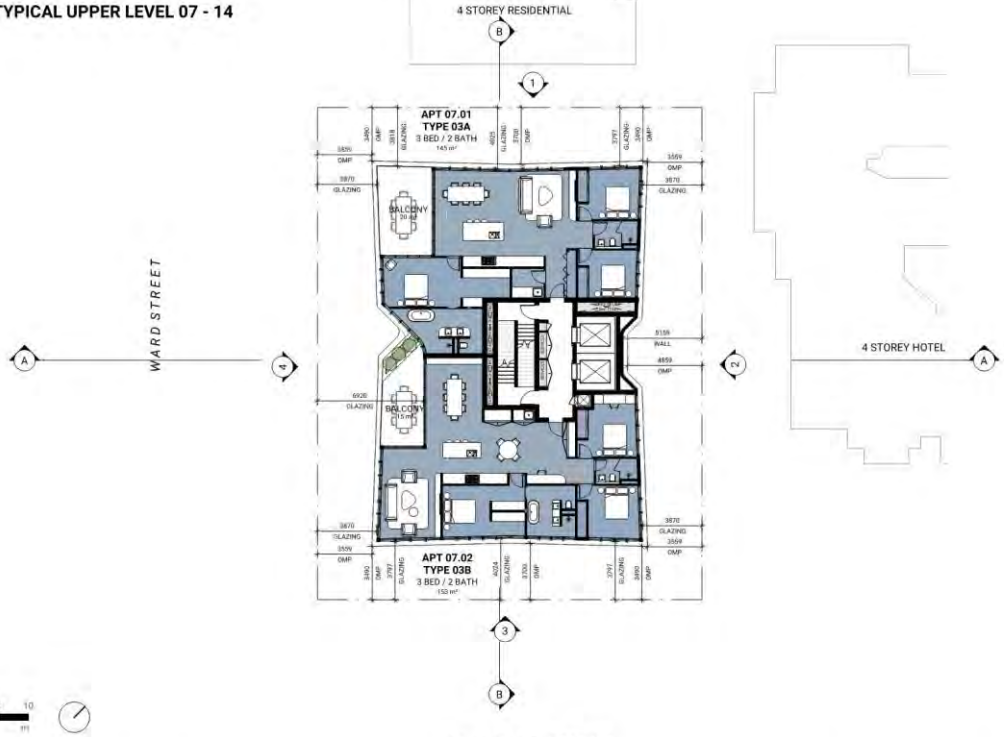
CONCEPT PLANNING
plus
DA102
FLOOR PLAN - LOWER TYPICAL LEVEL 02 - 06
4 STOREY RESIDENTIAL
APT 02.01
TYPE 02A
2 BED / 2 BATH
APT 02.03
TYPE 02C
2 BED / 2 BATH
APT 02.02
TYPE 02B
2 BED / 2 BATH
4 STOREY HOTEL
WARD STREET
BOUNDARY STREET
SCALE 1:200 @ A3 SIZE
70684 | 239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST
OCT 2022 | DEVELOPMENT APPLICATION | PLUS ARCHITECTURE

CONCEPT PLANNING

plus

DA103
FLOOR PLAN - TYPICAL UPPER LEVEL 07 - 14



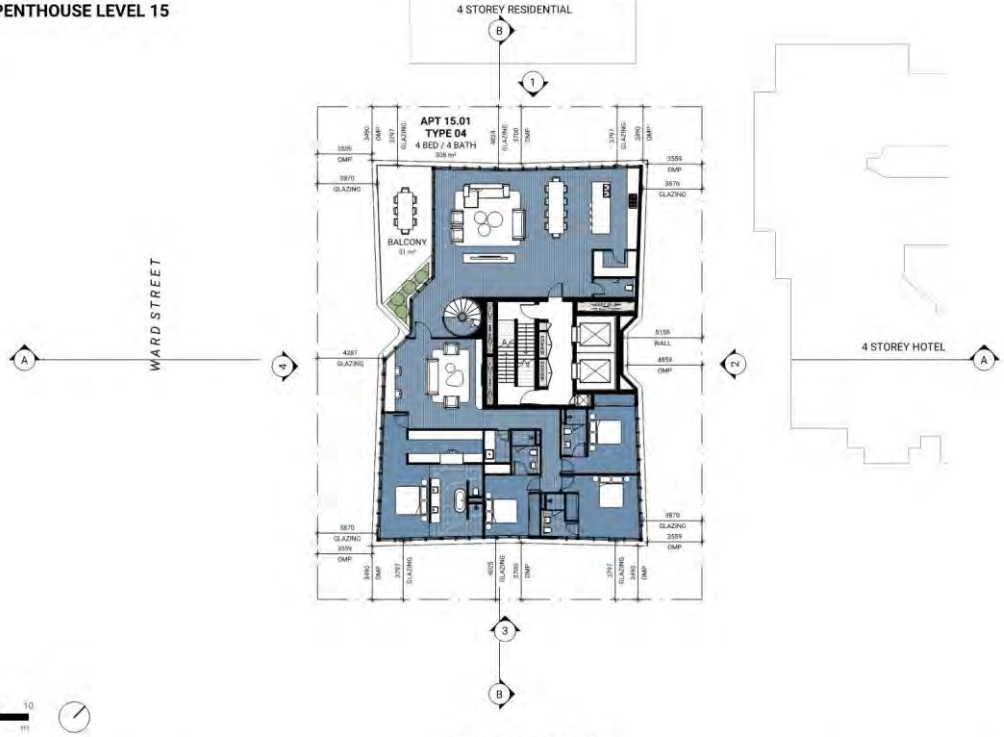
70684 | 239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

OCT 2022 | DEVELOPMENT APPLICATION | PLUS ARCHITECTURE

CONCEPT PLANNING

plus

DA104
FLOOR PLAN - PENTHOUSE LEVEL 15



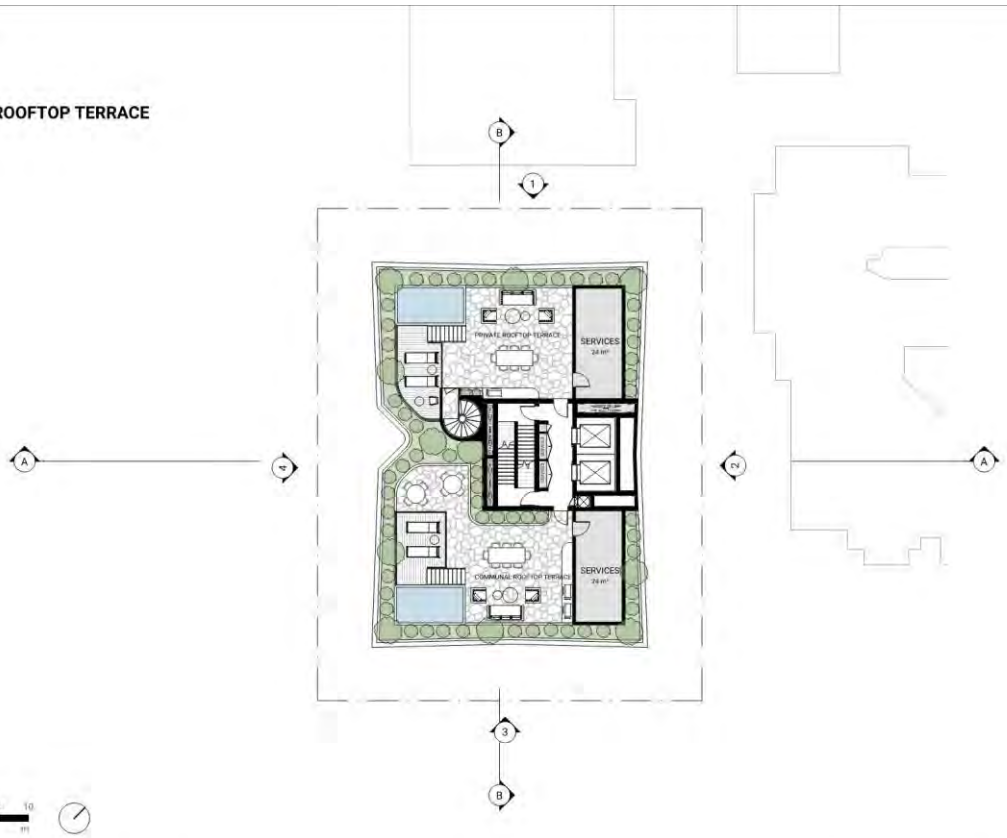
70684 | 239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

OCT 2022 | DEVELOPMENT APPLICATION | PLUS ARCHITECTURE

CONCEPT PLANNING

plus

DA105
FLOOR PLAN - ROOFTOP TERRACE



0 2 4 6 8 10
SCALE 1:200 @ A3 SIZE m

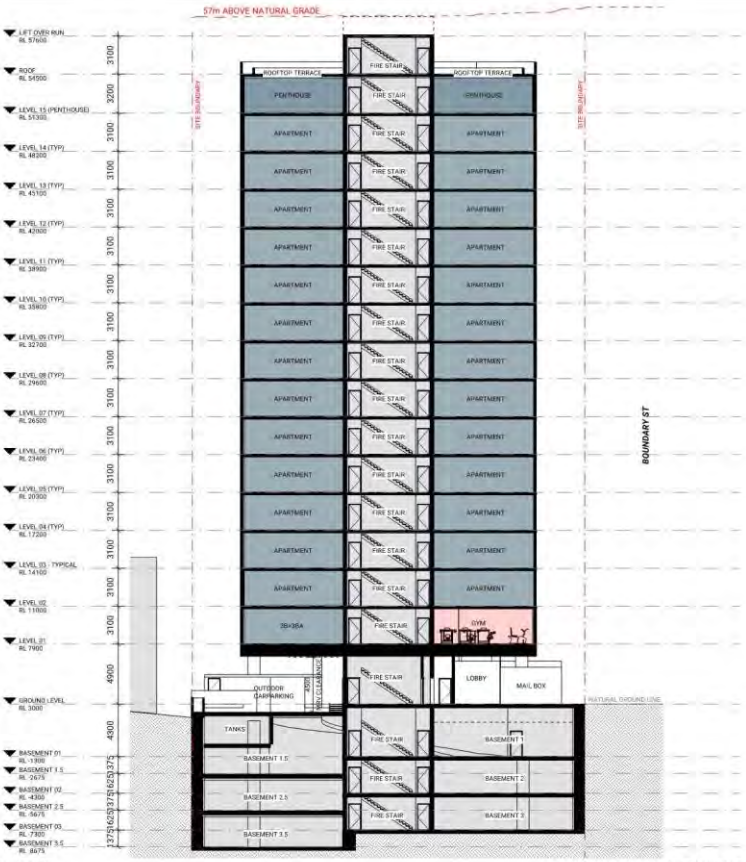
70684 | 239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

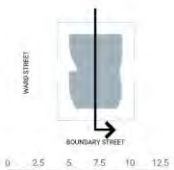
OCT 2022 | DEVELOPMENT APPLICATION | PLUS ARCHITECTURE

ARCHITECTURAL DRAWINGS

plus

DA301
BUILDING SECTION B



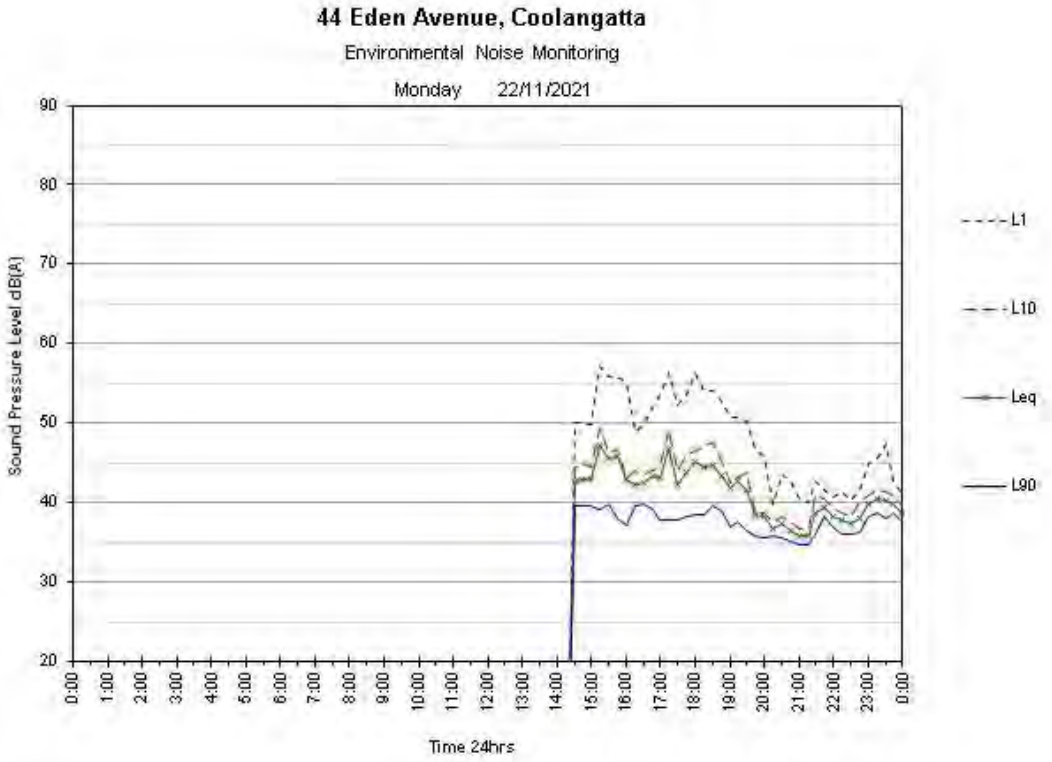


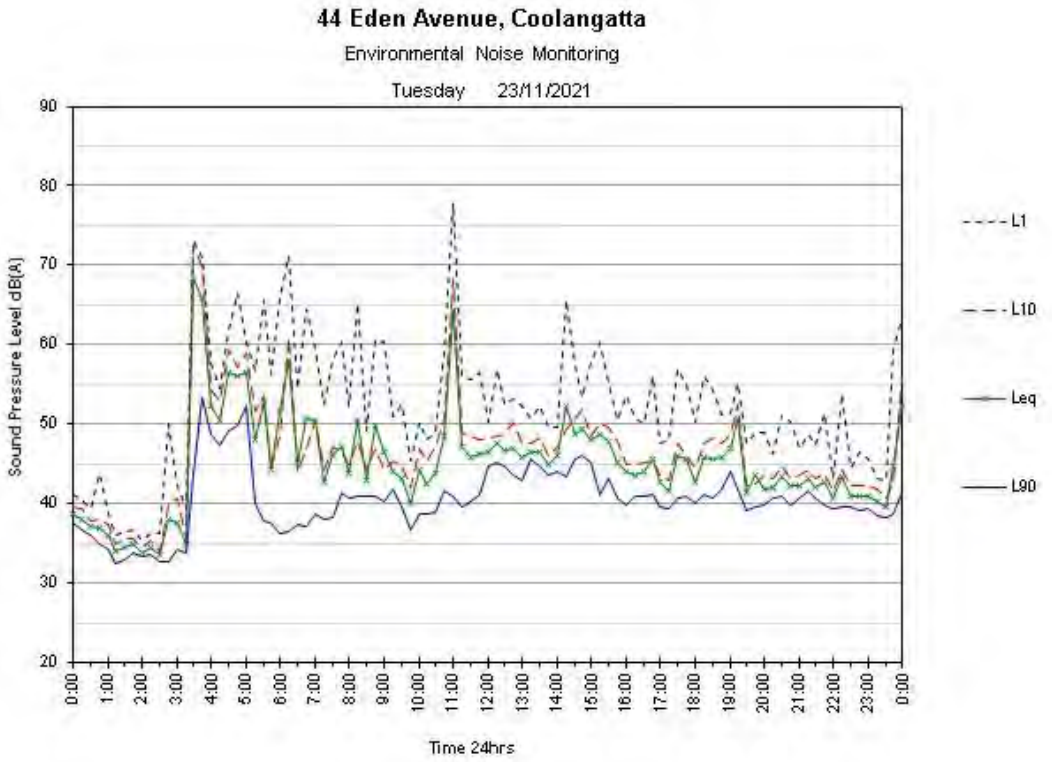
0 2.5 5 7.5 10 12.5
SCALE 1:250 @ A3 SIZE m

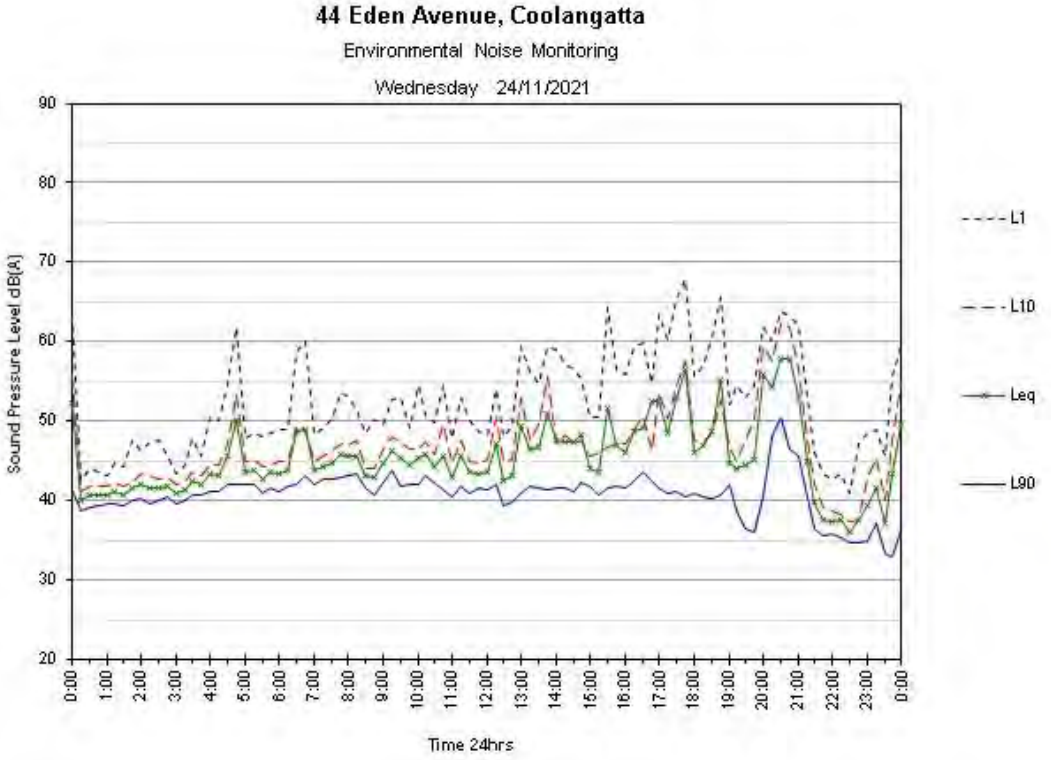
70684 | 239-241 BOUNDARY ST, COOLANGATTA | GOLD COAST

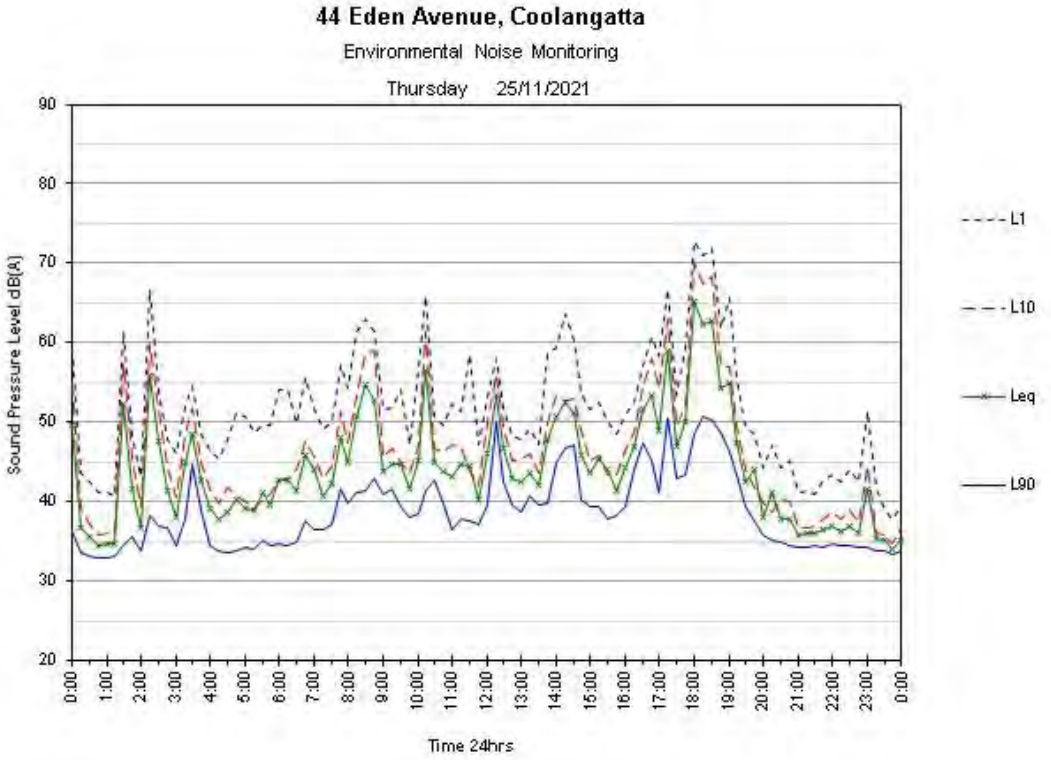
MMM YYYY | DEVELOPMENT APPLICATION PRE-LODGEMENT | PLUS ARCHITECTURE

10.2 Noise Monitoring Charts






44 Eden Avenue, Coolangatta
Environmental Noise Monitoring
Wednesday 24/11/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90


44 Eden Avenue, Coolangatta
Environmental Noise Monitoring
Thursday 25/11/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
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12:00
13:00
14:00
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22:00
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Time 24hrs
L1
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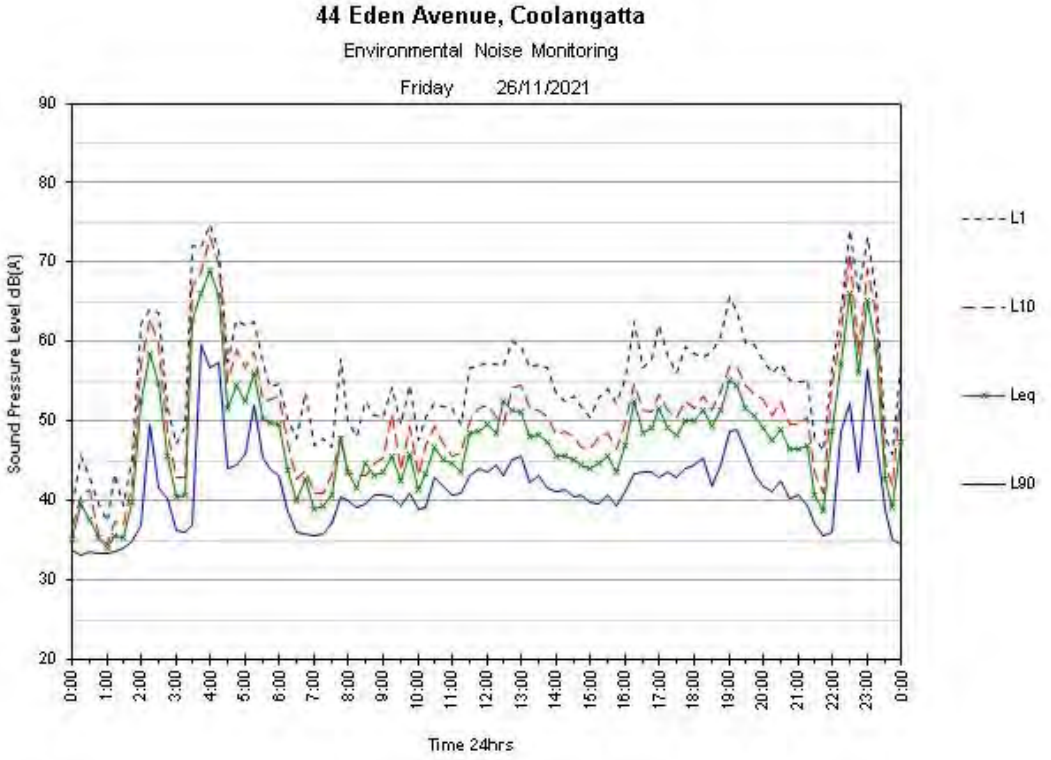
Leq
L90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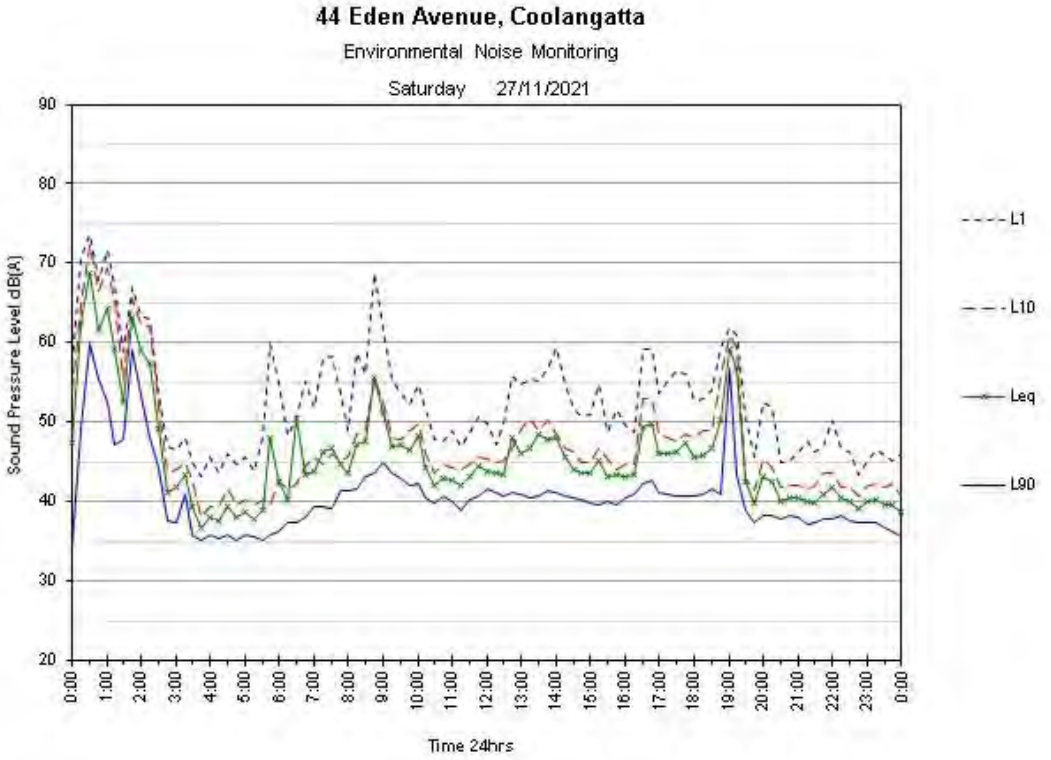
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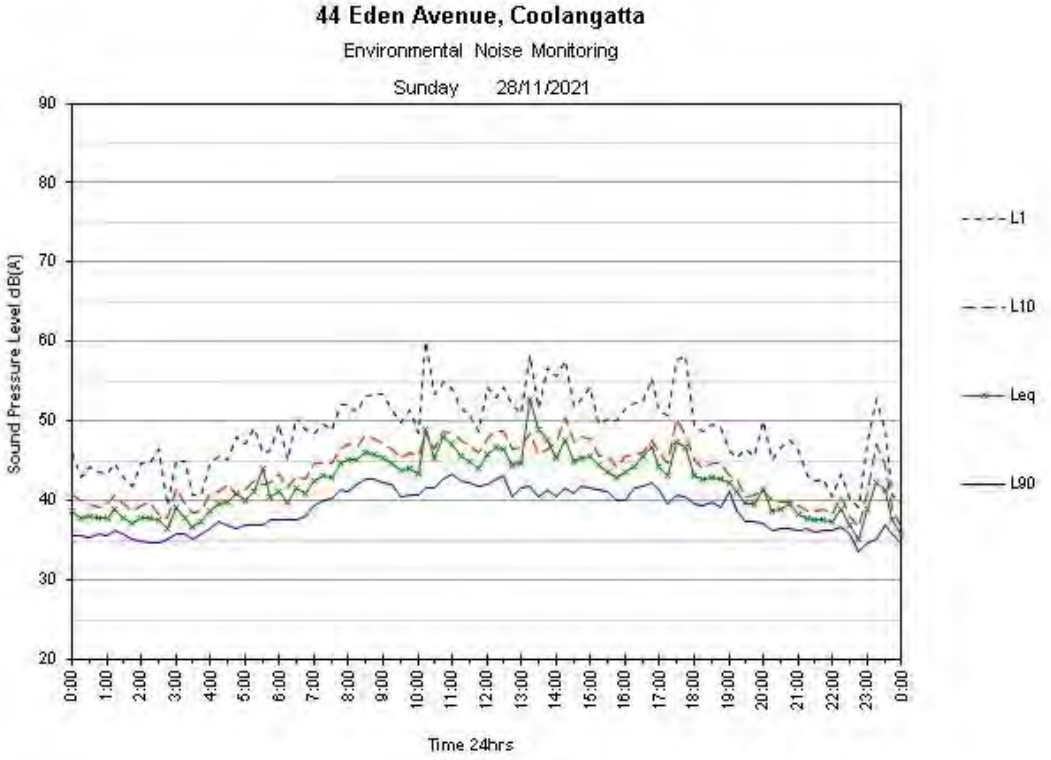
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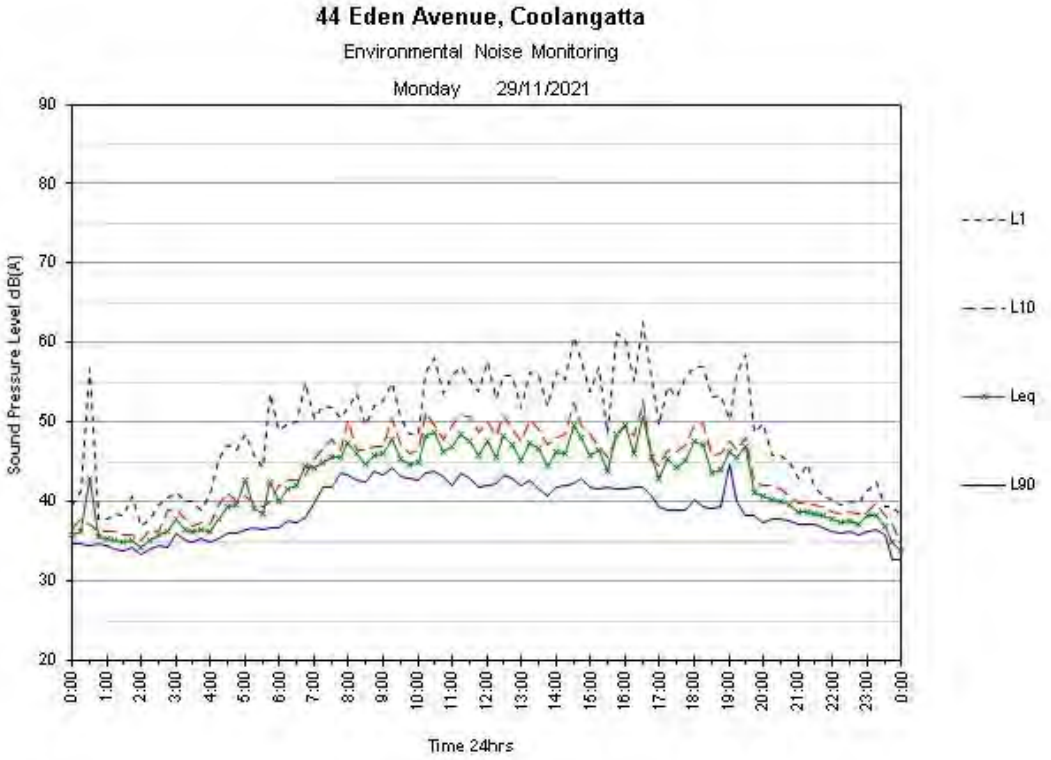
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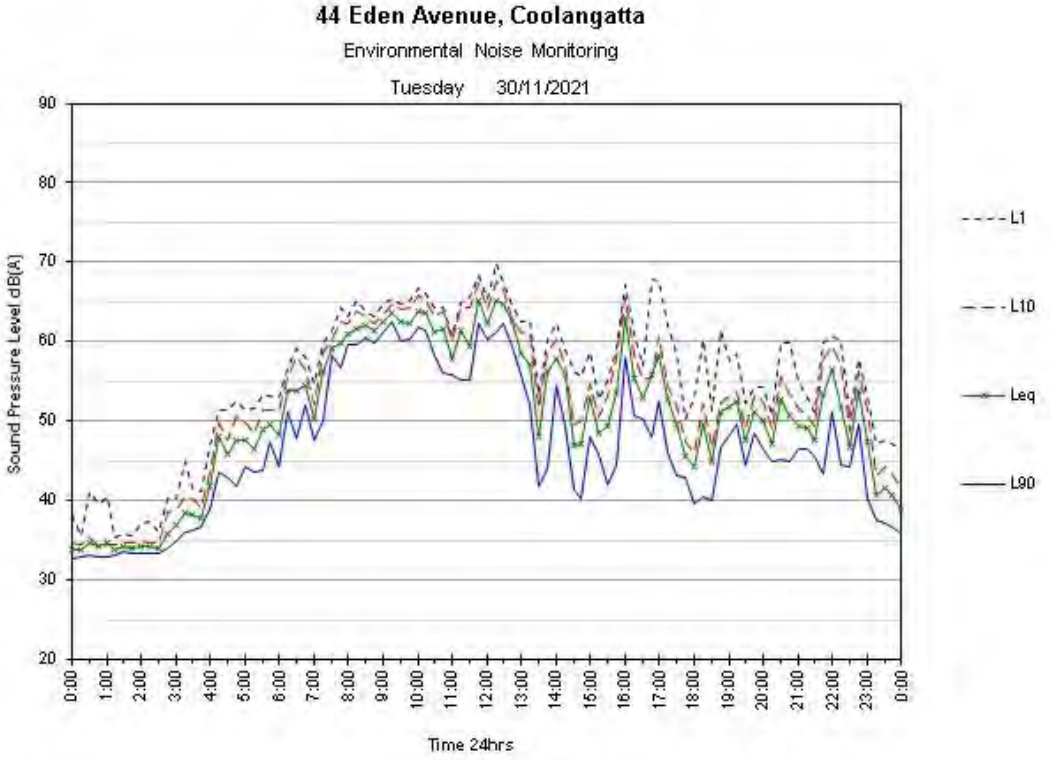
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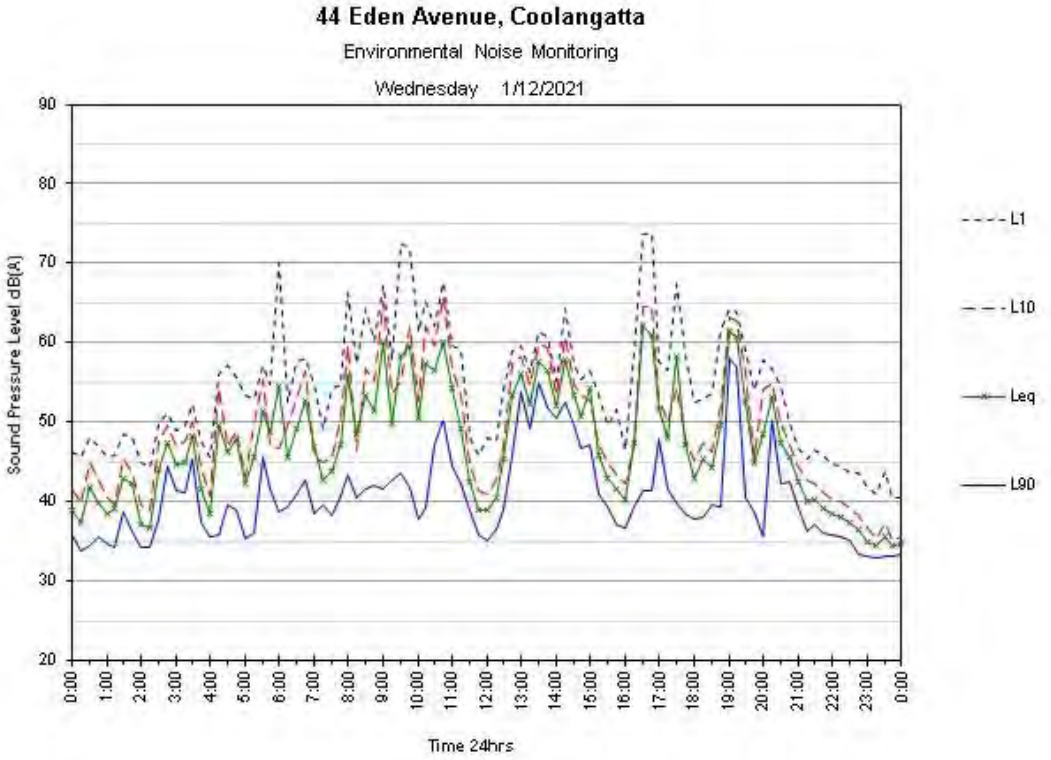
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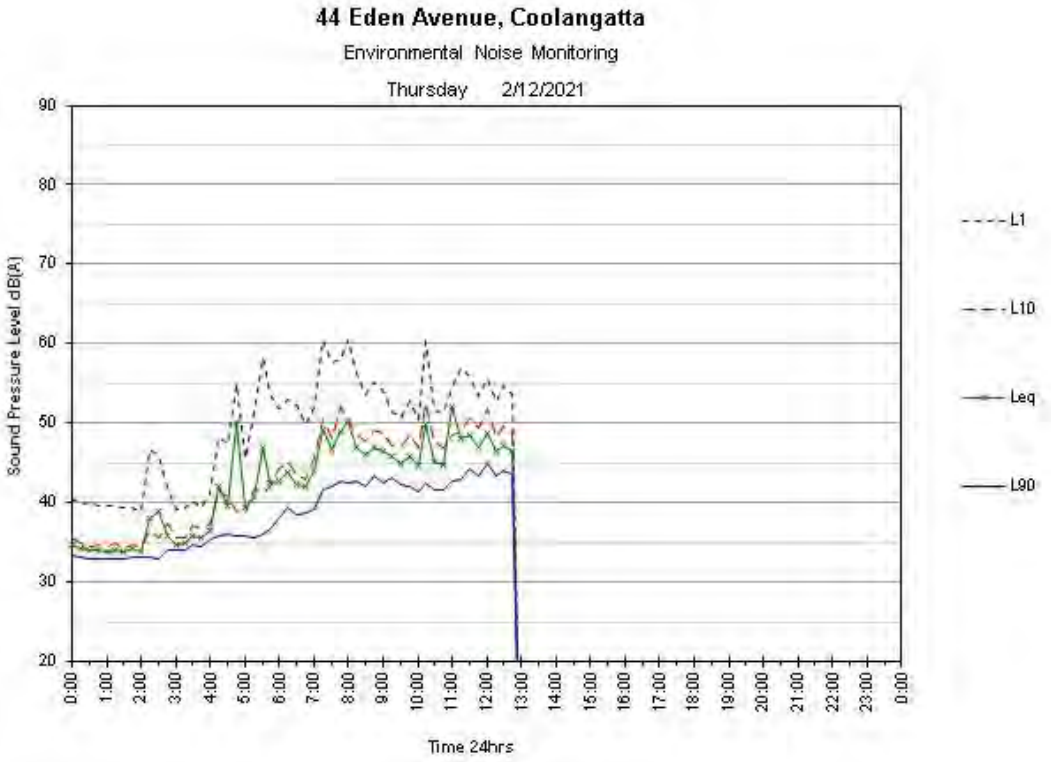
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L90

ENGINEERING SERVICES REPORT

Enhance
URBAN PLANNING

239 & 241 Boundary Street, Coolangatta

Friends civil engineering

239 & 241 Boundary Street, Coolangatta

Engineering Services Report

For: Intrepid Developments (Qld) Pty Ltd

January 2023

The information contained in this report has been prepared based on the information made available to Friends Civil Engineering Pty Ltd at the time of preparation. This document, design parameters, and conclusions rely on external data sources, and the accuracy of this document is correct to the extent of the information provided to us.

This report has been prepared solely for the benefit of our client. We do not accept any liability for damage or loss resulting from reliance on this report, or any part of it, by any party other than the client (named on this page of this report).

Document Control:

Author	**Alex Rowlands**		
Certification	Alex Rowlands RPEQ No.: **24572**		Signed: 
Report Title	R003-FE22103 – Engineering Services Report		
Revision	1	**Date**	24/01/2023

Revision History

Revision	Date	Author	Approver	Description
1	24/01/2023	AR	RR	For Council Submission

Company Contact Details

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Client Contact Details

- Client: Intrepid Developments (Qld) Pty Ltd

Contents

1. Introduction

This report has been prepared to support a Development Application to be lodged with and approved by the City of Gold Coast Council. The proposed development comprises a 16-storey multiple dwelling.

The development occurs over the following parcels of land:

Property Address:	239 & 241 Boundary Street, Coolangatta
Property Description:	Lot 6 & 7 on RP1777
Council:	City of Gold Coast
Registered Site Area:	810m^2

The purpose of this report is to address the management of civil engineering matters including services provision to ensure that the proposed development complies with all necessary state and local government policies.

1.1 Report Abstract

This report confirms that there are no apparent significant constraints that would inhibit the execution of earthworks, sediment and erosion control, the provision of vehicular access, or the drainage of stormwater for the proposed development.

1.2 Related Engineering Reports

A separate document by Friends Civil Engineering has been prepared to demonstrate the Stormwater Management of the development, refer to report reference R1-FE22103.

1.3 Previous Approvals or Requests for Information

There are no records of previous development applications over the land parcel.

2. Property Description

2.1 Site Locality

The subject site is located in the urbanised area of Coolangatta on the Gold Coast. The site is surrounded by a variety of residential, tourist and commercial uses, as well as the nearby Coolangatta beachfront.

The zoning of the land is "High Density Residential" in accordance with the current City of Gold Coast City Plan.

The site has access to Boundary Street via the south-eastern boundary of the land parcel and Ward Street via the south-western. Full details of the site topography and existing features are shown on the detailed site survey in Appendix A. A general locality plan is presented in Figure 2.1 below:

Figure 2.1 - Site Locality (Courtesy of City of Gold Coast City Plan – Accessed October 2022)

2.2 Land Usage

Prior to the proposed development, the sites contain two walk-up style unit buildings.

2.3 Topography and Drainage

The development site generally grades towards the north-west, with surface flows collected by the existing stormwater infrastructure within Ward Street.

Details of the existing topography can be found on the site survey provided as Appendix A.

2.4 Upstream Catchment

All surrounding allotments are developed with drainage to the street frontage via each allotment's outlet to the kerb or connection to Council infrastructure. As such the site is not affected by any upstream catchments.

3. Proposed Development

The proposed development comprises a 16-storey multiple dwellgin. Key components of the development proposal include the following:

- 3 levels of underground carparking.
- 16 storeys of residential apartments.
- Shared internal driveway to underground carparking.

No major external works are proposed as part of the development.

The only works outside the site boundary are expected to include a new vehicle cross over (VXO) to allow for access to the site, as well as connections to public infrastructure such as stormwater, water, sewer, electricity and telecommunications.

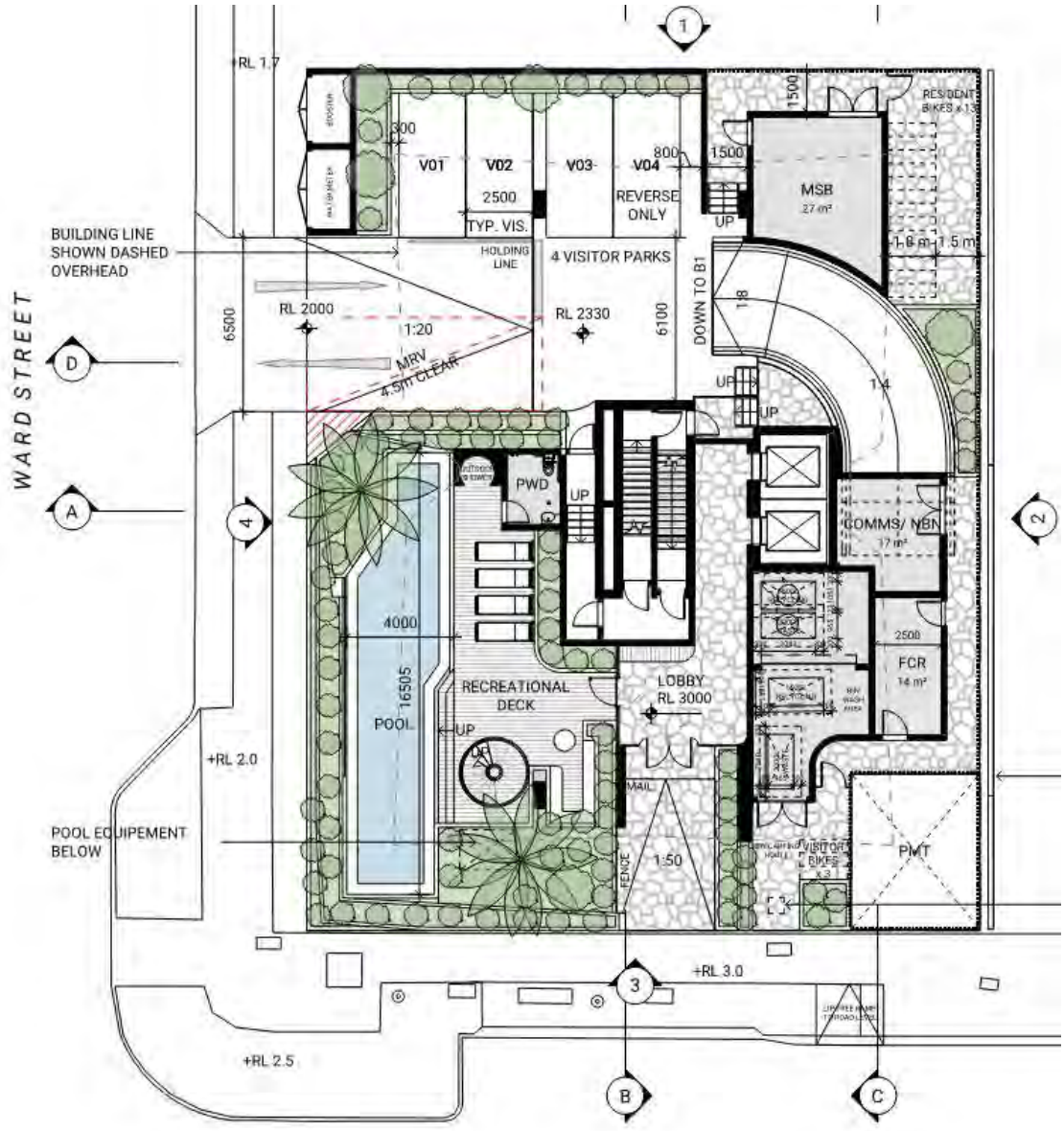

Figure 3.1 Proposed Development (Courtesy of Plus Architecture)

4. Earthworks

The earthworks associated with the proposed development will predominantly involve the earthworks associated with the excavation of the proposed basement and construction of hardstand areas.

The development is mapped as being within a potential acid sulfate soils area in City of Gold Coast's Interactive Mapping, shown in Figure 4.1 below. Due to excavations for the proposed basement levels, footings and minor civil works, a site-specific Acid Sulfate Soils assessment will be required for this site. This is to be prepared by a suitably qualified geotechnical engineer and can be conditioned by Council.

Figure 4.1: Acid Sulfate Soils Overlay Map (OM14) (Courtesy of City of Gold Coast City Plan – Accessed October 2022)

5. Erosion and Sediment Control

The development has the potential to cause erosion and sedimentation runoff. The information presented in this section is relevant to the City of Gold Coast's Erosion Hazard Assessment table.

The average slope across the development site is estimated to be 2%. Australian Soil Resource Information System (ASRIS) data surrounding the subject site suggests that the soil type is a sandy loam. The estimated duration of soil disturbance will likely be more than six months, considering the development type and average construction times.

The average rainfall for the Gold Coast area was taken from the bureau of meteorology for a three-month period from January to the end of March. This resulted in an expected mean rainfall of 184mm. There are currently no off-site sediment control measures serving the development site and analysis of the site survey and surrounding properties shows it is unlikely that stormwater from upstream catchments will discharge into the development area.

The results of the Erosion Hazard Assessment presented in Table 9.4.5-3 of the City of Gold Coast City Plan are shown in Table 5.1 below. If the development scores equal to or more than 11 points, a detailed Erosion and Sedimentation Control Plan will be required.

Table 5.1: Erosion Hazard Assessment

Controlling Factor	Result	Points
Average Slope	2%	1
Soil Type	Sandy Loam	2
Duration of Disturbance	>6 months	5
Rainfall Risk	High (101-225mm)	2
Off-Site Sediment Control	No	1
Run-off Entering the Site	No	0
Extent of Site Disturbance	Yes	2
	Total	13

As the total score for the proposed development is 13 points, erosion and sediment control measures shall be undertaken in accordance with a future approved Erosion and Sediment Control Plan, as per International Erosion Control Association. Detailed erosion and sediment control plans are to be prepared and lodged to Council during the Operational Works phase of the development.

6. Regional Flooding

The site is affected by regional flooding and has a Designated Flood Level (DFL) of 2.28m AHD, assigned by Council's Flood Search Report service.

The DFL relates to a flood with a 1% Annual Exceedance Probability (sometimes referred to as a 1 in 100 year return interval).

The DFL affects only a portion of the site, and the site's Ward Street frontage. Ward Street adjacent to the site and the surrounding roadways experience flood depths in excess of 300mm during the DFL.

Figure 2.2 below shows the extents of flooding surrounding the site in the DFL.

Figure 6.1 Flood Mapping (Courtesy of City of Gold Coast City Plan – Accessed October 2022)

A Flood Code Response (REF R3-FE22103) has been prepared for the proposed development to address flood constraints.

7. Water and Sewer Connection and Capacity

7.1 Sewer Connection

There is an existing ø300 AC sewer main located within the neighbouring allotment to the north of the development site. It is proposed that a new ø150mm connection to this main be achieved through direct connection to the existing manhole located adjacent to the northern corner of the allotment (REF S001-00004M).

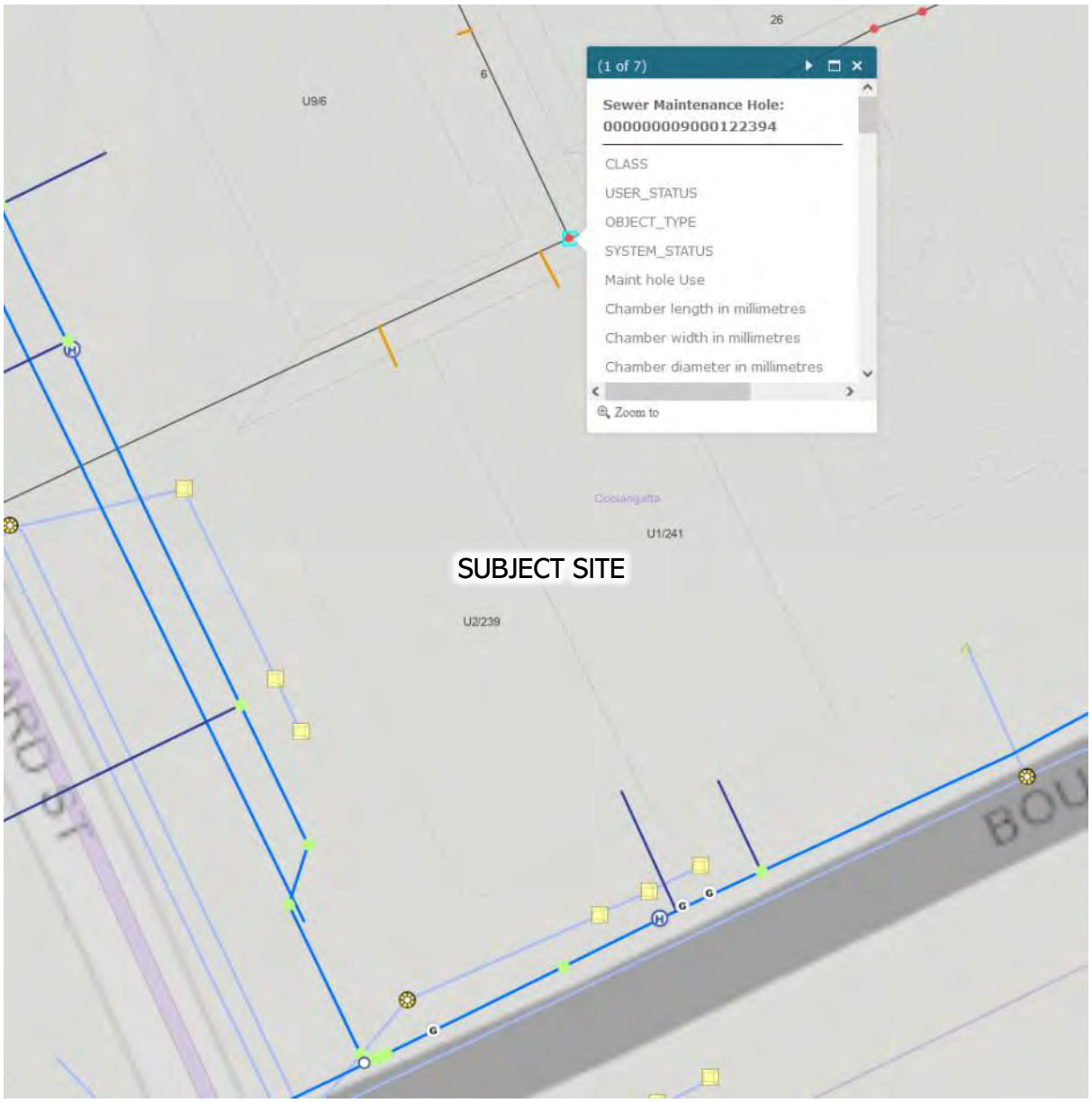

Figure 7.1: Existing Sewer Main (Courtesy of City of Gold Coast ARCGIS – Accessed June 2022)

Please refer to drawing DA04 for further details on the proposed sewer connection location.

7.2 Water Connection

There is an existing ø100 DICL water main located within the western verge of Ward Street. It is proposed to provide a ø100mm connection to this main to service the proposed development.

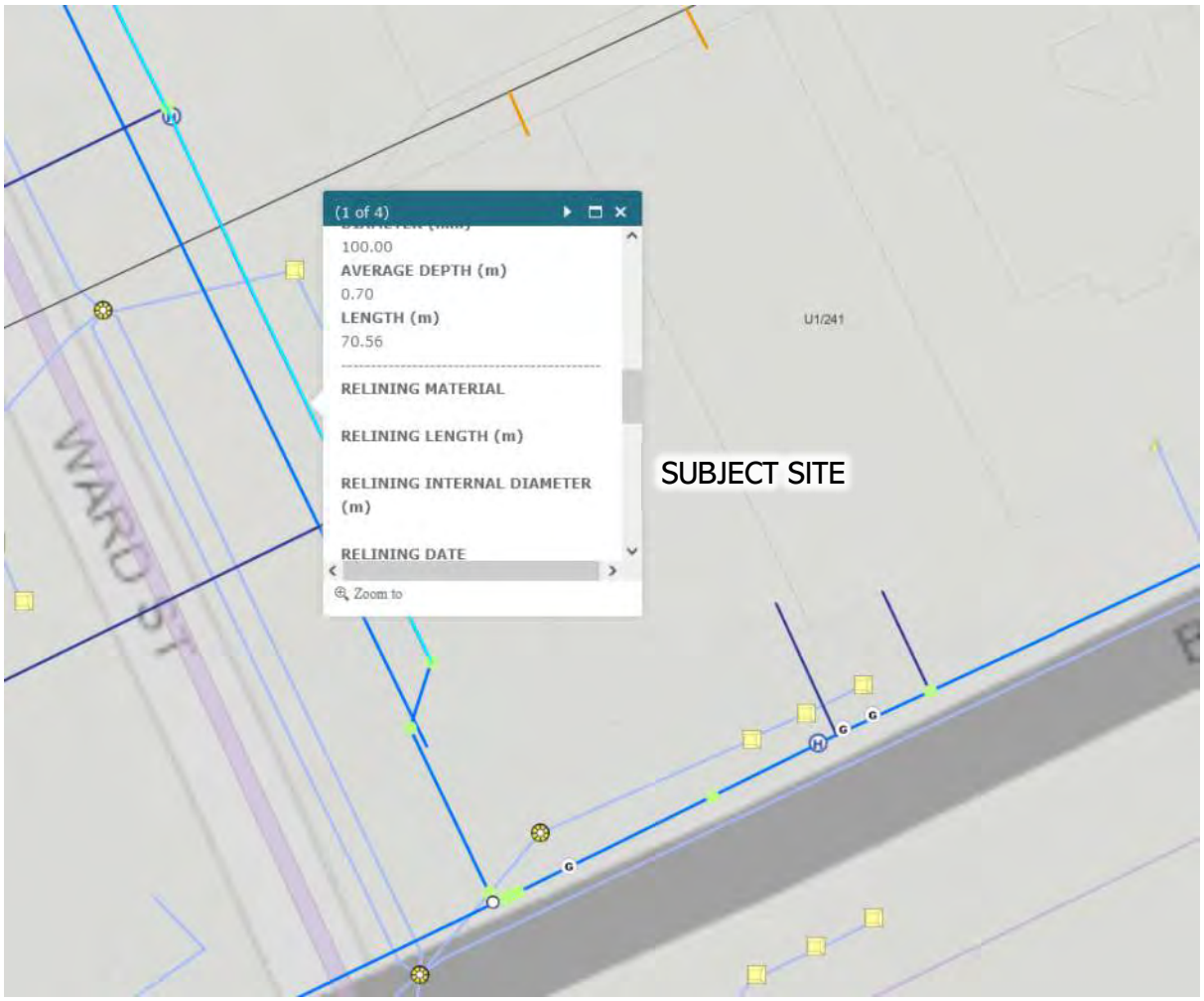

Figure 7.2: Existing Water Main (Courtesy of City of Gold Coast ARCGIS – Accessed October 2022)

It is proposed to utilise the existing water main as the connection point for the development. Connection for the development will be via a new connection and water meter, refer DA04 for further concept details.

8. Conclusion

This report has been prepared to support the lodgement of a development application to approve the construction of a 16-storey multiple dwelling.

This report confirms that there are no apparent significant constraints that would inhibit the execution of earthworks, sediment and erosion control, the provision of vehicular access, or the drainage of stormwater for the proposed development.

A summary of the proposed water and sewer connection strategy is presented for Council's consideration. It has been assumed that surrounding infrastructure has sufficient capacity to service the proposed development.

This report demonstrates that the proposed development can be suitably serviced with all engineering services described, and supports the type and scale of development that is proposed.

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Appendix A

- Site Survey

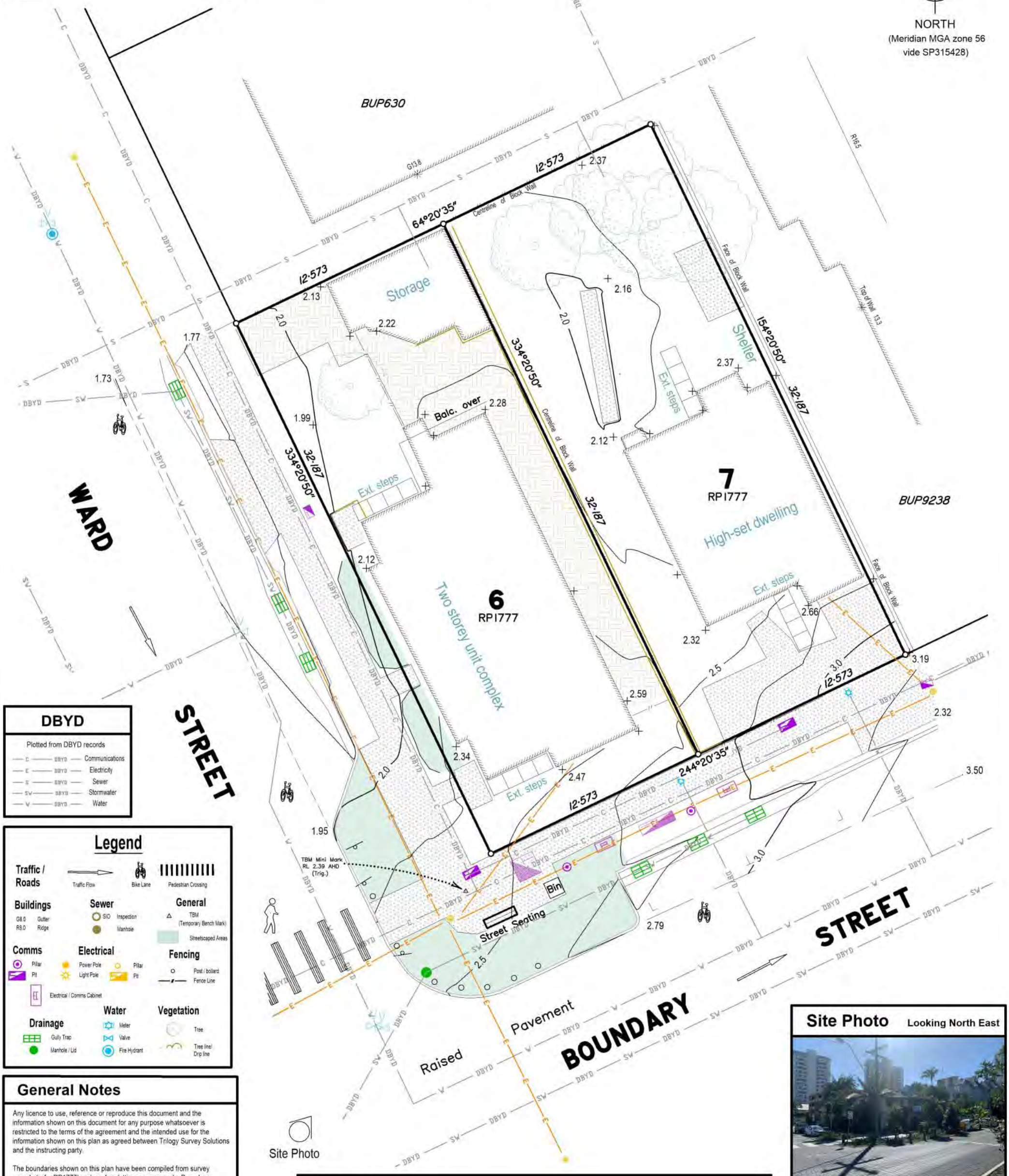
3D Tin - Notes

3d Tin - refer layer "Tin Surveyed":
The 3d tin may be a combination of surface levels, road features, improvements such as retaining walls, concrete paths and slabs, etc.

Nominated Flood Level

The defined flood level as per Council records has not been searched unless noted otherwise

NORTH
(Meridian MGA zone 56 vide SP315428)



DBYD

Plotted from DBYD records

- Communications
- Electricity
- Sewer
- Stormwater
- Water

Legend

Traffic / Roads: Traffic Flow; Bike Lane; Pedestrian Crossing

Buildings: G8.0 Gutter; R8.0 Ridge

Sewer: SIO Inspection; Manhole

General: TBM (Temporary Bench Mark); Streetscaped Areas

Comms: Pillar; Pit

Electrical: Power Pole; Light Pole; Pillar; Pit; Electrical / Comms Cabinet

Fencing: Post / bollard; Fence Line

Drainage: Gully Trap; Manhole / Lid

Water: Meter; Valve; Fire Hydrant

Vegetation: Tree; Tree line/ Drip line

General Notes

Any licence to use, reference or reproduce this document and the information shown on this document for any purpose whatsoever is restricted to the terms of the agreement and the intended use for the information shown on this plan as agreed between Trilogy Survey Solutions and the instructing party.

The boundaries shown on this plan have been compiled from survey records (refer RP1777) and are for plotting purposes only. Boundary corners have not been reinstated or marked on site.

Only visible features (inspection openings) of underground services have been located (unless noted otherwise). Positions plotted are indicative only compiled from available records and should be confirmed prior to undertaking any works on site. The extents of any services as shown should not be relied upon without verification on site. Contact relevant authorities before any excavation.

Site Photo

Looking North East

General Notes

This plan and the information contained within have been provided for the use of the intended person/s only and has prepared specific for thier use. As such information shown is per the scope only and may not be inclusive of all detail on site.

Trilogy Survey Solutions accept no responsibility for the misuse or misunderstanding of information contained on this plan. Anyone referring to the plan must make thier own judgements and site analysis to determine if the information is current and correct.

Revision:	Notes:

Trilogy Survey Solutions
Over 30 years experience

SURVEY SERVICES ■ CADASTRAL / TITLING ADVICE

GOLD COAST

0431 400 670

wayneg@trilogyss.com.au

Project Specifics:	
Local Government:	Gold Coast City
RP Description:	Lot 6 and 7 on RP1777
Project Coordinates:	Local
Project Meridian:	MGA vide SP315428
Level Datum:	AHD (derived) from PSM 124958 RL28.571
Contour Interval:	Contours @ 0.25m intervals

Scale: 1:200 @ A3
0 2 4 6m
1 : 200@A3 (Before Reduction)

Client: Intrepid Developments (Qld) P/L

Detail Survey

239-241 Boundary St Coolangatta

Sheet 1 of 1

Drawn: WG

Surveyed: WG

Drawing Number: TSS-221006-001-A

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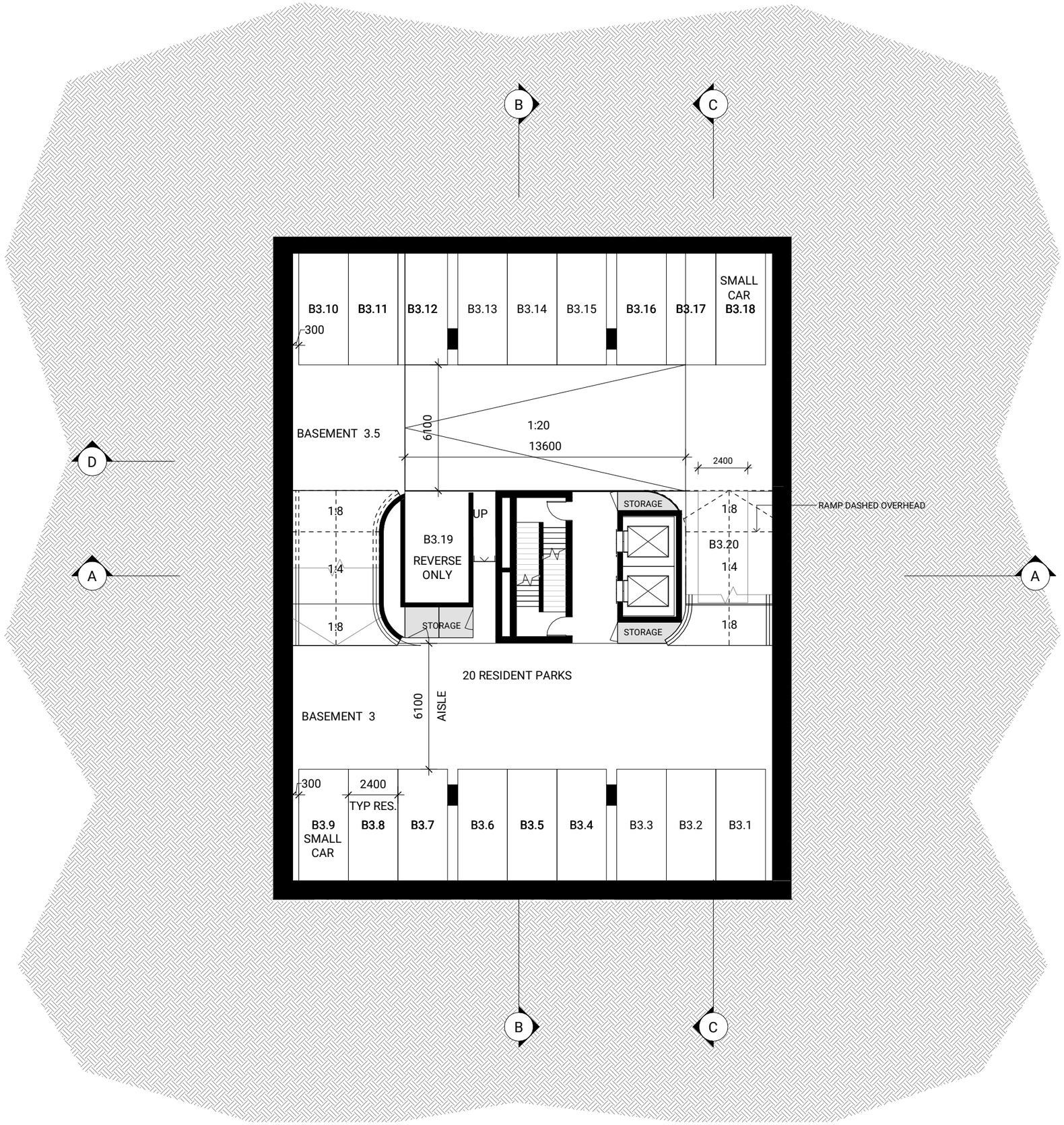
Appendix B

- Development Plans

DA097
FLOOR PLAN - BASEMENT 03



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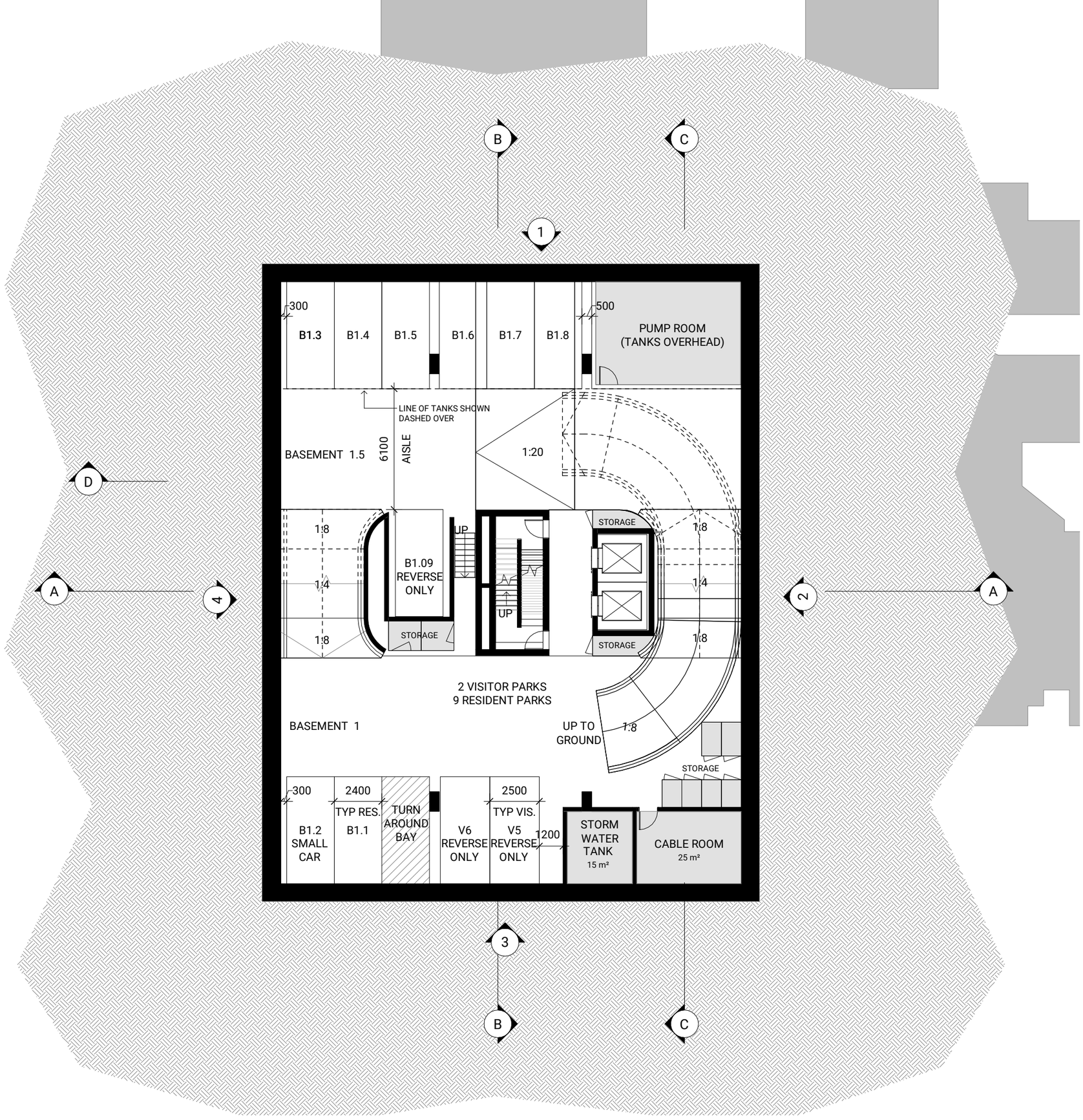
DA099
FLOOR PLAN - BASEMENT 01



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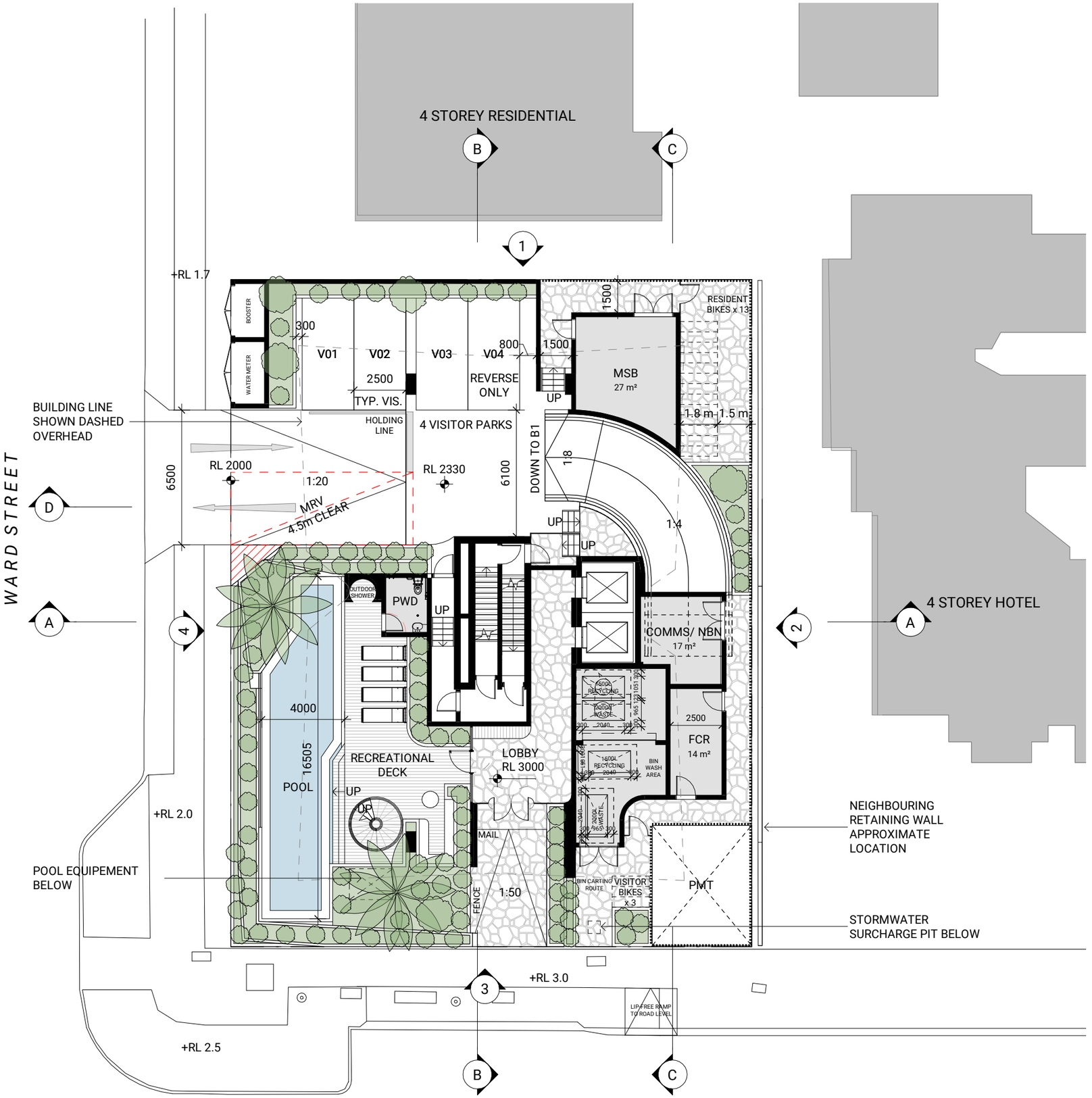
DA100
FLOOR PLAN - GROUND LEVEL



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DA101
FLOOR PLAN - LEVEL 1

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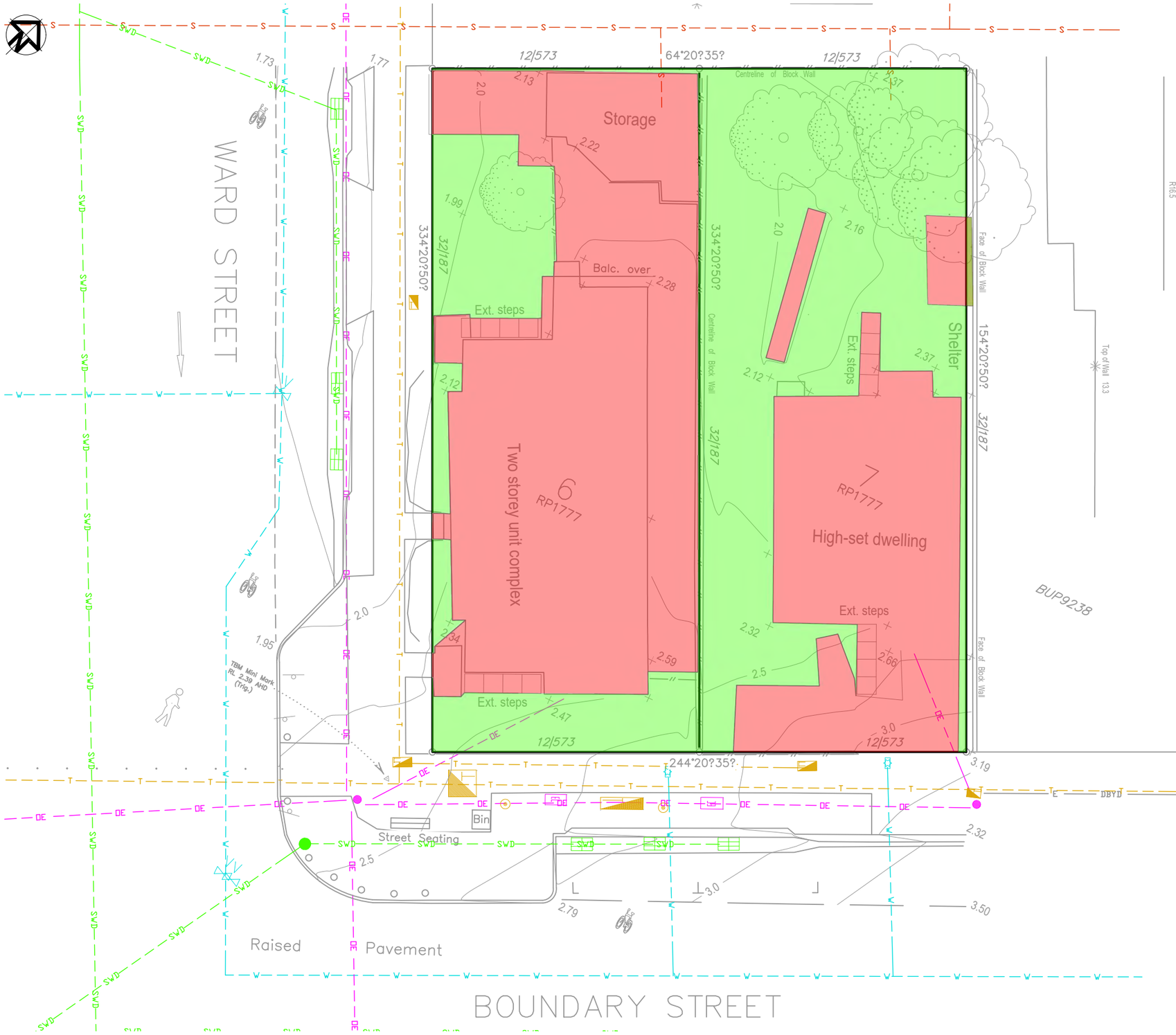
Appendix C

- Civil Engineering Sketches



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- EXISTING EDGE OF BITUMEN
- EXISTING BUILDING
- EXISTING CONTOUR
- EXISTING CONCRETE PAVEMENT
- EXISTING DRIVEWAY
- EXISTING FENCE
- EXISTING KERB
- EXISTING RETAINING WALL
- S — EXISTING SEWER LINE
- W — EXISTING WATER
- SWD — EXISTING STORMWATER
- E — EXISTING UNDERGROUND ELECTRIC
- OE — EXISTING OVERHEAD ELECTRICAL
- T — EXISTING TELSTRA
- G — EXISTING GAS

NOTES / WARNINGS

1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION

CATCHMENT AREAS

LEGEND	AREA (M^2)	DESCRIPTION
	338	LANDSCAPING GARDENS/LAWNS (PERVIOUS)
	472	LANDSCAPE HARDSTAND (IMPERVIOUS)

ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

ARCHITECT: plus architecture

SCALE: 1 0 1 2 3 4 5 — SCALE 1:100

SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

DISCLAIMER: FOR DA PURPOSES ONLY NOT FOR CONSTRUCTION

APPROVED FOR AND ON BEHALF OF FRIENDS CIVIL ENGINEERING PTY LTD

R.P.E.Q No :		PROJECT TEAM	
HEIGHT DATUM	AHD	DESIGNER	AR
GRID	MGA	CHECKER	AR
ORIGINAL SHEET SIZE	A1	APPROVED	AR

Friends civil engineering
Friends Civil Engineering Pty Ltd
ABN 40 638 121 132
p. 0415 704 063 & 0422 024 440
e. contact@friendsengineer.com
w. friendsengineer.com

FILENAME: DA01 - EXISTING IMPERVIOUSNESS.DWG

DRAWING TITLE: EXISTING IMPERVIOUSNESS LAYOUT PLAN

PROJECT No.	DRAWING No.	ISSUE
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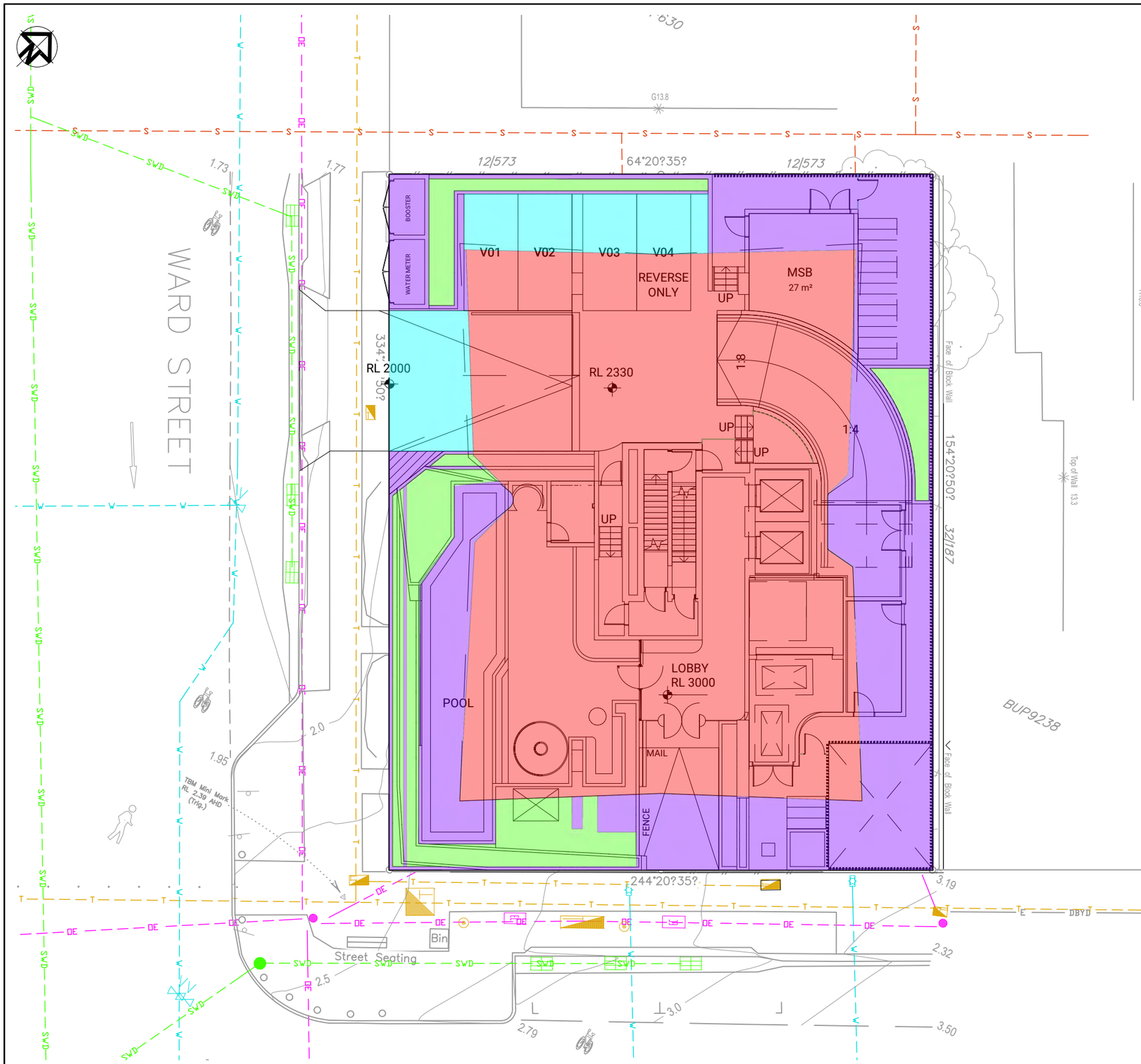

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- EXISTING FENCE
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- S — EXISTING SEWER LINE
- W — EXISTING WATER
- SWD — EXISTING STORMWATER
- E — EXISTING UNDERGROUND ELECTRIC
- OE — EXISTING OVERHEAD ELECTRICAL
- T — EXISTING TELSTRA
- G — EXISTING GAS

NOTES / WARNINGS

1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION

CATCHMENT AREAS

LEGEND	AREA (M^2)	DESCRIPTION
	66	LANDSCAPING GARDENS/LAWNS (PERVIOUS)
	303	LANDSCAPE HARDSTAND (IMPERVIOUS)
	415	ROOFED AREA
	26	DRIVEWAY AREA

ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

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ARCHITECT: plus architecture

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SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

APPROVAL ISSUE
NOT FOR CONSTRUCTION

APPROVED FOR AND ON BEHALF OF FRIENDS CIVIL ENGINEERING PTY LTD

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HEIGHT DATUM	AHD	DESIGNER	AR
GRID	MGA	CHECKER	AR
ORIGINAL SHEET SIZE	A1	APPROVED	AR

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Friends Civil Engineering Pty Ltd
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w. friendsengineer.com

FILENAME: DA02 - DEVELOPED IMPERVIOUSNESS.DWG

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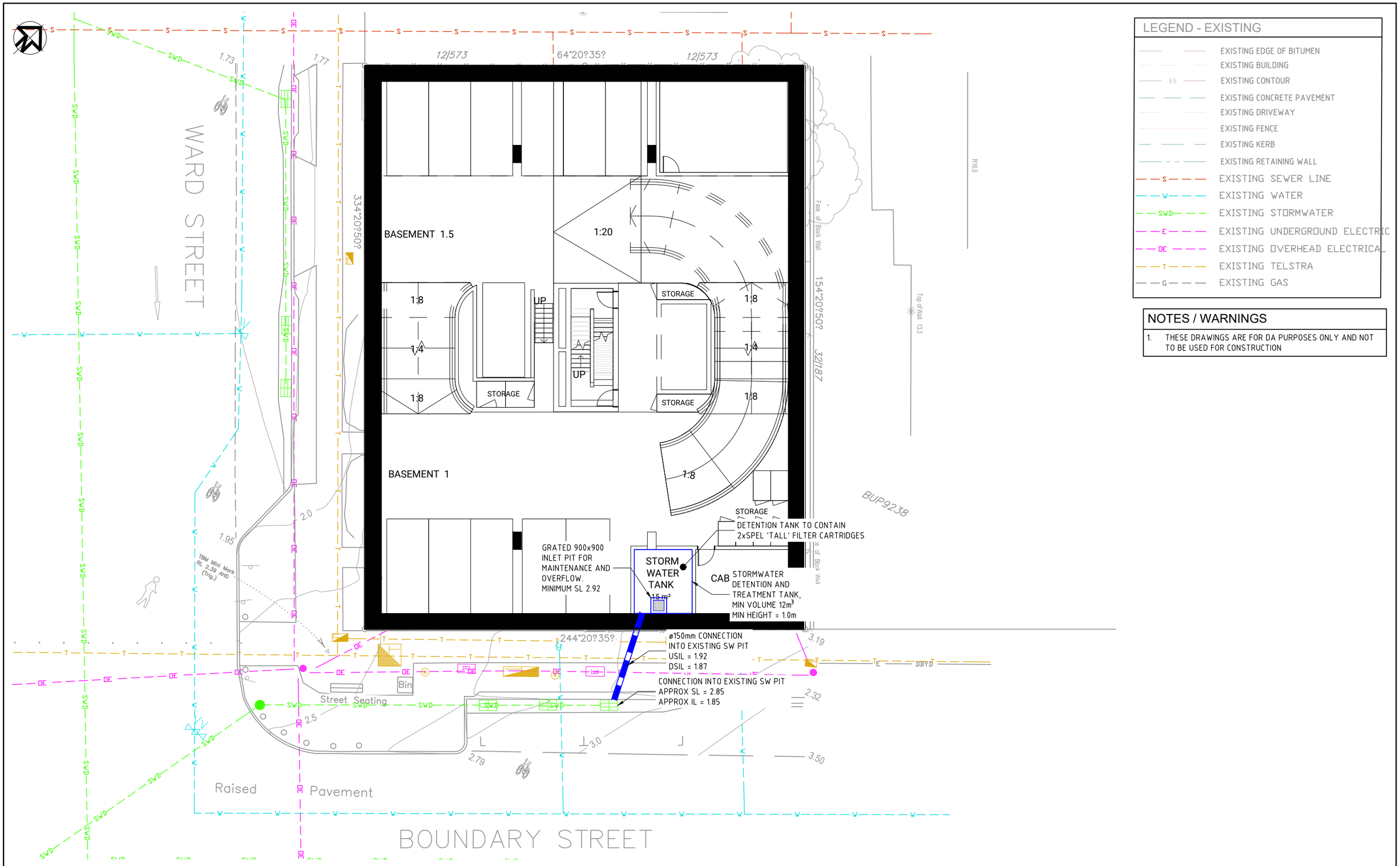

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- EXISTING RETAINING WALL
- EXISTING SEWER LINE
- EXISTING WATER
- EXISTING STORMWATER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING OVERHEAD ELECTRICAL
- EXISTING TELSTRA
- EXISTING GAS

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ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

ARCHITECT: plus architecture

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SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

APPROVAL ISSUE
NOT FOR CONSTRUCTION

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R.P.E.Q No :		PROJECT TEAM	
HEIGHT DATUM	AHD	DESIGNER	AR
GRID	MGA	CHECKER	AR
ORIGINAL SHEET SIZE	A1	APPROVED	AR

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Friends Civil Engineering Pty Ltd
ABN 40 638 121 132
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e. contact@friendsengineer.com
w. friendsengineer.com

FILENAME: DA03 - STORMWATER MANAGEMENT LAYOUT PLAN.DWG

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PROJECT No.	DRAWING No.	ISSUE
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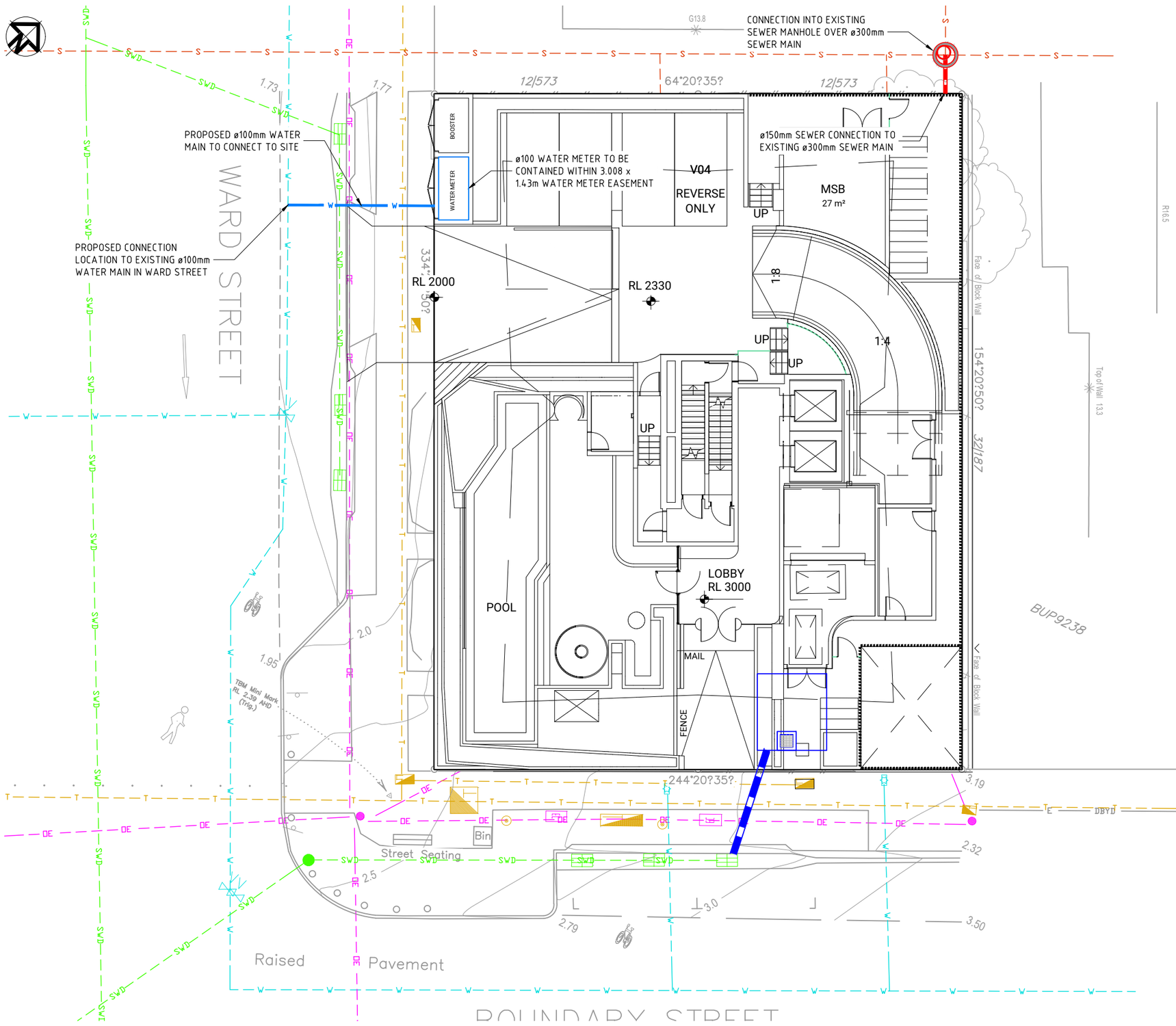

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- EXISTING CONTOUR
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- EXISTING DRIVEWAY
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- EXISTING KERB
- EXISTING RETAINING WALL
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- EXISTING WATER
- EXISTING STORMWATER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING OVERHEAD ELECTRICAL
- EXISTING TELSTRA
- EXISTING GAS

NOTES / WARNINGS

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ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

ARCHITECT: plus architecture

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SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

APPROVAL ISSUE
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R.P.E.Q No :		PROJECT TEAM	
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FILENAME: DA04 - SERVICE CONNECTION LAYOUT PLAN.DWG

DRAWING TITLE: SERVICE CONNECTION LAYOUT PLAN

PROJECT No.	DRAWING No.	ISSUE
FE22103	DA04	[01]

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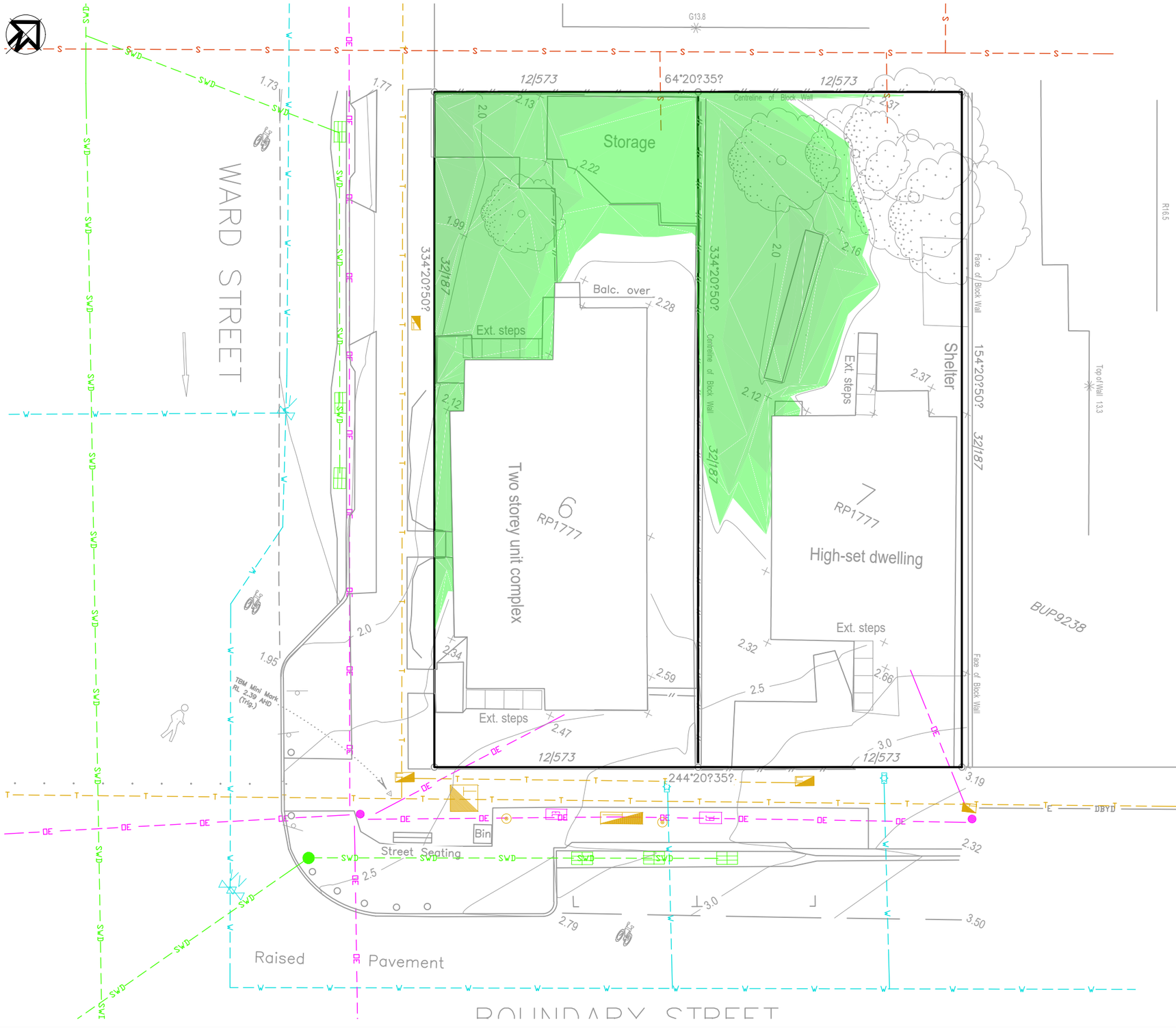

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ISSUE	DESCRIPTION	BY	DATE
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SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

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FILENAME: DA05 - FLOOD STOAGE LAYOUT PLAN.DWG

DRAWING TITLE: EXISTING FLOOD STORAGE LAYOUT PLAN

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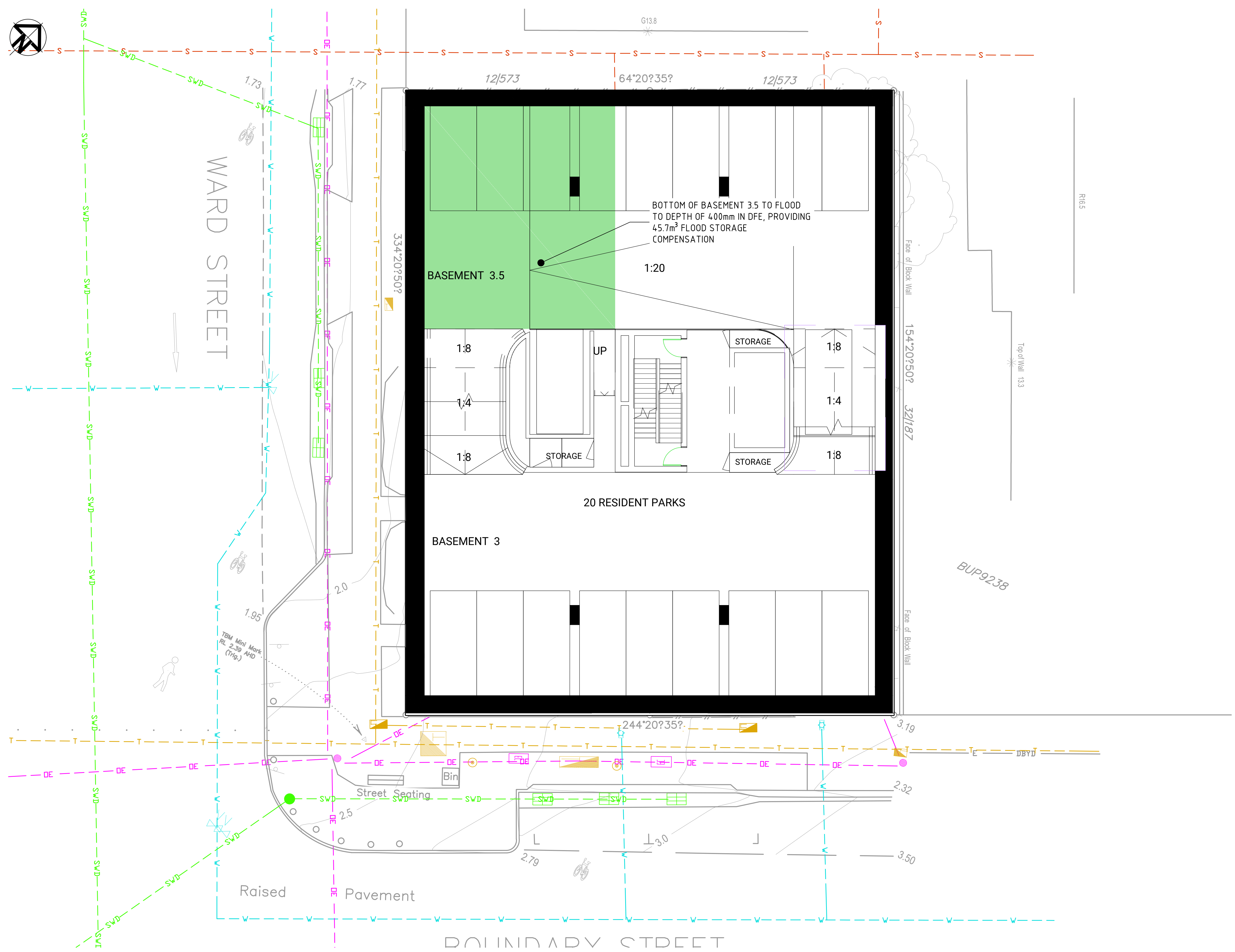

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ARCHITECT: plus architecture

SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

SCALE 1:100 — SCALES SHOWN ARE AT A1 SIZE

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

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DRAWING TITLE: DEVELOPED FLOOD STORAGE LAYOUT PLAN

PROJECT No.	DRAWING No.	ISSUE
FE22103	DA06	[01]

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FLOOD CODE RESPONSE REPORT

Enhance
URBAN PLANNING

239 & 241 Boundary Street, Coolangatta

Friends civil engineering

239 & 241 Boundary Street, Coolangatta

Flood Code Response

For: Intrepid Developments (Qld) Pty Ltd

January 2023

The information contained in this report has been prepared based on the information made available to Friends Civil Engineering Pty Ltd at the time of preparation. This document, design parameters, and conclusions rely on external data sources, and the accuracy of this document is correct to the extent of the information provided to us.

This report has been prepared solely for the benefit of our client. We do not accept any liability for damage or loss resulting from reliance on this report, or any part of it, by any party other than the client (named on this page of this report).

Document Control

Author	**Alex Rowlands**		
Certification	Alex Rowlands RPEQ No.: **24572**	Signed:	
Report Title	R001-FE22103 – Flood Code Response		
Revision	1	**Date**	24/01/2023

Revision History

Revision	Date	Author	Approver	Description
1	24/01/2023	AR	RR	For Council Submission

Company Contact Details

- Name: Friends Civil Engineering Pty Ltd
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- Email: alex@friendsengineer.com

Client Contact Details

- Client: Intrepid Developments (Qld) Pty Ltd

Contents

1. Introduction

This report has been prepared to support a Development Application to be lodged with and approved by the City of Gold Coast Council. The development comprises a 16-storey multiple dwelling.

The development occurs over the following parcels of land:

Property Address:	239 & 241 Boundary Street, Coolangatta
Property Description:	Lot 6 & 7 on RP1777
Council:	City of Gold Coast
Registered Site Area:	810m^2

This report has been prepared to provide details for the City of Gold Coast (Council) and future occupants of the development to ensure compliance with the Council's Flood Affected Areas Code.

A full response to every item of the Council's Flood Overlay Code is included in Appendix C of this report.

1.1 Report Abstract

The site is partially flood affected, with the possibility of flood free evacuation during the DFE via Boundary Street. The site also holds a minor volume of flood storage in the existing case scenario.

Calculations are included in this report and drawings are attached in Appendix A that will ensure the development achieves a flood storage balance and does not cause any adverse hydraulic impacts on the surrounding watercourses or properties.

A full response to Councils Flood Affected Areas Code is provided in Appendix C.

1.2 Revision History

This version of the report is the first version and has been prepared to support the application lodgement to Council.

No relevant previous reports exist for the proposed development site.

1.3 Related Reports

This report is intended to be read in conjunction with the associated development submission documents, current as of the date of this report. Specifically, separate reports by Friends Civil Engineering including the Site-based Stormwater Management Plan and Engineering Services Report (report Ref: R1 & R3- FE22103).

2. Property Description

2.1 Site Locality

The subject site is located in the urbanised area of Coolangatta on the Gold Coast. The site is surrounded by a variety of residential, tourist and commercial uses, as well as the nearby Coolangatta beachfront.

The zoning of the land is "High Density Residential" in accordance with the current City of Gold Coast City Plan.

The site has access to Boundary Street via the south-eastern boundary of the land parcel and Ward Street via the south-western. Full details of the site topography and existing features are shown on the detailed site survey in Appendix A. A general locality plan is presented in Figure 2.1 below:

Figure 2.1 - Site Locality (Courtesy of City of Gold Coast City Plan – Accessed October 2022)

2.2 Land Usage

Prior to the proposed development, the sites contain two walk-up style unit buildings.

2.3 Designated Flood Level

The site is partially affected by regional flooding and has a Designated Flood Level (DFL) of 2.28m AHD by Council's Flood Search Report service.

The DFL relates to a flood with a 1% Annual Exceedance Probability (sometimes referred to as a 1 in 100 year return interval).

The DFL affects the site primarily along the Ward Street frontage with the majority of the remainder of the site being flood free. Ward Street adjacent to the site and the surrounding roadways experience flooding depths in excess of 300mm during the DFL.

Figure 2.2 below demonstrates the extent of flooding surrounding the site during the DFL according to Council's mapping service.

Friends Civil Engineering drawing DA05 in Appendix A provides the extents of flooding more accurately, based upon detailed site survey levels.

Figure 2.2 – Extents of Flooding (1% AEP Events)

3. Proposed Development

The proposed development comprises a 16-storey multiple dwelling. Key components of the development proposal include the following:

- 3 levels of underground carparking.
- 16 storeys of residential apartments.
- Shared internal driveway to underground carparking.

No major external works are proposed as part of the development.

The only works outside the site boundary are expected to include a new vehicle cross over (VXO) to allow for access to the site, as well as connections to public infrastructure such as stormwater, water, sewer, electricity and telecommunications.

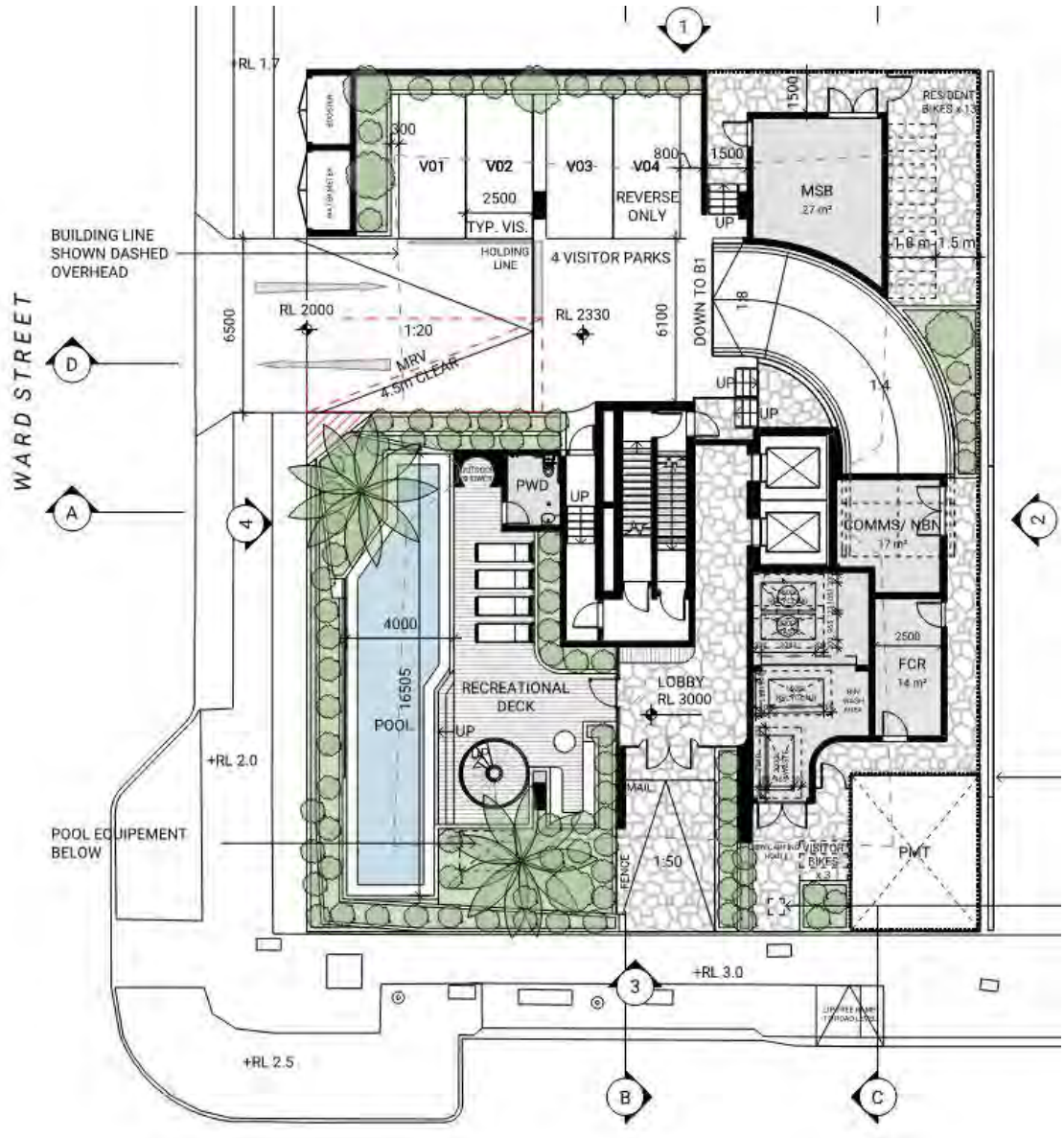

Figure 3.1 Proposed Development (Courtesy of Plus Architecture)

4. General Description of The Flood Risk

The site's vehicular access to Ward Street is flood affected during the DFE. Flood depths at the VXO are expected to reach approximately 500mm during the DFE.

Parts of the site are flood affected and the internal driveways, carparking and hardstand areas will hold flood water during the DFL and rarer events. The development has measures in place to ensure that the risk and consequence of flooding on the site are within the requirements of the Council's Flood Overlay Code. These specifically include the setting of habitable and non-habitable flood levels around the site and the implementation of a shelter in place refuge above the Probable Maximum Flood level for extremely rare flood events.

The flood emergency management features of the development are described in detail in Section 6 of this report.

5. Flood Storage Balance

The development proposes new works that will be within the flood affected areas, however the proposed filling works will be compensated for by equivalent excavation to ensure a flood storage balance over the site.

To ensure that the works comply with Council's Flood Overlay Code, flood storage calculations have been undertaken using 12D Model Software (V14). The site's flood extents and flood storage volume has been calculated and plotted to confirm the works occurring within the flood zone.

The site has an existing flood storage volume of 45.6m^3, calculated using the site survey data provided by Trilogy Survey Solutions (Project Ref: TSS-221006-001-A).

In the developed case scenario, the driveway is to be graded to ensure that the crest level of the driveway is at 2.33m AHD, 50mm above the DFL. Friends Civil Engineering drawing DA06-FE22103 shows the proposed flooding strategy for the development with average heights and areas of proposed flooding.

The flood depths within the development are below a 'medium hazard' and in accordance with Council's Flood Overlay Code.

The proposed development will not result in any reduction in flood storage volume. Basement 3 of the proposed development will be allowed to flood up to a depth of 400mm, providing a post-developed flood storage volume of 45.7m^3, and ensuring no loss in flood plain storage. Alternatively, the development may construct a flood storage tank of 45m^3 volume to ensure no loss in flood plain storage.

Full details of the flood storage calculation extents and depths are provided on the Friends Civil Engineering drawing DA06-FE22103.

6. Shelter in Place Provisions

The habitable floors of the development are located above the Designated Flood Level and are in accordance with Council and Queensland Development Code requirements.

The street access is flooded to a depth that exceeds 300mm and is therefore considered to be a 'medium hazard' for access and egress during a flood event.

To ensure that future residents of the buildings are safe, and the development complies with Council's Flood Affected Areas Code, each of the new dwellings include "shelter in place" provisions that are above the "probable maximum flood" (PMF). The PMF level for this site has been supplied by Council, and is indicated to be 4.35m AHD. All habitable dwellings are located above the PMF level.

The usage of the PMF shelter complies with the Council's *Fact Sheet: Interim approach for small scale developments*, which is attached as Appendix B.

6.1 Warning and Evacuation Closure Triggers

The Bureau of Meteorology will issue warnings when flooding is likely for the Gold Coast area. As soon as a flood warning is issued, residents should evacuate to flood immune homes of friends or families or return home to potentially shelter in place, as they prefer.

As soon as flood water is observed in any of the street frontages, vehicle movements should cease and vehicles should be removed from Basement 3.5. Residents are to shelter in place within their homes until the flood recedes.

6.2 Emergency Management Kit

All residents should maintain an emergency management kit within their own dwellings. It is recommended that the tenants perform a stocktake of their emergency supplies every 6 months.

The emergency management kit should, at a minimum, contain the following:

1. Food and water
    - Residents should be encouraged to keep 7 day's supply of non-perishable food and to fill water containers when a cyclone or flood watch is issued. See https://www.qld.gov.au/emergency/dealing-disasters/emergency-pantry-list.html for suitable items and quantities;
    - Water containers (to be filled at cyclone watch stage).
2. Communication
    - a portable battery radio and spare batteries;
    - mobile telephone.
3. Medical and sanitation
    - First Aid kit and manual;
    - Personal hygiene items.
4. Light
    - Torch with extra batteries;
    - Battery powered lantern.
5. Blankets and Clothing

- Wet weather gear;
- Blankets.

6. Miscellaneous
    - Waterproof bags.

6.3 Standard Design Requirements for Shelter in Place Areas

The design of the dwellings is in accordance with the standard requirements of a 'shelter in place' area, as stipulated by the City of Gold Coast Council. Refer to *Council Fact Sheet: Interim approach for small scale developments*, which is attached as Appendix B for shelter in place minimum requirements.

The minimum requirements for the shelter in place refuge are listed below:

- the shelter-in-place is to be located above the Probable Maximum Flood (PMF) level and provide a safe habitable space during an event;
- be a minimum of $9m^2$ based on a single bedroom occupancy, with an addition of $4m^2$ for each additional bedroom;
- contain toilet and shower facilities;
- have unobstructed egress options for emergency evacuation (balcony or deck evacuation options). A balcony is included on the upper floor to allow for emergency evacuation during extreme flood events.
- have a dedicated storage cupboard to store the necessary items as advised by emergency services (ref: goldcoast.qld.gov.au/council/be-prepared-462.html);
- comply with the automatic fire detection and warning requirements of the Building Code of Australia for its normal use; and
- be engineered to withstand the flood actions (forces) generated by the PMF event.

All of these requirements are met by the architect's design of the dwellings. It is the responsibly of the residents to maintain the necessary emergency provisions in their dwellings.

It is noted that Level 1 of the proposed building contains communal facilities and a communal point for escape in the event of a PMF event.

7. Conclusion

This report has been prepared to support a Development Application to be lodged with and approved by the City of Gold Coast Council. The proposed development is a 16-storey multiple dwelling located at 239 & 241 Boundary Street, Coolangatta.

The site is flood affected; however the associated hazard is managed though building design and the allowance for refuge from the probable maximum flood in the upper habitable floors of the new dwellings.

The development proposes works within the flood zone, however this report has demonstrated that the works can be carried out in accordance with Council's Flood Overlay Code. A full copy of the response to the Flood Overlay Code is appended to this report.

This report demonstrates that the development has been designed to appropriately manage anticipated flood impacts on the development.

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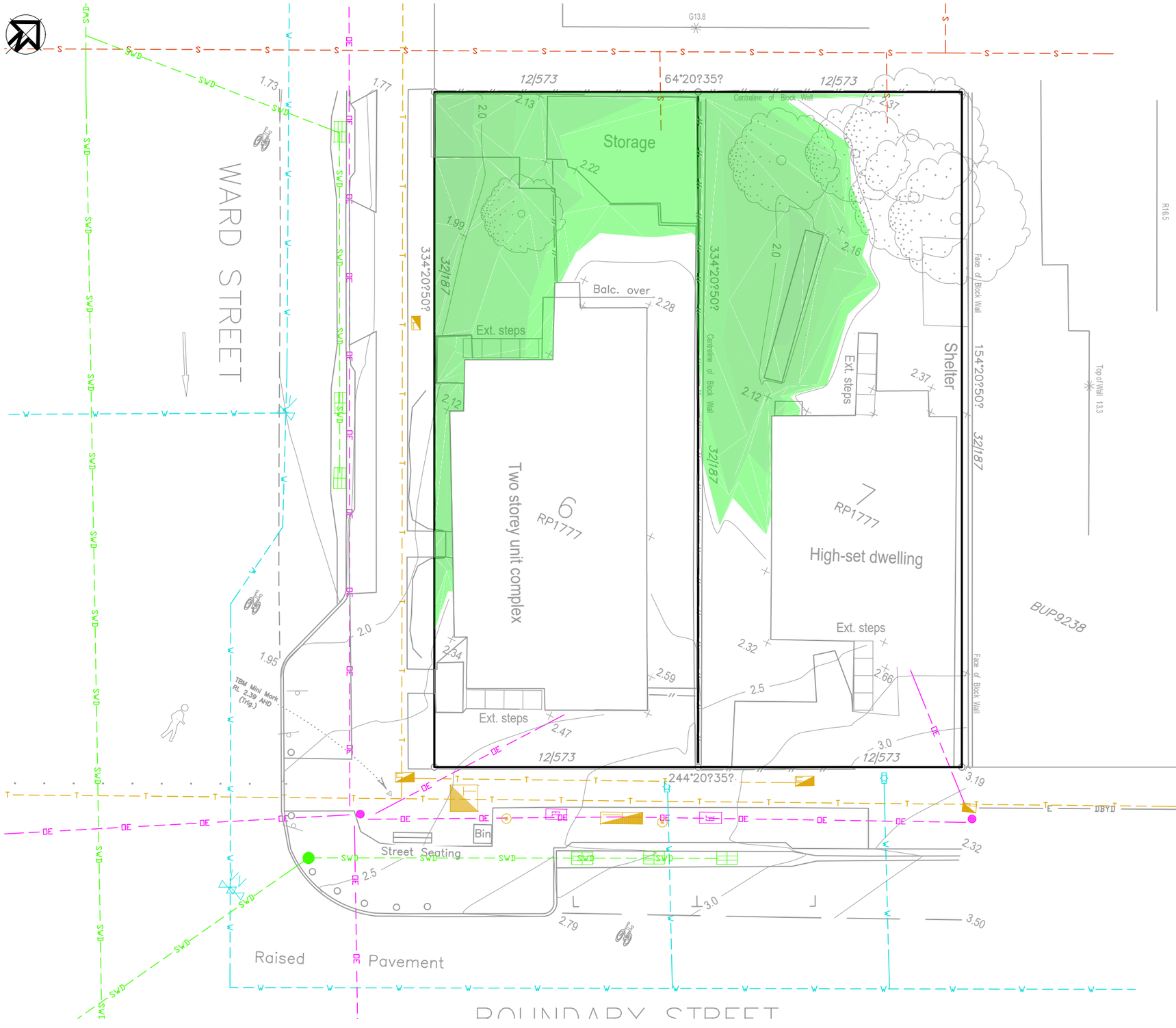
Appendix A

- Civil Engineering Drawings



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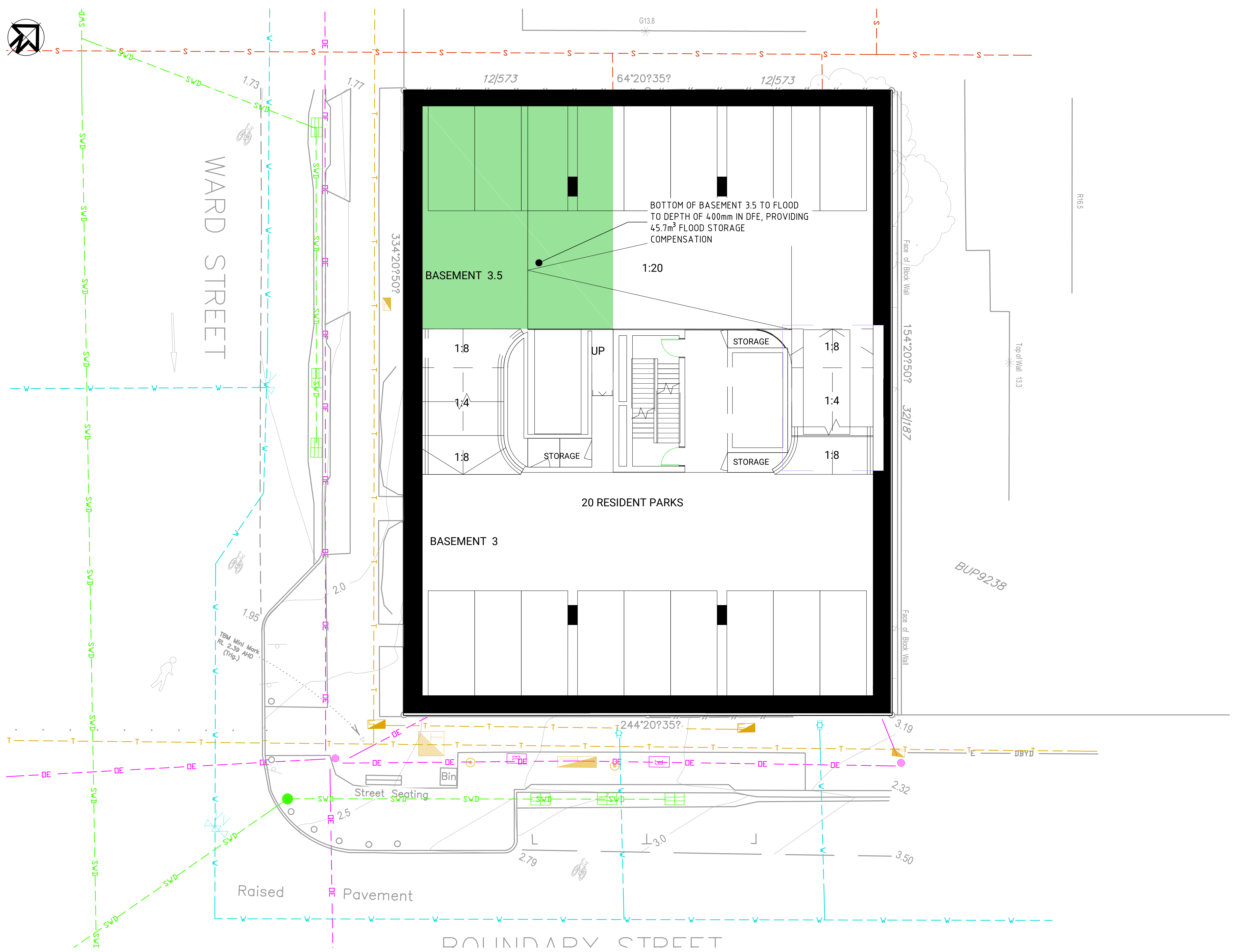

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FILENAME: DA06 - DEVELOPED FLOOD STOAGE LAYOUT PLAN.DWG

DRAWING TITLE: DEVELOPED FLOOD STORAGE LAYOUT PLAN

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Appendix B

- Council Fact Sheet for PMF Refuge

Interim approach for small scale developments

This is an interim approach until the Flood overlay code and shelter-in-place policy (including Flood Emergency Management Plan guidelines) are reviewed and take effect in City Plan.

The following guidance is relevant for small scale residential developments in areas of low, medium and high residential density zones identified in the Flood overlay map as being at risk of isolation due to flood (i.e. flood free access).

Where the proposed development cannot provide or demonstrate flood free access (PO11 of Flood overlay code), the proposed development will need to address the risk of isolation that may arise during a flood emergency event.

Isolation risks that are not effectively mitigated can result in harm to people and add additional burden to emergency services personnel during a flood emergency event.

A shelter-in-place approach provides an opportunity to address the risks of isolation and subsequent risk to life and potential burden to emergency services and has been commonly used in development assessment for larger developments. However, it has been identified that an interim approach is also needed for small scale developments.

Small scale developments in this instance include:

- reconfiguring a lot up to three lots that provide for a new future additional dwelling or dual occupancy development
- a dual occupancy on existing or new residential lot
- MCU's for single dwellings and/or applications involving a partial third storey or for multiple dwellings up to three dwellings.

For more information

For planning related matters, please contact our Planning Enquiries Centre on:

City of Gold Coast
P 07 5582 8708
E mail@goldcoast.qld.gov.au

Shelter-in-place

Shelter-in-place is defined as finding a safe location indoors, seeking immediate shelter and staying there during a flood emergency event until the threat is removed; rather than evacuating the area to an alternative safe refuge.

Interim framework

As a minimum, the shelter-in-place component of the development must:

- be located above Probable Maximum Flood (PMF) and provide a safe habitable space during an event
- be a minimum of $9m^2$ based on a single bedroom occupancy, with an addition of $4m^2$ for each additional bedroom
- contain toilet and shower facilities
- have unobstructed egress options for emergency evacuation (balcony or deck evacuation options)
- have a dedicated storage cupboard to store the necessary items as advised by emergency services goldcoast.qld.gov.au/council/be-prepared-462.html
- comply with the automatic fire detection and warning requirements of the Building Code of Australia for its normal use
- be engineered to withstand the flood actions (forces) generated by the PMF event.

Small-scale developments proposing Reconfiguring a lot (ROL) only, must also comply with:

- if flood free access cannot be demonstrated, the Applicant should propose appropriate wording to establish a covenant over the land that requires any future built form is designed to incorporate a shelter area above PMF, in accordance with the shelter-in-place requirements
- the covenant will be registered on the property's rates notice.

Probable maximum flood levels

Applicants who wish to know the PMF level for their premise can forward an email request to naturalhazards@goldcoast.qld.gov.au

For more information

For planning related matters, please contact our Planning Enquiries Centre on:

City of Gold Coast
P 07 5582 8708
E mail@goldcoast.qld.gov.au.au

Fe Friends
civil engineering

Appendix C

- Complete City Plan Flood Overlay Code

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

8.2.8 Flood overlay code

8.2.8.1 Application

This code applies to assessing operational work, material change of use or reconfiguration of a lot for development subject to the Flood overlay and identified in **Part 5.10 Categories of development and assessment – Overlays**

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3,** in **Part 5**.

8.2.8.2 Purpose

(1) The Flood overlay deals with areas of land identified in a state planning policy. It may include the following area of land identified in the local government area as:

(a) areas of land with flooding and inundation potential.

(b) overland flow paths identified locally.

It applies, at a minimum, to development that:

(a) increases the number of people living and working in the natural hazard management area, except where the premises are occupied on a short term or intermittent basis; or

(b) involves institutional uses where evacuating people may be difficult; or

(c) involve the manufacture or storage of hazardous materials in bulk.

(2) The purpose of the Flood overlay code is to regulate development occurring in flood affected areas to ensure development does not cause, increase or have cumulative potential to cause or increase, the risks and/or hazards associated with flooding.

(3) The purpose of the code will be achieved through the following overall outcomes:

(a) Avoid, if practicable, or otherwise lessen, the adverse impacts of flooding and ensure development is located, designed and managed to mitigate the risk to life and property.

(b) No extra burden on the city's counter-disaster response efforts during a flood emergency.

(c) Development constraints and development potential within a single river catchment and its sub-catchments are equitably shared.

(d) The costs and benefits of flood-mitigation infrastructure within a river catchment and its sub-catchments are equitably shared.

(e) The flood storage function of the city's flood plains is protected.

(f) The flood discharge capacity of the city's rivers, streams and canals is protected.

(g) A best-practice approach to flood-plain management is achieved and maintained.

(h) The effects of flooding are managed by requiring certified engineering hydraulic studies and specific design criteria for certain types of land uses.

(i) Provide standards for development in these areas that will ensure that the runoff from land and/or premises does not create any adverse environmental impacts.

(j) The effects of future climate variability are taken into account.

(k) Development does not occur at the expense of other environmental values.

All proposals for development are fully evaluated against the following criteria:

- Whether the development is likely to cause damage that would adversely affect land and/or premises to an extent likely to be actionable (Nerang River Catchment is to be based on Hinze Dam Stage 2 flood levels).
- Whether the cumulative impact of development is likely to cause or increase the adverse impacts of flooding.
- Whether the development is likely to cause or worsen flood hazard.

- Whether the risks associated with the development are fully known, quantifiable and capable of being dealt with to Council's satisfaction, without any uncertainties.
- Whether flood mitigation works, intended to reduce flood risk, hazard and damage, do so without adversely impacting upon other land and/or premises.
- Whether the impacts of climate change have been taken into account; and
- Whether extra burden is placed on the city's counter disaster response efforts during a flood emergency.

8.2.8.1 Specific benchmarks for assessment

Table 8.2.8-2: Flood overlay code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Flood storage			
PO1 All development activity conducted on land below the designated flood level must not detrimentally affect the flood storage capacity of the catchment and the drainage regime.	**AO1** The flood storage volume on the site is maintained up to the Designated Flood Level. **Note: The Designated Flood Level must be obtained from Council's Flood Search.**	**AO1 COMPLIES** Refer to Section 5 of the Friends Civil Engineering Flood Code Response Report.	
Building floor levels			
PO2 Development that is located on flood prone land shall not be inundated by floodwaters during a designated flood and allowance must be made for elements that could result in an elevated flood, including: (a) the hydraulic gradient above the main floodway (b) The impact of events such as wind and wave action on the flood surface; and (c) Uncertainty associated with the designated flood level.	**AO2.1** Building floor levels of habitable rooms must be at or above the height of the combined designated flood level and minimum freeboard derived from **Table 8.2.8-6 – table to acceptable outcome AO2.1**	**PO2 NOT APPLICABLE** All new habitable floor levels will be a minimum of 300mm above the designed flood level.	
	AO2.2 Where a proposed land use does not reasonably apply to any land use listed in the **Table 8.2.8-6: Table to acceptable outcome AO2.1**, the applicant is to submit: (a) the proposed minimum flood AEP for building floor levels; (b) the proposed design freeboard above the specified flood level; and (c) a flood hazard and flood risk assessment for the proposed development, assessing the effects on costs, safety, access and potential losses.		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO3 Building floor levels of garages and non-habitable rooms must be constructed at a height that reflects an acceptable flood risk for their purpose. **Note: PO3 does not apply to:** • **extensions to existing buildings;** • **structures detached from a dwelling, for which the use is ancillary to that of a dwelling, provided that use is not listed in column 1 of Table 8.2.8-3: Table to performance outcome PO7.**	**AO3.1** Building floor levels of garages and non-habitable rooms, constructed at approximately the same level as, and attached to, the main dwelling, are constructed at a height above the Designated Flood Level, except where the dwelling has a suspended floor, constructed one metre or more above ground, or where the building is to be constructed within a Rural zone.		
	AO3.2 Garages and car parks detached from the building are not inundated to cause more than a medium hazard, as identified within **Table 8.2.8-5 Table to acceptable outcome AO11, for the designated flood**.	**AO3.1 COMPLIES** The proposed basement 3 area will be allowed to flood to a maximum depth of 400mm, as shown on Friends plan DA06-FE22103.	
Overland flow			
PO4 Development must not obstruct free open surface flow of stormwater through a site.	**AO4** Overland flowing stormwater is allowed free open surface flow between the street and any waterway at the rear of the property, in accordance with the provisions of the *Building Code of Australia*.	**APO4 NOT APPLICABLE** The site is not affected by any overland flow. Flooding on the site is controlled by riverine and storm tide.	
Flooding risk			
PO5 Development in flood affected areas must not cause, or have the cumulative potential to cause, damage, must not increase the level of risk to life, or be to the detriment of flood evacuation procedures.	**AO5** Development does not: (a) increase the number of people calculated to be at risk from flooding; (b) increase the number of people likely to need evacuation; (c) shorten flood warning times;	**AO5 COMPLIES** Refer to Section 6 of the Friends Civil Engineering flood code response report.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	(d) impact on the ability of traffic to use evacuation routes, or unreasonably increase traffic volumes on evacuation routes, or as identified within Council's Counter Disaster Plan (flooding); (e) place additional burdens on Council's resources or emergency services; (f) increase the duration of flooding, unless that increase is part of a Council approved flood mitigation strategy.		
Flood storage and conveyance			
PO6 Development with plans for earthworks in a floodplain on or over a water body or within a flood affected area below the Designated Flood Level must allow for the maintenance of flood storage, and flood conveyance of flood and drainage channels and overland flow paths.	**AO6.1** Provide flood storage calculations that demonstrate that flood storage volume, over the site below the Designated Flood Level, is maintained or increased.	**AO6.1 COMPLIES** Refer to Section 5 of the Friends Civil Engineering flood code response report.	
	AO6.2 A certified hydraulic study (and, if necessary, a hydrologic study) is prepared by a suitably qualified and experienced engineer to investigate the hydraulic characteristics of both the undeveloped and developed site and make comparisons between them. Proposed developments in, on or over a water body, or within a flood affected area, must be tested for: (a) the 50%, 20%, 10%, 5%, 2% and 1% Annual Exceedance Probability (AEP) for local flood events; (b) the 5%, 2%, and 1% AEP floods. For the Nerang River Catchment		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? **If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome**	Internal use
	Hinze Dam stage 2 condition must be used. (as specified in **Table 8.2.8-3: Table to performance outcome PO7**); and (c) any resultant afflux or increase in flood velocities sufficient to cause real damage to premises. The Assessment Manager may also require the development to be assessed against rarer floods.		
Development for certain purposes			
PO7 Development is constructed at or above the Designated Flood Level, shown in **Table 8.2.8-3: Table to performance outcome PO7**. **Note: The designated flood level for the Nerang River is based on Hinze Dam Stage 2 condition.**	**AO7** No acceptable outcome provided.	**PO7 NOT APPLICABLE** The development does not propose any of the uses listed in the table.	
PO8 Development must consider hydrologic and hydraulic impacts of development in flood affected areas with regard to future climate change.	**AO8** No acceptable outcome provided. **Note: As part of a hydrologic and hydraulic impact assessment, investigation has been undertaken to determine the impacts of future climate change. The findings of the investigation may be used to modify modelling parameters and boundary conditions used in modelling the hydrologic and hydraulic impacts of development in flood affected areas.**	**AO8 COMPLIES** The development has been planned to consider the designated flood level provided by the City of Gold Coast Council, which makes allowances for climate change.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Hazard considerations for development			
PO9 Development listed in the **Table 8.2.8-4: Table to acceptable outcome AO9** below must be designed and constructed to avoid causing exposure to undue flood hazard.	**AO9** Development is to be designed and constructed so that users are not exposed to a greater degree of hazard than shown in **Table 8.2.8-4: Table to acceptable outcome AO9** for the range of flows specified in **Table 8.2.8-5: Table to acceptable outcome AO11**.	**PO9 NOT APPLICABLE** The development is not listed in the table.	
Storage of hazardous chemicals (exceeding a threshold) in a flood hazard area			
PO10 Storage, handling or manufacturing areas that are identified on the Flood overlay map and contain hazardous chemicals in quantities greater than 2500L or 2500kg must be located and designed to minimise the likelihood of: • inundation by flood waters from creeks, rivers, lakes or estuaries and • the possibility of spills to flood waters	**AO10.1** The base of any tank with a capacity >2500L or >2500kg is higher than the designated flood level identified in **Table 8.2.8-3: Table to performance outcome PO7** (where the designated flood level is not specified a minimum flood level of 1% AEP must be applied).	**PO10 NOT APPLICABLE** The development does not propose storage of any hazardous materials.	
	AO10.2 Bulk tanks with a capacity >2500L or >2500kg: (a) are anchored so they remain stable and cannot float or topple if submerged or inundated by water, and		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	(b) tank openings not provided with a liquid tight seal, i.e. an atmospheric vent, are extended above the designated flood level identified in **Table 8.2.8-3: Table to performance outcome PO7** (where the designated flood level is not specified a minimum flood level of 1 in 100 must be applied).		
	AO10.3 The lowest point of any storage area for packages >2500L or >2500kg within an area identified on the Flood overlay map must be higher than the designated flood level identified in **Table 8.2.8-3: Table to performance outcome PO7** (where the designated flood level is not specified a minimum flood level of 1% AEP must be applied). OR Package stores, for packages >2500L or >2500kg, are provided with impervious bund walls or racking systems higher than the designated flood level identified in **Table 8.2.8-3: Table to performance outcome PO7** (where the designated flood level is not specified a minimum flood level of 1% AEP must be applied).		
Access with respect to hazard			
PO11 All proposed development must demonstrate that sufficient access or egress will be available to enable evacuation during a range of floods, up to and including the designated flood.	**AO11** Development, not including underground car parks, must ensure that evacuation opportunities exist in accordance with the minimum levels of exposure outlined in **Table 8.2.8-5:**	**AO11 COMPLIES** Refer to Section 6 of the Friends Civil Engineering flood code response report.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	Table to acceptable outcome AO11, where means of access or egress may be: (a) an access route that is below the level of the designated flood, provided that route is classed as a low hazard, as defined in **Table 8.2.8-5: Table to acceptable outcome AO11**; or (b) an access route that is not the main access route. However, it must remain effective for the duration of a range of flood events, up to and including the designated flood; or (c) a temporary access arrangement, provided that access can be gained without significant preparation time being required. The access or egress must: (a) in the event of a designated flood: (i) not expose users to undue risk; (ii) not cause, or have the cumulative potential to cause, real damage to land and/or premises; (iii) not interrupt or materially change the surface water drainage from or onto adjoining land; (b) not create, in the event of a flood, a sudden change in flow distributions, flood level or velocity that could result in: (i) the breaking of a levee; or		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	(ii) the establishment of blockage of a breakout; or (iii) excessive scour; or (iv) sedimentation; or (v) increased flood hazard.		
Filling, excavation and contouring			
PO12 Any change to ground level, by way of filling, excavation or contouring, must not result in damage, flood hazard or impediment to any Counter Disaster Plan, measure or create unreasonable change in the exposure to flood hazard.	**AO12** Changes to ground level, by way of filling, excavating or contouring, comply with a hydraulic master plan approved by Council. OR A flood study is prepared in accordance with the requirements set out in **AO6.1** and **AO6.2**, is approved by Council, and it is established that the development complies with, or does not impede, any Counter Disaster Plan measure.	**AO12 COMPLIES** Refer to Section 5 of the Friends Civil Engineering Flood Code Response Report	
PO13 Filling, excavation or contouring must not cause sedimentation, erosion or adverse impact on the City's drainage network.	**AO13** No acceptable outcome provided. For guidance, please refer to the **Healthy waters code**.	**PO13 NOT APPLICABLE** The development does not trigger the need for a sediment and erosion control plan. The works will not cause sedimentation, erosion or adverse impact on the City's drainage network.	
Landscaping			
PO14 Landscaping must not impede a natural waterway, a flood channel, flood storage or an overland flow path.	**AO14** Landscaping complies with a hydraulics master plan approved by Council. OR A flood study, allowing for the landscaping, is prepared in accordance with the requirements of **AO6.1 and**	**PO14 NOT APPLICABLE** Landscaping is minor and will not impede a natural waterway, a flood channel, flood storage or an overland flow path.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	AO6.2, and is approved by the Assessment Manager.		
Environmental values			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO15 Works to mitigate flood risks avoid adverse impact on other environmental values.	**AO15** No acceptable outcome is provided.		

Table 8.2.8-3: Table to performance outcome PO7

Land use	Designated flood[1]
Disaster management facilities	0.2% AEP
Hospitals	0.2% AEP
Major electrical switchyards, power stations, water treatment plants	0.2% AEP
Fire/police stations	0.5% AEP
Places of refuge	0.5% AEP
Electricity substations	0.5% AEP
Sewage treatment plants	0.5% AEP
Home for the aged, hospice	0.5% AEP
Regional fuel storage	0.5% AEP
Food storage warehouses	0.5% AEP
Hotel residential	1.0% AEP
Education facilities	1.0% AEP
Residential buildings	1.0% AEP
Camping grounds, caravan parks and relocatable homes reclamation levels	1.0% AEP
Commercial	1.0% AEP
Light industrial/warehousing	1.0% AEP
Theme parks	Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in **AO11**
Clubs/non-habitable buildings associated with enjoyment of public open space	Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in **AO11**
Car parking below buildings	Not specified, but users should not be subjected to any more than medium hazard conditions in the designated flood, as specified in **AO11**

Land use	Designated flood[1]
Open space	Not specified, but ancillary structures are subject to appropriate hazard conditions in the designated flood, as specified in **AO11**
Rural	Not specified

Notes for Table to acceptable outcome AO7:

(1) The designated flood level is the level that is associated with the minimum flood annual exceedence probability (AEP) for different land use types. For the Nerang River catchment the flood AEP must be calculated based on the Hinze Dam stage 2 condition. Where a modelled flood AEP is not available, historic information must be used. The designated flood level for each site must be obtained from the Council's flood search database.

Table 8.2.8-4: Table to acceptable outcome AO9

Land use	Appropriate degree of hazard				
	Nil	Low	Medium	High	Extreme
Places of refuge	√				
Public open space/recreation	√	√	√	√	
Theme parks	√	√	√	√	
Clubs/non-habitable buildings associated with enjoyment of public open space	√	√	√	√	
Commercial/industrial	√	√	√		
Residential	√	√	√		
Public institutions	√	√	√	√	
Car parking below buildings/at basement	√	√	√		
Caravan parks	√	√	√		
Council offices	√	√			
Educational facility (classrooms/office building	√				
Educational facility (sporting fields)	√	√	√		
Homes for the elderly	√	√			
Child Care Centre	√				
Hospitals	√	√			
Disaster management facility	√	√			

Land use	Appropriate degree of hazard				
	Nil	Low	Medium	High	Extreme
Police/fire stations	√	√			
Museums/libraries/archives/infrastructure plans repositories	√				
Telephone exchanges	√				

Note: √ Indicates an appropriate land use.

The above table examines the appropriateness of land use decisions from the aspect of flood hazard only. As such, it does not confer any land use rights or provide any indication that Council will reject or favourably consider various uses in particular areas. Such consideration will be dealt with appropriately, in the context of the City Plan, and based upon full consideration of all relevant issues.

Table 8.2.8-5: Table to acceptable outcome AO11

Criteria	Degree of flood hazard			
	Low	Medium	High	Extreme
Wading ability	If necessary children and the elderly could wade. (Generally, safe wading velocity depth product is less than 0.25.)	Fit adults can wade. (Generally, safe wading velocity depth product is less than 0.4.)	Fit adults would have difficulty wading. (Generally, where wading velocity depth product is less than 0.6.)	Wading is not an option.
Evacuation distances	<200metres	200-400metres	400-600metres	>600metres
Maximum flood depths	<0.3metres	<0.6metres	<1.2metres	>1.2metres
Maximum flood velocity	<0.4 metres per second	<0.8metres per second	<1.5metres per second	>1.5metres per second
Typical means of egress	Sedan	Sedan early, but 4WD or trucks later	4WD or trucks only in early stages, boats or helicopters	Large trucks. Boats or helicopters
Timing **Note:** **This category cannot be implemented until evacuation times have been established in the Counter Disaster Plan (flooding).**	Ample for flood forecasting. Warning and evacuation routes remain passable for twice as long as evacuation time.	Evacuation routes remain trafficable for 1.5 times as long as the evacuation time.	Evacuation routes remain trafficable for only up to minimum evacuation time.	There is insufficient evacuation time.

Note: The evacuation times for various facilities or areas would (but not necessarily) be included in the Counter Disaster Plan (flooding).

Generally, safe wading conditions assume even walking surfaces with no obstructions, steps, soft underfoot, etc.

Table 8.2.8-6: Table to acceptable outcome AO2.1

Land use	Designated flood level[1] plus minimum freeboard
Disaster management facilities	0.2% AEP + 500mm freeboard
Hospitals	0.2% AEP + 500mm freeboard
Major electrical switchyards, Power stations, Water treatment plants[2]	0.2% AEP + 500mm freeboard
Fire and Police stations[3]	0.5% AEP + 400mm freeboard
Places of refuge	0.5% AEP + 400mm freeboard
Electricity Substations[2]	0.5% AEP + 400mm freeboard
Sewage Treatment Plants[4]	0.5% AEP + 400mm freeboard
Homes for the aged, Hospice[5]	0.5% AEP + 400mm freeboard
Regional fuel storage	0.5% AEP + 400mm freeboard
Food storage warehouses	0.5% AEP + 400mm freeboard
Hotel residential	1.0% AEP + freeboard[8]
Educational facilities[6]	1.0% AEP + freeboard[8]
Residential buildings	1.0% AEP + freeboard[8]
Camping grounds, Caravan parks and Relocatable homes reclamation levels	1.0% AEP + freeboard[8]
Commercial[7]	1.0% AEP
Light industrial/Warehousing[7]	1.0% AEP
Theme parks	Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.
Clubs/Non-habitable buildings associated with enjoyment of public open space	Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.
Car parking below buildings/at basement or detached	Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.
Open space	Not specified, but ancillary structures are subject to appropriate hazard considerations at the designated flood.
Rural	Not specified

Notes for Table to acceptable outcome AO2.1:

(1) **The designated flood level is the level that is associated with the minimum flood annual exceedence probability (AEP) for different land use types. For the Nerang River catchment the flood AEP must be calculated based on the Hinze Dam stage 2 condition. Where a modelled flood AEP is not available, historic information must be used. The designated flood level for each site must be obtained from the Council's flood search database.**

(2) **Applies to switchyard components necessary for the operation of the facility during a flood emergency. This shall be determined by Powerlink.**

(3) **Excludes 'shop front' facilities and those not likely to be utilised during a flood emergency.**

(4) **Specifically, bunds, electrical and mechanical equipment necessary for the continued operation of a sewage treatment plant shall not be at risk of inundation during a flood emergency.**

(5) **The flood immunity specified is to meet the objective of not adding to the burden of flood emergency services.**

(6) **It is not necessary that all rooms within an education facility be above the 1% AEP level. However, there should be sufficient space to accommodate the whole of the school population during a flood event.**

(7) **Freeboard is not specified, as it is considered that commercial risk provisions should apply. If such land is developed to a flood immunity less than 1% AEP (as may be permitted by any local planning instrument), Council may endorse rates notices accordingly.**

(8) **for these uses the height of 300mm freeboard is as per the *Building Regulation 2006*.**

STORMWATER MANAGEMENT PLAN

Enhance
URBAN PLANNING

239 & 241 Boundary Street, Coolangatta

Friends civil engineering

239 & 241 Boundary Street, Coolangatta

Stormwater Management Plan

For: Intrepid Developments (Qld) Pty Ltd

January 2023

The information contained in this report has been prepared based on the information made available to Friends Civil Engineering Pty Ltd at the time of preparation. This document, design parameters, and conclusions rely on external data sources, and the accuracy of this document is correct to the extent of the information provided to us.

This report has been prepared solely for the benefit of our client. We do not accept any liability for damage or loss resulting from reliance on this report, or any part of it, by any party other than the client (named on this page of this report).

Document Control

Author	**Alex Rowlands**		
Certification	Alex Rowlands RPEQ No.: **24572**		Signed: 
Report Title	R001-FE22103 – Stormwater Management Plan		
Revision	1	**Date**	24/01/2023

Revision History

Revision	Date	Author	Approver	Description
1	24/01/2023	AR	RR	For Council Submission

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Contents

1. Introduction

This report has been prepared to support a Development Application to be lodged with and approved by the City of Gold Coast Council. The proposed development comprises a 16-storey multiple dwelling building.

The development occurs over the following parcels of land:

Property Address:	239 & 241 Boundary Street, Coolangatta
Property Description:	Lot 6 & 7 on RP1777
Council:	City of Gold Coast
Registered Site Area:	810m^2

The purpose of this report is to address the management of stormwater quantity and quality to ensure that the proposed development complies with all necessary state and local government policies.

This report demonstrates the likely impact of the proposed development in relation to stormwater quantity and quality, with proposed treatment measures documented in this report to achieve all relevant objectives.

1.1 Report Abstract

This report recommends the following treatment systems for inclusion in the development design:

- Proprietary water quality treatment system (comprising 2/ "SPEL Filter" cartridges in an underground chamber);
- Stormwater detention via a 12kL underground detention tank (10m^3 for detention and 2m^3 to house the SPEL cartridges).

Based on the analysis presented in this report, the proposed system will achieve compliance with the relevant state and local government standards and support the approval of the proposed development.

1.2 Related Engineering Reports

A separate document by Friends Civil Engineering has been prepared to demonstrate the flood compliance of the development. Refer to report reference R2-FE22103.

1.3 Previous Approvals or Requests for Information

There are no records of previous development applications over the land parcel.

2. Property Description

2.1 Site Locality

The subject site is located in the urbanised area of Coolangatta on the Gold Coast. The site is surrounded by a variety of residential, tourist and commercail uses, as well as the nearby Coolangatta beachfront.

The zoning of the land is "High Density Residential" in accordance with the current City of Gold Coast City Plan.

The site has access to Boundary Street via the south-eastern boundary of the land parcel and Ward Street via the south-western. Full details of the site topography and existing features are shown on the detailed site survey in Appendix A. A general locality plan is presented in Figure 2.1 below:

Figure 2.1 - Site Locality (Courtesy of City of Gold Coast City Plan – Accessed October 2022)

2.2 Land Usage

Prior to the proposed development, the sites contain two walk-up style unit buildings.

2.3 Topography and Drainage

The development site generally grades towards the north-west, with surface flows collected by the existing stormwater infrastructure within Ward Street.

Details of the existing topography can be found on the site survey provided as Appendix A.

2.4 Upstream Catchment

All surrounding allotments are developed with drainage to the street frontage via each allotment's outlet to the kerb or connection to Council infrastructure. As such the site is not affected by any upstream catchments.

2.5 Regional Flooding

The site is partially affected by regional flooding in the Council's flood mapping data base.

The DFL relates to a flood with a 1% Annual Exceedance Probability (sometimes referred to as a 1 in 100 year return interval).

The DFL affects the site primarily along the Ward Street frontage with the majority of the remainder of the site being flood free. The surrounding roadways experience flooding depths slightly in excess of 300mm during the DFL.

Figure 2.2 below shows the extents of flooding surrounding the site in the DFL.

Figure 2.2 Flood Mapping (Courtesy of City of Gold Coast City Plan – Accessed October 2022)

A separate document by Friends Civil Engineering has been prepared to demonstrate the flood management procedures proposed for the development. Refer to report reference R2-FE22103.

3. Proposed Development

The proposed development comprises a 16-storey multiple dwelling tower. Key components of the development proposal include the following:

- 3 levels of underground carparking.
- 16 storeys of residential apartments.
- Shared internal driveway to underground carparking.

No major external works are proposed as part of the development.

The only works outside the site boundary are expected to include a new vehicle cross over (VXO) to allow for access to the site, as well as connections to public infrastructure such as stormwater, water, sewer, electricity and telecommunications.

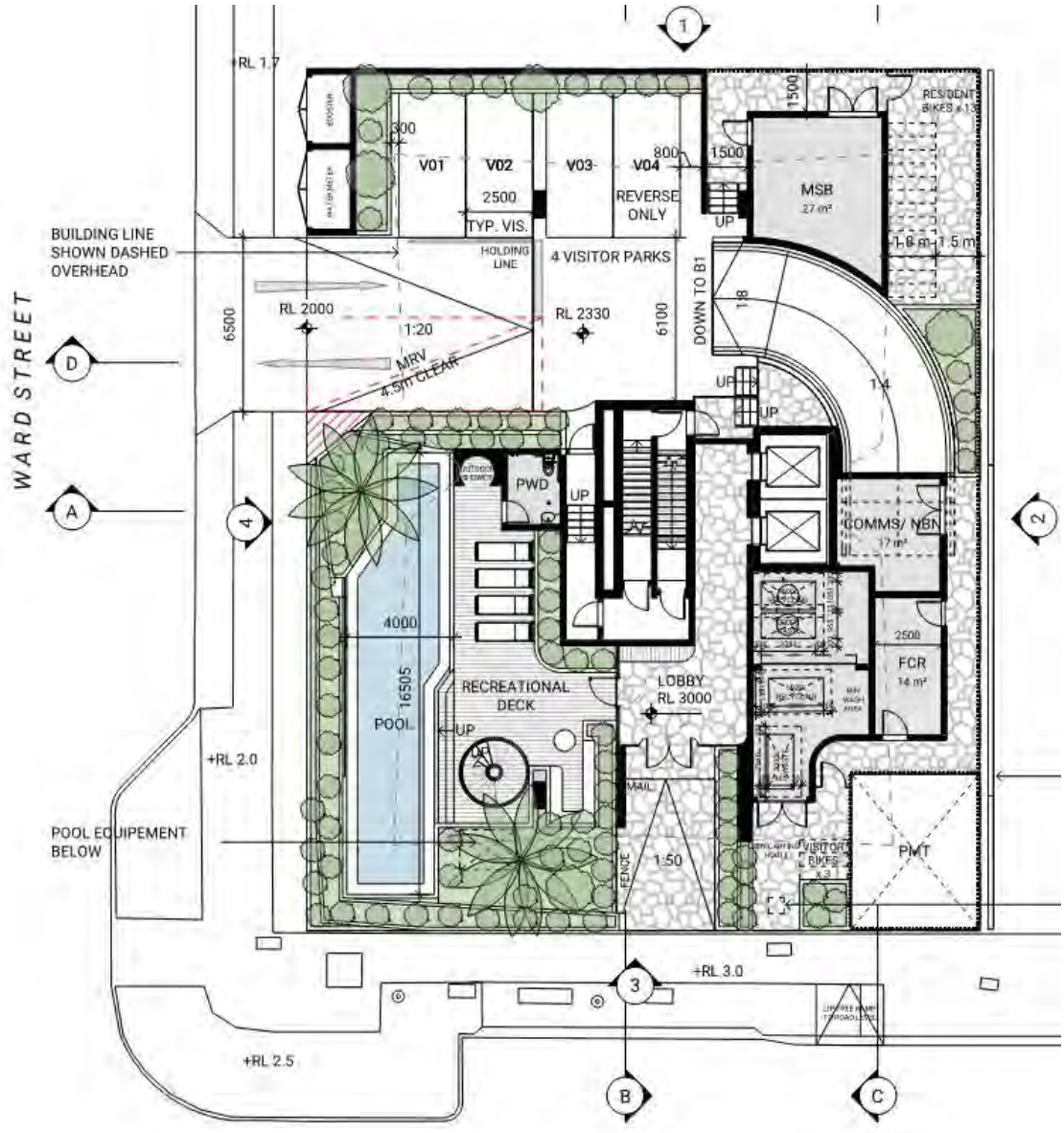


Figure 3.1 Proposed Development (Courtesy of Plus Architecture)

4. Lawful Point of Discharge

In the existing case, the site discharges towards Ward Street via overland flow and a connection to the existing gully pits adjacent to the site's frontage.

In the developed case, it is proposed that this outlet arrangement will remain unchanged, with direct connection for site flows to the existing stormwater pit within the site frontage.

The proposed discharge arrangement is considered to comply with the requirements of a lawful point of discharge and will be maintained following the development of the site. It is not anticipated that any stormwater will be directed towards any adjacent properties.

QUDM (2017) provides a three-part framework for the identification of a lawful point of discharge for a development site. The first assessment item is to consider if the proposed development will alter the site's stormwater discharge characteristics in a manner that may substantially damage a third-party property. As the proposed development is not considered likely to worsen the flows received by the council stormwater infrastructure, the proposed point of discharge is considered to satisfy the requirements set out in Section 3.9.1 – Lawful Point of Discharge Test.

This compliance is further demonstrated in the following pages where it is shown that the proposed development will result in no worsening of peak flows from the development site.

5. Site Specific Hydrology

The proposed development will involve the construction of a multi-level residential development. This will include a new access driveway, car parking and other associated hardstand surfaces. This will result in an alteration to the coefficient of discharge, and the peak stormwater discharge rates of the development site.

This section of the report addresses peak stormwater discharge resulting from the site and identifies whether attenuation measures are necessary to ensure "no-worsening" of the peak flows from the site.

5.1 Methodology

The methodology of the hydrologic analysis involves the use of both the Rational Method and DRAINS runoff-routing software.

The Rational Method, as described by the Queensland Urban Drainage Manual (QUDM 2017), provides a simple means for the assessment of the peak discharge rate for design storms. The rational method does not provide a reliable basis for the determination of runoff volume or hydrograph shape.

DRAINS software (by Watercom) is a computer-based model that incorporates time-area routing processes to more accurately determine the volume and shape of the hydrograph during a storm event. DRAINS also includes storage-routing processes that can simulate the effect of stormwater detention systems.

The Rational Method is used in the hydrologic analysis to calibrate and verify the results of the DRAINS software modelling, in lieu of the availability of gauged information.

Once calibrated and verified, the DRAINS software modelling is used to calculate all the pre and post development hydrographs that are used in the assessment, and for the design of the proposed stormwater detention system.

5.2 Catchment Definition

In the existing case, the site has been modelled as a single catchment, and considers the site's current impervious value of 60% refer DA01 in Appendix B.

In the developed case, the development site is represented and modelled individually, considering the site catchment consisting of 92% impervious, refer DA02 in Appendix B.

Table 5.1 below summarises the catchment properties used for the Rational Method calculations.

Table 5.1 Catchment Parameters

Catchment	Catchment Area	Fraction Impervious
Pre-Development	810m^2	0.60
Post-Development	810m^2	0.92

5.3 Site Specific Rational Method Calculations

Time of Concentration

The development site is developed with two buildings in the pre-developed scenario and the time of concentration was calculated using standard inlet times. A time of concentration of 5 minutes was adopted.

In the post-development scenario 5 mins standard inlet is also considered an appropriate time of concentration for such developed catchment.

C_{10} Value

In this instance the development site is zoned as High Density Residential in both pre- and post-development conditions. In accordance with the City of Gold Coast's Land Development Guidelines Section SC6.11.4 Table 4.4: Runoff Coefficient vs. Development Category, the C_{10} value would not change. Using this method of C_{10} value estimation, there would be zero impact on peak runoff.

In reality however, the sites imperviousness is changing from 60% to 92%, which would potentially cause a minor impact on peak flow rates.

The Queensland Urban Drainage Manual (QUDM, 2017) Table 4.5.3 has therefore been referenced as a second source to estimate the sites C_{10} values based on the sites imperviousness. The adopted C_{10} values for the site are presented in Table 5.2 below.

The adopted C_{10} values for the site are presented in Table 5.2 below.

Table 5.2 C_{10} Values

	Area	C_{10} QUDM
Pre-development	810m^2	0.82
Post-development	810m^2	0.884

Rainfall Intensity

Rainfall intensity data has been obtained from the Australian Bureau of Meteorology's Design Rainfall Data System, using the nearest grid cell coordinates: 27.9375 (S) and 153.4125 (E).

Table 5.3 overleaf provides the Intensity Frequency Distribution (IFD) chart.

Table 5.3 Rainfall Intensity Chart (depths in mm)

Duration	Duration in min	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	2.85	3.22	4.36	5.14	5.9	6.9	7.67
2 min	2	4.95	5.57	7.56	8.95	10.3	12.5	14.2
3 min	3	6.89	7.77	10.6	12.5	14.4	17.3	19.6
4 min	4	8.65	9.76	13.3	15.7	18.1	21.5	24.2
5 min	5	10.3	11.6	15.7	18.6	21.4	25.3	28.3
10 min	10	16.5	18.6	25.2	29.6	33.9	39.5	43.7
15 min	15	20.9	23.6	31.9	37.4	42.8	49.7	54.9
20 min	20	24.3	27.4	37.1	43.5	49.8	57.9	64
25 min	25	27.2	30.6	41.4	48.6	55.7	64.9	71.8
30 min	30	29.5	33.3	45	53	60.7	71	78.8
45 min	45	35.2	39.6	53.8	63.5	73.2	86.3	96.6
1 hour	60	39.5	44.5	60.6	71.9	83.2	98.9	111
1.5 hour	90	46	52	71.5	85.4	99.5	120	136
2 hour	120	51.2	57.9	80.2	96.4	113	137	157
3 hour	180	59.3	67.4	94.5	115	136	166	191
4.5 hour	270	68.9	78.6	112	137	163	201	232
6 hour	360	76.7	87.9	126	155	186	229	265
9 hour	540	89.7	103	150	185	223	275	318
12 hour	720	100	116	169	209	252	311	359
18 hour	1080	118	137	200	248	298	366	421
24 hour	1440	132	153	225	277	332	406	465
30 hour	1800	143	167	244	300	358	437	499
36 hour	2160	153	178	261	319	379	462	526
48 hour	2880	169	197	286	349	412	499	568
72 hour	4320	191	222	320	387	453	548	622
96 hour	5760	204	237	340	411	479	579	658
120 hour	7200	213	247	353	426	498	603	685
144 hour	8640	218	252	362	438	514	623	709
168 hour	10080	220	255	367	447	528	641	731

Results

The results of the Rational Method calculations are presented in Table 5.4.

Table 5.4: Rational Method Results

AEP	*39%*	*18%*	*10%*	*5%*	*2%*	*1%*
Q Pre-developed (m3/s)	0.021	0.033	0.041	0.049	0.063	0.074
Q Post-developed (m3/s)	0.023	0.035	0.044	0.053	0.067	0.075
Impact (m3/s)	***+0.002***	***+0.002***	***+0.003***	***+0.004***	***+0.004***	***+0.001***

The rational method results demonstrate that the proposed development will result in an increase in flow volumes expected from the development site. A detention system has therefore been sized for the proposed development using the DRAINS modelling software.

5.4 Detention Design Parameters

A process of iteration using a combination of detention system height, storage and outlet pipework arrangements have been used to determine the optimal design for the detention system. Table 5.5 below provides the final dimensions, volume and outlet configuration of the detention system adopted for the development, implemented within a combined detention/treatment tank to catch runoff from the proposed development.

Table 5.5 Detention System Design Parameters

Detention Parameters

	Basement Detention Tank
Detention Base	10.0m²
Detention Depth	1.0m
Total Detention Volume**	10.0m³ max
Outlet Pipe Size/Level	1 x Ø150mm outlet pipe at invert of the tank 900x900mm access/surcharge pit 1.0m from base of tank

All areas of the proposed development are to be connected directly to the detention system. A screenshot of the DRAINS model used to model the development site is presented in Figure 5.1 overleaf:

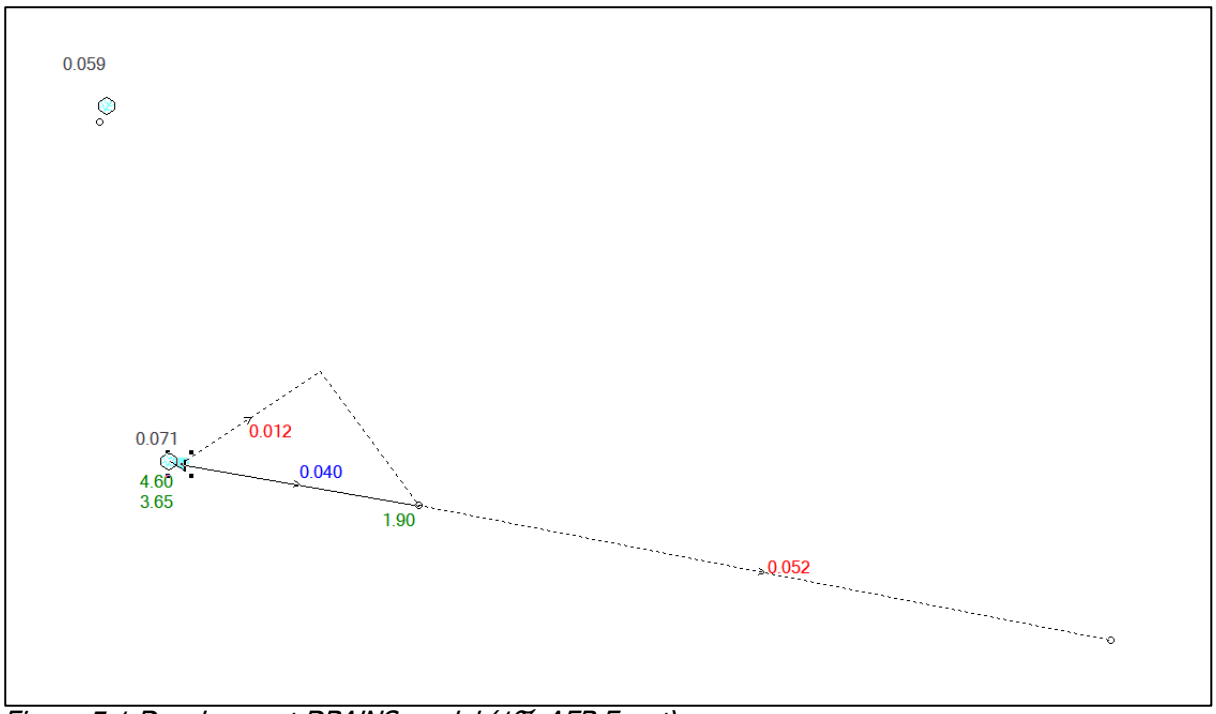


Figure 5.1 Development DRAINS model (1% AEP Event)

5.5 DRAINS Hydrologic Modelling Results

The on-site stormwater detention arrangement described in Table 5.5 has been designed to demonstrate that the proposed on-site detention strategy is effective in reducing developed case peak stormwater discharge to a rate that is less than the existing, pre-development case scenario.

The results of the assessment and confirmation of the achievement of the on-site detention objectives are displayed in Table 5.6.

Table 5.6 Development Runoff Calculations with Detention – DRAINS Model

Development Site Discharge	39% (m^3/s)	18% (m^3/s)	10% (m^3/s)	5% (m^3/s)	2% (m^3/s)	1% (m^3/s)
$Q_{Pre\text{-}Development}$	0.023	0.030	0.037	0.043	0.052	0.059
$Q_{Detention\ Outlet}$	0.023	0.027	0.031	0.034	0.040	0.052
Peak Flow Reduction	-0.000	-0.003	-0.006	-0.009	-0.012	-0.007

The comparison of pre-developed and attenuated post-developed with detention conditions confirm that non-worsening of peak discharges in the 39, 18, 10, 5, 2 and 1 percent AEP storm events is achievable with the detention system described in previous sections.

For further information on the location and details of the proposed detention area, refer to the Engineering Drawings attached as Appendix B.

6. Stormwater Quality

6.1 Introduction

This section of the report aims to identify the requirements for stormwater quality management resulting from the proposed development and recommend suitable stormwater treatment devices to comply with relevant requirements of the State Planning Policy and the City of Gold Coast City Plan Policy – Land Development Guidelines.

6.2 State Planning Policy Assessment

An assessment has been undertaken to determine whether the development proposal necessitates compliance with the State Planning Policy (SPP) objectives. The following trigger questions are used to determine whether SPP compliance is required.

Table 6.1- State Planning Policy Trigger Questions

Trigger Question	Development Response
Material Change of Use for Urban Purposes with a land area greater than 2,500m^2 and:	No
a) Will result in an impervious area greater than 25% of the net developable area; or	-
b) Will result in 6 or more dwellings.	-
Reconfiguration of Lot for Urban Purposes that involves a land area greater than 2,500m^2, and will result in 6 or more lots	No

The above table indicates that the development does not trigger a requirement to comply with the water quality objectives outlines within the State Planning Policy.

6.3 Local Authority Assessment

Further to the requirement to comply with the SPP objectives, an assessment has been undertaken to determine whether the development proposal necessitates compliance with City of Gold Coast (CoGC) objectives. The following trigger questions are used to determine whether CoGC compliance is required.

Table 6.2- City of Gold Coast Trigger Questions

Trigger Question	Development Response
Greater than 850m^2 of land and results in an increased number of allotments	No
3 or more dwellings (attached or detached)	**Yes**
Includes newly constructed road (previously unformed road) exceeding 30m in total length	No
Includes 200m^2 or more uncovered new or refurbished car park area including parking bays and circulation driveway	No

As the above trigger questions are applicable to this development, the site is required to achieve the design objectives of the City of Gold Coast City Plan Policy.

6.4 Water Quality Objectives and Methodology

Table 6.3 indicates that the proposed development triggers the requirement for the development to achieve the Water Quality Objectives outlined in the CoGC City Plan. As such, the development must demonstrate the following minimum reductions in mean annual pollutant loads from the unmitigated development:

Table 6.3- Water Quality Objectives

Pollutant	**Minimum Reduction in Mean Load (%)**
Total Suspended Solids (kg/yr)	80
Total Phosphorus (kg/yr)	60
Total Nitrogen (kg/yr)	45
Gross Pollutants (kg/yr)	90

To design and assess the achievement of these stormwater quality objectives the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 6.3 has been utilised to size suitable stormwater quality improvement devices as described in the following sections.

6.5 Catchment Areas & Source Nodes

The development areas have been separated into pollutant source nodes for MUSIC modelling using the "split catchment" approach as follows with the areas as follows:

- Roof Area to Treatment = 415m^2 (100% Impervious);
- Hardstand to Treatment = 303m^2 (100% Impervious);
- Landscaped Ground Area to Treatment = 66m^2 (0% Impervious); and
- Road Area to Treatment = 26m^2 (100% Impervious).

6.6 Recorded Rainfall Data – Gold Coast Central

Rainfall data for the site was taken from the City of Gold Coast (Central) Hinze Dam (ID 40584) using the dates 1/1/1976 – 31/12/1985 in accordance with the Water By Design – MUSIC Modelling Guidelines (2010) using a 6 minute time step. The mean average rainfall over the period is 1,371mm.

Rainfall over this time period was modelled using MUSIC to calculate the pollutant generation and treatment effectiveness of the proposed systems.

6.7 Rainfall-Runoff Parameters

Rainfall-runoff parameters were taken in accordance with the Water by Design – MUSIC Modelling Guidelines (2010) using *Urban* land use. The MUSIC modelling parameters used are tabulated in Table 6.4 below:

Table 6.4: MUSIC Modelling Parameters

Parameter	Value
Rainfall threshold (mm)	1.00
Soil storage capacity (mm)	500
Initial storage (%)	10
Field capacity (mm)	200
Infiltration capacity coefficient a	211
Infiltration capacity exponent b	5.0
Initial depth (mm)	50
Daily recharge rate (%)	28
Daily baseflow rate (%)	27

6.8 Pollutant Export Parameters

Pollutant export parameters were taken in accordance with Water by Design – MUSIC Modelling Guidelines (2010) using the *Urban Residential* land use.

The split catchment approach was utilised for each surface type, with the input parameters shown in
Table 6.5 below:

Flow Type	Surface	TSS log10 values		TP log10 values		TN log10 values	
Flow Type	Surface	TSS log^{10} values		TP log^{10} values		TN log^{10} values	
Baseflow	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Roads	1.00	0.34	-0.97	0.31	0.20	0.20
	Ground	1.00	0.34	-0.97	0.31	0.20	0.20
Stormflow	Roof	4.50	0.39	-0.89	0.31	0.26	0.23
	Roads	2.43	0.39	-0.30	0.31	0.26	0.23
	Ground	2.18	0.39	-0.47	0.31	0.26	0.23

Table 6.5: Pollutant Export Parameters

6.9 Proposed Treatment Device Details

It is proposed to treat stormwater runoff with a SPEL Filter cartridge system.

The SPEL Filter is a proprietary cartridge filter system that incorporates an up flow treatment process that maximises surface treatment area. Flow through the filter cartridges utilises a self-regulating siphon which results in a low maintenance and high performance stormwater treatment. The automatic backwash at the end of each storm event further lengthens the lifespan of the filter.

Hydraulic pressure forces water through the filter media — causing a constant velocity throughout the filter area realising a consistent media contact time and therefore treatment.

Upon completion of a treatment cycle, the filter backwashes and effectively dislodges particulates from the filtration layers. This re-establishes filter media porosity. The

dislodged particles then accumulate away from the filter media allowing easy removal during maintenance.

Figure 6.1 SPEL Filters located in a tank (diagram only)

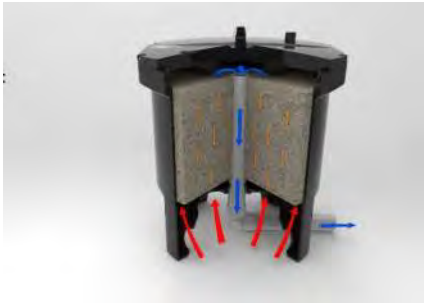


Figure 6.2 Inside the SPEL Filter showing the movement of water through the cartridge (diagram only)

6.10 MUSIC Modelling Results

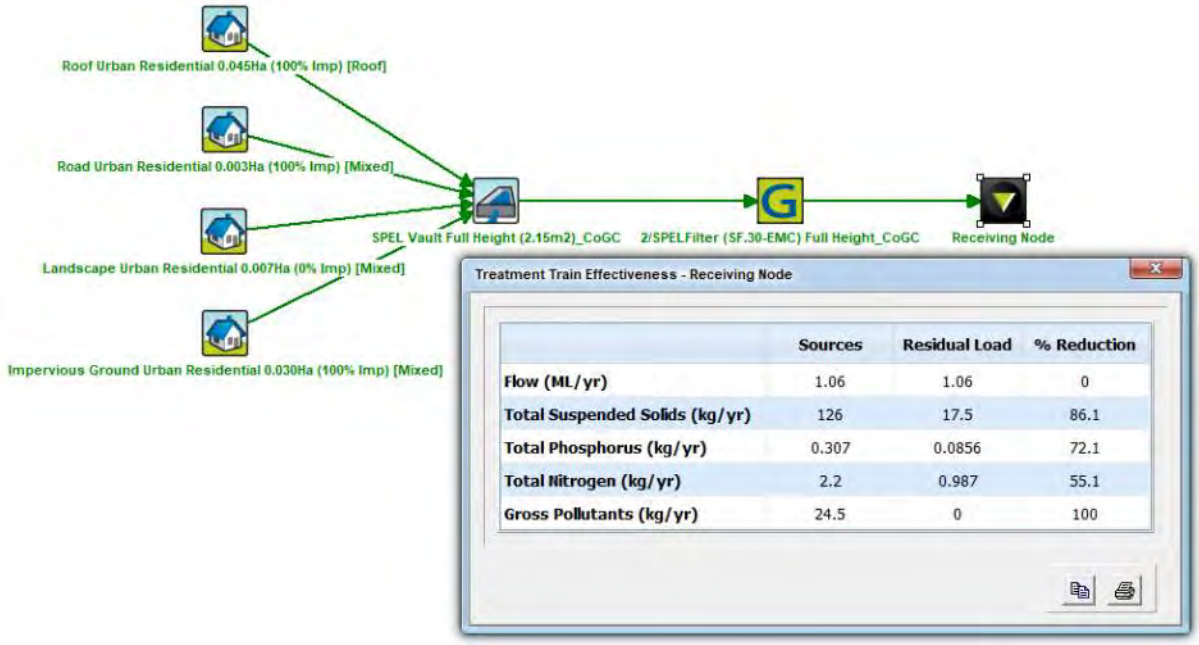
MUSIC was used to model the treatment train effectiveness in terms of the percentage of pollutants being removed from the system using the proposed treatment devices.

The results of the MUSIC modelling compared to the stated Water Quality Objectives (WQO's) are presented in Table 6.6 below:

Table 6.6: MUSIC Modelling Results

Potential Pollutant	**Target WQO's**	**MUSIC Results**
Total Suspended Solids (kg/yr)	80%	86.1
Total Phosphorus (kg/yr)	60%	72.1
Total Nitrogen (kg/yr)	45%	55.1
Gross Pollutants (kg/yr)	90%	100

The results in Table 6.6 indicate that the proposed treatment strategy is efficient in achieving the water quality objectives and exceeds the minimum required pollutant reduction targets. A screenshot of the MUSIC model used for the development is included as Figure 6.3.



	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.06	1.06	0
Total Suspended Solids (kg/yr)	126	17.5	86.1
Total Phosphorus (kg/yr)	0.307	0.0856	72.1
Total Nitrogen (kg/yr)	2.2	0.987	55.1
Gross Pollutants (kg/yr)	24.5	0	100

Figure 6.3 MUSIC Model Screenshot

7. Conceptual Erosion and Sediment Control Plan

7.1 Introduction

During construction, it shall be the responsibility of the Principal Contractor to ensure that the development complies with the relevant erosion and sediment control objectives, as outlined in the State Planning Policy and the City of Gold Coast City Plan.

This section of the report provides suggested inclusions in an erosion and sediment control plan for the proposed development site. This plan includes recommendations for monitoring & reporting responsibilities and the construction of site-specific sedimentation and erosion control measures. Detailed drawings specifying the proposed erosion and sediment control measures are to be provided at the Operational Works stage of the development.

7.2 General Erosion and Sediment Control Measures

It shall be the responsibility of the Principal Contractor to ensure the following erosion and sediment control measures are implemented on site:

- Clean stormwater runoff from upstream allotments is to be directed away from the development site using earth bunds or cut-off drains, as deemed appropriate by a suitable supervisor;
- The prevention of sediment runoff towards other allotments via the effective implementation of silt fences, sediment basins or other mitigation devices as deemed appropriate by a suitable supervisor;
- Sediment runoff shall also be prevented from entering the Council stormwater drainage system via the implementation of control measures such as gully pit sediment barriers;
- Erosion shakedown points shall be established at all vehicular access points, with shakedown areas regularly swept clean and sediment removed; and
- Erosion and sediment control measures are not to be removed from the development site until the site is completely rehabilitated and the surface is capable of resisting erosion.

7.3 Spoil and Stockpile Management Measures

It shall be the responsibility of the Principal Contractor to ensure the following spoil and stockpile management measures are implemented on site:

- Where the stockpiling of spoil and excess earthworks is necessary on the development site, stockpiles shall be established as far away as possible from stormwater inlets and pipelines to reduce the likelihood of sediment runoff; and
- Stockpiles are to be established within a designated zone of fill material and should be surrounded with appropriate erosion and sediment control measures.

7.4 Training Requirements

It shall be the responsibility of the Principal Contractor to ensure the following training protocols are implemented on the development site:

- Site induction courses shall include details of an environmental management reporting system, through which personnel will be able to report perceived erosion and sediment control issues on site.

8. Conclusion

This report has been prepared to support the lodgement of a development application to approve the construction of a new 16-storey multiple dwelling building.

This report has addressed the management of stormwater quantity and quality to ensure that the proposed development complies with all necessary state and local government policies.

This report recommends the following treatment systems for inclusion in the design of the development:

- Proprietary water quality treatment system (comprising 2/ "SPEL Filter" cartridges in an underground chamber);
- Stormwater detention via a 12kL underground detention tank (10m^3 for detention and 2m^3 to house the SPEL cartridges).

Based on the analysis presented in this report, these systems will achieve compliance with the relevant State and Local Council standards and support the approval of the proposed development.

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Appendix A

- Site Survey
- Development Layout Plans

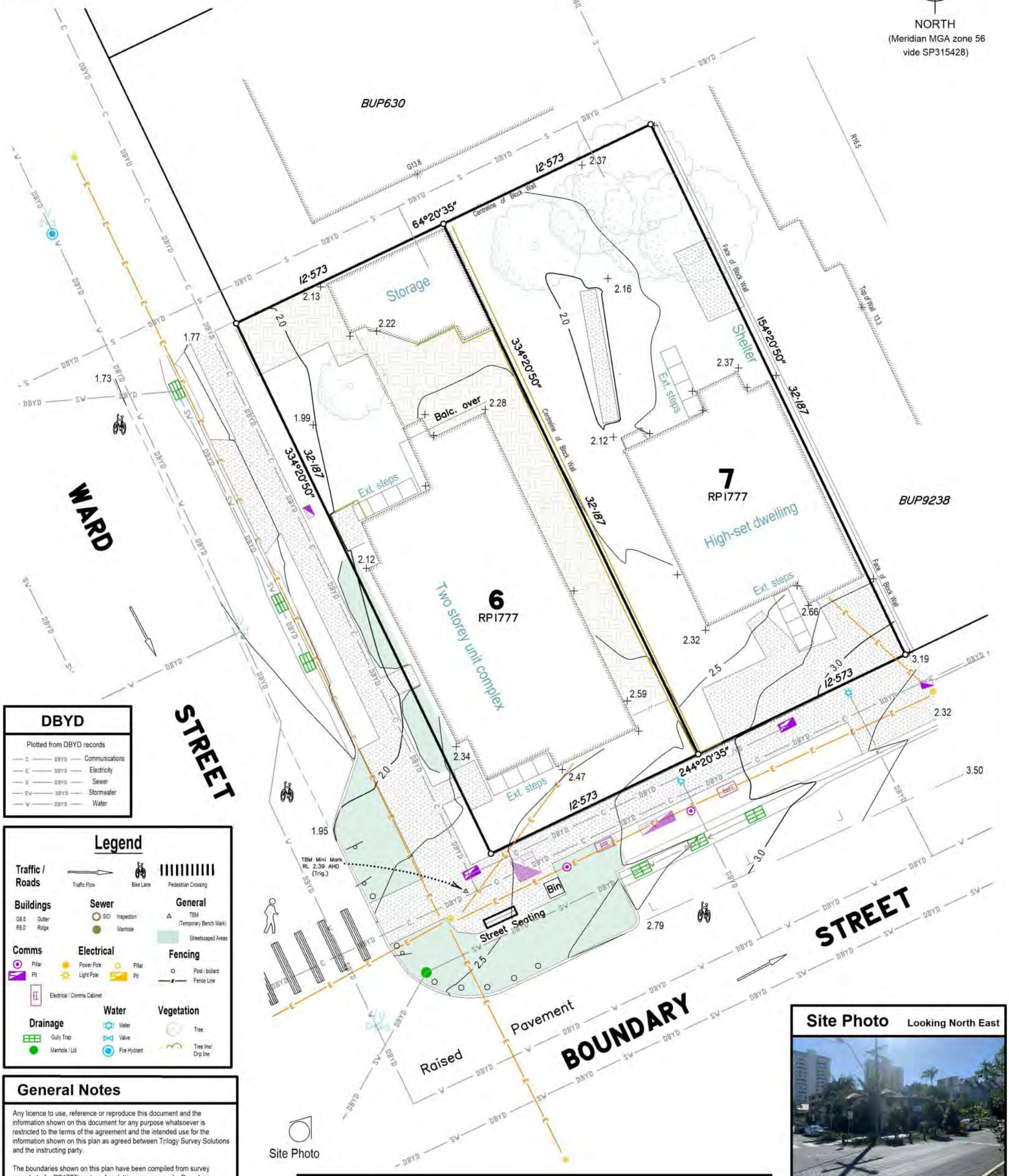
3D Tin - Notes

3d Tin - refer layer "Tin Surveyed":
The 3d tin may be a combination of surface levels, road features, improvements such as retaining walls, concrete paths and slabs, etc.

Nominated Flood Level

The defined flood level as per Council records has not been searched unless noted otherwise

NORTH
(Meridian MGA zone 56 vide SP315428)



DBYD

Plotted from DBYD records

- Communications
- Electricity
- Sewer
- Stormwater
- Water

Legend

Traffic / Roads: Traffic Flow; Bike Lane; Pedestrian Crossing

Buildings: G8.0 Gutter; R8.0 Ridge

Sewer: SIO Inspection; Manhole

General: TBM (Temporary Bench Mark); Streetscaped Areas

Comms: Pillar; Pit

Electrical: Power Pole; Light Pole; Pillar; Pit; Electrical / Comms Cabinet

Fencing: Post / bollard; Fence Line

Drainage: Gully Trap; Manhole / Lid

Water: Meter; Valve; Fire Hydrant

Vegetation: Tree; Tree line/ Drip line

General Notes

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The boundaries shown on this plan have been compiled from survey records (refer RP1777) and are for plotting purposes only. Boundary corners have not been reinstated or marked on site.

Only visible features (inspection openings) of underground services have been located (unless noted otherwise). Positions plotted are indicative only compiled from available records and should be confirmed prior to undertaking any works on site. The extents of any services as shown should not be relied upon without verification on site. Contact relevant authorities before any excavation.

Site Photo

Looking North East

General Notes

This plan and the information contained within have been provided for the use of the intended person/s only and has prepared specific for thier use. As such information shown is per the scope only and may not be inclusive of all detail on site.

Trilogy Survey Solutions accept no responsibility for the misuse or misunderstanding of information contained on this plan. Anyone referring to the plan must make thier own judgements and site analysis to determine if the information is current and correct.

Revision:	Notes:

Trilogy Survey Solutions
Over 30 years experience

SURVEY SERVICES ■ CADASTRAL / TITLING ADVICE

GOLD COAST

0431 400 670

wayneg@trilogyss.com.au

Project Specifics:	
Local Government:	Gold Coast City
RP Description:	Lot 6 and 7 on RP1777
Project Coordinates:	Local
Project Meridian:	MGA vide SP315428
Level Datum:	AHD (derived) from PSM 124958 RL28.571
Contour Interval:	Contours @ 0.25m intervals

Scale: 1:200 @ A3
0 2 4 6m
1 : 200@A3 (Before Reduction)

Client: Intrepid Developments (Qld) P/L

Detail Survey

239-241 Boundary St Coolangatta

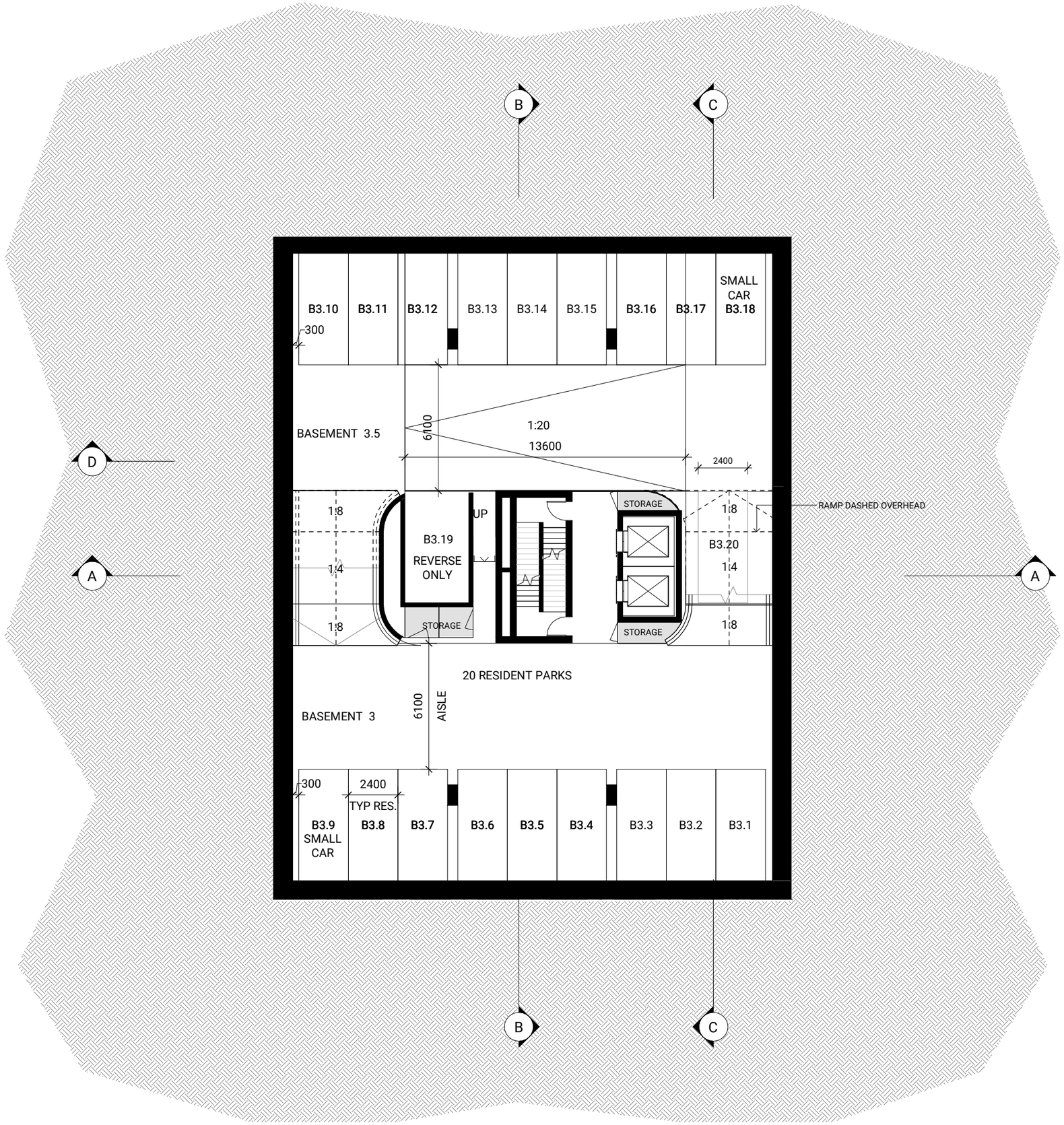
Sheet 1 of 1

Drawn: WG

Surveyed: WG

Drawing Number: TSS-221006-001-A

DA097
FLOOR PLAN - BASEMENT 03



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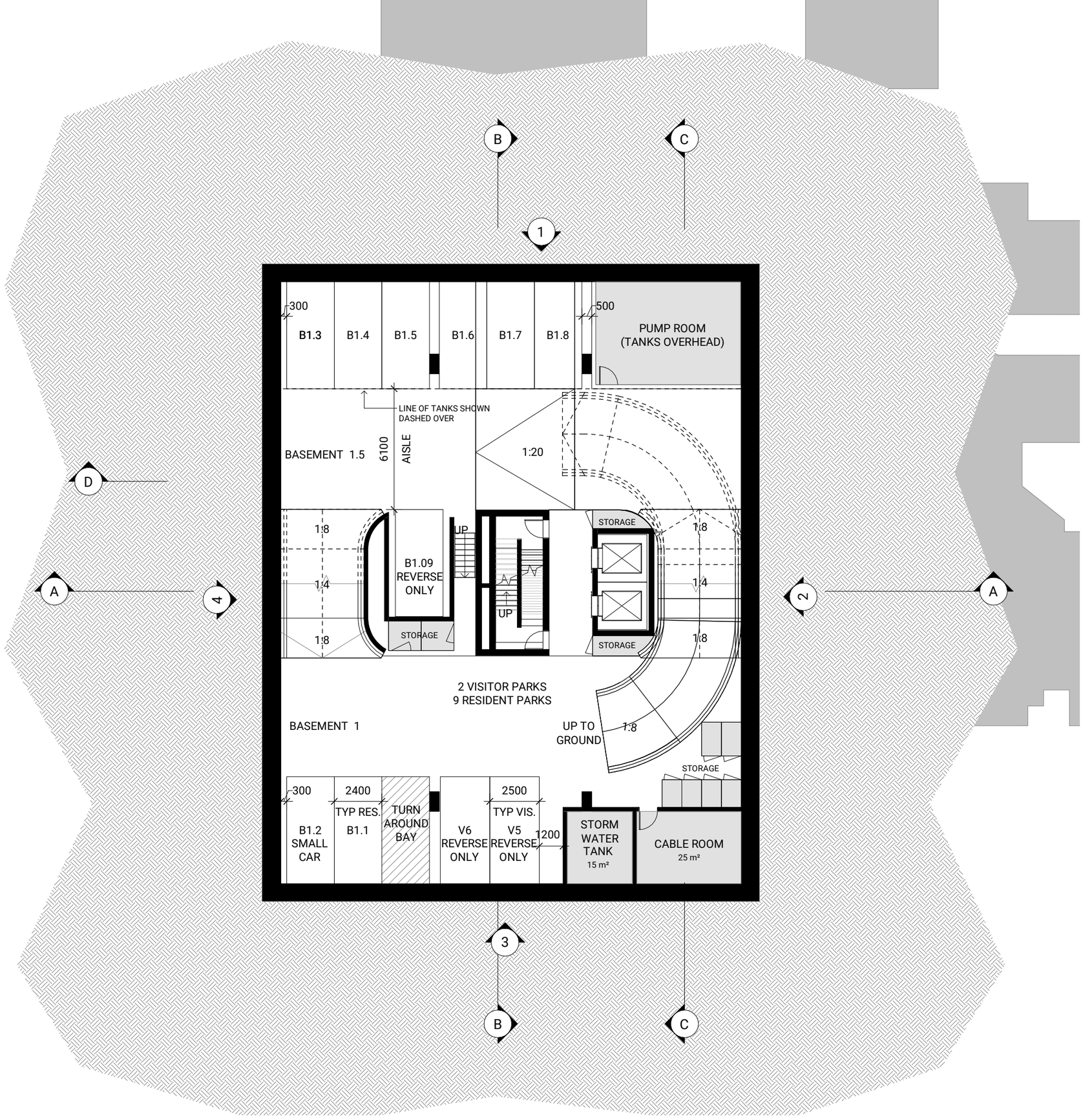
SCALE 1:200 @ A3 SIZE m

DA099
FLOOR PLAN - BASEMENT 01



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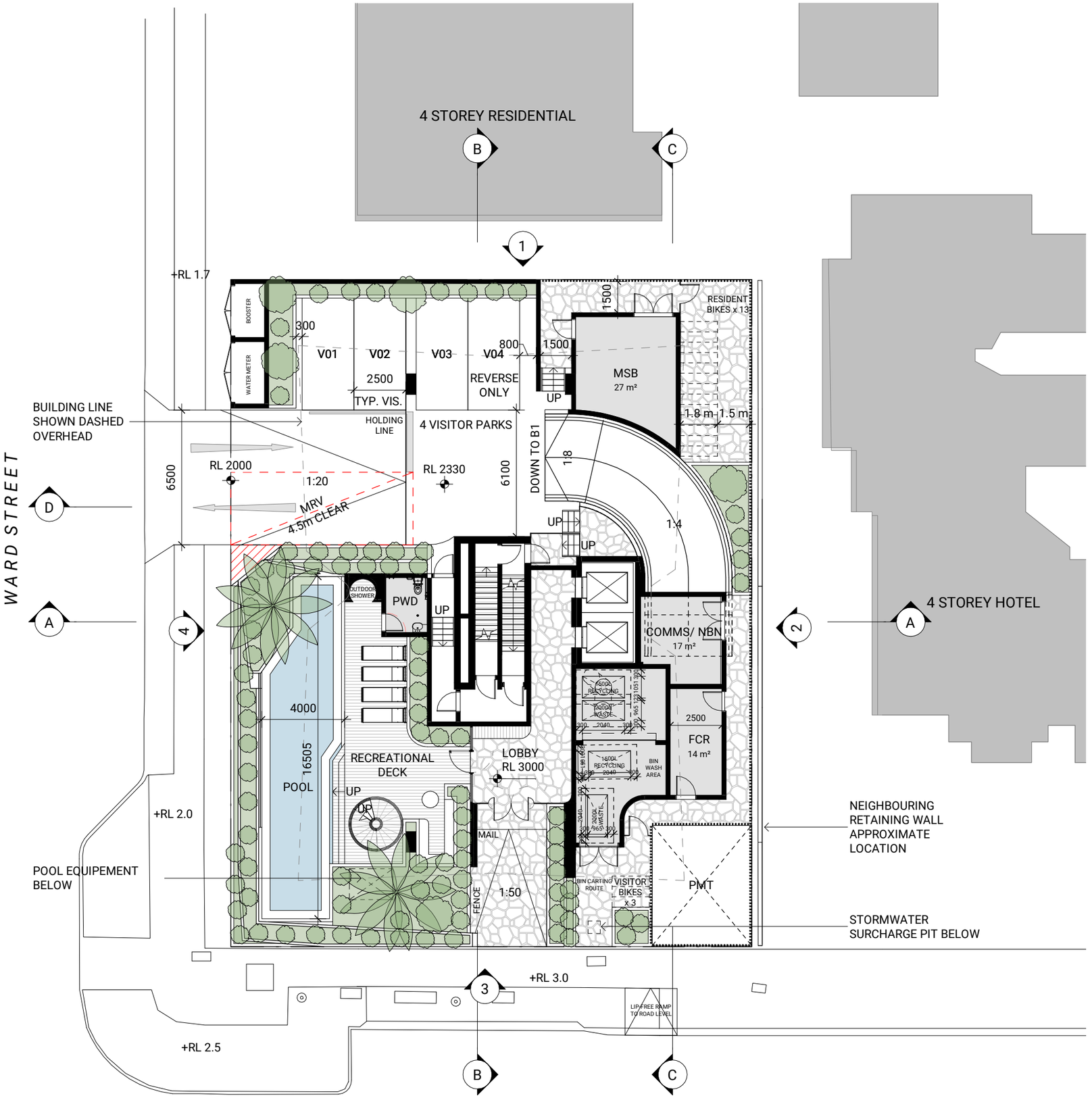
SCALE 1:200 @ A3 SIZE

DA100
FLOOR PLAN - GROUND LEVEL



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SCALE 1:200 @ A3 SIZE m

DA101
FLOOR PLAN - LEVEL 1

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SCALE 1:200 @ A3 SIZE m

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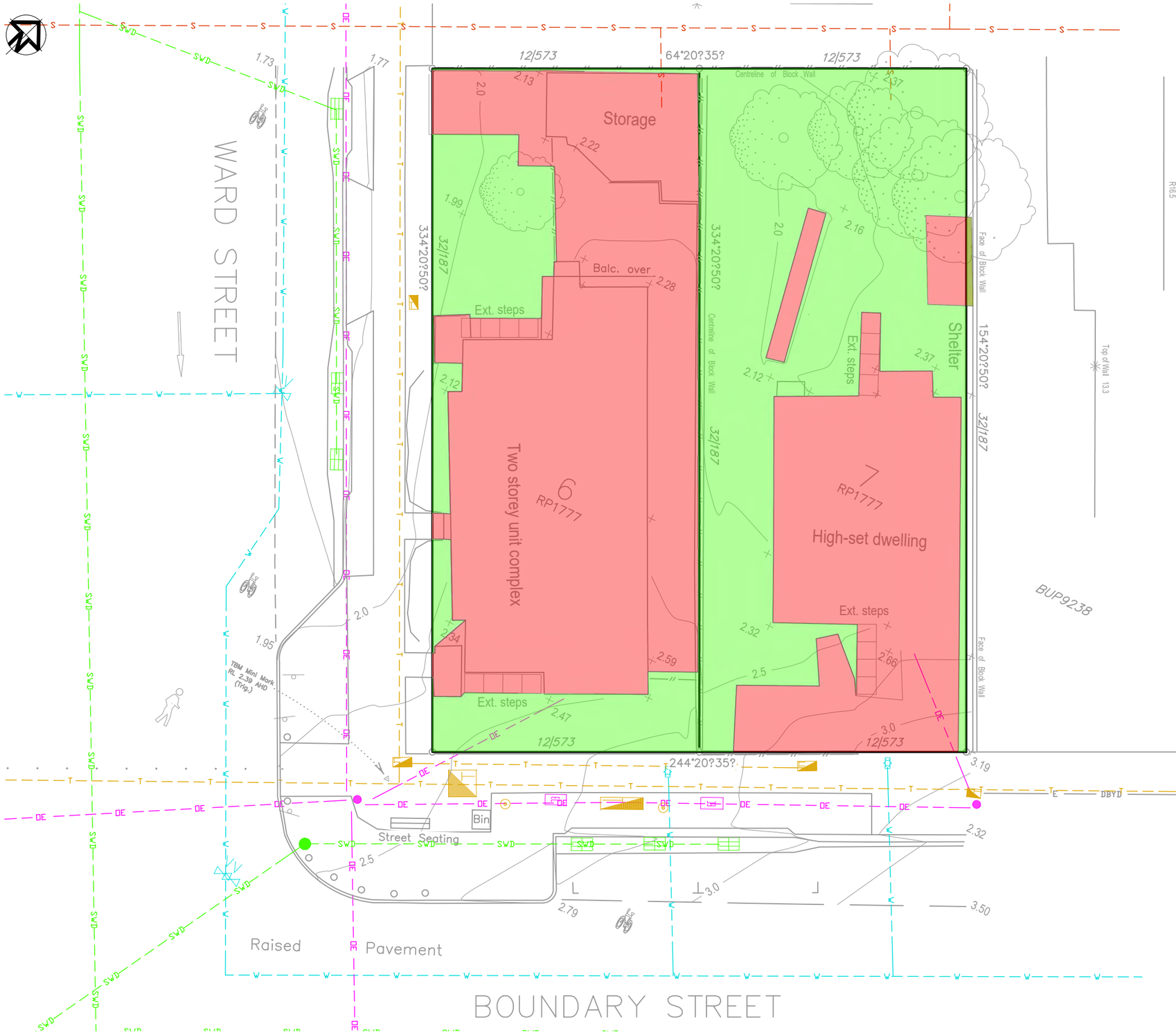
Appendix B

- Civil Engineering Drawings



LEGEND - EXISTING

- EXISTING EDGE OF BITUMEN
- EXISTING BUILDING
- EXISTING CONTOUR
- EXISTING CONCRETE PAVEMENT
- EXISTING DRIVEWAY
- EXISTING FENCE
- EXISTING KERB
- EXISTING RETAINING WALL
- S — EXISTING SEWER LINE
- W — EXISTING WATER
- SWD — EXISTING STORMWATER
- E — EXISTING UNDERGROUND ELECTRIC
- OE — EXISTING OVERHEAD ELECTRICAL
- T — EXISTING TELSTRA
- G — EXISTING GAS

NOTES / WARNINGS

1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION

CATCHMENT AREAS

LEGEND	AREA (M^2)	DESCRIPTION
	338	LANDSCAPING GARDENS/LAWNS (PERVIOUS)
	472	LANDSCAPE HARDSTAND (IMPERVIOUS)

ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

ARCHITECT: plus architecture

SCALE: 1 0 1 2 3 4 5 — SCALE 1:100

SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

DISCLAIMER: FOR DA PURPOSES ONLY NOT FOR CONSTRUCTION

APPROVED FOR AND ON BEHALF OF FRIENDS CIVIL ENGINEERING PTY LTD

R.P.E.Q No :		PROJECT TEAM	
HEIGHT DATUM	AHD	DESIGNER	AR
GRID	MGA	CHECKER	AR
ORIGINAL SHEET SIZE	A1	APPROVED	AR

Friends civil engineering
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w. friendsengineer.com

FILENAME: DA01 - EXISTING IMPERVIOUSNESS.DWG

DRAWING TITLE: EXISTING IMPERVIOUSNESS LAYOUT PLAN

PROJECT No.	DRAWING No.	ISSUE
FE22103	DA01	[01]

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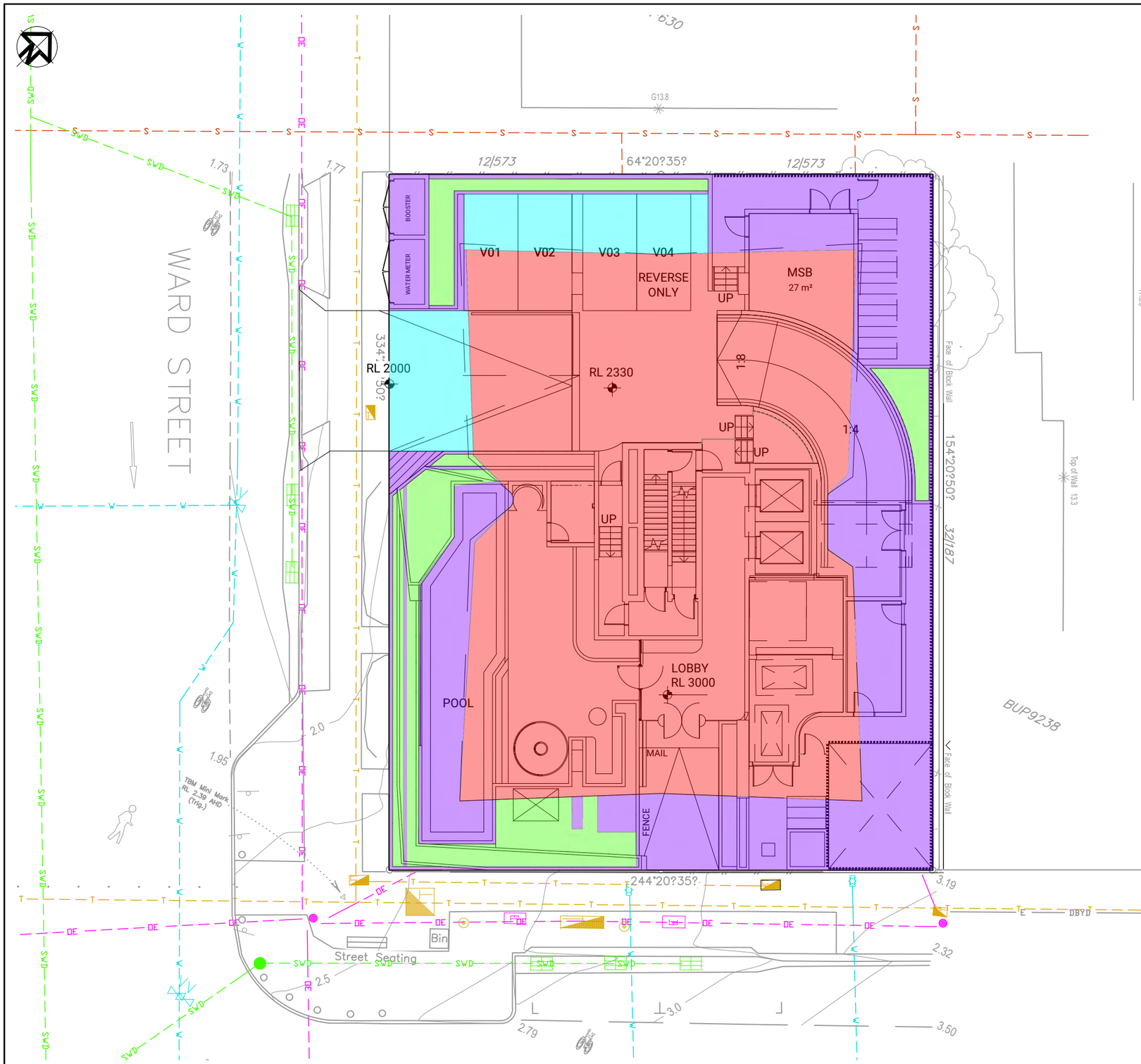

LEGEND - EXISTING

- EXISTING EDGE OF BITUMEN
- EXISTING BUILDING
- EXISTING CONTOUR
- EXISTING CONCRETE PAVEMENT
- EXISTING DRIVEWAY
- EXISTING FENCE
- EXISTING KERB
- EXISTING RETAINING WALL
- S — EXISTING SEWER LINE
- W — EXISTING WATER
- SWD — EXISTING STORMWATER
- E — EXISTING UNDERGROUND ELECTRIC
- OE — EXISTING OVERHEAD ELECTRICAL
- T — EXISTING TELSTRA
- G — EXISTING GAS

NOTES / WARNINGS

1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION

CATCHMENT AREAS

LEGEND	AREA (M^2)	DESCRIPTION
	66	LANDSCAPING GARDENS/LAWNS (PERVIOUS)
	303	LANDSCAPE HARDSTAND (IMPERVIOUS)
	415	ROOFED AREA
	26	DRIVEWAY AREA

ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

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20/10/2022 1:57:18 AM · Street, Coolangatta\CAD\DA02 - DEVELOPED IMPERVIOUSNESS.dwg

ARCHITECT: plus architecture

SCALE: 1 0 1 2 3 4 5 1:100 SCALE

SCALES SHOWN ARE AT A1 SIZE

[G:\Shared Drives\Friends Engineering\Projects\FE22103 239-241 Boundary St, Coolangatta\CAD\DA02 - DEVELOPED IMPERVIOUSNESS.dwg]

SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

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ORIGINAL SHEET SIZE	A1	APPROVED	AR

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FILENAME: DA02 - DEVELOPED IMPERVIOUSNESS.DWG

DRAWING TITLE: DEVELOPED IMPERVIOUSNESS LAYOUT PLAN

PROJECT No.	DRAWING No.	ISSUE
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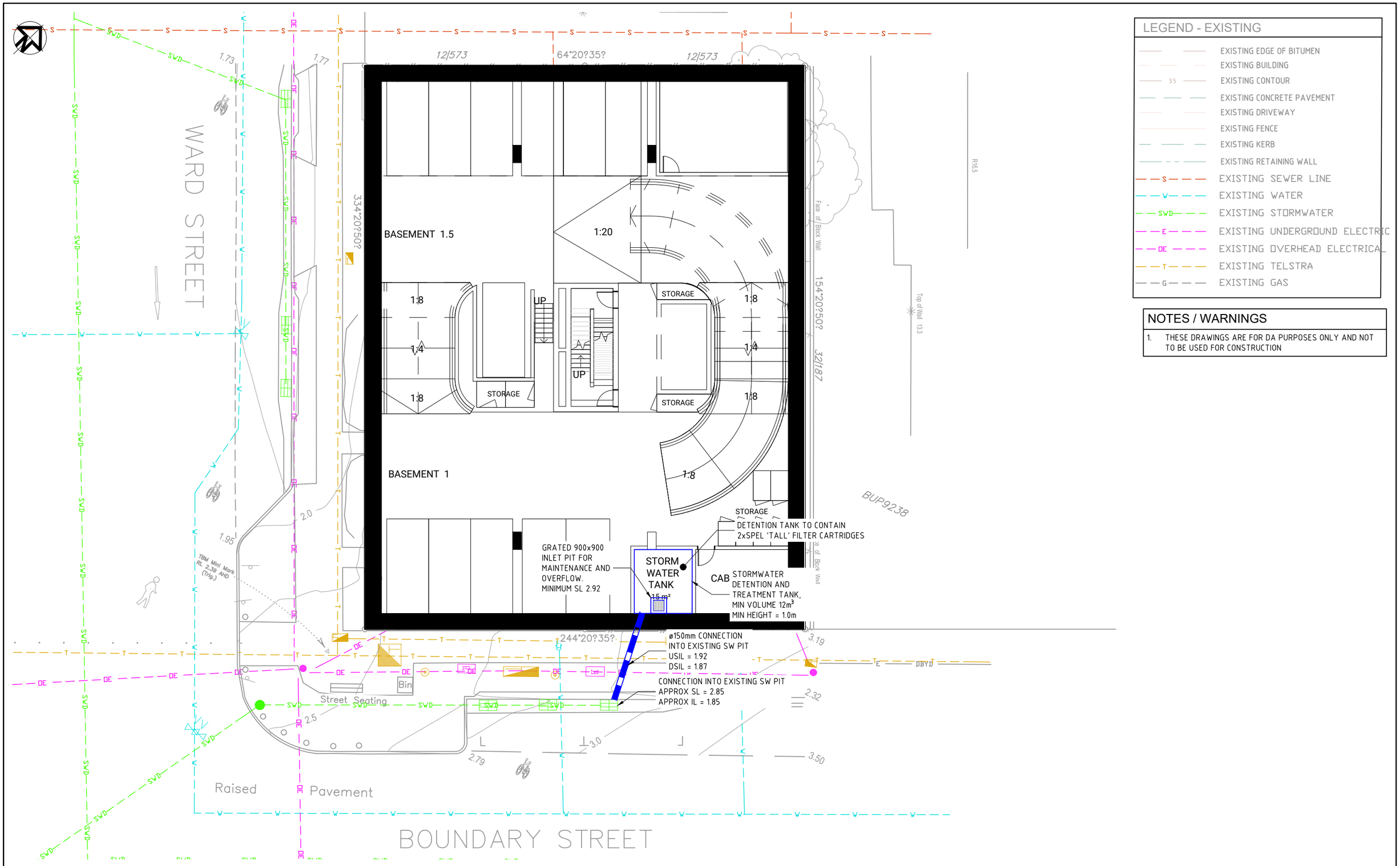

LEGEND - EXISTING

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- EXISTING BUILDING
- EXISTING CONTOUR
- EXISTING CONCRETE PAVEMENT
- EXISTING DRIVEWAY
- EXISTING FENCE
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ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

ARCHITECT: plus architecture

SCALE: 1 0 1 2 3 4 5 1:100 SCALE

SCALES SHOWN ARE AT A1 SIZE

SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

APPROVAL ISSUE
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R.P.E.Q No :		PROJECT TEAM	
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ORIGINAL SHEET SIZE	A1	APPROVED	AR

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FILENAME: DA03 - STORMWATER MANAGEMENT LAYOUT PLAN.DWG

DRAWING TITLE: STORMWATER MANAGEMENT LAYOUT PLAN

PROJECT No.	DRAWING No.	ISSUE
FE22103	DA03	[01]

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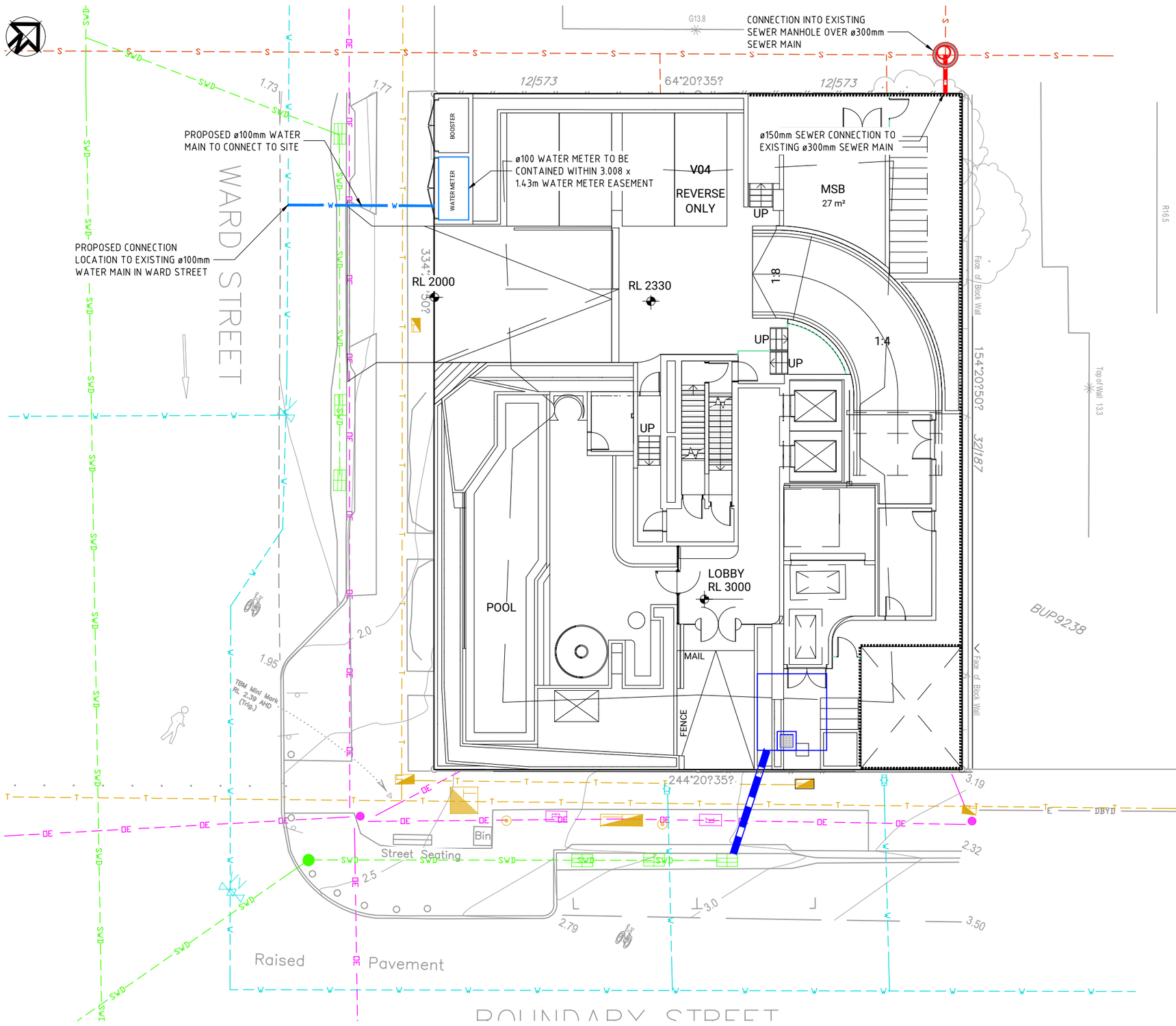

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NOTES / WARNINGS

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ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

ARCHITECT: plus architecture

SCALE: 1 0 1 2 3 4 5 1:100 SCALE

SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

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ORIGINAL SHEET SIZE	A1	APPROVED	AR

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FILENAME: DA04 - SERVICE CONNECTION LAYOUT PLAN.DWG

DRAWING TITLE: SERVICE CONNECTION LAYOUT PLAN

PROJECT No.	DRAWING No.	ISSUE
FE22103	DA04	[01]

SCALES SHOWN ARE AT A1 SIZE

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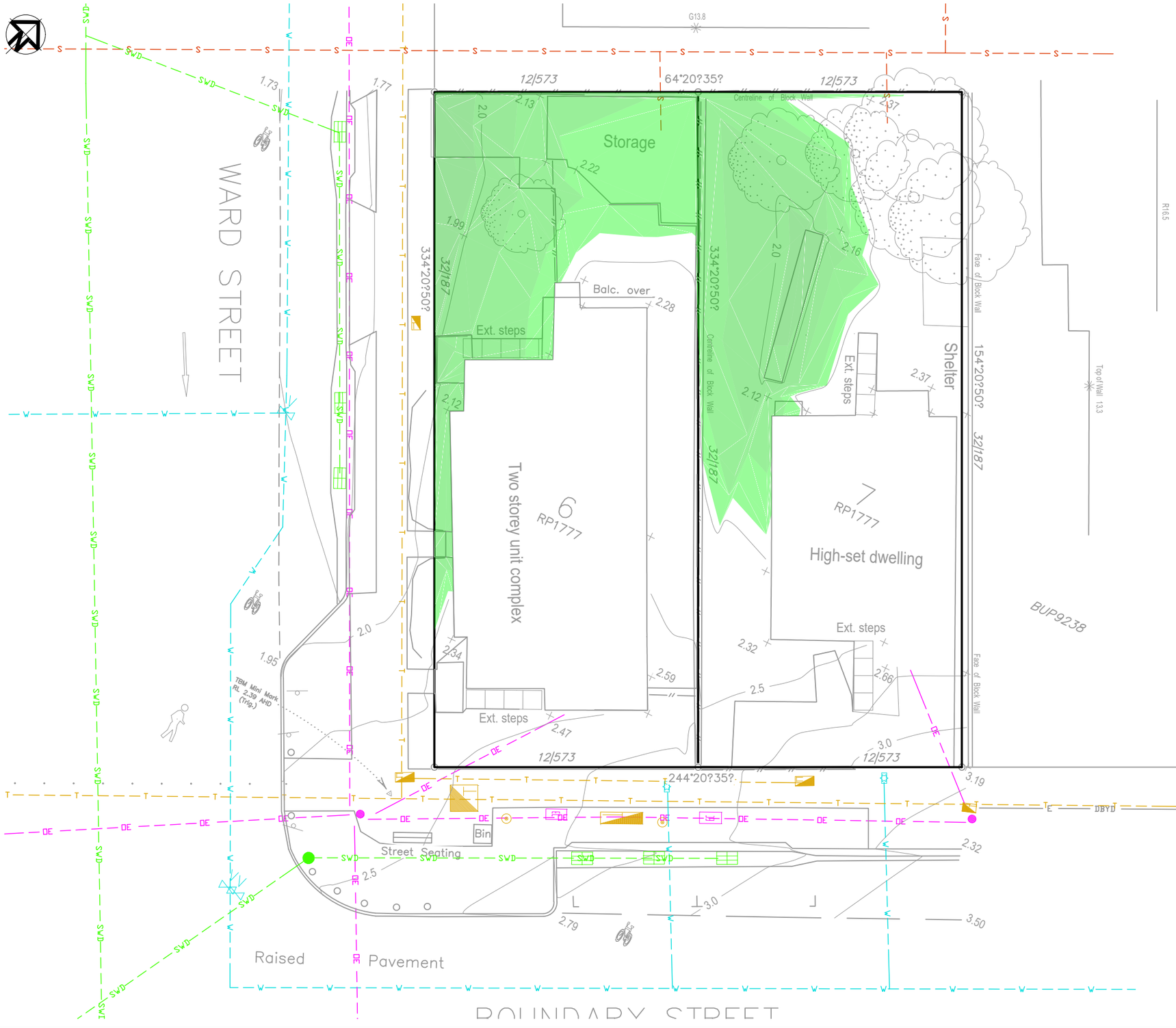

LEGEND - EXISTING

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NOTES / WARNINGS

1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION
2. EXISTING FLOOD STORAGE VOLUME IS 45.6m^3

FLOOD STORAGE LEGEND				
0.05	to	0.1	m	
0.1	to	0.2	m	
0.2	to	0.3	m	
0.3	to	0.4	m	
0.4	to	0.5	m	
0.5	to	0.6	m	
0.6	to	0.7	m	
0.7	to	0.8	m	
0.8	to	0.9	m	
0.9	to	1.0	m	

ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

100mm on A1 SHEET 20/10/2022 3:01:49 AM Street, Coolangatta\CAD\DA05 - FLOOD STOAGE LAYOUT PLAN.dwg

ARCHITECT: plus architecture

SCALE: 1 0 1 2 3 4 5 1:100 SCALE

SCALES SHOWN ARE AT A1 SIZE

G:\Shared Drives\Friends Engineering\Projects\FE22103 - 239 and 241 Boundary St

SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

APPROVAL ISSUE
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R.P.E.Q No :		PROJECT TEAM	
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GRID	MGA	CHECKER	AR
ORIGINAL SHEET SIZE	A1	APPROVED	AR

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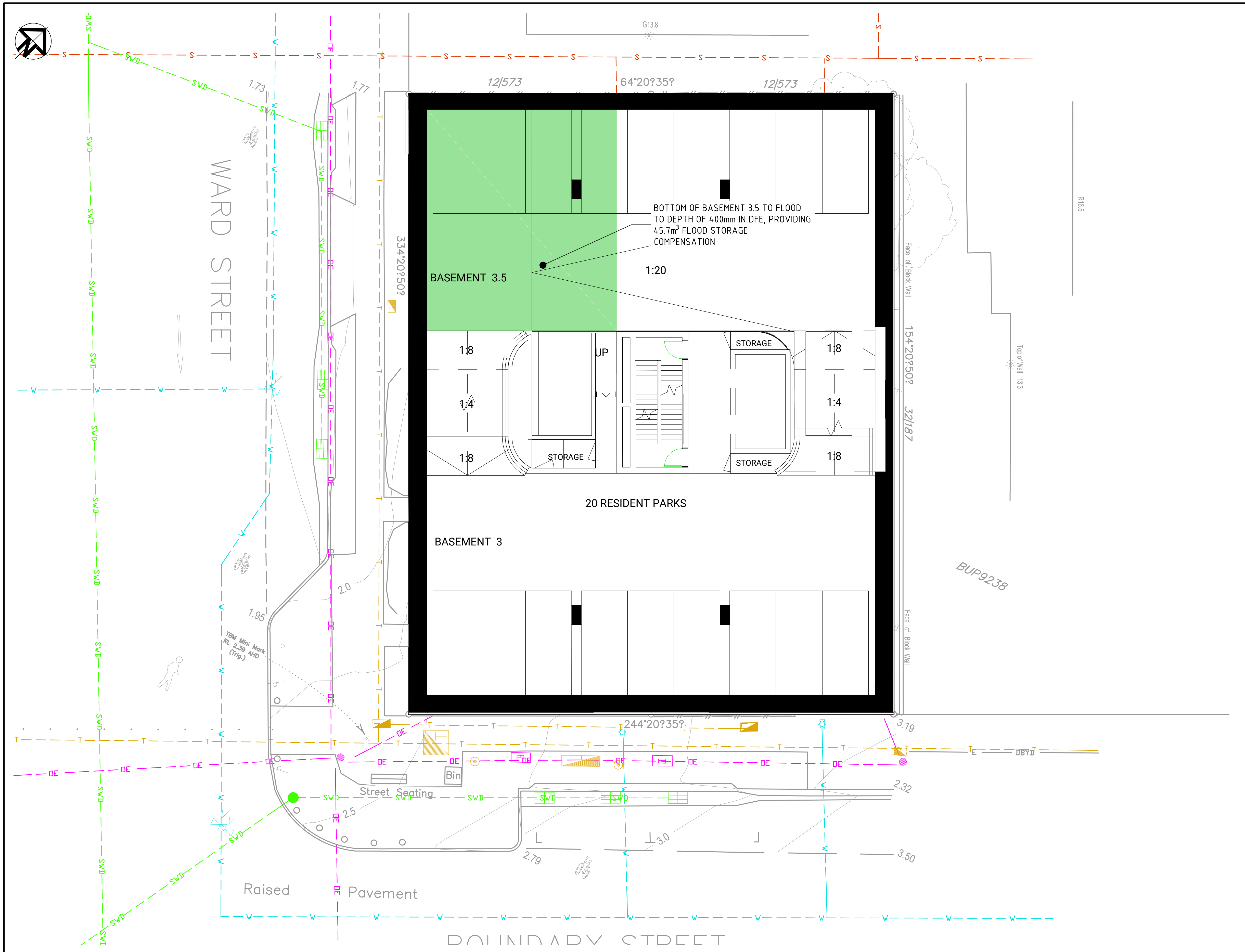
FILENAME: DA05 - FLOOD STOAGE LAYOUT PLAN.DWG

DRAWING TITLE: EXISTING FLOOD STORAGE LAYOUT PLAN

PROJECT No.	DRAWING No.	ISSUE
FE22103	DA05	[01]



LEGEND - EXISTING

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NOTES / WARNINGS

1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION
2. EXISTING FLOOD STORAGE VOLUME IS 45.7m³

FLOOD STORAGE LEGEND

0.05	to	0.1	m
0.1	to	0.2	m
0.2	to	0.3	m
0.3	to	0.4	m
0.4	to	0.5	m
0.5	to	0.6	m
0.6	to	0.7	m
0.7	to	0.8	m
0.8	to	0.9	m
0.9	to	1.0	m

ISSUE	DESCRIPTION	BY	DATE
[01]	ORIGINAL ISSUE	AR	19.10.22

ARCHITECT: plus architecture

SURVEYOR: Trilogy Survey Solutions — Over 30 years experience

SCALE 1:100 — SCALES SHOWN ARE AT A1 SIZE

CLIENT: INTREPID DEVELOPMENT (QLD) PTY LTD

PROJECT TITLE: 239-241 BOUNDARY ST COOLANGATTA

APPROVAL ISSUE — NOT FOR CONSTRUCTION

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GRID	MGA	CHECKER	AR
ORIGINAL SHEET SIZE	A1	APPROVED	AR

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DRAWING TITLE: DEVELOPED FLOOD STORAGE LAYOUT PLAN

PROJECT No.	DRAWING No.	ISSUE
FE22103	DA06	[01]

FILENAME: DA06 - DEVELOPED FLOOD STOAGE LAYOUT PLAN.DWG

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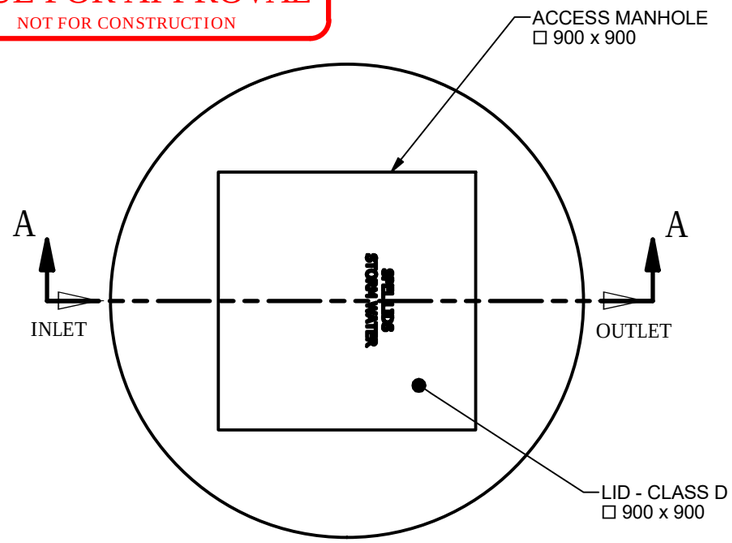
ISSUE FOR APPROVAL
NOT FOR CONSTRUCTION

Site Level Confirmation	
Finished Surface Level (FSL):	mm
Inlet Invert Level (IIL):	mm
Outlet Invert Level (OIL):	mm
Inlet Pipe Size:	mm
Inlet Pipe Type:	mm
Outlet Pipe Size:	mm
Outlet Pipe Type:	mm
Company:	
Name:	
Date:	

REVISION HISTORY				
REV	DESCRIPTION	BY	DATE	CHECKED BY
1	INITIAL RELEASE	P.Z.	24/04/2020	



PLAN VIEW

APPROVED.....

NAME.....

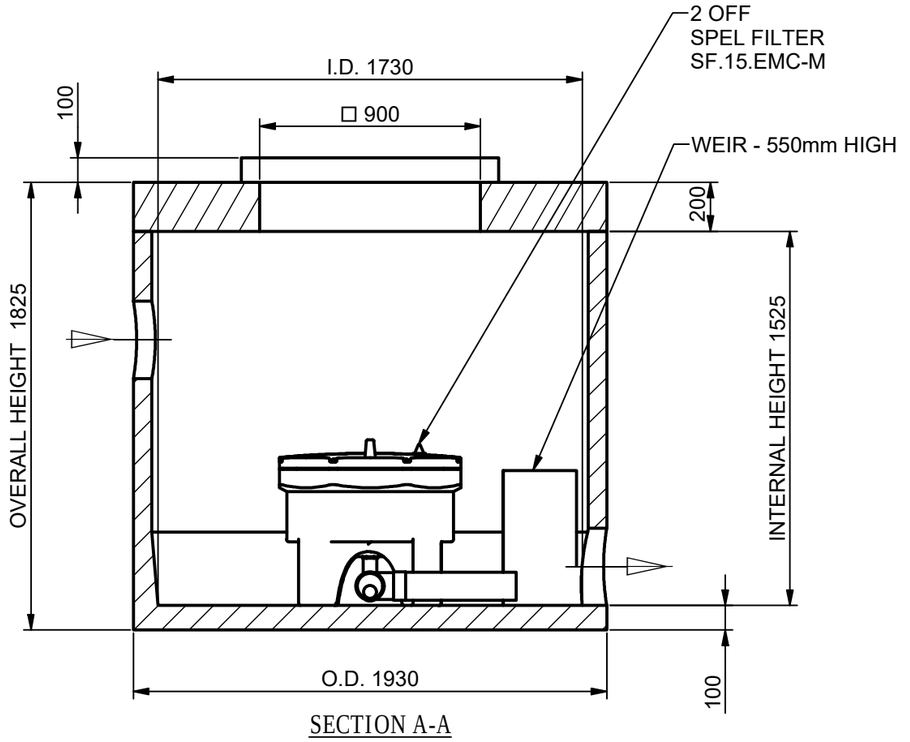
SIGNED.....

DATE...../...../.....

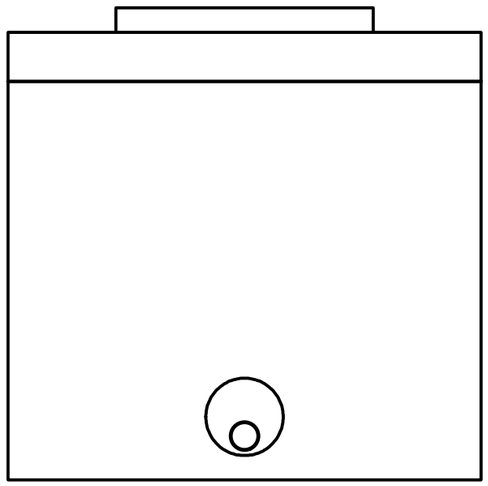
TANK WEIGHTS	
TANK	LID
2.5 t	1.8 t

NOTE:
LIFTING WEIGHTS MAY VARY
DEPENDING ON CUSTOM DESIGN

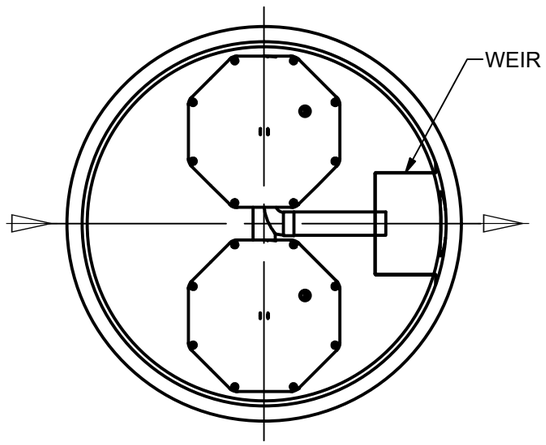
ISOMETRIC VIEW



SECTION A-A



SIDE VIEW



PLAN VIEW
COVER & LID REMOVED FOR CLARITY

TOLERANCE: ALL DIMENSIONS 10mm UNLESS OTHERWISE STATED.

CLIENT:

DISTRIBUTOR :

Drawn	P.Z.	Date 24/04/2020
Check		Date
Verified		Date
Approved		Date
Request No.		

SPEL STORMWATER
100 Silverwater Road Silverwater NSW 2128
PH: 1300 773 500 | E: sales@spel.com.au
www.spel.com.au

PROJECT : SPEL 3.7kL ROUND TANK & FILTER FITOUT

TITLE
SPEL PRECAST TANK
3.7 kL CLASS D
SF.173D/02-15.CON
2 SPEL FILTER CARTRIDGES

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

CUSTOMER CODE :

DWG No. SP20-SF14590-P

F:\Vault Working Folder\Designs\SPEL\PRODUCTS\FILTER\EMC-45\STANDARD\02-FILTERS\CONCRETE\PROJECTS\SPEL PRECAST T44 TANK 3.7 kL\SP20-SF14590-P.idw

Appendix C

- Code Response

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

Healthy waters code

Application

This code applies to assessing material change of use or reconfiguring a lot for development where indicated within **Part 5 Tables of assessment** unless either of the following circumstances apply:

(1) No increase in impervious area is required onsite for the development.

(2) A stormwater quality and quantity management plan previously approved by the Council has been fully implemented within the existing development layout.

Note: Where a development proposal meets either (1) and (2) above, this code is not applicable.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3,** in **Part 5**.

9.4.5.2 Purpose

(1) The purpose of the Healthy waters code is to protect the quality of the city's waters from the impacts of development.

(2) The purpose of the code will be achieved through the following overall outcomes:

(a) Urban stormwater quality management, wastewater management, and management of waters are based on the following principles:

(i) Development and construction activities are conducted to achieve the water quality objectives, as specified in the *Environmental Protection (Water) Policy 2009*.

(ii) The ongoing management of urban stormwater quality reflect the regional climate and the site's landscape characteristics.

(iii) Development is undertaken in accordance with best practice environmental management.

(iv) Development avoids adverse impacts on the City of Gold Coast's waters or, where this is not feasible, adverse impacts are minimised.

(b) Water resource catchments are protected from contamination by chemicals.

(c) The drainage capacity of the Woongoolba Flood Mitigation Scheme Area for rainfall events up to 1 in 10 year 72 hours is maintained (contained within the Scheme drains within a 4 day period) and this capacity is not be eroded due to cumulative impact of development.

9.4.5.3 Specific benchmarks for assessment

- **Table 9.4.5-2: Healthy waters code – for assessable development**

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? **If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome**	Internal use
Stormwater quality			
PO1 Development appropriately manages stormwater quality to: a) protect natural ecosystems; b) integrate stormwater treatment into the urban landscape; c) protect water quality; d) reduce runoff and peak flows; and e) meet the water quality objectives and environmental values for Queensland waters. **Note: Water quality objectives and environmental values for Queensland waters are contained within *Schedule 1* of the *Environmental Protection (Water) Policy 2009*. Water quality objectives are locally specific and vary between and within river catchments.**	**AO1.1** Where development is: (a) for a dwelling house, dual occupancy or multiple dwelling on a lot less than 5000m²; or (b) light industry or business activity on a lot less than 2500m², it complies with the 'Deemed to comply' requirements detailed in the **Stormwater quality management guidelines** in **SC6.11 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**.	**PO1 COMPILES** Refer to the Friends Civil Engineering Stormwater Management Plan above.	
	AO1.2 Where development is: for a dwelling house, dual occupancy or multiple dwelling on a lot equal to or more than 5000m² but less than 1.25 ha; or a) light industry or business activity on a lot equal to or more than		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	2500m² but less than 1.25 ha; b) it complies with the 'Deemed to comply' requirements detailed in the **Stormwater quality management guidelines** in **SC6.11 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**.		
	AO1.3 Where development is not listed in AO1 a Stormwater Quality Management Plan is prepared by a suitably-qualified person in accordance with the **Stormwater quality management guidelines** in **SC6.11 City Plan policy – Land development guidelines, Section 8 – Engineering drawings, documents and reports**.		
Stormwater quantity			
PO2 Stormwater quantity management outcomes demonstrate no adverse impact on stormwater flooding or the drainage of properties external to the subject site.	**AO2** A stormwater quantity management plan is prepared by a suitably qualified person and demonstrates: (c) achievable stormwater quantity control measures for discharge during both the construction and operational phases of development designed in accordance with the *Queensland Urban Drainage Manual (QUDM)* unless subject to specific requirements of **SC6.11 City Plan policy – Land development**	**PO2 COMPILES** Refer to Section 5 of the Friends Civil Engineering Stormwater Management Plan above.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards; (d) on-site detention systems that are designed to restrict peak outflows for Q2, Q5, Q10, Q20 Q50 and Q100 to pre-development conditions.		
Woongoolba Flood Mitigation Scheme Catchment Area			
PO3 In the Woongoolba Flood Mitigation Scheme Catchment Area, shown on the **Water catchments and dual reticulation overlay map**, peak outflow and its timing for Q2, Q5 and Q10 for rainfall events up to 72 hours does not change as a result of development.	**AO3** No acceptable outcome provided.	**PO3 COMPLIES** Refer to Section 5 of the Friends Civil Engineering Stormwater Management Plan above.	**C)**
Protection of natural flows (discharge)			
PO4 Construction and operational activities avoid or minimise adverse impacts of altered stormwater quality and quantity.	**AO4** Development achieves the Frequent Flow Management and Waterway Stability Management design objectives as stated within *Chapter 2 – Section 2.4.2 of the Urban Stormwater Quality Planning Guidelines 2010*. **Note: A site Stormwater Quality and Quantity Management Report prepared by a suitably qualified person is Council's preferred method required to be submitted to Council to address this Acceptable outcome.**	**PO4 COMPILES** Refer to the Friends Civil Engineering Stormwater Management Plan above.	**D)**

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	The intent in the above guidelines (*Urban Stormwater Quality Planning Guidelines 2010*) can be achieved by adopting Water Sensitive Urban Design (WSUD) concepts within the development.		
Wastewater management			
PO5 Development does not discharge wastewater to receiving waters or areas external to the site unless demonstrated to be the best-practice environmental management for that site and takes into consideration: (e) the applicable water quality objectives for the receiving waters; and (f) the potential adverse impact on ecosystem health of receiving waters.	**AO5** Where the development involves the discharge of wastewater, a Wastewater Management Plan (WWMP) is prepared, demonstrating compliance with the performance outcome, by a suitably qualified person and submitted to the Council, detailing all of the following: a) wastewater type; b) climatic conditions; c) water quality objectives; d) best-practice environmental management; e) waste management hierarchy; and f) the WWMP provides for the management of wastewater in accordance with a wastewater management hierarchy that: (i) avoids wastewater discharge to waterways; or (ii) if wastewater discharge to the environment cannot practicably be avoided wastewater discharge to waterways is minimised through re-use, recycling, recovery and treatment for	**PO5 NOT APPLICABLE** Site is connected to CoGC sewer, no discharge to receiving waters will take place.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? **If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome**	Internal use
	disposal to sewer, surface water and groundwater.		
Erosion and sediment control (ESC)			
PO6 Development does not cause erosion or allow sediments to leave the site.	**AO6** An **Erosion hazard assessment** completed in accordance with the criteria in **Table 9.4.5-3** is undertaken to establish the level of risk for soil erosion and sediment pollution to the environment. **Where the Erosion hazard assessment has a risk score less than or equal to 10:** A deemed to comply report is prepared by a suitably qualified person for Council approval, including conceptual location and design drawings of each treatment measure in plan and section views, in accordance with the *Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008.* **Where the Erosion hazard assessment has a risk score greater than 10:** A conceptual erosion and sediment control plan (ESCP) is prepared by a suitably qualified person for Council approval in accordance with the *Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008*.	**PO6 COMPILES** Refer to Section 7 of the Friends Civil Engineering Stormwater Management Plan above.	

TRAFFIC ENGINEERING REPORT

Enhance
URBAN PLANNING

239 & 241 Boundary Street, Coolangatta

Traffic Engineering

Proposed Residential Development
At 239 & 241 Boundary Street, Coolangatta

On behalf of Intrepid Developments (QLD) Pty Ltd

About TTM

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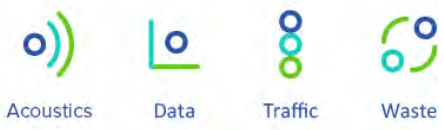

Revision Record

No.	Author	Reviewed/Approved	Description	Date
1.	Richard V Jones / Lee Flueckiger	Richard V Jones	DA Report (Rev A)	27/10/22
2.				
3.				
4.				
5.				

Seabank Building Level 7, Suite 701, 12-14 Marine Pde, Southport Qld 4215

Contents

Table Index

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1 Introduction

1.1 Background

TTM Consulting has been engaged by Intrepid Developments (QLD) Pty Ltd to prepare a traffic engineering report investigating a proposed residential multiple dwelling. It is understood that a Development Application will be lodged with The City of Gold Coast Council.

1.2 Scope

This report investigates the transport aspects associated with the proposed development. The scope of the transport aspects investigated includes:

- Parking supply required to cater for development demand
- Parking layout to provide efficient and safe internal manoeuvring
- Identification of likely traffic volumes and traffic distribution from the future development
- Identification of likely traffic impact of development on the public road network
- Access configuration to provide efficient and safe manoeuvring between the site and the public road network
- Suitability of access and internal facilities to provide for pedestrian and cyclist operation
- Access to suitable level of public transport

To assess the proposed transport arrangements, the development plans have been assessed against the following guidelines and planning documents:

- The City of Gold Coast City Council City Plan (2020 version 8), specifically:
  - Transport Code (Section 9.4.13 of the City Plan)
- Australian Standard 2890

1.3 Site Location

The site is located at 239 & 241 Boundary Street, Coolangatta, QLD 4225, as shown in Figure 1-1 and Figure 1-2. The property description is Lot 6 and Lot 7 on RP1777. The site has road frontages to Boundary Street and Ward Street and is currently occupied by 5 holiday unit accommodation (No.239) and a single dwelling (No.241).

Figure 1-1: Site Location

Figure 1-2: Site Area

1.4 Development Profile

The proposed land uses for this development are summarised in Table 1-1.

Table 1-1: Proposed land uses

Use	Qty
Multiple Dwelling units	34 units

1.5 Access

The development plan includes the following access arrangements:

- Ward Street, located at the north-western side of the subject site. The characteristics of this access include:
  - 6.5m wide at the property boundary.
  - Left in / left out only.
  - 19m from the give-way at the raised intersection of Boundary Street

1.6 Parking

The development proposal includes the following parking supply:

- 54 spaces, which are located in the basement and at ground floor: including.
  - 6 visitor spaces
  - 48 residential parking spaces throughout 3 basement levels

2 Existing Transport Infrastructure

2.1 The Road Network

Roads in the immediate vicinity of the site are administered by The City of Gold Coast Council. The hierarchy and characteristics of roads in the immediate vicinity of the site are shown below in Table 2-1.

Table 2-1: Local Road Hierarchy

Road	Speed Limit	Lanes	Classification	Road Authority
Boundary Street	50kph	2 (divided, plus parking & bike lane)	Collector Road	CoGC / Tweed
Ward Street	50kph	2 (divided, plus parking & bike lane)	Local Road	CoGC
Eden Avenue	50kph	1 (One-way)	Local Road	CoGC
Marine Parade	50kph	2 (undivided, plus parking)	Collector Road	CoGC

Boundary Road has a 12.0m wide carriageway on the QLD side and an 8.25m wide carriageway on the NSW side. The boarder runs through the middle of Boundary Street.

Ward Street has a 22.25m wide carriageway at the site frontage where the proposed access is located.

2.2 Public Transport and Pedestrian Facilities

Buses

The site is well connected by bus to the greater Gold Coast. There is a bus stop approximately 500m west of the site along Boundary Street.

Route 700 provides peak 6-11 minute service along the coastal roads through Palm Beach, Burleigh Heads, and Broadbeach, with connections to the light rail for the latter.

Route 760 provides peak 30 minute service from Boundary Street through Currumbin and Mudgeeraba, terminating at Robina Town Centre. This service runs from 9:45am to 10:05pm, though the route services from 7:48am during school term.

Route 768 provides peak 1 hour service as an alternative to route 760, servicing much of the same route, but terminating instead at Elanora.

Route T601 provides peak 30 minute service from Tweed Heads West, Chinderah, Kingscliff and TAFE NSW.

Pedestrians

Formal pedestrian footpaths are located on both sides of all adjacent streets.

There are numerous formal uncontrolled pedestrian crossings near the site, as shown in Figure 2.1. The nearest signal-controlled crossing is the intersection of McLean Street and Marine Parade.

Figure 2-1: Site Pedestrian Connections

Cyclists

As shown by Figure 2.2, Gold Coast City's Active Travel Guide shows that the on-street bikeways are along Boundary Street and Ward Street and the Shared path of the Oceanway is to the north of the site.

Figure 2-2: Cycle facilities

3 Car Parking Arrangements

Council parking requirements for this type of development are identified in Table 3-1. The development is zoned as Medium Density Residential, and council parking provisions are as per table 9.4.13-3 of the City Plan.

Additionally, marked visitor parking to the adjacent medical centre is provided to continue the site's existing parking provision. While this provision is a result of an agreement between the developer and medical centre, council parking requirements can be found in table 9.4.13-5 of the City plan owing to its inclusion in the Centre Zone.

Table 3-1: Parking Supply Requirement

Land Use	Council Requirement	Extent	Requirement	Provision
Multiple Dwelling – Resident Unit (4 bed) – Resident Unit (3-bed) – Resident Unit (2-bed) – Visitor	 2 per unit 1.5 per unit 1.25 per unit 2 plus 1 per 10 units	 1 unit 16 units 17 units 34 units	 2 24 21.25 5.4	 48 residents 6 visitors
Total			54 (rounded up)	54 car spaces

3.1 Site Car Parking Supply

The proposed residential car parking supply is to provide a total of 54 spaces. The residential and visitor parking provisions meets or exceeds Council's supply requirements and is suitable for the proposed development.

There are five small car bays as part of this development and each of these bays will be a second parking space and allocated to one of the three bed units.

3.2 Car Park Layout

Table 3-2 identifies the characteristics of the proposed parking area with respect to the Council requirements. The last column identifies the compliance of each design aspect. Where compliance with Council is not achieved, further information is provided below.

Table 3-2: Parking Design Requirements

Design Aspect	Minimum AS2890.1 Standard	Proposed Provision	Compliance
Parking space length: – Standard bay – Short car bay – PWD bay – Visitor bay	 5.4m 5.0m 5.4m 5.4m	 5.4m 5.4m 5.4m 5.4m	 Compliant Compliant N/A Compliant

Design Aspect	Minimum AS2890.1 Standard	Proposed Provision	Compliance
Parking space width: – Resident – Short car bay – PWD – Short-term visitor	 2.4m 2.3m 2.4m 2.6m	 2.4m 2.4m 2.4m 2.6m	 Compliant Compliant N/A Compliant
Aisle Width: – Parking aisle – Circulation Aisle (one-way)	 5.8m 3.6m (wall to wall)	 6.1m 3.9m	 Compliant Compliant
Parking envelope clearance – space adjacent to wall	Space 0.3m clear of wall	Space 0.3m clear of wall	Compliant
End of Aisle extension	1.0m	0.3m	Performance Solution
Column Location	750mm forward from rear of parking envelope	750mm forward from rear of parking envelope	Compliant
Maximum Gradient: – Parking bay – Parking aisle – Ramp (private)	 1:20 (5.0%) 1:16 (6.25%) 1:4 (25%)	 <1:20 (5.0%) 1:20 (5.0%) 1:4 (22.22%)	 Compliant Compliant Compliant
Maximum Change in Grade	1:8 (12.5%) summit 1:6.67 (15.0%) sag	12.5% 12.5%	Compliant Compliant
Height Clearance	2.2m	>2.2m	Compliant

3.3 Performance Solutions

End of Aisle Extension

A swept path conducted by TTM (Appendix B) shows that the 0.3m end of aisle extension adjacent to the south-eastern and north-western car parks of Basement levels are intended for small cars only to allow for access into these bays without the vehicle wheels using part of the ramp grade. This is an acceptable performance solution as the small car park bay allows vehicles to enter and exit the parking spaces safely. These small car park bay will be provided as a second car park bay to one of the units.

3.4 Proposed Car Parking Operations

3.4.1 Visitor Parking

There are two visitor spaces on Basement level 1, due to the position of the ground level ramp and its holding position. These two residential visitor parking spaces in the basement will require use of the signal system to exit safely. There will be signage informing residential visitors using these spaces that they will need to push a button and wait until a green signal before exiting, similar to an arrangement demonstrated by Figure 3.1.

Figure 3-1: Example of Button Signage for Visitors

3.4.2 Signal Ramp

It is proposed to install a signal-controlled ramp for this development to allow resident vehicles to access their parking spaces within the basement levels.

Two single-lane ramps, one bridging each parking level, will provide connected access, linking the ground floor to each of the basement levels. Each ramp is independently controlled to allow access and egress from multiple levels simultaneously.

At ground level, a signal is visible from the ramp queuing area. By default, priority is given to access, indicated by a green signal. Egress is accomplished through using buttons located on columns near parking spaces (or to use a keyfob) to signal a halt in access and allow leaving traffic use of the ramp. Activating a button (or keyfob) for egress will change the signal from a solid red to a flashing red to indicate that a priority change is acknowledged and imminent. On a green signal, a vehicle will be able to leave the parking space and exit the basement parking using the ramp. For cars leaving basement level 2 and 3, detectors on the lower ramp will pass the change in priority to the basement 1 and 2 floors, meaning that a driver will not have to leave their car to reactivate the signal ramp when leaving from basement 2 or 3 to the ground floor.

Signal lights will be clearly visible to all parking spaces within the basement to indicate priority of ramp use.

There is a hold position on the ground floor to accommodate 1 vehicle in the queue within the site boundary and an additional space partially in the site and on the verge. This is more than adequate for anticipated peak hours.

4 Road Network Performance

4.1 Existing Site Traffic

The site is currently occupied 5 holiday unit accommodation (No.239) and a single dwelling (No.241).

4.2 Estimated Development Traffic Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual (2012) recommends using specific generation rates, for planning purposes, for different development types. Application of these rates to the proposed development, results in the estimate of development site traffic generation, as shown in Table 4-1. The Department of Transport and Main Road's (DTMR) 'Guide to Traffic Impact Assessment' outlines in Section 8.2.1 that the guideline applied above is a preferred data source when estimating the traffic generation of a development.

A trip generation of 0.53 AM and 0.32 PM trips per dwelling has been assumed, which is based on the RTA's trip generation rate for high density dwellings (regional average).

An in:out split of 20:80 for the morning and 80:20 for the evening peak period has been assumed for the proposed high density residential uses.

Table 4-1: Peak Hour Trip Generation

Land Use	RTA Rate	Extent	Trip Generation	In : Out Split	In : Out Trips
Morning Peak Hour					
Existing dwelling (No.241)	0.85	1	-0.85	20 : 80	1 : 2
Holiday Accommodation (5 units)	0.4	5	-2.0	20 : 80	
Residential Unit	0.53	34	18.02	20 : 80	4 : 14
Total Net Trips (AM)			15.17		3 : 12
Evening Peak Hour					
Existing dwelling (No.241)	0.85	1	-0.85	80 : 20	2 : 1
Holiday Accommodation (5 units)	0.4	5	-2.0	80 : 20	
Residential Unit	0.32	34	10.88	80 : 20	9 : 2
Total Net Trips (PM)			8.03		7 : 1

From Table 4-1, it is expected that the development would generate 3 in net trips and 12 out net trips during the morning peak hour. Similarly, it is expected that 7 in net trips and 1 out net vehicle trips would be generated during the evening peak hour.

4.3 Impact on the Local Road Network

4.3.1 Traffic Distribution

Morning and evening peak hour vehicle trips are likely to distribute to and from the nearby arterial roads. As an assumption, 100% of peak traffic will travel towards Wharf Street and Griffith Street to head either to and from the Gold Coast or NSW. When returning to the site, it likely that some (40%) may use Marine Parade to access the left in driveway. Exiting trips will need to turn left from the driveway and then head along Boundary Street to Wharf Street and Griffith Street. The impact on local roads leading to these transport routes will vary, as estimated by the trip distribution in Figure 4.1.

Figure 4-1: Estimated Traffic Distribution (Net trips) on Local Roads

The worst case estimated traffic trips generated from the site are likely to have an additional vehicle trip every 5 minutes on the Boundary Street westbound during the peak morning, and one trip every 8.5 minutes during the peak evening traffic. This is unlikely to have any significant impact on the local road network.

5 Site Access Arrangements

It is proposed that the site be accessed via Ward Street.

The proposed entry / exit to the development from Ward Street is to be left in / left out movements. The proposed access driveway requirements are identified in Table 5-1.

Table 5-1: Access requirements – entry and exit to main car park.

Design Aspect	AS2890.1 Requirement	Proposed Provision	Compliance
Distance from another driveway	3m	6.3m	Compliant
Distance from a minor intersection	6m (min) from tangent point.	>20m	Compliant
Sight Distance - 50kph	Desirable – 69m Minimum - 45m	>75m to the north Not required to the south	Compliant Compliant
Driveway Design Type	1	2	Compliant
Width/ Entry and Exit Widths	3.0-5.5m	6.5m	Compliant
Pedestrian Sight Triangle	2.5m by 2.0m	2.5m by 2.0m	Compliant
Minimum Queuing Provisions	18m (3 cars)	6m (1 car)	Noncompliant (a)

TTM considers identified issues of noncompliance still acceptable within the site access design for the following reasons:

5.1 Performance Solutions

a) Queuing

With respect to entry queue capacity, it is noted that the car parking areas accessed from the one-way ramp will mostly comprise of low-turnover residential parking spaces, which will typically operate on a tidal basis. TTM have carried out this scenario on the PM peak traffic, as this has the higher number of vehicles entering the development (see Section 4**Error! Reference source not found.** for a detailed discussion).

The PM peak trip rates based on *trips per unit* space for the 34 units is derived from the RMS's Guide to Traffic Generating Developments (discussed in Section 4.2). These spaces provide a total of 11 trips in the PM peak, split into 9 in trips and 2 out trips as per an 80:20 split.

The layout provides an internal queuing capacity of over 8.5m length to a conflict point with other exiting vehicles (1 vehicle - 6.0m each) from the hold position. TTM have conducted a queuing assessment to determine whether there is sufficient on-site queuing capacity.

The service rate of the signal ramp system is estimated by a speed of 10km/h for typical vehicle speeds and 5km/h for turning. From the ground floor hold point to the mid-point car bay hold area, there is 30m of straight circulation, and 16m of turning circulation, resulting in a service period of 22.32 seconds per vehicle. For a queue analysis, TTM have used the conservative estimate of a 25 second service period per vehicle.

To calculate the amount of queuing space required the probability of a number of vehicles in a queue *n* exceeding a specified number of vehicles *N* (ie. the design queue) at any instant must be calculated. This is achieved by the following formula.

$$Pr\ (n > N) = \rho^{N+1} \leq \alpha$$

The 95th percentile queue is considered an adequate measure of an acceptable queue at access driveways. This infers that there is a 5% probability that the queue length will be exceeded. A summary of the queuing assessment results is provided in Table 5.2.

Table 5.2: Queuing Assessment Probability

PM Peak						
Description	Calculation	Rate	Inbound		Outbound	
Arrival Ratio	r		9	vph	2	vph
Service rate	s		25	s	25	s
			144	vph	144	vph
Utilisation Factor	$\rho = r/s$		6.25%		1.4%	
Proportion of time during which ground signal is in use	$\rho_{total} = \rho_{in} + \rho_{out}$		7.6%			
Proportion of time during which an inbound queue of exactly *n* vehicles occurs	$P_n = \rho_{total}\ \rho_{in}^{\ n}\ (1-\rho_{in})$	n =1	0.448%			
		n = 2	0.028%			
		n = 3	0.002%			
		n = 4	0.000%			

The probability of one vehicle queuing is 0.49% and for two vehicles queuing is 0.028%, which is more than sufficient for this development's queuing arrangement for the ground floor entry.

Based on the information noted above, TTM is satisfied that there is sufficient queuing available at the proposed development.

6 Service Vehicle Arrangements

To assess the required number of service bays for the development, TTM has referred to the Council of the City of Gold Coast requirements for service vehicles. Other service vehicle provisions are generally in accordance with AS2890.2.

6.1 Council Requirements

The proposed development includes multiple dwellings residential uses. The City Plan service vehicle requirements are shown in Table 6-1.

Table 6-1: Minimum Service Vehicle Requirements

Use	Requirement
Multiple Dwellings	Medium Rigid Vehicle (MRV)

6.2 Proposed Service Vehicle Arrangements and Their Adequacy

By classification as a multiple dwelling development, city council transport code (9.4.13-8) advises a standing area a for a service vehicle is to be provided for site servicing. There is provision for an MRV to stand on site within the boundary and TTM have conducted a swept path analysis of an MRV standing in the aisle whilst cars can pass.

Section D in the architectural drawing pack indicates that there is sufficient space for the 4.5m height clearance for the MRV. This section plan is enclosed with this report.

6.3 Refuse Collection

The refuse collection will be via on street with the bin storage on the southern side of the site on Boundary Street and within 5m of the site boundary. It is proposed to provide a ramp access for the bins to access Boundary Street form the footpath, which will be in front of the existing on-street parking bays.

It is expected that the proposed servicing arrangements are suitable for the proposed development and would not significantly impact the local road network.

7 Active Transport

7.1 Public Transport

Access to public transport from the site is considered adequate as there is a bus stop on Boundary Street 500m from the development, with regular 10-minute services to Palm Beach, Burleigh Heads, and Broadbeach, with connections to the Light Rail at its termination. Additional bus services every 30-60 minutes provide connections to Robina Town Centre, Elanora, and Mudgeeraba. Route numbers 700, 760, 768 and T601 service the site, with buses providing service throughout the full day. The peak service for each route is generally every 7-8 minutes.

TTM consider the availability of public transportation provisions in the vicinity of the site will satisfy the site's requirements for such facilities.

7.2 Pedestrian Access

Formal pedestrian footpaths are located on both sides of all adjacent streets.

The existing footpath network is considered suitable to cater for the needs of the development.

7.3 Cyclist Requirements

The City Plan requires the site to have the following on-site cyclist parking facilities:

Table 7-1: Off-Street Bicycle Parking

Land Use	Quantity	Residential / Staff – Class 2	Requirement	Provided	Visitor – Class 3	Requirement	Provided
Multiple Dwelling	34	1 per dwelling	**34 Class 2 spaces**	16	1 per 3 dwellings	**14 Class 3 spaces**	10

TTM considers these rates excessive or prohibitive and proposes that the development may at its discretion adopt Residential bicycle parking rates in line with those presented in Austroads Guides, as detailed in Table 7-2.

Table 7-2: Austroads Bicycle Parking

Land Use	Quantity	Residential / Staff – Class 2	Requirement	Provided	Visitor – Class 3	Requirement	Provided
Multiple Dwelling (Flat)	34 dwellings	1 per 3 flats	**12 Class 1 spaces**	22	1 per 12 flats	**3 Class 3 spaces**	3

The proposed development meets or exceeds council's required bicycle parking rates (Austroads rates have been accepted by Council in previous applications) and is an acceptable provision.

Some resident bike parking is located on each basement level (3 in each) and another 13 located on the ground floor via a small set of stairs with a stairway groove to wheel bikes up. An example of a stairway groove is shown in Figure 7-1

Figure 7-1: Example of stairway bike groove

8 Summary and Conclusions

8.1 Development Summary

The proposed development is to consist of a total of 34 residential units. Access is to be provided via a 6.5m wide driveway off Ward Street.

8.2 Car Parking Arrangements

The car parking provision, of 54 car parking spaces, for the proposed development meets the expected car parking demand and is considered suitable to cater for the needs of the proposed development.

The ground level and basement car park layouts comply with Australian Standard requirements. Overall, TTM considers the proposed car parking arrangements for this development are adequate.

8.3 Impact on Surrounding Road Network

Assessment of the proposed development indicates that the development trips of only 18 morning and 11 evening peak trips will not have a significant impact on the future road network. As such, no further mitigating road works are required.

8.4 Service Vehicle Arrangements

TTM considers that the proposed on-site servicing provisions for the MRV are sufficient to cater for the expected demands generated by the development.

8.5 Active Transport Facilities

The current public transport infrastructure and proposed site provisions for pedestrian/bicycle facilities is considered adequate for the development.

8.6 Conclusion

Based on the assessment contained within this report, TTM see no traffic engineering reason why the relevant approvals should not be granted.

Appendix A Proposed Site Development Plan

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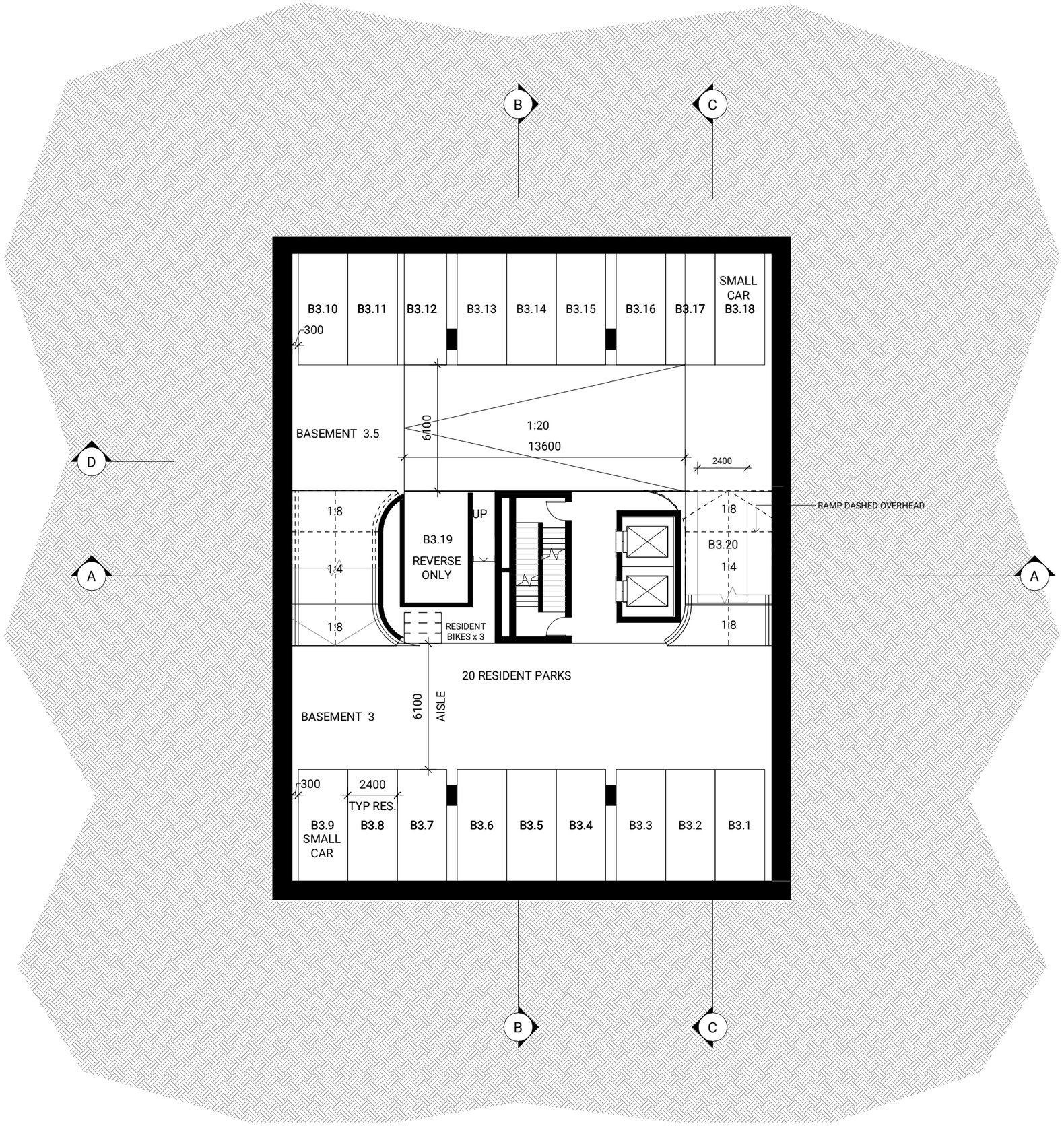
FLOOR PLAN - BASEMENT 03



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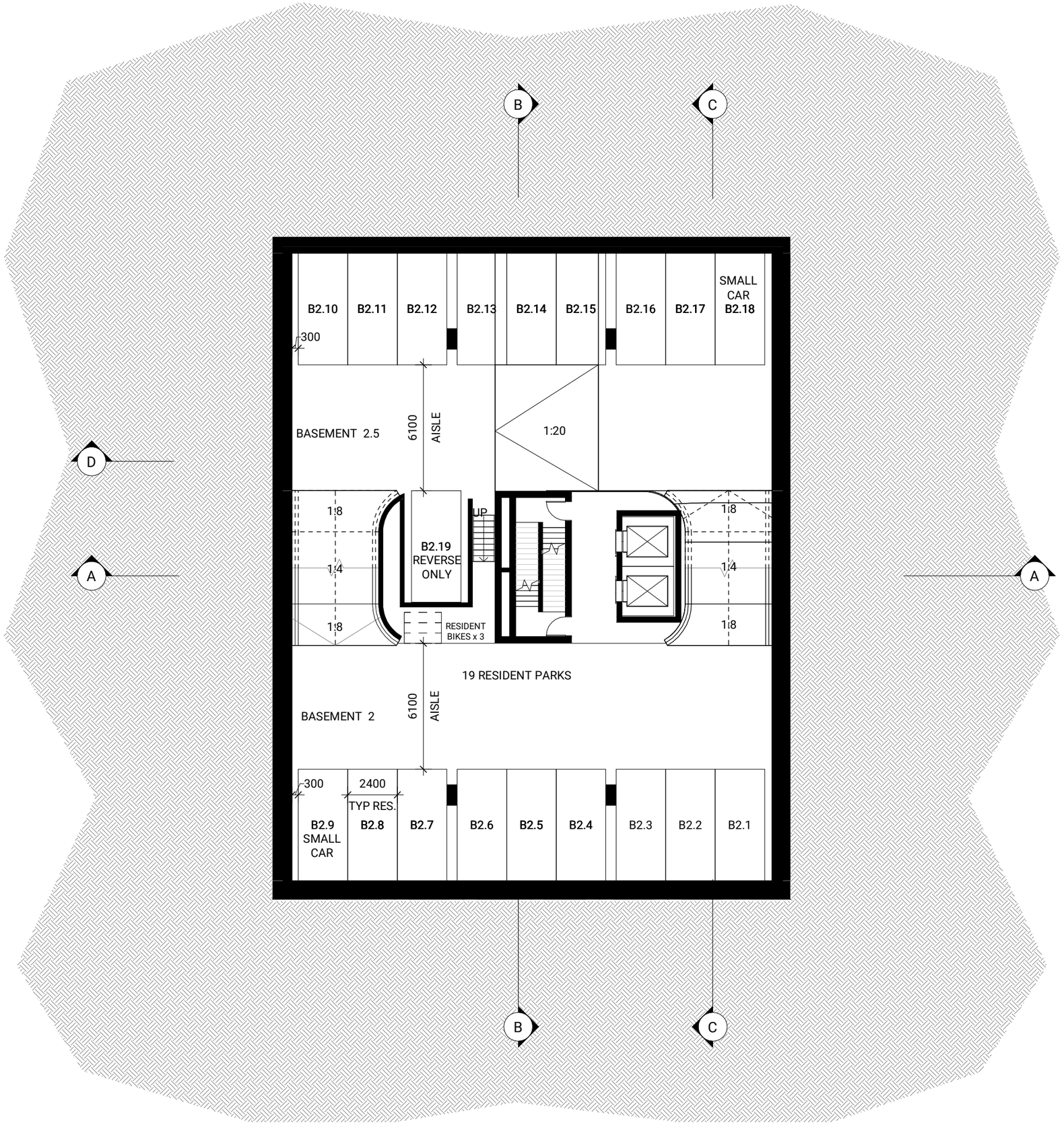

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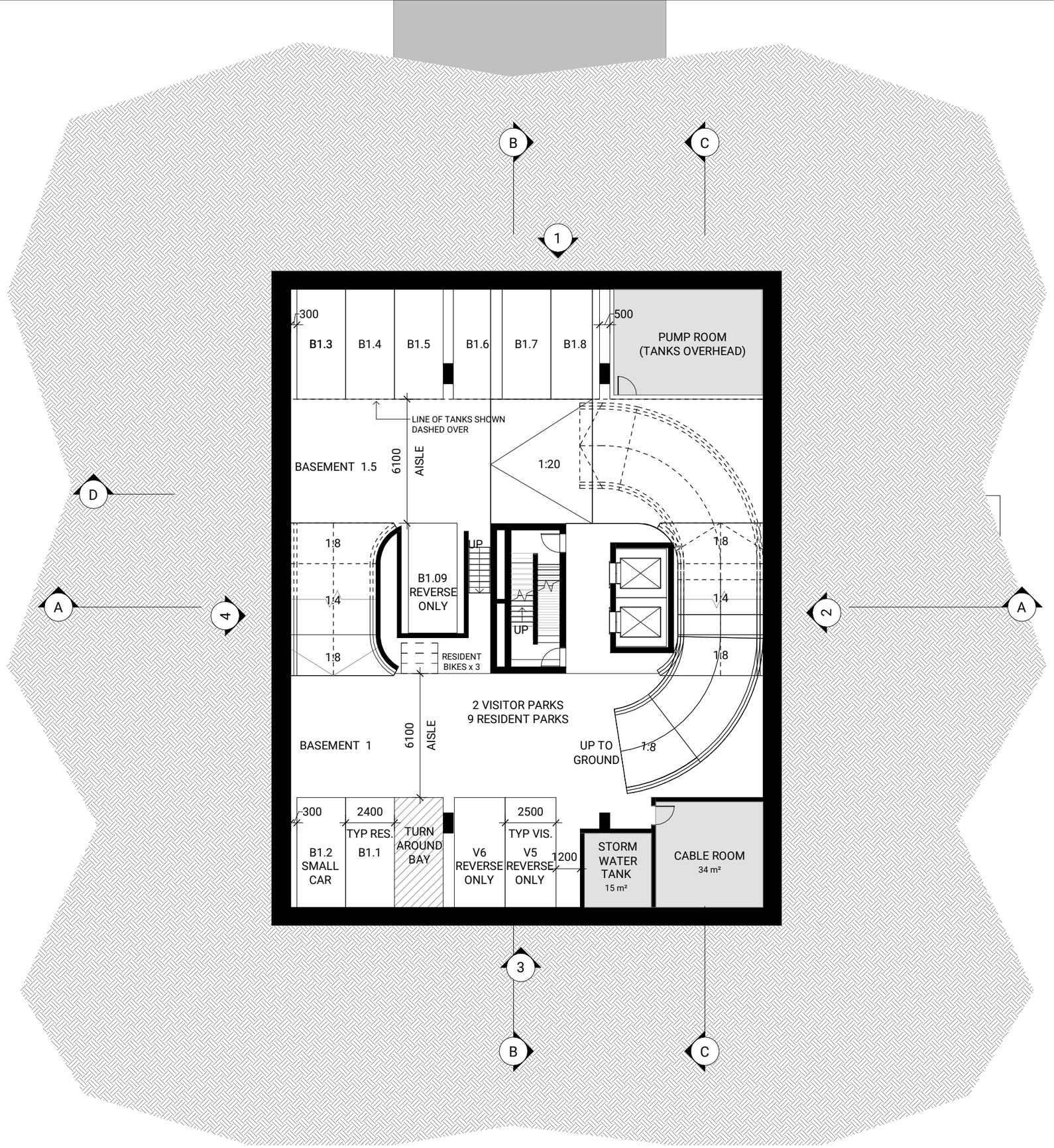

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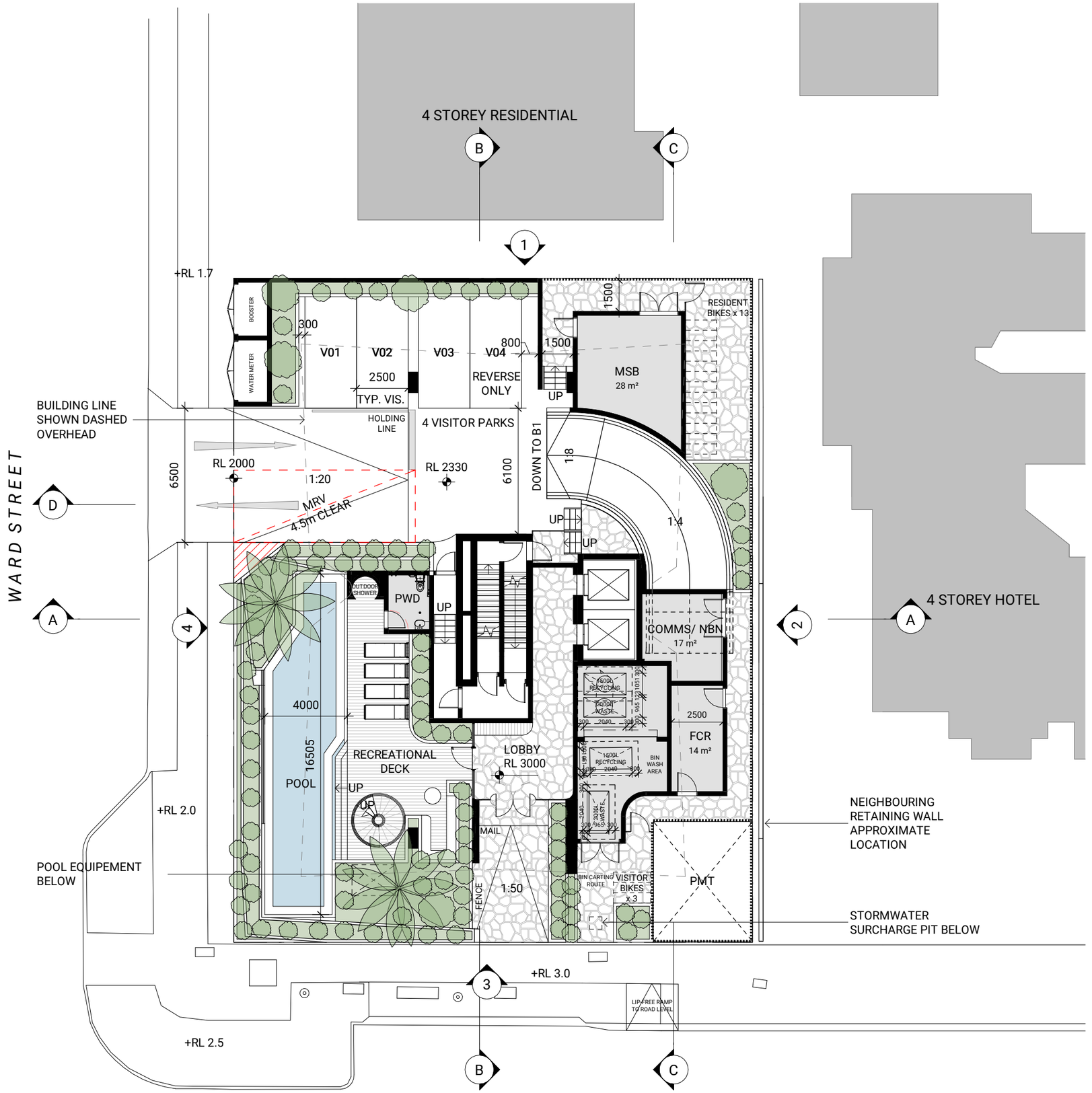
FLOOR PLAN - GROUND LEVEL



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FLOOR PLAN - LEVEL 1

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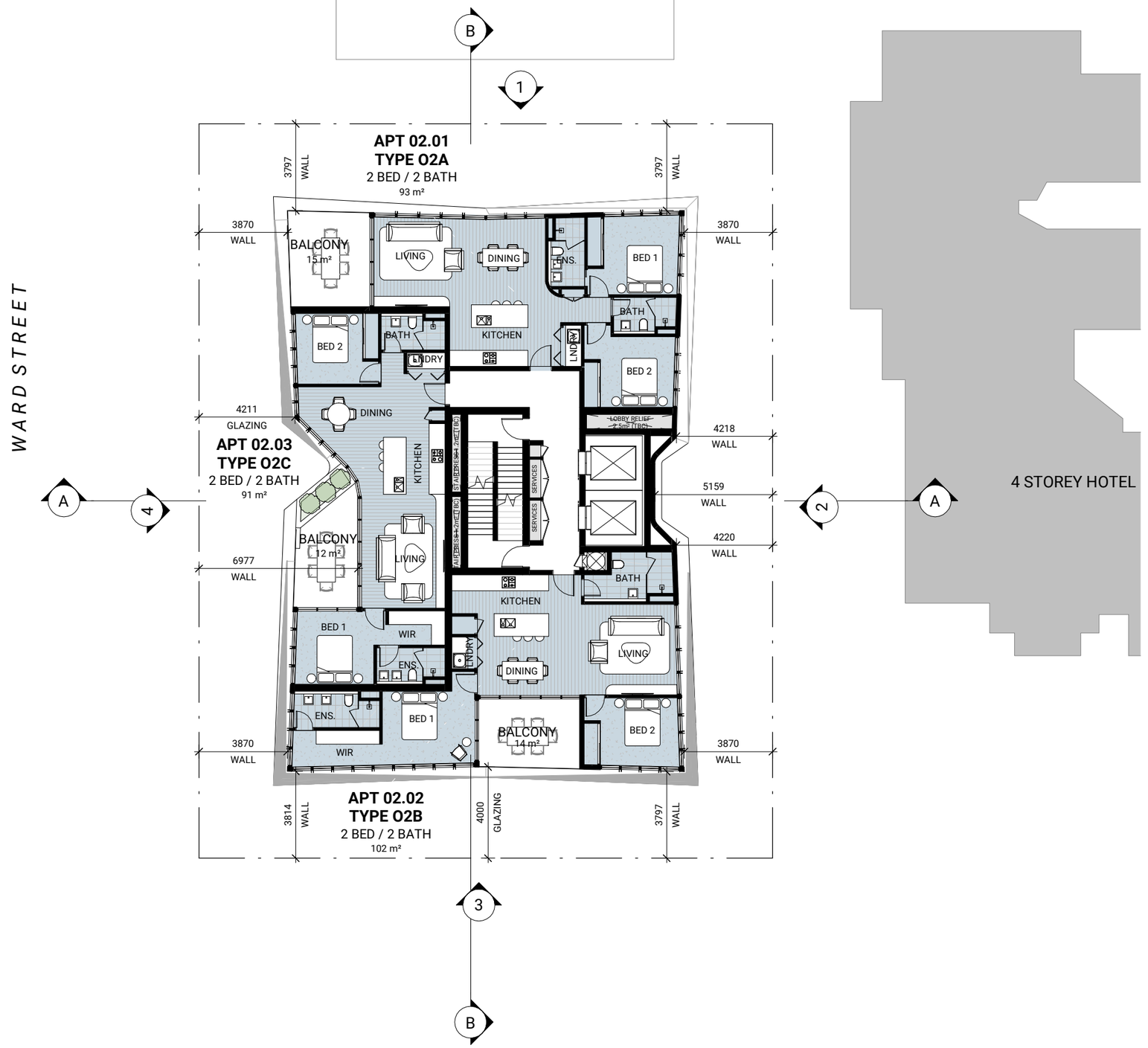
DA102
FLOOR PLAN - LOWER TYPICAL LEVEL 02 - 06



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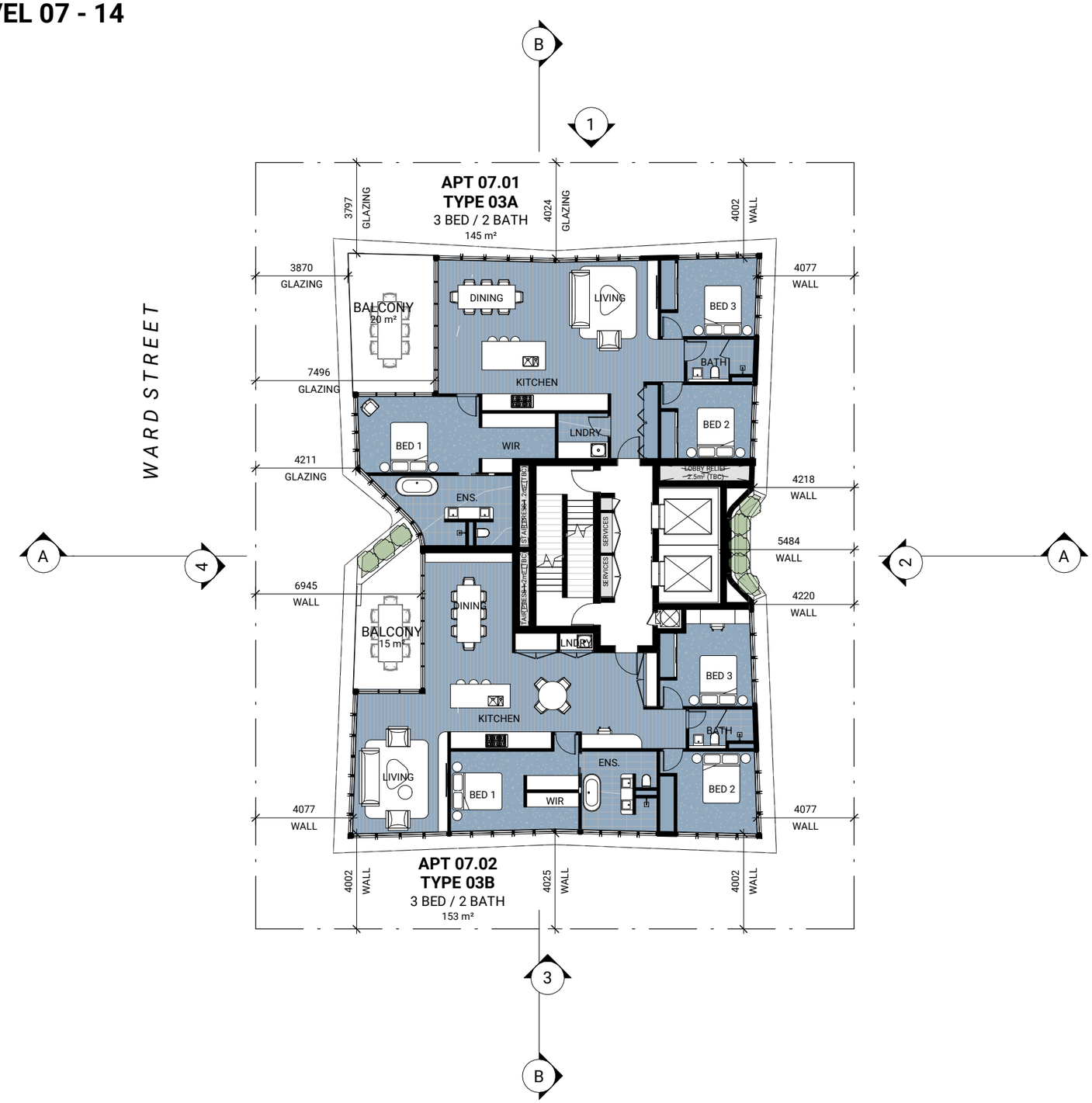

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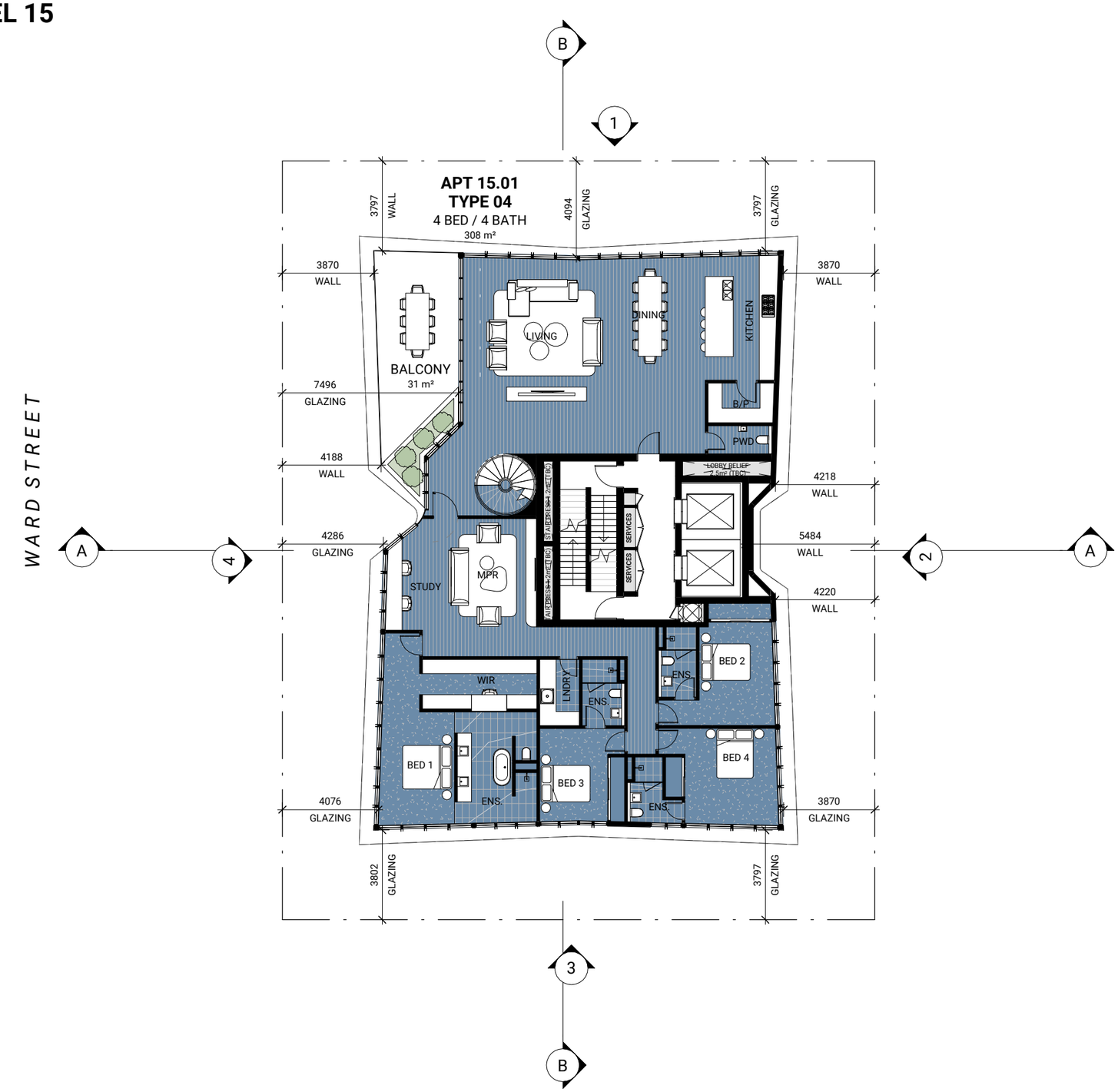

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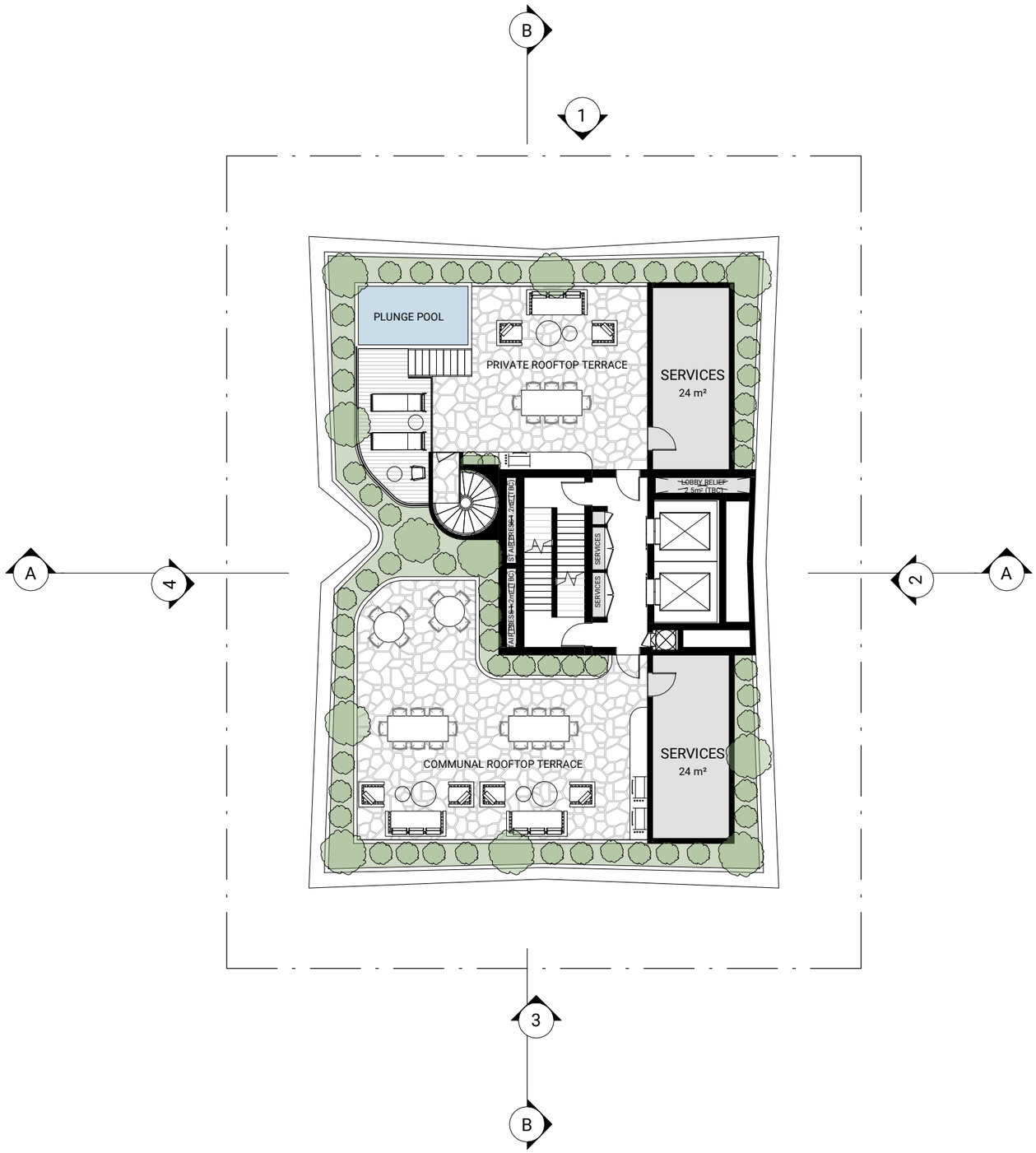

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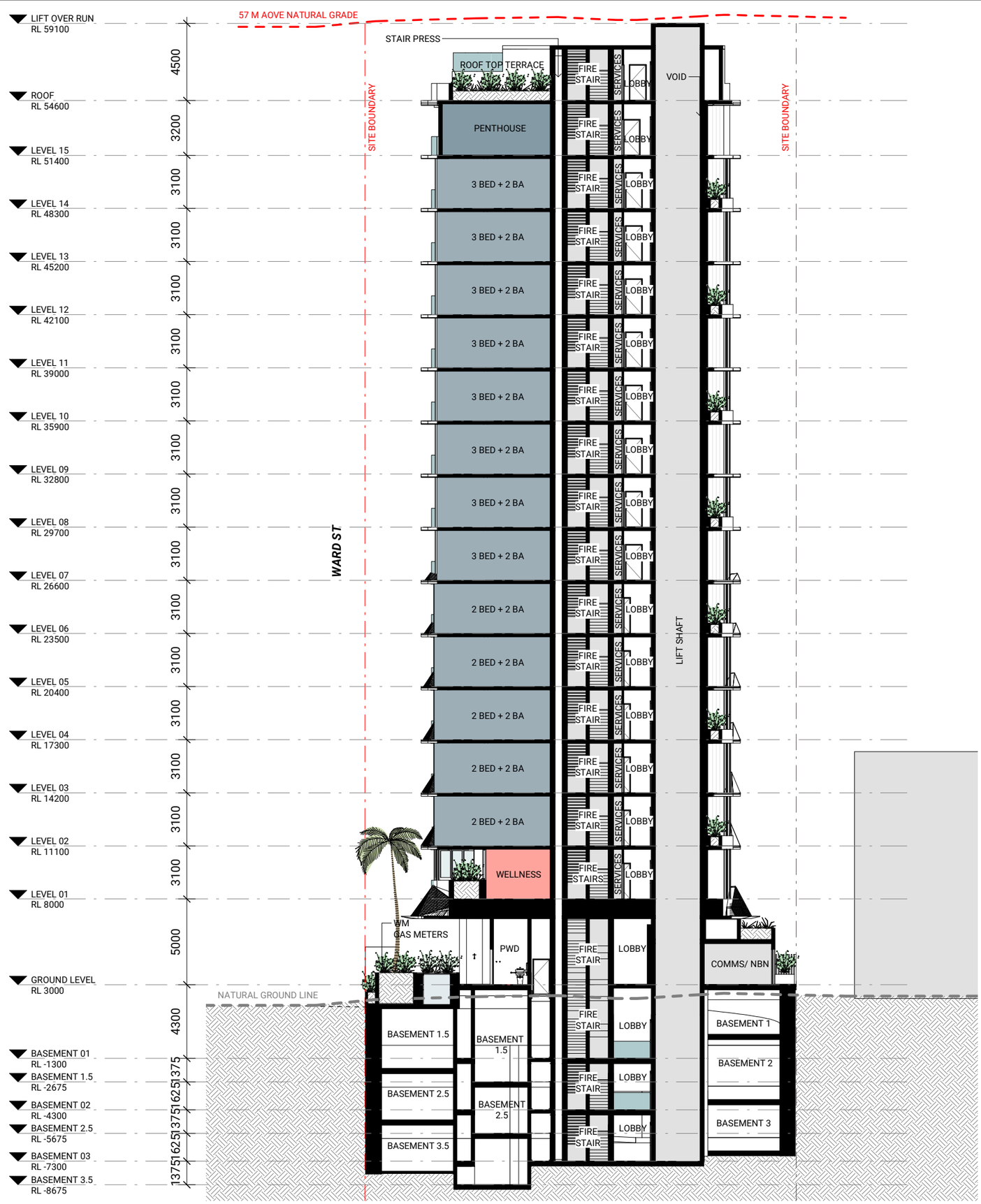

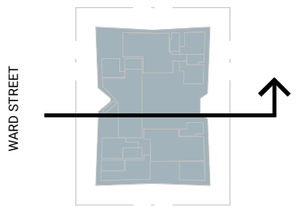

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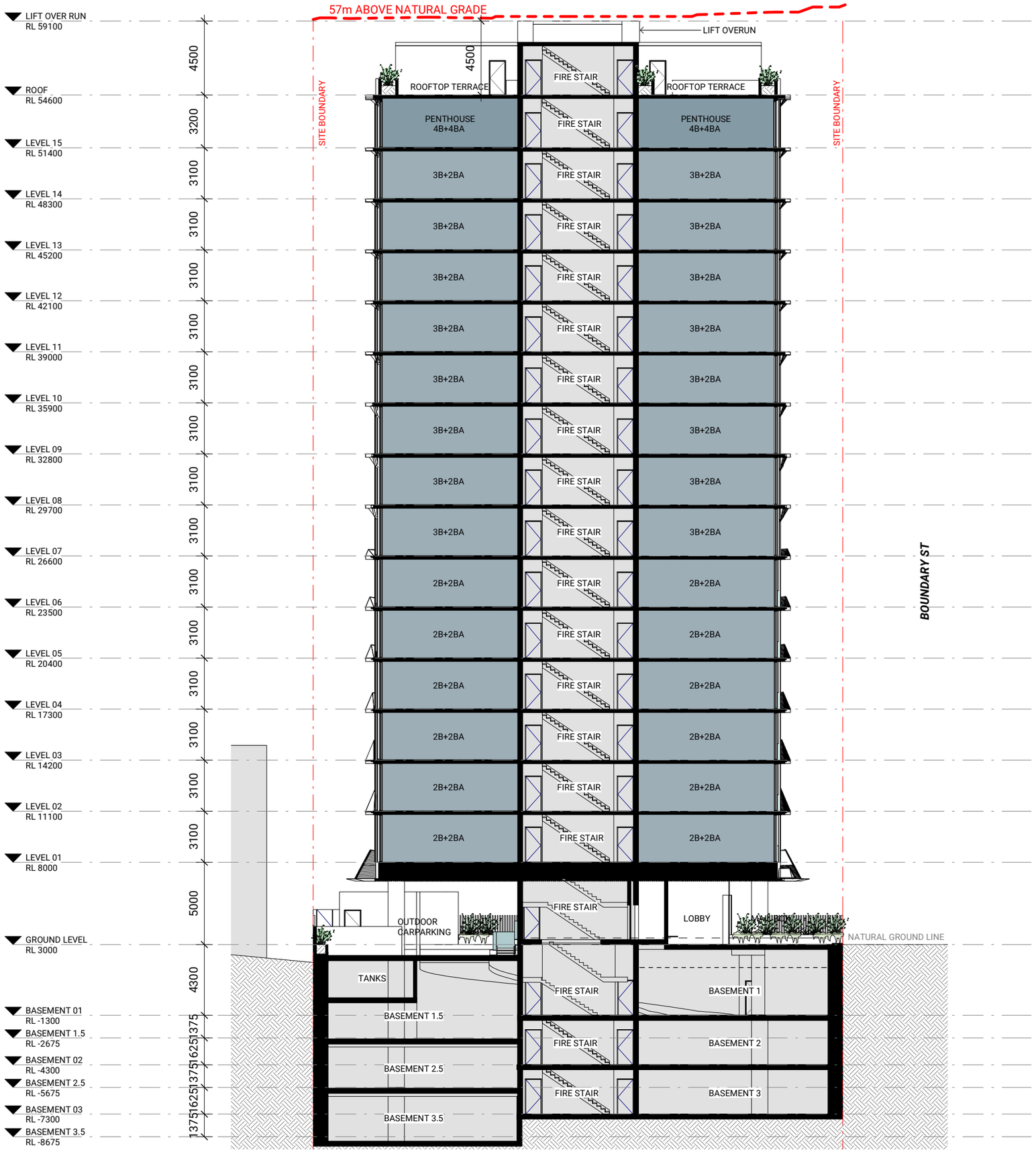

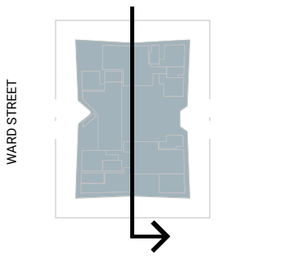

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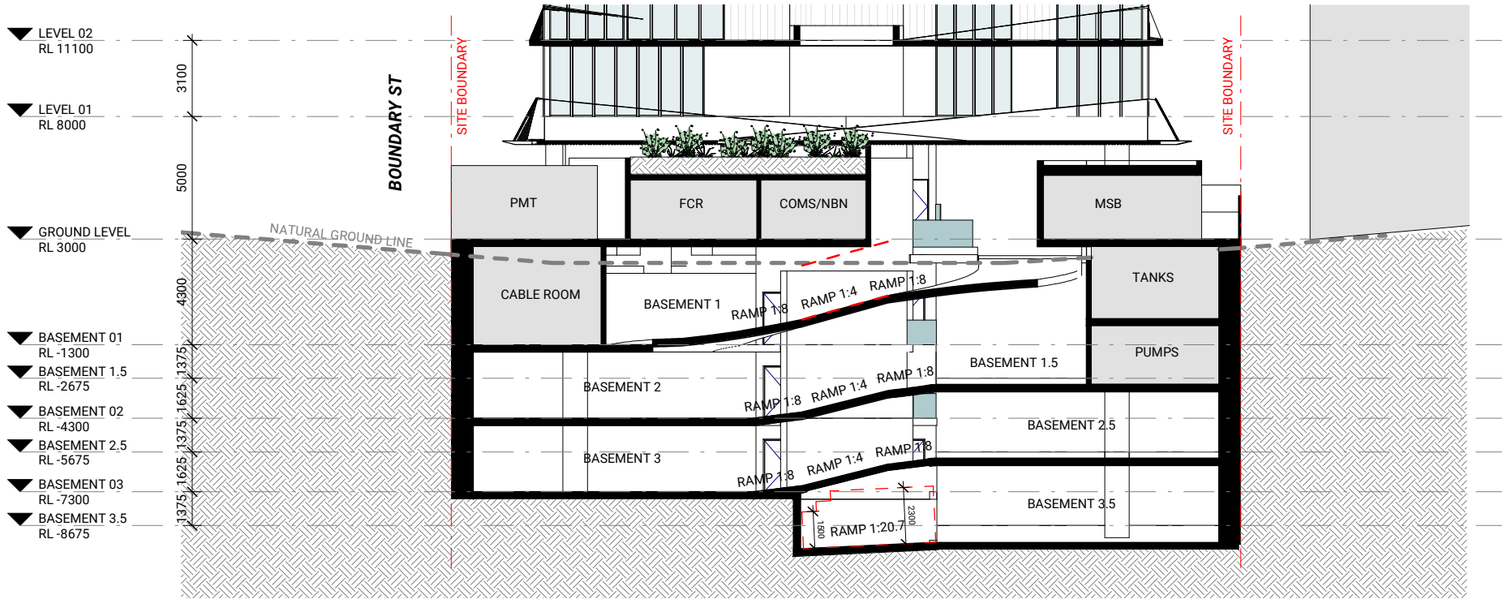
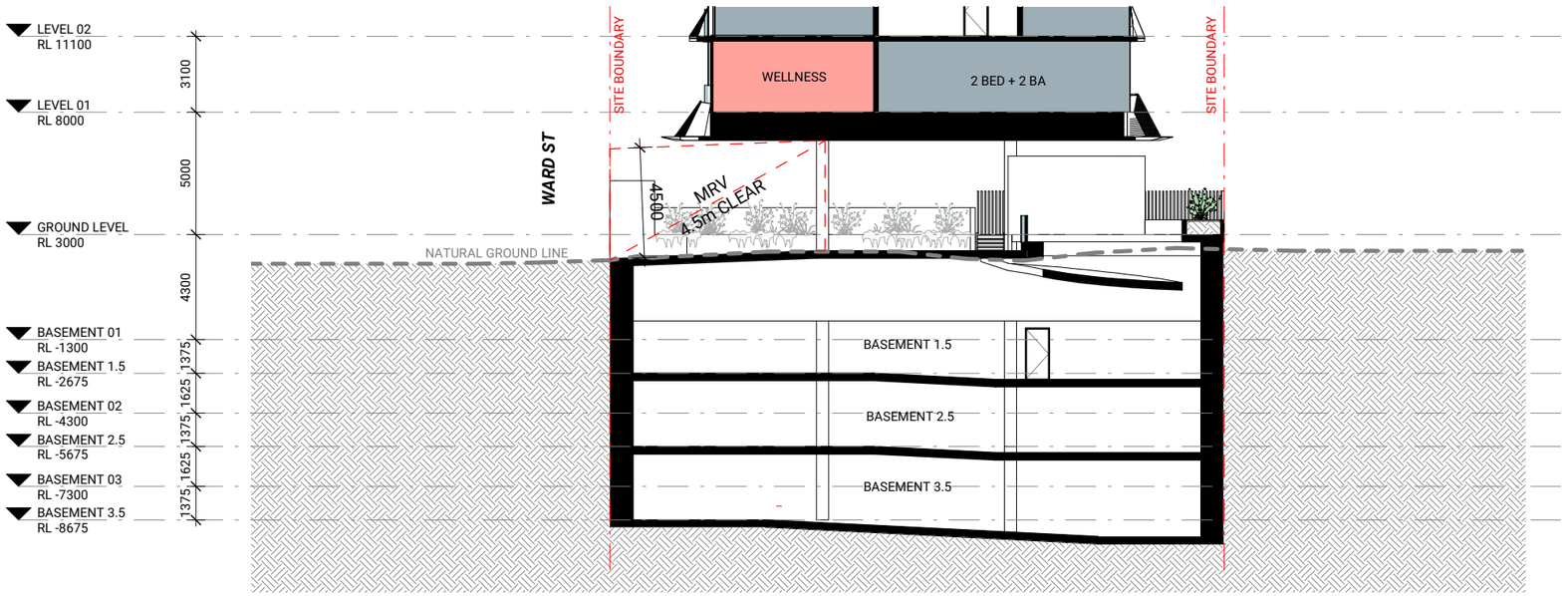


SECTION C



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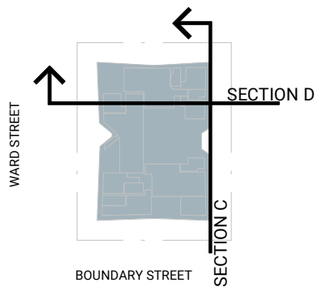

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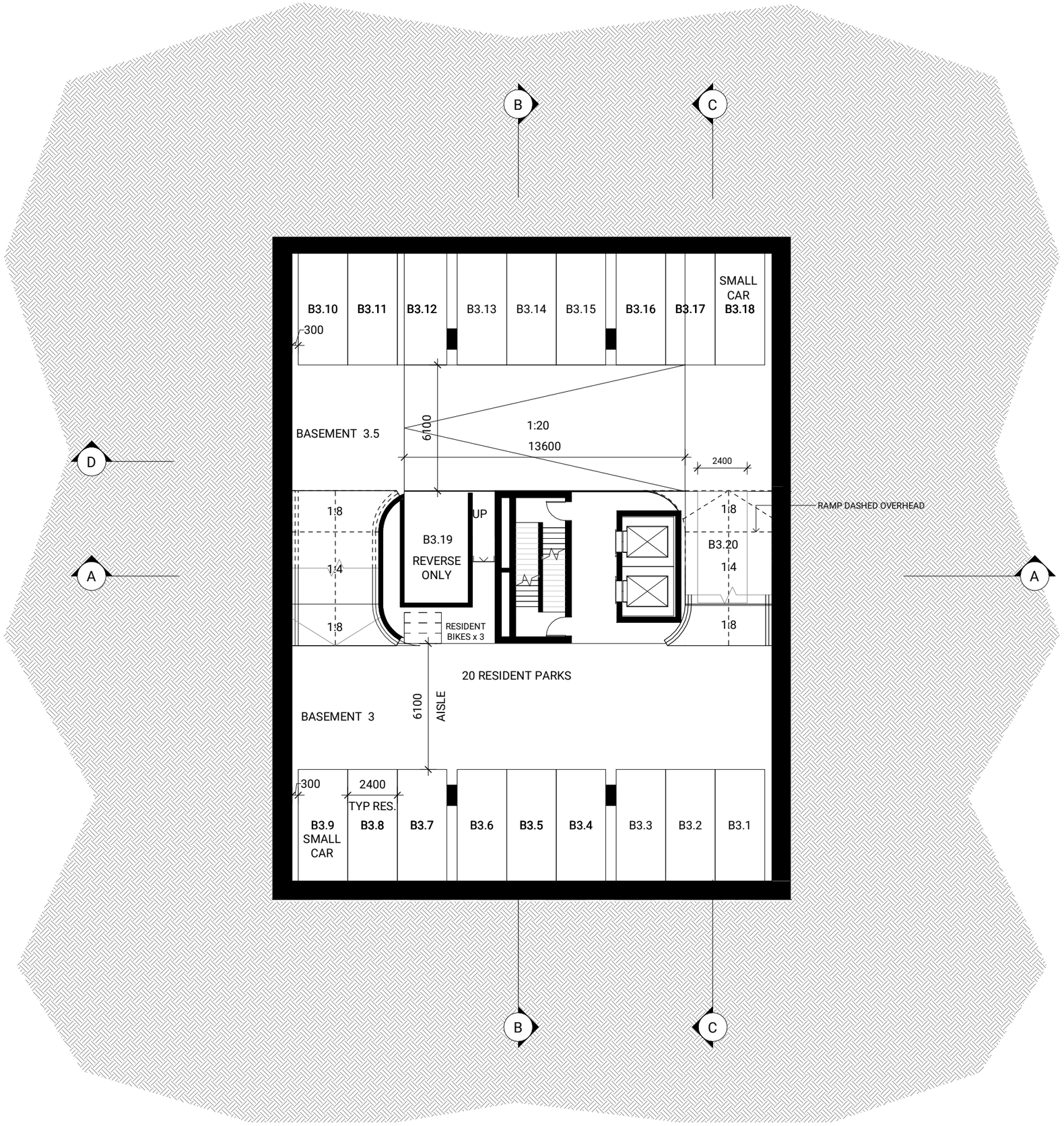
DA097
FLOOR PLAN - BASEMENT 03



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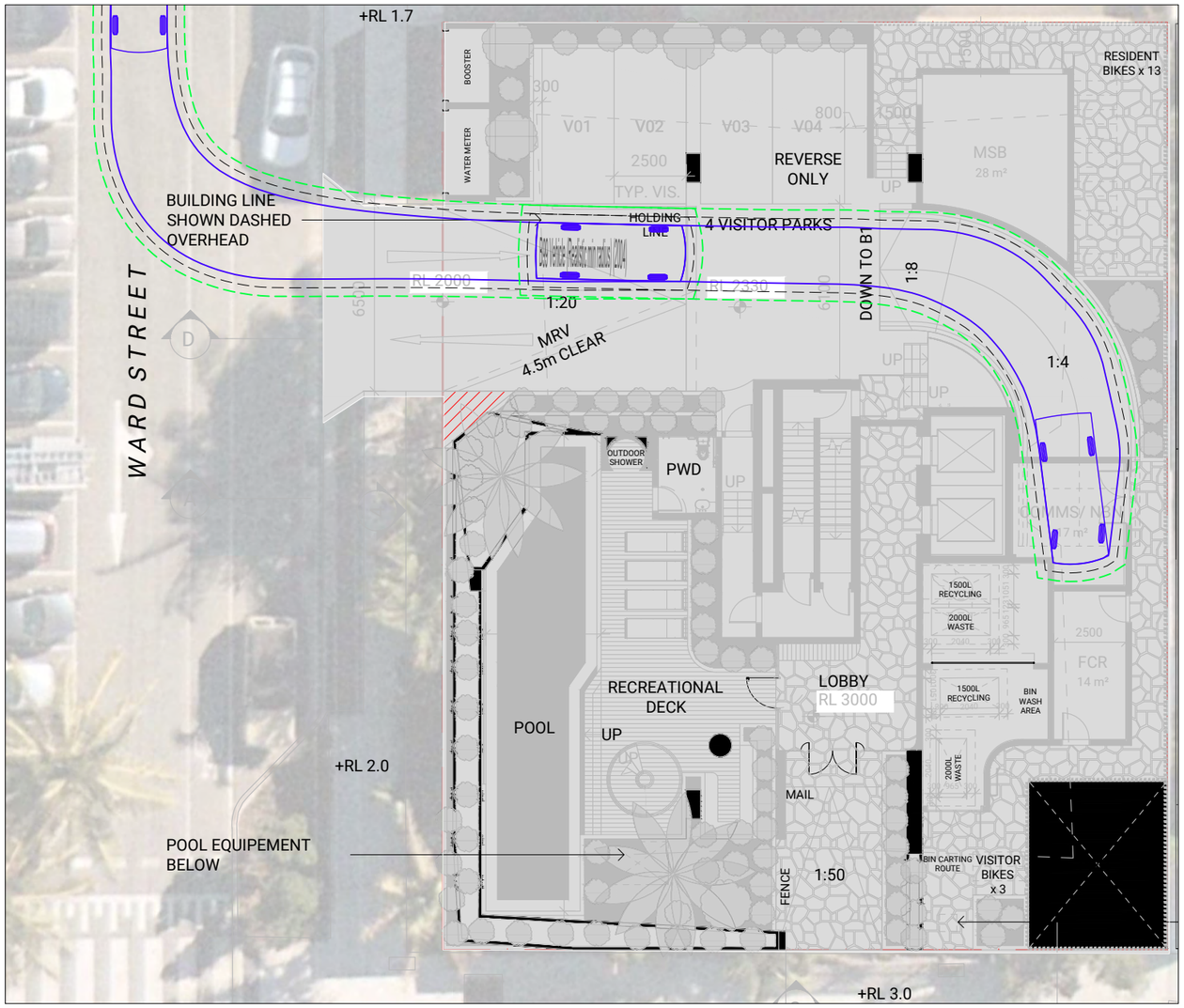
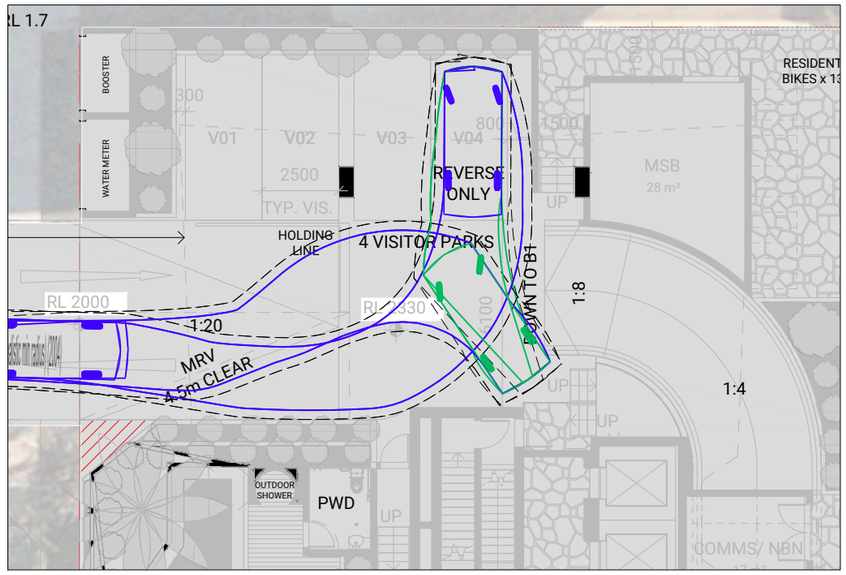
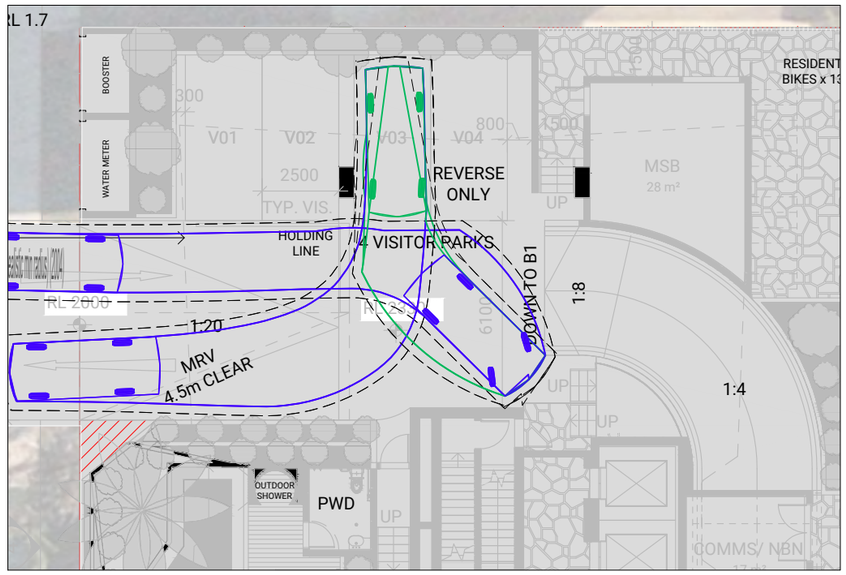


B99 ACCESS & EGRESS - GROUND FLOOR



B85 VISITOR 04 ACCES & EGRESS



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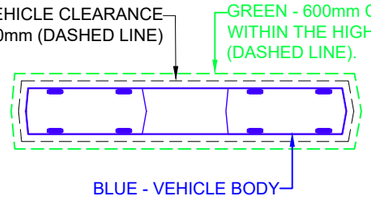
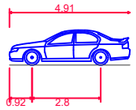


VEHICLE PROFILES



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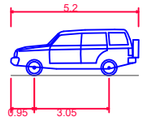

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SCALE 0 2.5 5 7.5 10 12.5m
SCALE 1:250 AT ORIGINAL SIZE

NORTH

CLIENT
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PROJECT
239 and 241 Boundary Street, Coolangatta - Residential

DRAWING TITLE
GROUND FLOOR SWEPT PATH ANALYSIS
DESIGN VEHICLE 8.8M MRV

PROJECT NUMBER	ORIGINAL SIZE
22GCT0119	A3
DRAWING NUMBER	REVISION
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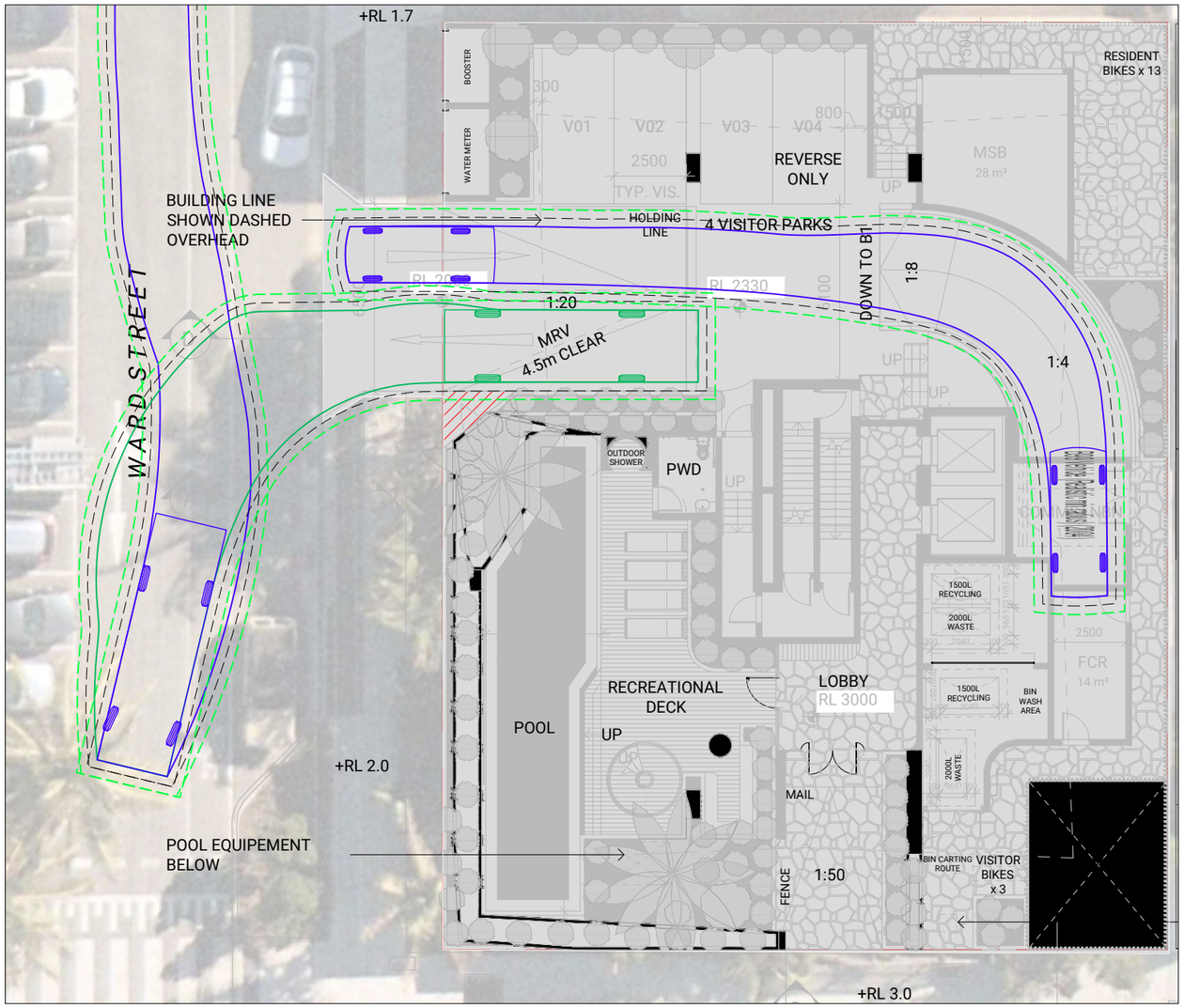
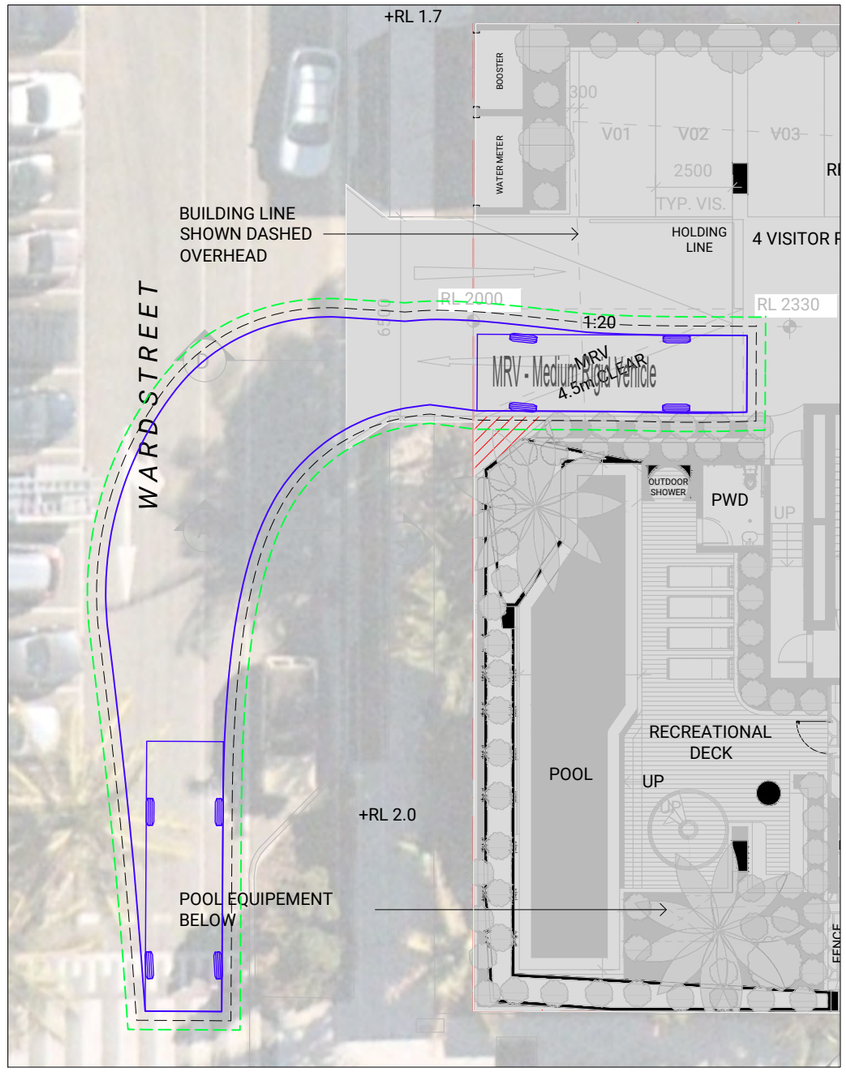
DATE	SHEET
27 Oct 2022	1 OF 1



MRV ACCESS / STANDING & PASSING B99



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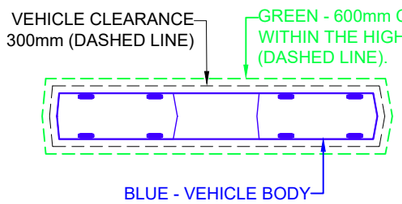
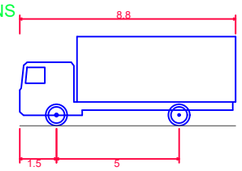
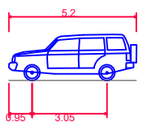




VEHICLE PROFILES

MRV - Medium Rigid Vehicle	
Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	3.633m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10.000m
Design Speed Forward	5.0KM/H Parking
Clearance Envelope	0.300mm & 0.600mm



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DRAWING NUMBER	REVISION
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DATE	SHEET
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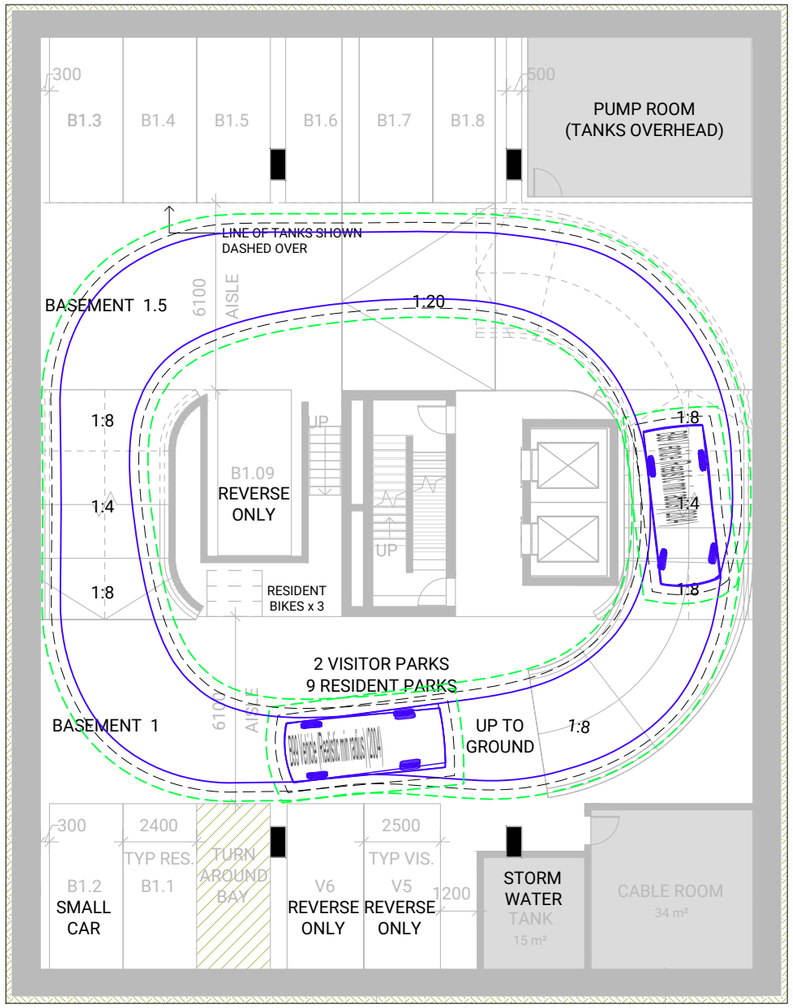
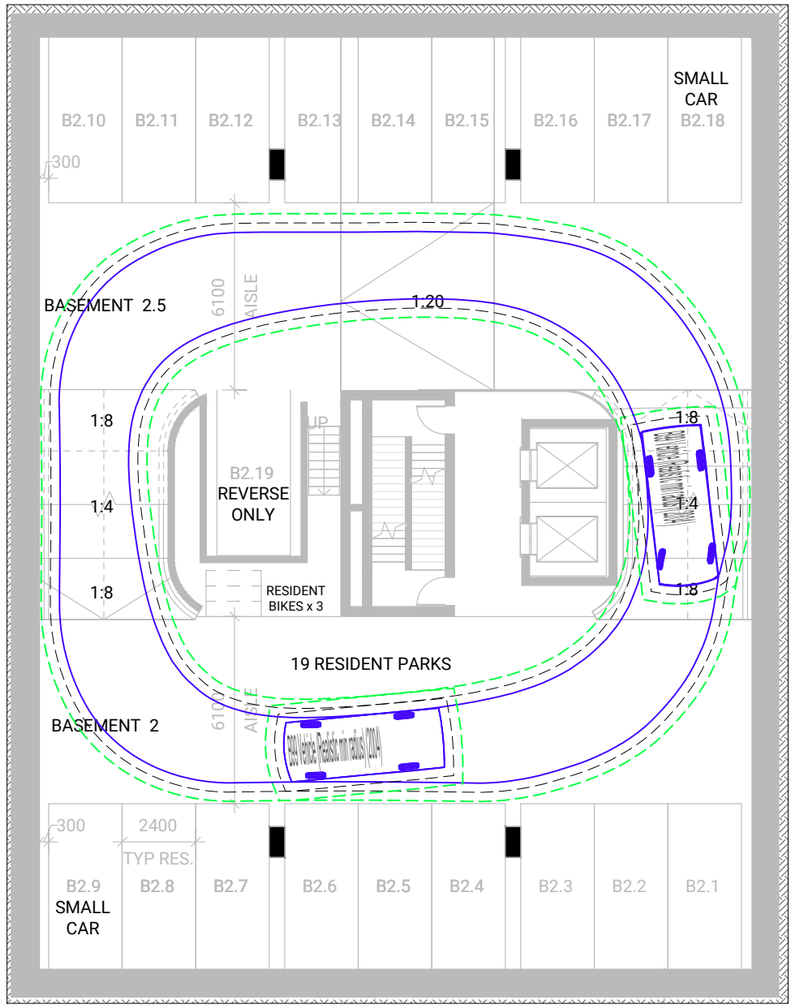
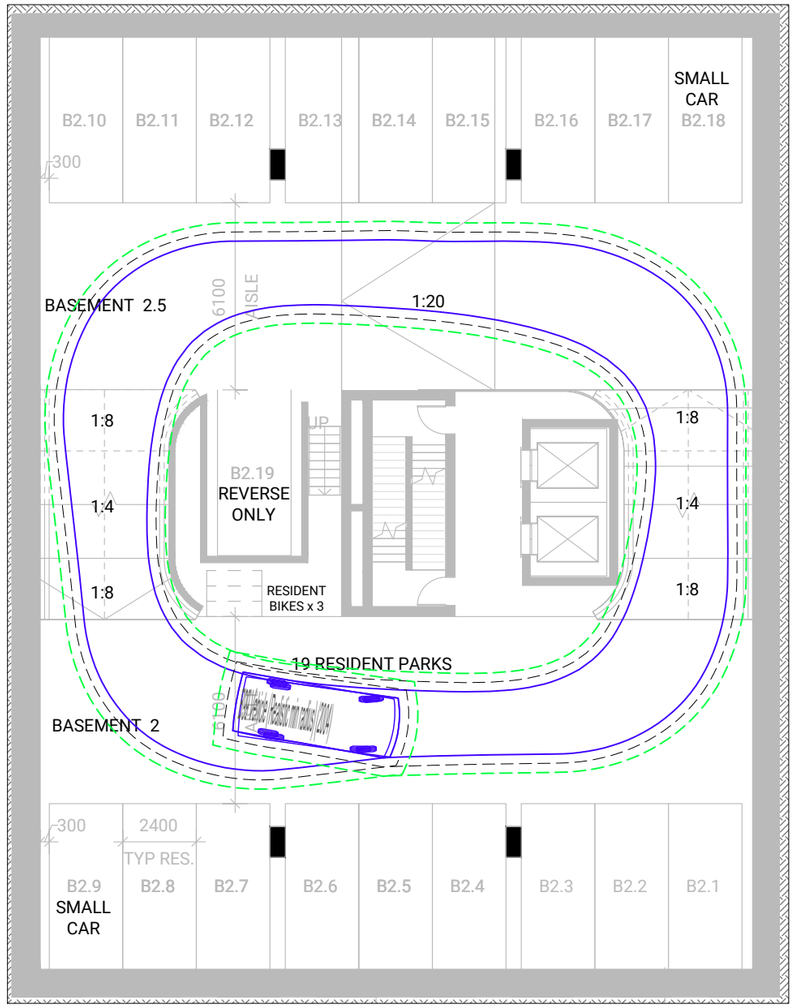


B99 BASEMENT 01 DESCENDING



B99 BASEMENT 02 & 03 DESCENDING



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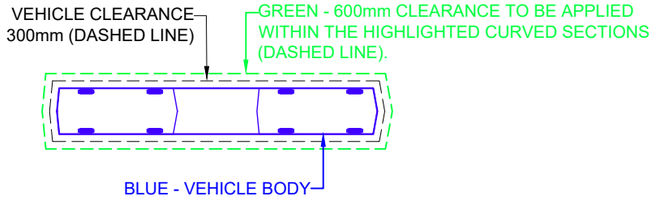

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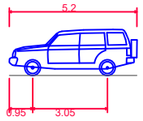

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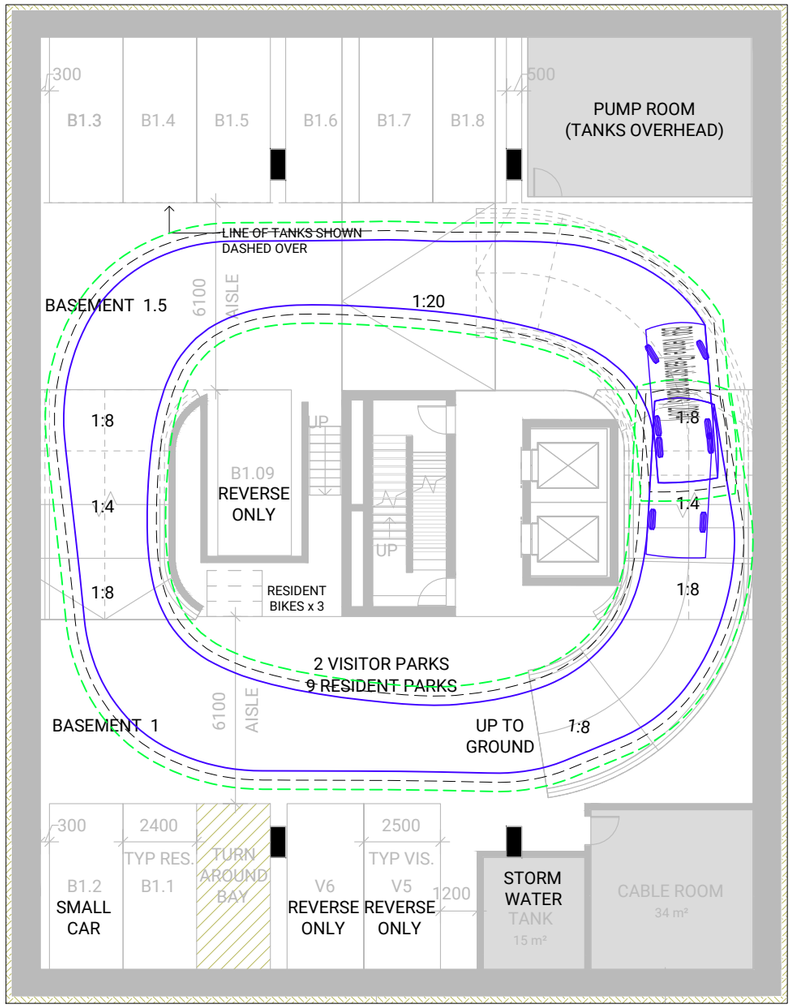

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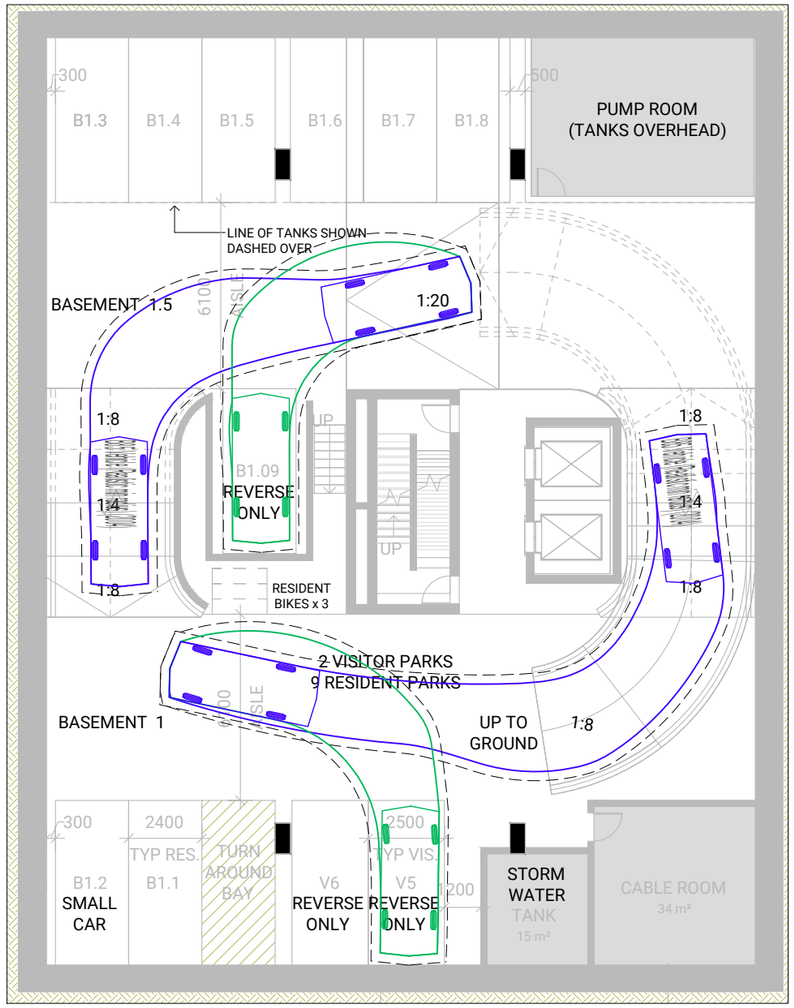

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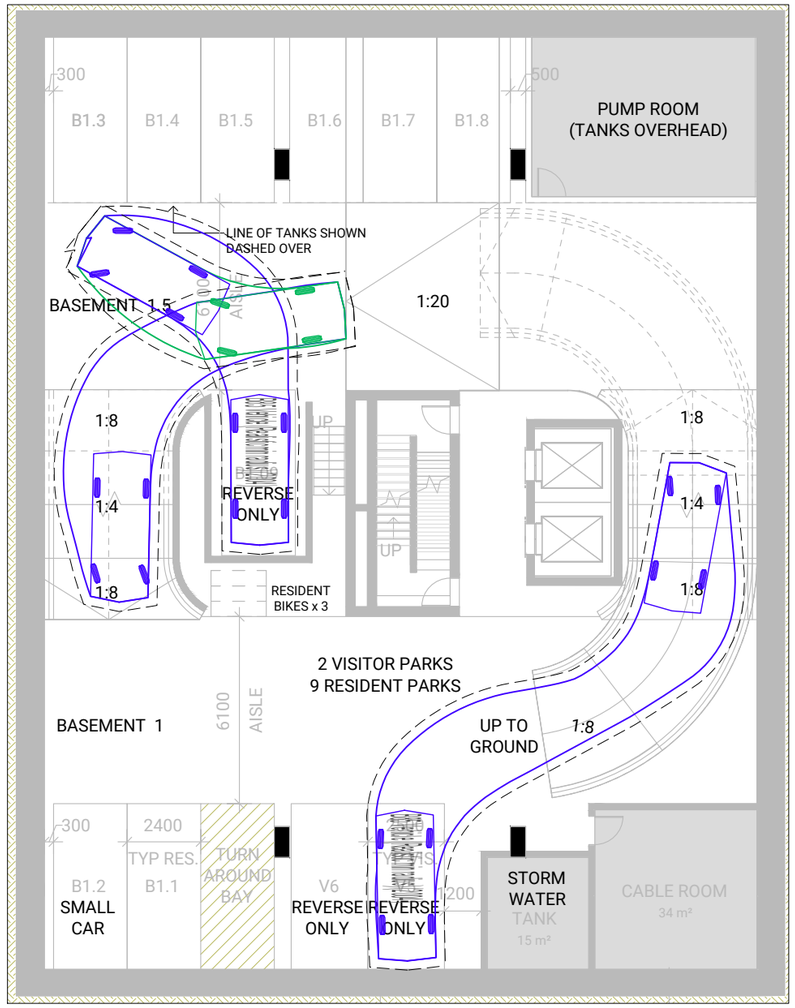

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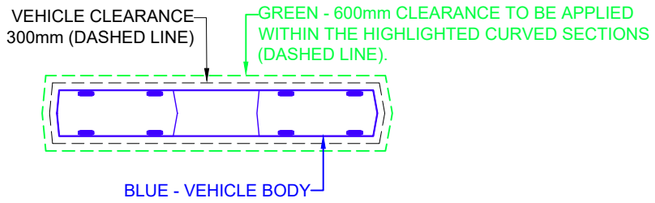
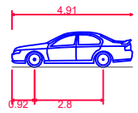


VEHICLE PROFILES



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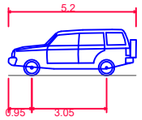

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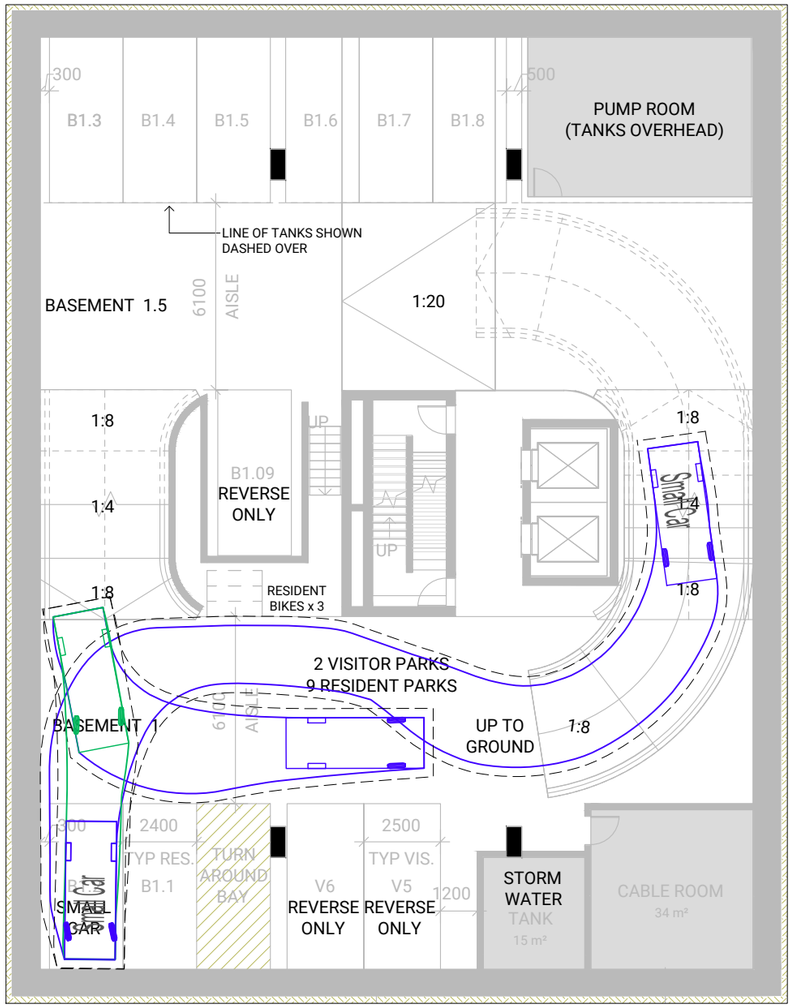
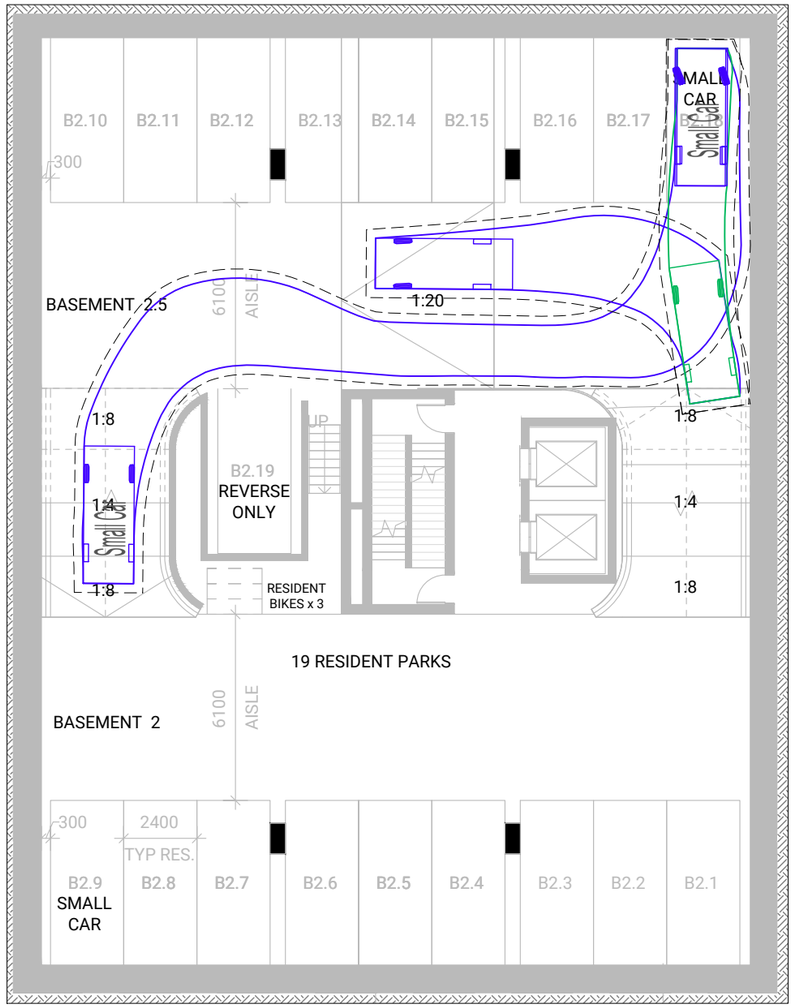
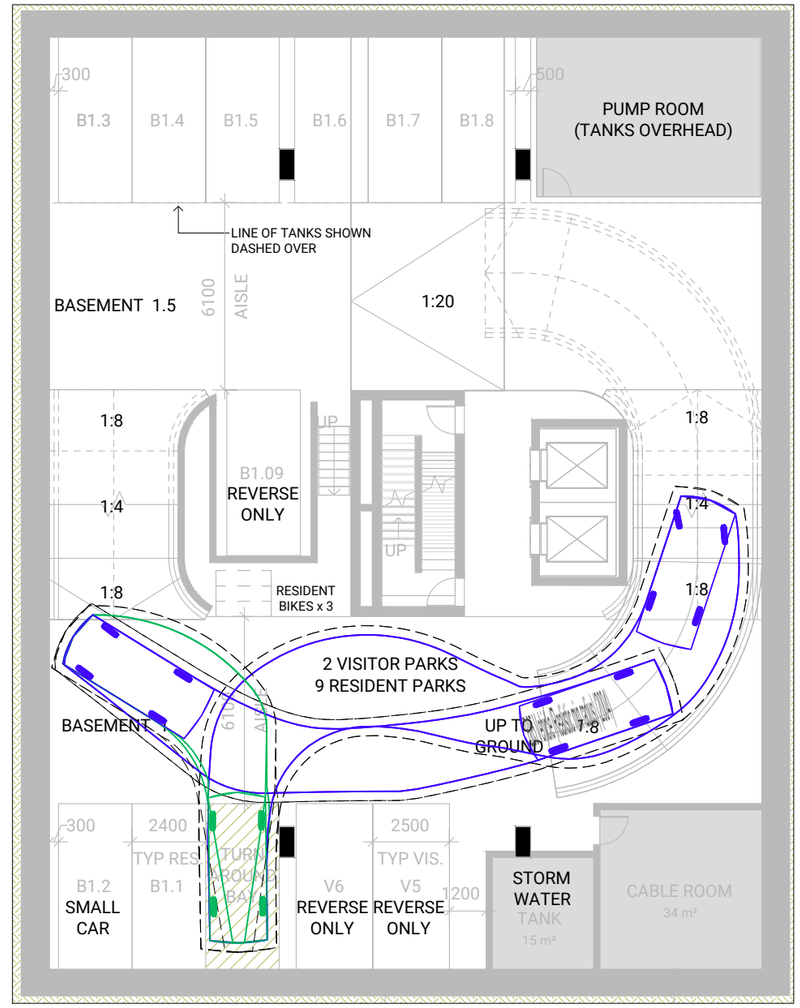


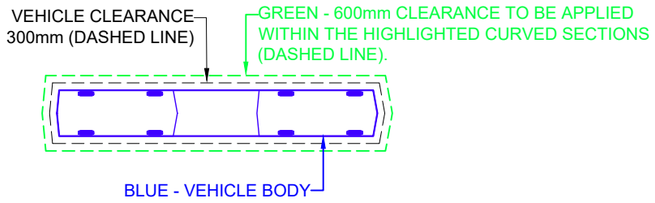
SMALL CAR B01 ACCESS / EGRESS



SMALL CAR B01 ACCESS / EGRESS



B85 B01 VISITOR TURNAROUND



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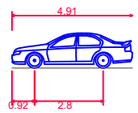

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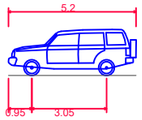

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WASTE MANAGEMENT PLAN

Enhance
URBAN PLANNING

239 & 241 Boundary Street, Coolangatta

Operational Waste Management Plan

Proposed Residential Development

At 239 and 241 Boundary Street, Coolangatta

On Behalf of Intrepid Development s (QLD) Pty Ltd

About TTM

For 30 years, we've been at the centre of the Australian development and infrastructure industry. Our unique combination of acoustics, data, traffic and waste services is fundamental to the success of any architectural or development project.

We have over 50 staff, with an unrivalled depth of experience. Our industry knowledge, technical expertise and commercial insight allow us to deliver an exceptional and reliable service.

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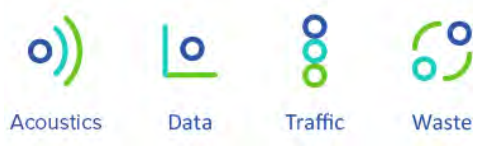

Revision Record

No.	Author	Reviewed/Approved	Description	Date
1.	N. Lee	S. Kenny	OWMP – Draft	14/09/2022
2.	N. Lee		OWMP – DA Issue	27/10/2022
3.	N. Lee		OWMP – DA Issue Update	29/11/2022

Level 8, 369 Ann Street, Brisbane. PO Box 12015 George Street Brisbane QLD 4003

Executive Summary

This document is an Operational Waste Management Plan (OWMP) developed for a proposed residential development to be located at 239 and 241 Boundary Street, Coolangatta.

The purpose of the OWMP is to provide compliance and design information relating to the handling, storage, and collection of refuse within the proposed development. Compliance relates to alignment with the relevant section of the Gold Coast's City Plan Policy – Solid Waste Management Code. The content of the OWMP is written with the purpose of providing a guide for the construction and operational phases of the development and therefore may be updated to include detailed information as required for each phase.

A summary of the proposed development and waste management processes are outlined below:

- Proposed equipment:

Residential	Bin Requirements	Services Per Week
General Waste	1 x 2000L bin	2 Services per week
Commingled Recycling	1 x 1500L bin	2 Services per week
Refuse Chute	1 x single chute with Diverter system	

- Refuse collection:
  - Refuse will be collected by Council contractor.
  - Refuse collection is based on a maximum of 4 days of storage between collections for all refuse streams which equates to 2 services per week.
  - All refuse collections occur at the designated servicing point entrance off Boundary Street, near the temporary bin storage area on ground level which is accessible via the hard stand pathway.
- Refuse storage:
  - All refuse will be stored in bulk bins located in the refuse room found on ground level.
  - The refuse chute is accessible from each residential level of the building.
- Refuse transfer:
  - Building Management Staff / Caretaker will transfer the bins from the chute discharge room to the adjoining temporary bin storage area either on or before collection.
  - The contractor will collect the bins from the temporary bin storage area and return them after servicing via the hardstand carting route.
  - It is the responsibility of the Building Management Staff/ Caretaker to rotate the bins underneath the chute when deemed suitable.

- Refuse disposal:
  - Each residency will be equipped with receptacles in their individual apartments for the immediate disposal of refuse.
  - During the day or as required residents will transfer their waste material to the chute access points located on each residential level of the building.
  - The single chute with diverter will dispose of the refuse into the appropriate streams. With the inclusion of the diverter, the single hopper door on each level provides an option for selection of recycling disposal. The default selection is General Waste.

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1 Introduction

1.1. Background

TTM Consulting has been engaged by Intrepid Developments (QLD) Pty Ltd to prepare an OWMP to support a proposed residential development located at 239 and 241 Boundary Street, Coolangatta. It is understood that a development application will be lodged with the City of Gold Coast Council.

1.2. Scope

The content of this OWMP is intended to provide information in reverse order to the typical movement of waste streams from disposal to collection. The reverse order provides context for refuse collection, storage, and transfer. Information on refuse disposal and collection points is given for each use within the development.

The items covered within the OWMP are described in Table 1.1. The key information for council approval can be found in Section 2.

Table 1.1: Scope Items

Item	Description
Refuse streams	Identification of refuse streams & anticipated development refuse volumes likely to be produced
Refuse separation	Recommendations for appropriate segregation methods for each refuse stream
Refuse collections	Assessment of waste collection vehicle (WCV) access and manoeuvring
Refuse storage	Detailed analysis of refuse storage facilities and design
Refuse transfer	Assessment of refuse transfer between refuse storage and collections areas
Refuse disposal	Recommendations for refuse disposal within the development
Refuse management equipment	Identification of recommended and optional refuse management systems and equipment
Refuse management operations	Recommendations for operational efficiency and ongoing management, including refuse minimisation, tenant education and safety
Building design	Recommendations for design of refuse management facilities

Detailed information including site plans and drawings, recommended refuse management equipment and system specifications, common refuse signage as well as a list of terms and abbreviations are provided in the appendices.

The recommendations in this OWMP relate to the operational phase of the development. Additional requirements for refuse management during or after demolition or construction phases are not included and require a dedicated plan.

The provisions outlined in this OWMP are considered appropriate for this type of development. It is noted that the refuse rooms are suitably sized to accommodate the refuse generated and number of bins proposed based on standard storage and collection methods. The refuse rooms will also accommodate all options for alternate equipment and disposal methods.

1.3. Regulatory Considerations

1.3.1. Council's Refuse Planning Scheme

The plan satisfies CoGC's requirements by providing the following information:

- Type and quantity of refuse materials to be generated during the occupancy of the proposed site.
- Refuse collection, storage, transfer and disposal arrangements during occupancy of the completed development.
- Recommended operational requirements for the operational phase of the development, and design requirements for the building and refuse management facilities.

As this development is a residential site, TTM has referred to CoGC requirements as outlined in the City of Gold Coast – Solid Waste Management Code.

Table 1.2: OWMP Compliance Checklist

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome?
Waste and recycling storage and bin wash-down facilities		
PO1 Development provides waste and recycling storage and servicing facilities that are safe, convenient, efficient, appropriately sized for the type and volume of waste generated.	**AO1.1** Development includes waste storage points of sufficient size to accommodate the required number of waste and recyclable bins consistent with **SC6.15 City Plan policy –Solid waste management.**	**Complies with AO1.1 and PO1** Ground level bin storage room and ground level bin servicing point is provided for storage of all refuse bins and is appropriately sized in accordance with **SC6.15 City Plan policy –Solid waste management.**
	AO1.2 Waste and recycling storage points are located, designed and sized consistent with **SC6.15 City Plan policy – Solid waste management.**	**Complies with AO1.2 and PO1** The bin storage room and bin servicing point have been designed in accordance with SC6.15 City Plan policy – Solid waste management.
	AO1.3 Development with a dwelling above the third story include appropriate waste removal systems which incorporate: waste chutes; hoppers; and separate waste storage rooms. Note: Waste removal system design is to be consistent with SC6.15 City Plan policy – Solid waste management.	**Complies with AO1.3 and PO1** Development includes chute with Diverter, hoppers and waste storage rooms. All areas will be designed in accordance with SC6.15 City Plan policy – Solid waste management.
	AO1.4 Development that includes a commercial kitchen or generates clinical or related waste incorporate additional waste facilities consistent with **SC6.15 City Plan policy – Solid waste management.**	**N/A**
PO2 Development provides a bin wash-down facility that maintains appropriate environmental health and amenity standards.	**AO2** Development includes appropriately sized and located bin wash-down facilities consistent with **SC6.13 City Plan policy – Solid waste management.**	**Complies with AO2 and PO2** Bin wash-down facilities will be provided in the bin storage room and will be designed in accordance with SC6.15 City Plan policy – Solid waste management.

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome?
Amenity		
PO3 Waste and recycling storage and servicing points are appropriately located and designed for convenient and safe access by all users and to minimise the potential for nuisance to occupants of the development or adjoining properties.	**AO3.1** Direct unobstructed paths exist between waste and recycling storage and servicing points and road frontages.	**Complies with AO3.1 and PO3** All disposal and transfer paths between the disposal points, bin storage room and servicing area are direct and provided without obstructions.
	AO3.2 Waste and recycle storage points are screened by solid fencing or vegetation to ensure they are not visible from a public place or sensitive land use.	**Complies with AO3.2 and PO3** All waste storage areas will be enclosed and screened to ensure it is not visible from public areas.
Waste servicing		
PO4 Waste and recycling servicing points are appropriately located and designed to facilitate safe, unobstructed and efficient servicing of waste containers.	**AO4** Waste and recycling servicing points are located, designed and sufficiently sized consistent with **SC6.15 City Plan policy – Solid waste management.** Note: Regulation of the access, stopping and maneuvering of refuse collection vehicles are subject to meeting, Part 9.4.13 Transport code and associated City Plan guidelines.	**Complies with AO4 and PO4** 1. The bin storage room and bin servicing point have been designed to accommodate the required number of bins. 2. The servicing area is located with access directly to the temporary holding area to facilitate unobstructed and efficient servicing.
Non-serviced areas		
PO5 Developments in non-serviced areas have appropriate solid waste management measures to adequately service the development. Note: For Commercial developments a WMP, prepared in accordance with SC6.15 City Plan policy – Solid waste management, is Council's preferred method of addressing the above outcome.	**AO5** No acceptable outcome provided.	**Complies with AO5 and PO5** The OWMP has been prepared in accordance with SC6.15 City Plan policy – Solid waste management.

1.4. Site Location

The site is located at 239 and 241 Boundary Street, Coolangatta as shown in Figure 1.1. The property is described as Lot/Plans 6RP1777 and 7RP1777. The site is located with frontages on Boundary and Ward Streets. All vehicular access will be via Ward Street.

Figure 1.1: Location of Site (Source: Nearmap image 14/08/2022)

1.5. Development Summary

The proposed development is a 19-Stoey residential building comprising of 3 basement levels, ground level Residential amenity and 15 Residential Apartment levels.

Table 1.3 provides a summary of the development in relation to refuse generating areas for use with the refuse calculations provided in Section 2.1

Table 1.3: Development Summary

Lot	Description	Measure *
Basement 1-3	Resident Parking / Plant / Services	N/A
Ground Level	Visitor Parking / Residential Amenity / Refuse Storage	N/A
Levels 1 - 6	17 x 2 Bedroom Apartment	17 Units
Levels 7 - 14	16 x 3 Bedroom Apartment	16 Units
Level 15	1 x 4 Bedroom Apartment	1 Unit
Total		34 Units

2 Refuse Management

This section provides the detailed refuse calculations and describes the arrangements for the collection, storage, transfer and disposal of refuse within the development. This includes associated bin quantities, storage capacities, equipment details, collection frequencies and site access details.

2.1. Refuse Calculations

The generation rates used for the calculation of residential refuse produced have been applied based on rates recommended by the City of Gold Coast Council to achieve compliance. It should be noted that these rates are standardised generation rates and not site specific however, give an estimation of potential waste generation. Site specific auditing will be required to establish actual refuse generation of this site.

Table 2.1: CoGC Provided Generation Rates

Type	Measure	General Waste	Commingled Recycling
2 Bedroom	L / Unit / Week	100	60
3 Bedroom (and above)	L / Unit / Week	120	80

Table 2.2: Refuse Calculations

Description	Area	Measure	General Waste L/Week	Commingle Recycling L/Week
2 Bedroom	17	Units	1,700	1,020
3 Bedroom (and above)	17	Units	2,040	1,360
Total Weekly Volumes (L / Week)			**3,740**	**2,380**
Volumes per Day (L / Day)			**534**	**340**
Volumes per Collection (L / Collection)			**2,137**	**1,360**
Collection and Equipment Details	Collections per Week		2	2
	Storage Capacity		4 Days	4 Days
	Equipment Size		2000L	1500L
	Equipment Quantity Required		1+1	1+1

A maximum collection frequency for all refuse of 2 days per week or 4 days per fortnight has been established and is compliant with CoGC service frequency requirements.

2.2. Refuse Bins and Equipment Requirements

Table 2.3 and Table 2.4 below outlines the number of bins and additional equipment required for the development. As waste volumes may vary according to the development occupants' attitudes to waste disposal and recycling, bin numbers and sizes may need to be altered to suit the building operation. The table shows the maximum number of bins and equipment expected.

Table 2.3: Bin Requirements

Refuse Stream	Bin / Equipment - Type or Size	Bins Required
General Waste	2000L	1 + 1 to remain under chute
Commingled Recycling	1500L	1 + 1 to remain under chute

Table 2.4: Additional Equipment

Component	Description	Quantity	Notes
Residential	Single refuse chute with Diverter	1	See Appendix B.2 and B.3.

2.3. Refuse Room Requirements

All refuse will be stored within bins within the refuse room located on ground level for everyday use. The refuse room is separated into a chute discharge room and temporary storage room, separated by full length roller door. Authorised building management staff, caretaker or approved personnel only will be granted access to the chute discharge room via restricted distribution of keys.

The refuse room is sufficiently sized to accommodate all bins and equipment required in provided in Table 2.3 and Table 2.4 and provide bulky item storage. Figure 2.1 below shows a potential configuration for the refuse room. The configuration and size of the refuse room is provided to ensure the majority of bins are accessible or easily rotated.

The refuse area also has the following features in order to minimise odours, deter vermin, protect surrounding areas, and make it a user-friendly and safe area:

- Doors wide enough to allow for the easy removal of the largest container to be stored.
- Adequate artificial lighting.
- Not located adjacent to or within any habitable portion of a building or place used in connection with food preparation (including food storage).
- Permits unobstructed access for removal of the containers to the service point.
- Does not have any steps or lips.
- Is enclosed on all sides except for the entrance door to ensure bins are not visible from a public place, neighbouring properties, passing vehicles or pedestrian traffic external to the site.
- Is of sufficient size to accommodate the bins with sufficient clearance around the combined bin area.
- Is positioned away from entrances to shops or residential premises.
- The height of the bin storage area allows for waste bins to be opened and closed.
- The floors to be graded to fall to a drainage point.
- Drainage points connected to sewer in accordance with trade waste requirements.
- A hose cock provided inside the room for cleaning bins and the rooms.

Additional Design Requirements:

- The walls, ceilings, floors and equipment are to be designed and constructed of impervious material with a smooth finish to allow for easy cleaning.
- Is designed to minimise their visual impact on the surrounding areas.
- Is naturally or mechanically ventilated.

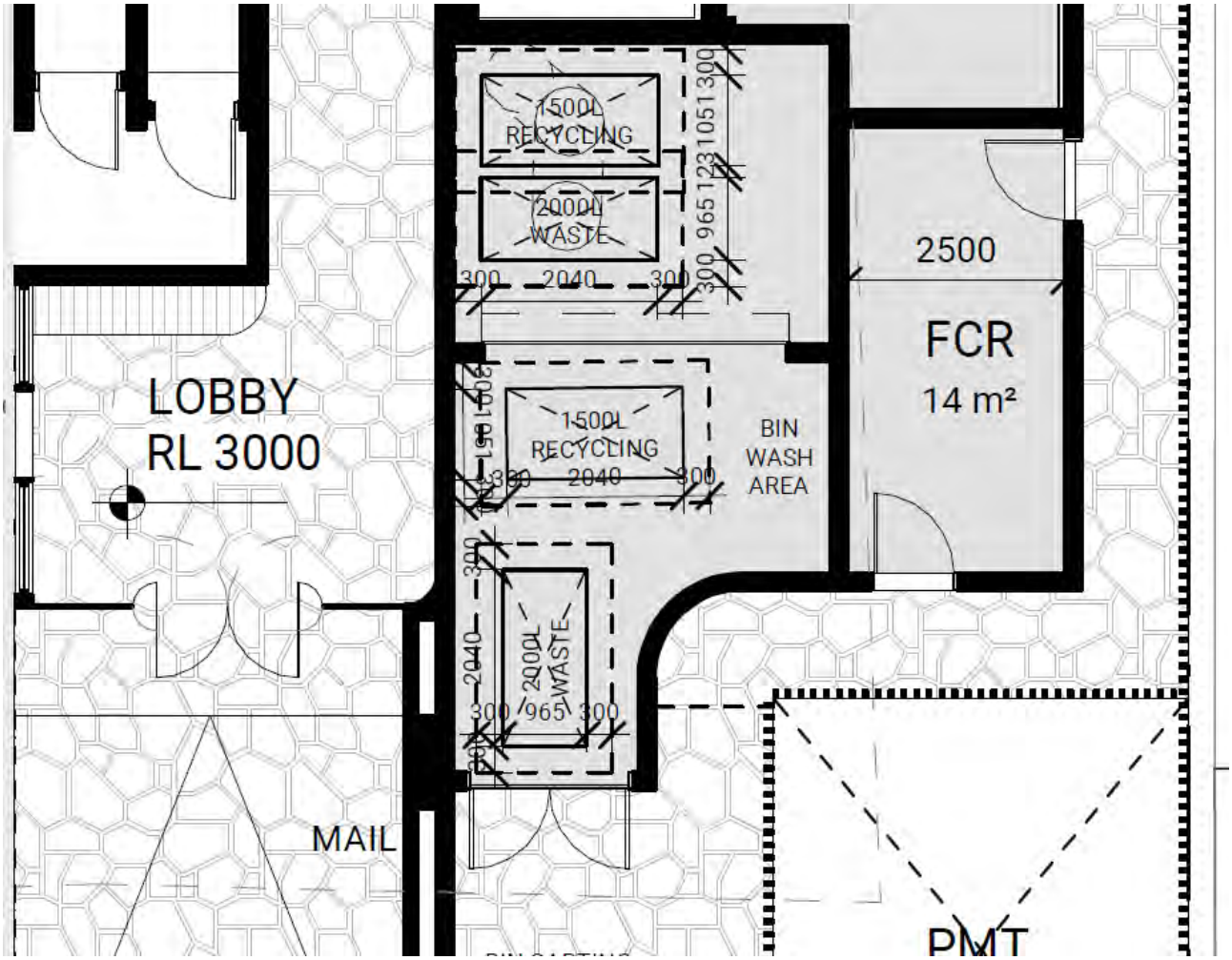


Figure 2.1: Refuse Room Layout (Source: Plus architecture, DA100 Ground Level Floor Plan, Nov 2022)

2.4. Refuse Transfer

Minimal transfer is required, building management staff or caretaker will be responsible for rotation of bins underneath single chute with diverter as required and will transfer bins to the adjoining temporary storage area for servicing. Council's appointed collecting contractor will enter temporary storage area and transfer bins to the kerbside for collection.

Figure 2.2 below demonstrates the typical movement path to transfer bins to the temporary refuse holding area for servicing.

The refuse transfer path has been designed to allow for:

- The bins to be transferred via hard stand pathway.
- The ground treatment will be of a suitably smooth surface.
- Allows bins to be easily manoeuvred.
- Does not impede traffic flow.
- Does not extend through any habitable parts of a building or food premises.
- Does not have any lips, stairs or steps for bins to be manoeuvred easily.
- Doors wide enough to accommodate the largest bin.

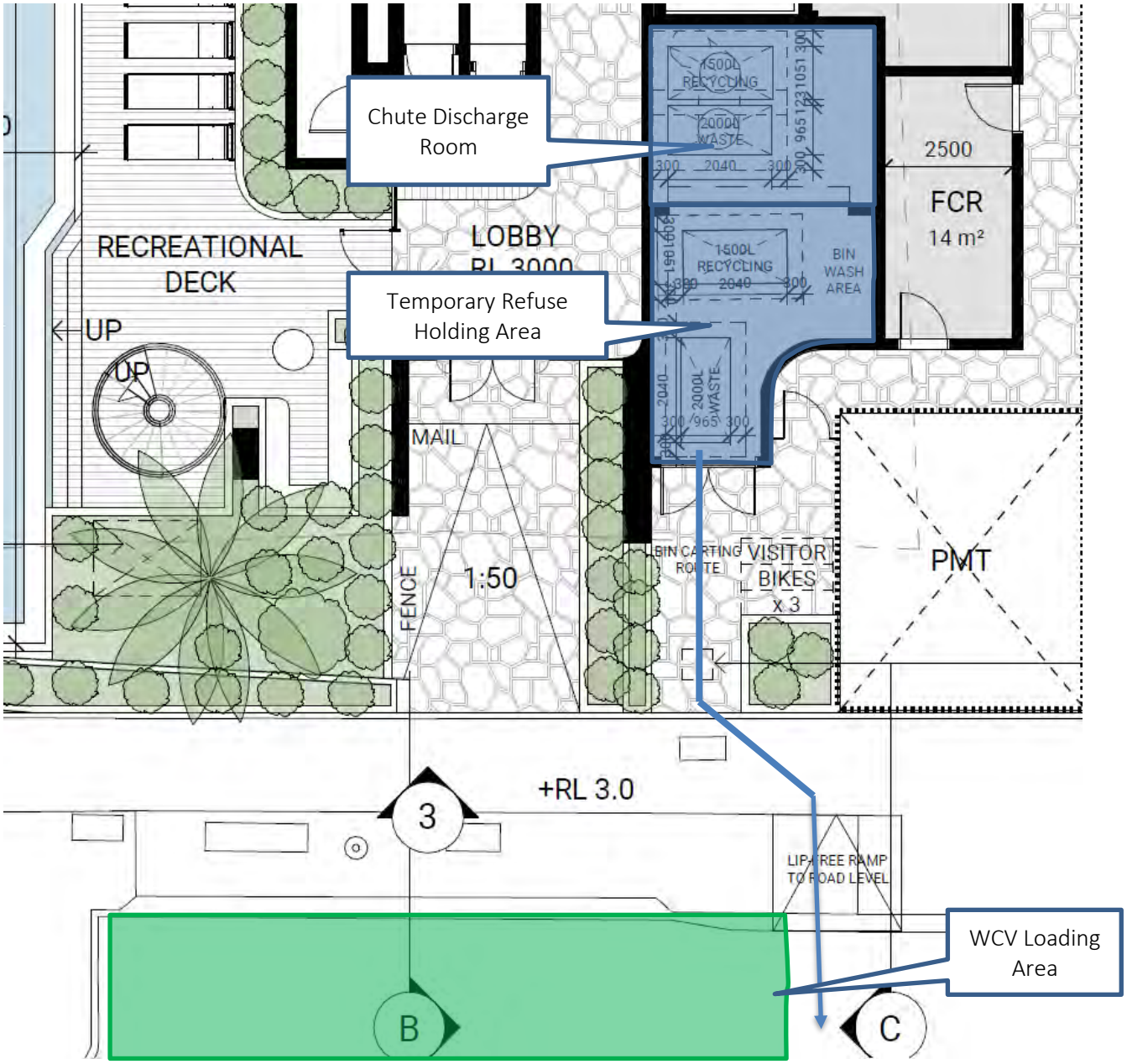


Figure 2.2: Bin Room and Servicing Area (Source: Plus architecture, DA100 Ground Level Floor Plan, Nov 2022)

2.5. WCV Arrangements and Bin Servicing Areas

Servicing from the property boundary where the WCV does not enter the property has been proposed for this site. The WCV will stop on Boundary Street, near the temporary bin storage / bin collection point for servicing.

All refuse will be collected directly from the temporary bin storage area adjacent via the hardstand pathway entrance on Boundary Street by the collection contractor. Once the bins have been serviced, they will be returned to the temporary storage area where building management staff / cleaners will clean bins and rotate to the chute discharge room as required.

Further details on vehicle access and on-site manoeuvring can be found in the traffic report.

The bin servicing area / loading bay has been designed with the following features:

- Has sufficient access and clearance for the waste and recycling collection vehicles to service the bins, including no overhead obstructions.
- Allows bins to be serviced safely while minimising the impediment to vehicle movements during servicing.
- Is clearly separated from car parking bays, footpaths and pedestrian access.
- Is serviced from a public roadway:
  - Positioned on a level pad within the site, pad not more than 5m from the property boundary and 15m from the crossover, level with the kerbside and adjacent to a driveway or other approved crossover on the public roadway.
  - Connected to the crossover by a paved path so that the bin can be manoeuvred for servicing without lifting the bin over raised surfaces (pram ramp).
- Does not block the entry and exit to the property.
- Is not adjacent to a kitchen or eating area for public use.
- Is over 5m from any door, window or fresh air intake within the development or any adjoining site.
- Is screened sufficiently to minimise the view of bins from neighbouring properties or passing vehicles and pedestrian traffic external to the site.
- Is positioned away from entrances to shops or residential premises.

3 Recommended Operational Requirements

3.1. Refuse Disposal

The tables in this section summarise general recommended disposal arrangements for frequently generated and infrequently generated refuse for each use within the development. Section 3.1.1 describes the frequently generated refuse streams that are generated in high volumes for any given period and require significant capacity for storage prior to collections. Section 3.1.2 describes the infrequently generated refuse streams that are generated in relatively low volumes, and where minimal provision for storage can be easily managed by collection frequency.

3.1.1. Residential Refuse

Bins will be provided for each residency. As required, refuse will be transferred by residents to chutes which will further decant refuse into the appropriate bulk bins via the diverter. With the inclusion of the diverter, the single hopper door on each level provides an option for selection of Recycling Disposal. The default selection is General Waste, see Figure 3.1 below for typical access hopper layout. It is the responsibility of the Building Management/ Caretaker to rotate the bulk bins underneath the chutes when appropriate. Further details are provided in Table 3.1.

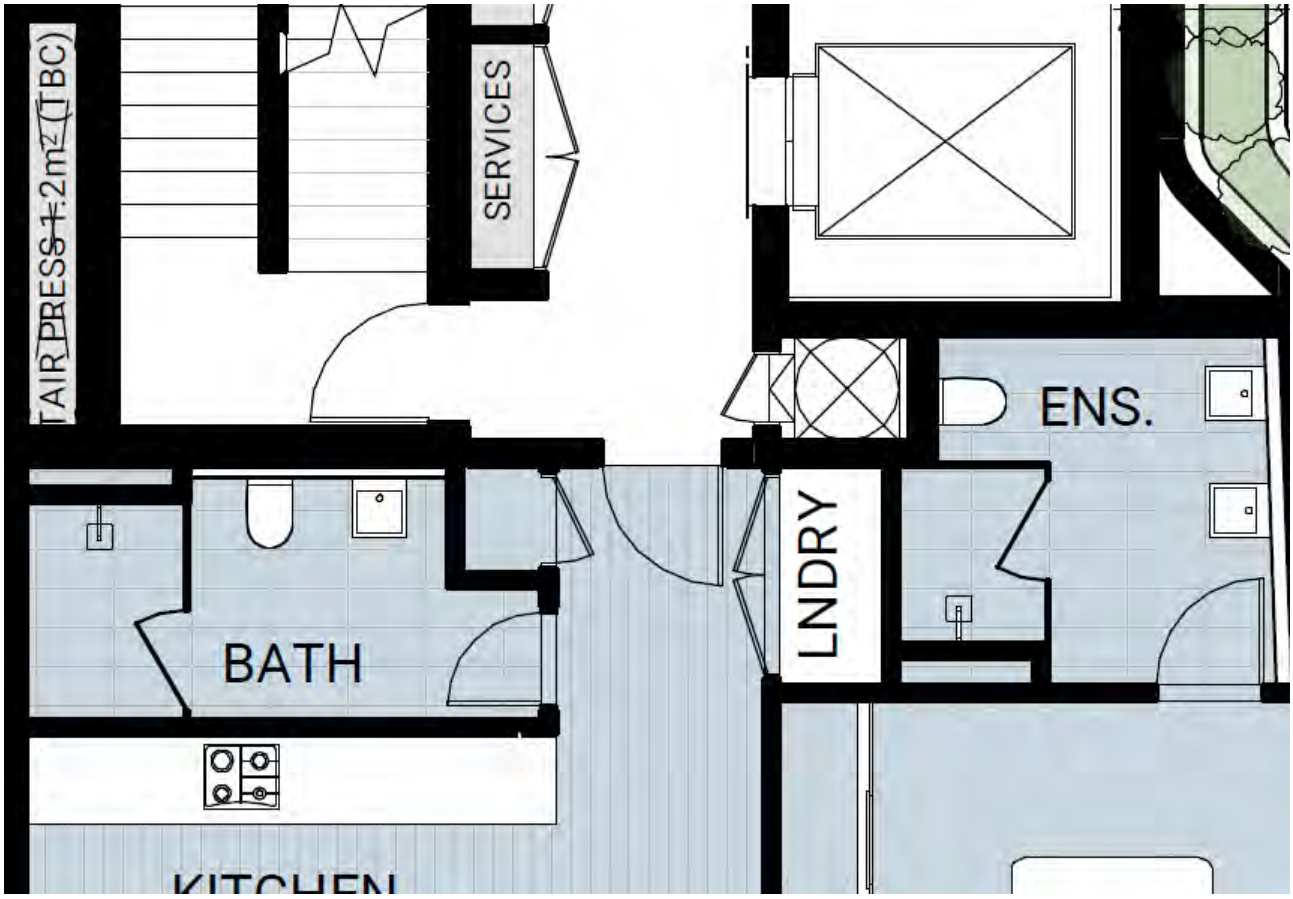


Figure 3.1: Typical diverter chute access hopper (Source: Plus architecture, DA102 Lower Level Typical Level 02-06 Floor Plan, Nov 2022)

Table 3.1: Disposal of Residential Waste

Refuse Stream	Disposal Details
WASTE	
General Waste	Depending on the type of operations of the individual tenancies, different wastes may be produced. Waste bins should always be lined with bags and the bags tied before removal. Waste bins should be accompanied by a recycling bin in order to facilitate separation of general waste and recycling. Residential Apartments Residents will have receptacles within their individual units for collection and storage of at least one day of general waste. Bins are typically placed under the kitchen sink. Additional bins can be placed in other areas as required. Communal Spaces General waste from the communal spaces may include small quantities of food waste, food packaging, drink bottles etc. General waste bins of an appropriate size to accommodate at least one day of waste should be located within the respective areas. Additional bins may be provided for special events. No bins will be provided on carpark levels.
Organic (Food) Waste	Separating organic or food waste from general waste is recommended to reduce the total amount of general waste produced. Apartment style equipment such as an organic household composter or worm farm is available for use where practical and space allows. Composting should be arranged with the building caretaker.
RECYCLING	
Commercial Commingled, including • glass • aluminum • steel cans • tins • cardboard • semi rigid plastics	Items for recycling must not be bagged and disposed in loose form. This can be done by decanting the materials from the individual receptacles into the recycling chute. Residents will liaise with building management for disposal of larger recyclable items not suitable for chute disposal. Residential Apartments Residents will have receptacles within their individual units for collection and storage of at least one day of recycling. Recycling bins are typically placed under the kitchen sink next to the general waste bin. Additional recycling bins can be placed in other areas as required. Recycling bins will usually be used for all recycling materials (commingled recycling). However, residents are encouraged to make use of the container refund scheme and separate eligible containers from the commingled recycling material (see below). Communal Spaces Recycling from the communal spaces may consist of recyclable drink containers, food packaging, (clean) paper, cardboard etc. Recycling bins should be located next to waste bins within this area. Extra bins may be provided for special events. No bins will be provided on carpark levels.
	Container deposit / refund schemes are currently in place in Queensland. Various models exist including bottle return facilities and (automated) reverse vending machines. Occupants should be encouraged to separate containers that qualify for the schemes from the waste or recycling streams, and send back to a return points. Storage space or dedicated bins within the units or refuse rooms can be provided. For the proposed developments, consideration should be given to placement of a reverse vending machine on site for disposal.

3.1.2. Infrequent Waste

Table 3.2: Disposal of Infrequently Generated Waste

Refuse Stream	Disposal Details
Green Waste	Green waste is not typically produced from this type of development other than from surrounding landscaped areas or potted plants. Green waste is usually removed by the designated maintenance contractor. The engaged contractor will be required to send this material to a composting or resource recovery facility rather than to a landfill.
Hard Waste / Bulky Goods	Hard waste may be stored within the refuse room using available spatial. Alternatively, collections can be coordinated, and hard waste / bulky goods moved to the loading area or a designated area for removal prior to collection. When storing bulky goods in a loading dock, it is recommended that items are placed on a pallet for easy loading via a pallet jack or forklift onto the CV.
Hazardous Waste (paints, batteries and cartridges) **Electronic Waste**	Where applicable, occupants usually make their own arrangements for the disposal of specialised or hazardous waste and electronic waste such as recycling of toner cartridges and batteries. Please refer to CoGC and QLD government websites for disposal options. It is an expectation that the building management assist with disposal of hazardous, electronic or liquid waste and any paint or chemicals as required and requested. Hazardous waste must be handled with due care, separated and securely stored for collection by a specialist waste contractor. Please refer to local CoGC and QLD government websites for further information.

3.2. On-going Management

The tables below are not assessable as part of the development application instead for the demonstration of required tasks during the operational phase of the development and therefore intentionally left blank.

Responsibilities have to be assigned for all on-going refuse management operations. This is generally done by a building manager, staff and / or cleaners. The following lists (Table 3.3 to Table 3.9) are designed to help managing responsibilities and monitor the refuse operations in order to maintain efficient services and a safe environment.

Table 3.3: General Refuse Management Checklist

Objectives	Checked	Remarks
Organise temporary additional bins to cater for additional waste generated during initial resident move in.		
Organising of weekly pick-ups for all refuse streams.		Liaise with private contractors and CoGC as required.
Managing daily bin transfers between refuse storage / collection areas if required.		
Check bin fill levels and rotate / swap bins as required		

3.2.1. Safety

Transferring refuse bins and using refuse management equipment are considered hazardous tasks. Therefore, contractors must ensure that a full risk assessment of equipment, surfaces and related gradients is complete. The contractor must provide procedural documentation to appropriate personnel prior to delivery of equipment and occupancy of the development.

Table 3.4: Safety Checklist

Objectives	Checked	Remarks
Abiding by all relevant occupational health and safety legislation, regulations and guidelines to ensure site safety for residents, visitors, staff and contractors.		
Assessment of any manual handling risks and preparation of a manual handling control plan for waste and bin transfers.		
Provision of equipment manuals, training, health and safety procedures, risk assessments and personal protective equipment to staff / contractors in order to control hazards associated with all waste management activities.		

3.2.2. Signage

All receptacles, bins and other refuse management equipment will have adequate signage. Standard signage will be provided in and around waste collection and storage areas and will be colour coded in accordance with AS 4123.7–2006 Mobile waste containers (see Appendix C).

Table 3.5: Signage Checklist

Objectives	Checked	Remarks
Ensuring compliance of signage with government local council regulations.		Use signage provided by CoGC if available
Ensuring that labelling on bins, refuse room etc. is appropriate and clear and easy to read and updated if required.		

3.2.3. Cleaning and Maintenance

Regular cleaning and maintenance of all refuse management facilities is important to maintain a safe and hygienic environment for residents, visitors, staff and contractors.

Table 3.6: Cleaning and Maintenance Checklist

Objectives	Checked	Remarks
General cleaning of all refuse holding and transfer areas including • Refuse bins, rooms and storage areas • Refuse transfer areas including lifts and staircases • Any other refuse management equipment		Frequency depends on refuse generation and building operation.
Coordination of specialised cleaning contractors as required.		
Maintenance and servicing of refuse management equipment as per schedule.		Frequency depends on equipment and building operation.
Coordination of specialised equipment contractors as required.		

3.2.4. Refuse Minimisation

Refuse minimisation is an important part of any site operation, it is strongly recommended that building management are actively involved in encouraging and assisting residents to follow the refuse hierarchy. At a minimum, the following should be implemented. Additional refuse minimisation options can be found in Appendix B.

Refuse minimisation requires regular reviewing to ensure operational sustainability of refuse volumes, equipment and economic feasibility. It is recommended that refuse weights and movements are noted and reviewed. An external review is usually conducted 12 to 18 months after the implementation of the plan.

Table 3.7: Refuse Minimisation Checklist

Objectives	Checked	Remarks
Encourage residents to regularly review grocery quantities to avoid over-ordering and food waste.		
Consideration of secondary and recycled materials where possible.		
Encouraging refuse minimisation through education and signage (see below).		
Reduce refuse through continuous monitoring and review (see below).		

3.2.5. Education and Communication

On-going education is important to ensure people continue to use the facilities as originally intended. All body corporate and leasing contracts should contain clauses pertaining to waste management arrangements and use of any associated equipment.

Table 3.8: Education and Communication Checklist

Objectives	Checked	Remarks
Communication of refuse management arrangements to residents, staff and contractors as required.		
Consideration of reward opportunities for any successes e.g. local shopping partnerships / discounts.		

3.2.6. Monitoring and Review

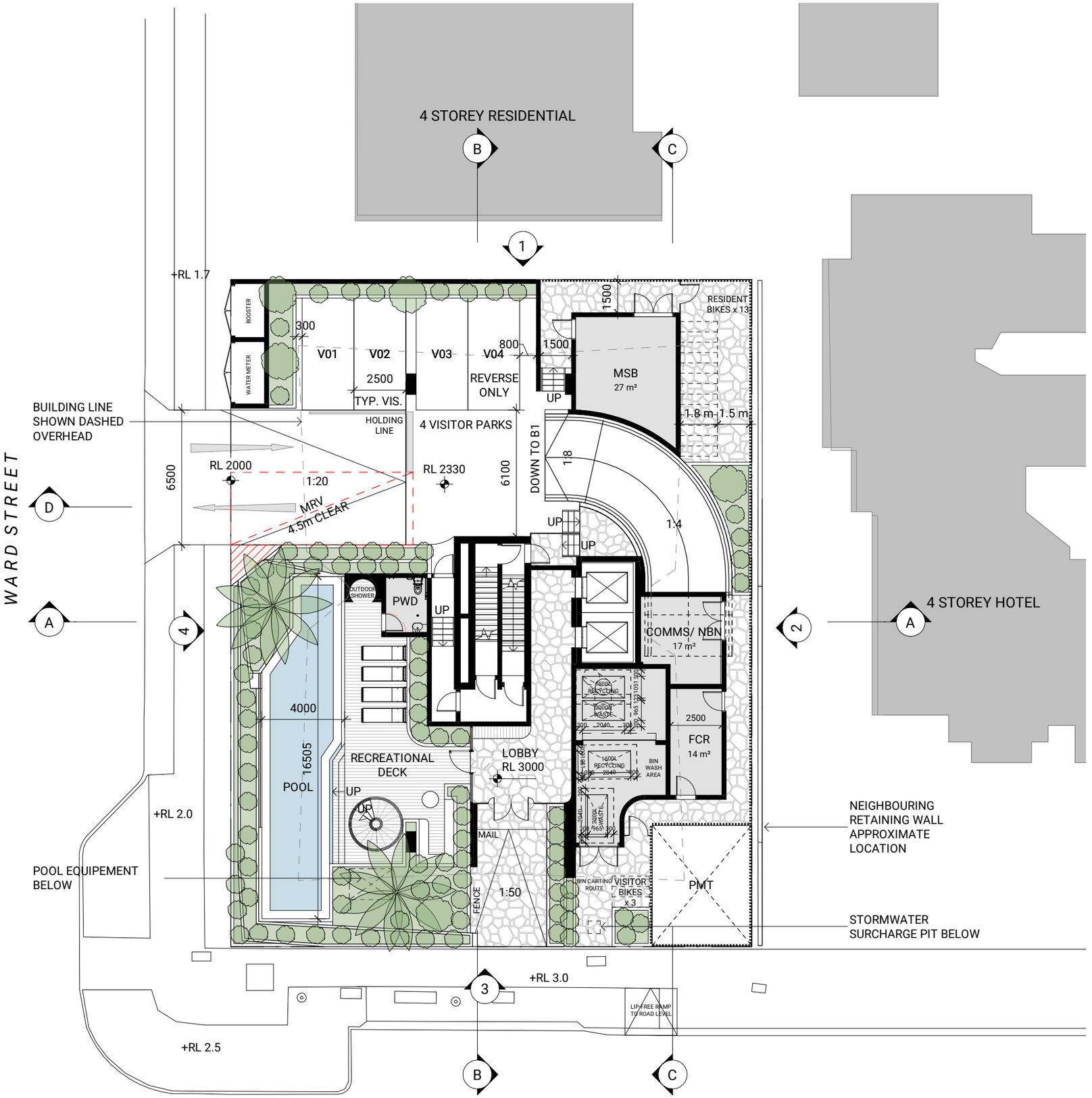
Regular monitoring and inspections of waste and related equipment and facilities from the development should be conducted by building management or designated contractor.

Table 3.9: Monitoring and Review Checklist

Objectives	Checked	Remarks
Continual monitoring of equipment uses and scheduling to ensure best operational outcomes.		
Regular review of refuse management equipment and facilities such as bin volumes, refuse storage capacities and stormwater management arrangements.		

Appendix A Site Plans and Drawings

DA100
FLOOR PLAN - GROUND LEVEL



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SCALE 1:200 @ A3 SIZE m

DA101
FLOOR PLAN - LEVEL 1

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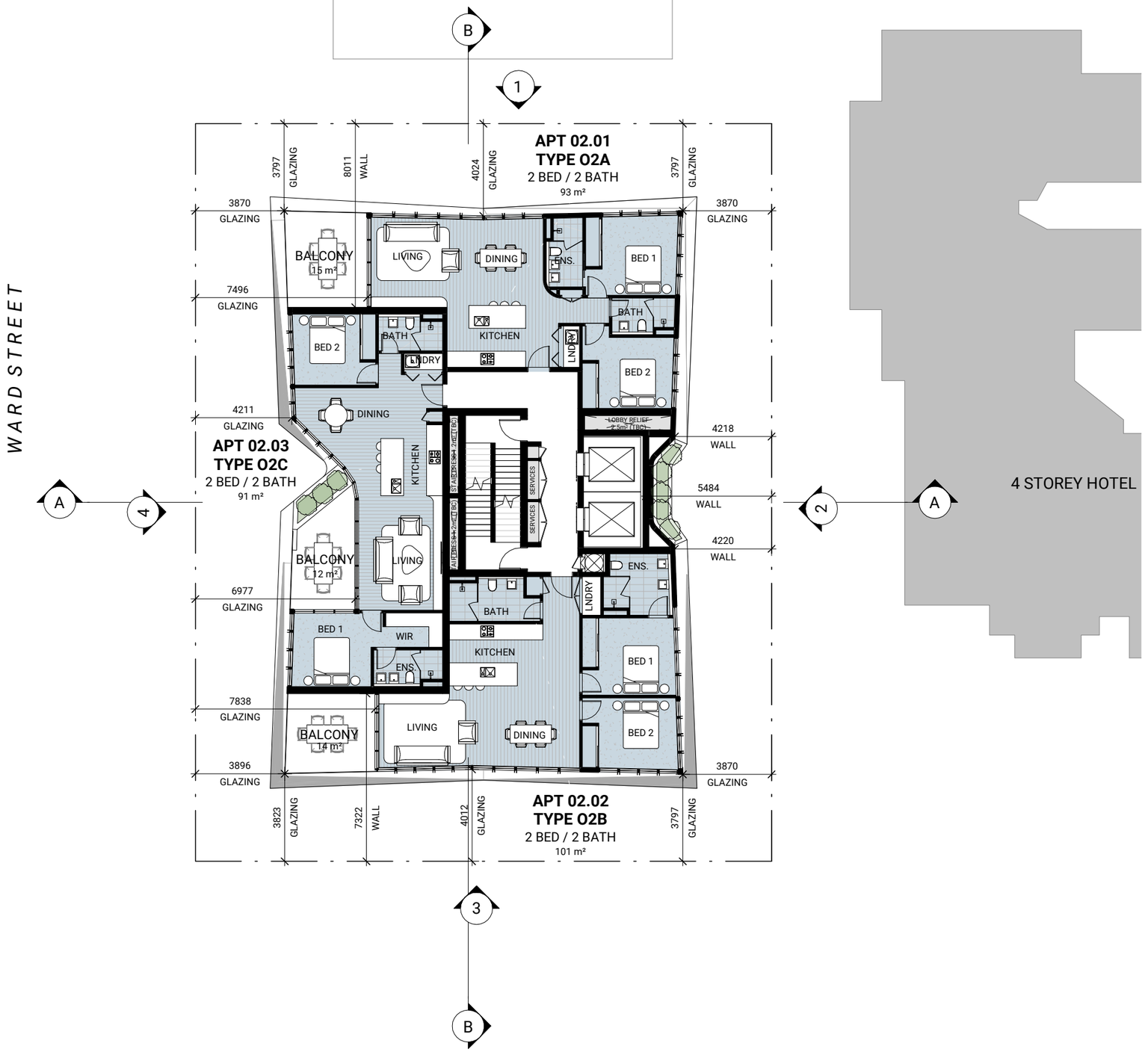
DA102
FLOOR PLAN - LOWER TYPICAL LEVEL 02 - 06



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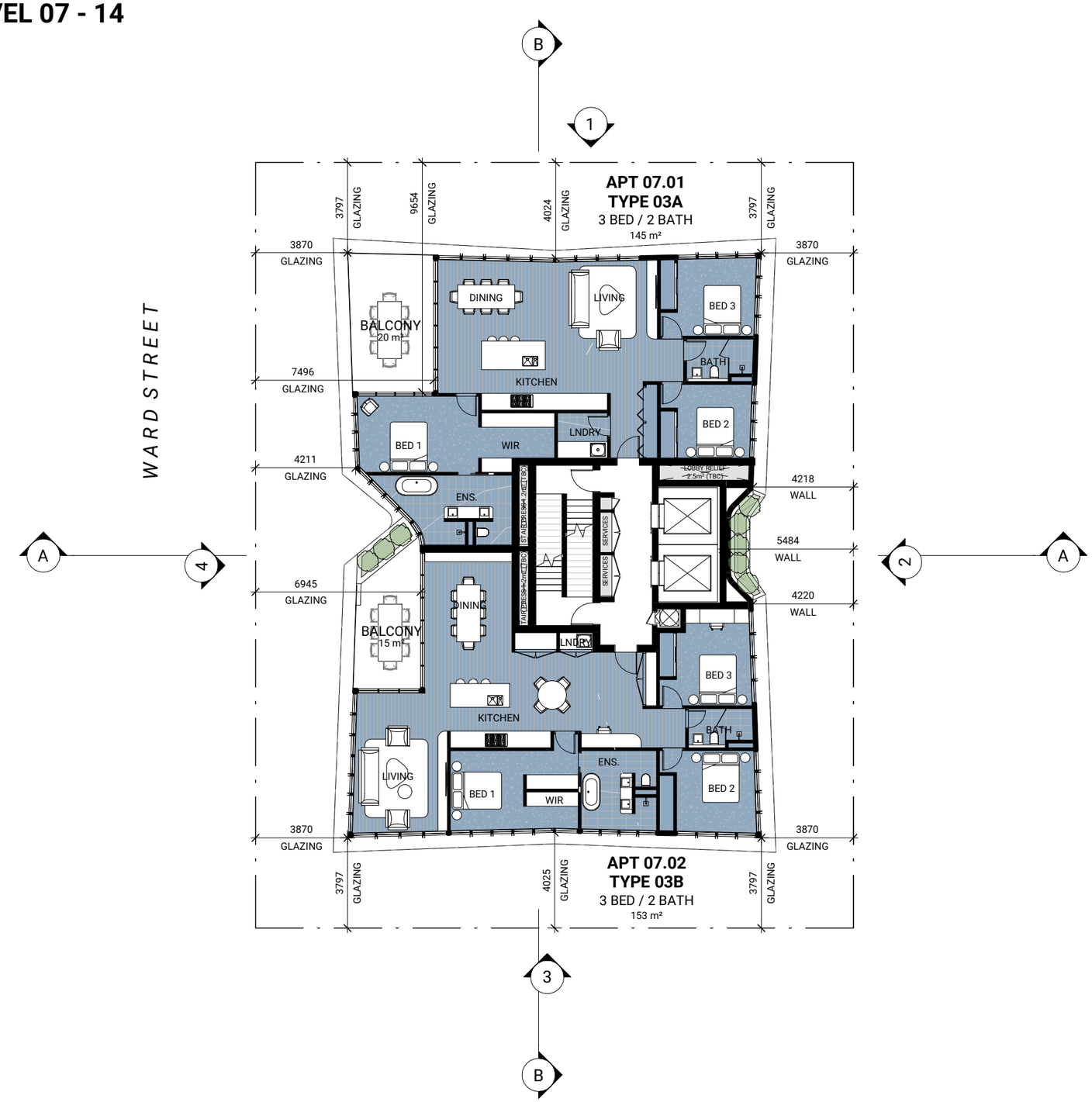
DA103
FLOOR PLAN - TYPICAL UPPER LEVEL 07 - 14



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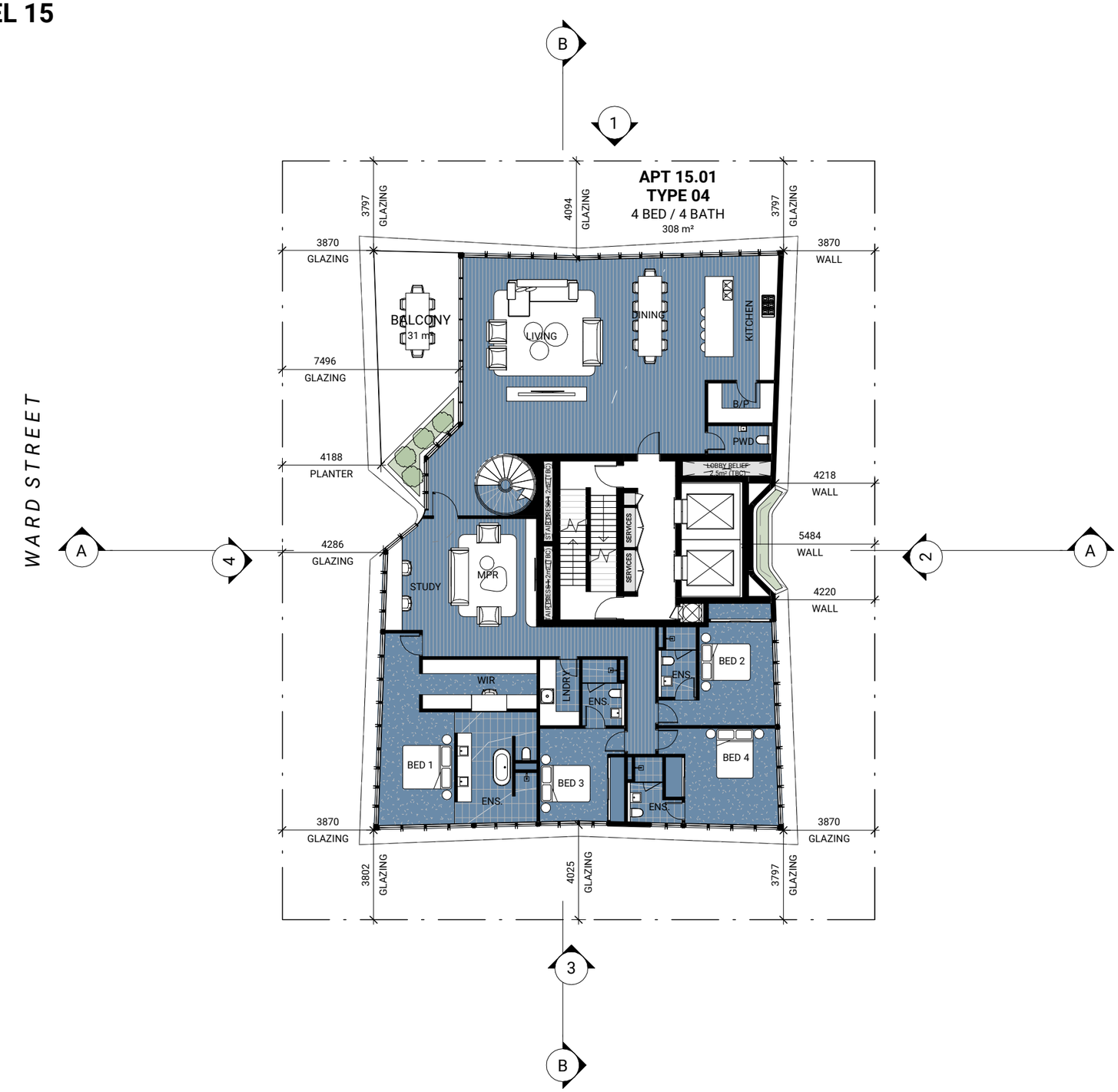
DA104
FLOOR PLAN - PENTHOUSE LEVEL 15



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Appendix B Systems and Specifications

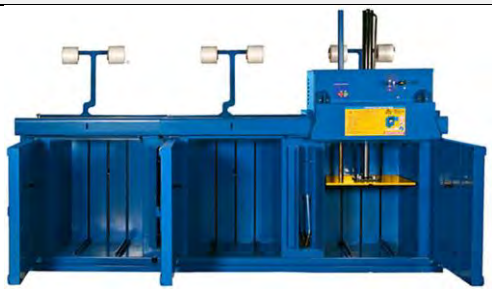
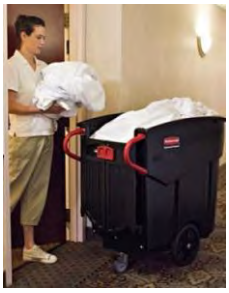
B.1 Project Specified Refuse Bins

Bin Types	Waste Streams	Examples	Information
Residential unit bins	General waste and recycling	 	Various options and sizes. Built and standalone bin available. Examples: https://www.bunnings.com.au
Back-of-house / Caddy bins	General waste, recycling, food waste, paper / cardboard		Various options and sizes available. Tenant to supply depending on preference and space available. Example: 60L metro bins Dimensions approx. 559 x 279 x 635mm (L x W x H) Examples: https://www.spacepac.com.au
1.5m^3 steel bins	General waste, recycling, paper / cardboard		Dimensions depend on contractor Example: https://www.jjrichards.com.au/service/industrial-bin-services
2m^3 steel bins	General waste, recycling, paper / cardboard		Dimensions depend on contractor Example: https://www.jjrichards.com.au/service/industrial-bin-services

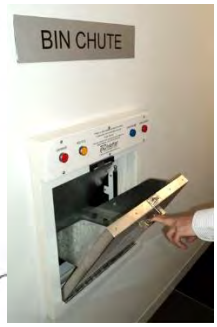
B.2 Typical Refuse Management Equipment

Systems	Waste Streams	Examples	Information
Organics Household Composting, Worm Farm, Digesters	Food waste / organics		Organics / food waste separation, composting and digesting; household-type and commercial grade equipment available Examples Urban Composter https://www.urbancomposter.com.au Closed Loop https://closedloop.com.au/upcycling-products ORCA https://www.feedtheorca.com
Food Waste Processing, Storage and Disposal	Food waste / organics		Volume reduction and organics / food waste recycling through food waste separation and macerating Examples: Pulpmaster Food Processing and Storage https://pulpmaster.com.au Under-sink food waste macerators and disposers https://www.insinkerator.com.au (household type macerators) https://insinkerator.emerson.com (commercial-grade macerators)
Cooking oil storage and recycling	Used cooking oil		Cooking oil recycling Example: https://www.cookers.com.au Cooking oil delivery, used oil collection and provision of required equipment

Systems	Waste Streams	Examples	Information
Bunded pallets	Liquid Waste		Spill containment, e.g. for waste cooking oil containers Example: https://www.tradeenviro.com.au/bunded-pallets https://www.materialshandling.com.au/products/bunded-pallet
Compactors / bin presses	General waste		Volume reduction through refuse compaction Examples: Stationary compactor, range between 10000L to 35000L https://www.wastech.com.au/products/compactors Litter bin compactor https://www.solarbins.com.au/features/big-belly-solar-bin Under-chute compactor https://www.wastech.com.au/products/chutes/ecopac-compactor Bin press https://wasteinitiatives.com.au/products/waste-compactors
Balers	Paper / cardboard, plastics		Volume reduction of paper, cardboard, plastics by compaction (baling) Examples: https://www.miltek.com.au/balers-and-compactors https://www.wastech.com.au/products/balers https://wasteinitiatives.com.au/product/vertical-balers/wastepac-60

Systems	Waste Streams	Examples	Information
			
Trolleys	General waste, recycling, food waste, paper / cardboard	   	Assisted manual transfer of refuse Examples: https://rubbermaidcommercial.com.au/products/waste-management/mega-brute https://www.materialshandling.com.au/products/deluxe-compact-cleaning-carts

B.3 Refuse Transfer and Disposal Methods

Method	Examples	Description
Manual transfer / disposal	   	**Manual transfer** is simply the process of physically carrying waste bags, food waste receptacles or recycling boxes and crates without assistance. From a safety perspective, this is acceptable for small quantities and initial disposal into refuse chutes, refuse compartments or, in the case of ground level activities, directly into the refuse storage room. • **Waste** material should be bagged prior to any transfer from apartments, suites, offices, back-of-house areas etc. to waste storage compartments or rooms. • **Food waste** should be placed in receptacles such as a caddy style bin or bucket which will not allow leakage during transfer. • **Recycling** material should be placed in boxes or crates prior to transfer. • **Cardboard and paper** items can be placed within another cardboard box for transfer. Examples: https://www.alamy.com
Assisted manual transfer		**Assisted manual transfer** includes the use of any wheeled container, wheelie bin or trolley with a capacity to carry refuse items with a combined weight of 20kg and above. The equipment bares the weight of the material, but it still requires physical force and or balance to move the bin or trolley. From a safety perspective, this type of equipment should be a minimum requirement for transfer of material greater than 20kg and when transferring between individual levels to the refuse storage room or loading areas. Use of enclosed or caged equipment will also eliminate 'litter or leakage trails' which can occur when using open or unsealed equipment. Examples: http://www.justwheeliebins.com.au, https://rubbermaidcommercial.com.au, https://www.materialshandling.com.au
Bin tugs / trailers	 	Assisted transfer of refuse Examples: http://ev.spacepac.com.au /categories/tugger, https://www.spacepac.com.au /product/wheelie-bin-aluminum-steel-trailers
Chute systems	 	Refuse disposal in multi-storey buildings through refuse chutes: single chute for waste only, or single chute with diverter system or dual chute for disposal of waste and recycling Examples: https://www.wastech.com.au /products/chutes https://www.elephantsfoot.com.au /products/chutes

B.4 Refuse Volume Minimisation Options

Refuse Volume Minimisation Options – Waste

Systems	Description
Food rescue	OzHarvest and Second Bite are food rescue organisations working throughout Australia. The organisation collects surplus foods from businesses (including Woolworths, Coles, Goodman Fielder and other smaller companies) and redistributes the foods to welfare agencies. They provide regular scheduled collections or ad-hoc / on call collections, and they have refrigerated vehicles. Other accepted items include fresh fruit and vegetables, tinned goods, cold meats and deli items, and readymade meals (which will only be accepted frozen). Where food rescue organisations are available, consideration may be given to suitable space for the temporary storage of food stuffs, including dry storage and the placement of a small fridge if cold room space is not available. There is no associated collections cost. Hence, it can be considered a zero-cost option for disposal of what would otherwise be food waste, and it supports the community at the same time.   Sources: www.ozharvest.org, www.secondbite.org
Composting	Food waste composing is an option of reducing the amount of general waste going to landfill where organic waste can create methane gas due to anaerobic digestion, which contributes to global warming. Systems of different scales exist from small benchtop composters for individual households or apartments to commercial size systems. Examples are shown below. The process usually involves breaking down organic food scraps through natural processes. This includes systems such as worm farms or composters where microbes break down the food waste, with or without the aid of compost additives. The composted products are rich in nutrients and good bacteria, and they can be added to flower bed or gardens. Most food wastes and other organic (garden) material can be composted including meat, fish, vegetables, fruit, dairy, coffee or wilted flowers. However, large bones, excessive liquids such as cooking oil or seafood shells should not be placed in the composers.  Sources: https://www.urbancomposter.com.au, https://closedloop.com.au/upcycling-products, https://www.feedtheorca.com
Food waste separation and collection	When considering separation of organic food waste, the handling and potential for volume reduction should also be considered. As an example, the **Pulpmaster** system can be used to reduce the stored volume of food waste produced, and to prepare the material for re-use. Typically, the system is placed in proximity to sink areas in the kitchen, particularly where food preparation waste or plate scrapings can be easily disposed. This provides a fully sealed transfer system for storage and collection. Pulping systems can also be placed back-of-house spaces for

Systems	Description
	restaurants and cafes or placed within a refuse room for centralisation to multiple users. Pulped food waste is pumped into holding tanks for storage and collection via a 50mm pipe and collected by a liquid vacuum tanker. The images below provide visual context of the connection from pulping machine to storage tank and the option for decanting 120L bins into the machine via a bin lifter and auger feed. The tank may be up to 20m away from the pulping machine. The distance is increased when including vertical drops from upper levels of the building. The storage tank may be up to 30m from a loading area, with the only requirement being a service pipe with camlock end connection placed within proximity of the loading area. Collections are completed by a vacuum tanker which may range in size depending on the size of the storage tanks and the distance of the tank from the loading area.      Source: http://pulpmaster.com.au
Waste Conversion	Converting waste by reducing its volume and weight means less material to be disposed of, which results in fewer refuse collection vehicle kilometres. This allows cost savings in logistics and has a positive environmental effect due to less fuel used per amount of waste to be disposed. As an example, OMPECO provide a solution for converting general and medical waste into a sterilised, dehydrated ground material as shown below. The process involves loading the sterilisation chamber with waste material and crushing / shredding of the material by rotors to produce a fine ground. During the process, the material is heated by friction to 100˚C which causes the moisture in the waste material to evaporate. After evaporation, the material is heated further to sterilisation or pasteurisation. The ground material is then cooled down to be unloaded from the converter. The final product has excellent long-term handling and storage properties, the it has up to 80% less volume and 50% less weight than the original waste material. It can be used in waste to energy systems as it is comparatively dry with a high calorific value.    Source: http://www.ompeco.com/italian/language/en/home-2/#
Waste compaction	Various compaction equipment exists for reducing the volume of (general) waste. As a result, less bins and / or fewer bin collections and service vehicle trips are required, which helps to reduce costs and environmental impact.

Systems	Description
	Examples of typical waste compaction equipment include the following: • Under chute compactors can be installed in developments with waste chutes. This allows to compact waste material before it is discharged from the chute into the waste bins. • Bin presses can be used to annually compress waste material in bins of different sizes. • For public spaces, litter bins are available with a built-in compaction mechanism that reduces the volume of waste material in the bins. An innovative example is the solar compactor shown below. Energy produced by a solar panel on top of the bin is used to operate a fill level sensor and automated internal compaction mechanism, allowing up to eight times more waste to be stored in the bin before collection is required. In addition, notification about the fill level of the bins can be sent out in order to monitor bins and manage collection frequencies.  Sources: https://www.wastech.com.au/products/compactors, https://www.wastech.com.au/products/chutes/ecopac-compactor, https://wasteinitiatives.com.au/products/waste-compactors, https://www.solarbins.com.au/features/big-belly-solar-bin
Charity donations	A good way of minimising waste is to reuse items that are still good to use. Several charity organisations exist that accept items such clothing, shoes, bedding, books, toys, furniture, kitchenware and other household items. The donated items must not be torn, damaged or broken. Electrical appliances such as white goods are usually not accepted. Common organisations operating in Australia include Saint Vincent de Paul Society (Vinnies) and Lifeline (see images below). Items can be placed into the organisations' charity / donation bins located in various public spaces such as near community or shopping areas. Alternatively, they can be dropped off at the organisations' shops during opening hours. Refer to https://www.lifeline.org.au or https://www.vinnies.org.au for further information. For larger developments and precincts where large amounts of donation items can be expected, the placement of charity bins within the development should be taken into consideration.   Sources: https://www.vinnies.org.au, https://lifelinesouthcoast.org.au

Refuse Volume Minimisation Options – Recycling

Systems	Description
Container deposit schemes	Container deposit / refund schemes are currently in place in several states in Australia. Various models exist including bottle return facilities and (automated) reverse vending machines. Residents, tenants, staff and cleaners should be encouraged to separate containers that qualify for the schemes from the waste or recycling streams, and return them to one of the return points. Storage space or dedicated bins within tenancies, apartments or communal areas should be provided. For larger developments or precincts where large amounts of empty containers are expected, consideration may be given to an on-site return point. The return points should be located near recycling bins so that cardboard boxes or plastic bags that have been used to transfer the empty containers to the return point can be disposed appropriately. This can prevent cluttering of the area around the return point. The images below show a typical return point and containers that commonly qualify for a deposit refund.    Sources: https://returnandearn.org.au, https://envirobank.com.au/bottle-and-can-recycling-queensland, https://www.containersforchange.com.au/how-it-works
Glass crushing	Bottle crushers can reduce back-of-house and refuse room storage volumes by up to 80%. The machines are quiet and efficient. The inclusion of a glass crusher may either be designed into bar or kitchen areas, placed in back-of-house areas, or a machine may take the place of an existing recycling bin within a refuse storage room. Scanners are also being developed for these machines for scanning of bottles prior to crushing to align with government bottle return schemes. The images below show a typical setting of a glass crusher in a bar.    Sources: http://www.insideenterprises.com.au/bottlecycler/index.html, http://www.bottlecycler.com

B.5 Refuse Management Equipment Suppliers

Waste Management Equipment	Balers	Compactors	Shredders	Glass Crushers	Chutes	Bin Tugs / Trailers	Trolleys / Manual Handling Equipment	Bin Lifters / Tippers	Bin Rotation	Weighing Systems	Spill Containment, Spill Response, Absorbents, Drain Protection	Food Waste Management / Vacuum Systems, Pulping, Digestors	Composting	Waste Cooking Oil Systems	Smoking Management	Bins (General), Bin Stands	Bin Cleaning Equipment	Sorting Equipment
Elephants Foot Recycling Solutions http://www.elephantsfoot.com.au	✓	✓		✓	✓			✓	✓	✓								
Waste Initiatives https://wasteinitiatives.com.au	✓	✓	✓	✓														✓
Wastech http://wastech.com.au	✓	✓	✓		✓			✓										
Pakmor http://pakmor.com.au	✓	✓	✓					✓		✓								
Miltek http://www.miltek.com.au	✓	✓																
BottleCycler http://www.bottlecycler.com				✓														
Materials Handling https://www.materialshandling.com.au						✓	✓	✓			✓					✓	✓	
Spacepac http://ev.spacepac.com.au						✓	✓											
Spacepac Solutions http://www.spacepac.com.au						✓	✓								✓	✓		
Draffin https://draffin.com.au								✓							✓	✓		
Electrodrive / Lift Master http://www.electrodrive.com.au						✓		✓										

Waste Management Equipment	Balers	Compactors	Shredders	Glass Crushers	Chutes	Bin Tugs / Trailers	Trolleys / Manual Handling Equipment	Bin Lifters / Tippers	Bin Rotation	Weighing Systems	Spill Containment, Spill Response, Absorbents, Drain Protection	Food Waste Management / Vacuum Systems, Pulping, Digestors	Composting	Waste Cooking Oil Systems	Smoking Management	Bins (General), Bin Stands	Bin Cleaning Equipment	Sorting Equipment
Absorbenviro http://www.absorbenviro.com.au											✓							
Trade Environmental http://www.tradeenviro.com.au											✓							
Spillstationaustralia www.spillstation.com.au											✓							
Pulpmaster http://pulpmaster.com.au												✓						
Australian Vacuum Systems http://www.australianvacuumsystems.com.au												✓						
Meiko https://www.meiko.com.au												✓						
Closed Loop Organics https://closedloop.com.au/upcycling-products,													✓					
Compost Revolution https://compostrevolution.com.au													✓					
Urban Composter https://www.urbancomposter.com.au													✓					
ORCA Digester https://www.feedtheorca.com													✓					
Cookers https://www.cookers.com.au														✓				

Waste Management Equipment	Balers	Compactors	Shredders	Glass Crushers	Chutes	Bin Tugs / Trailers	Trolleys / Manual Handling Equipment	Bin Lifters / Tippers	Bin Rotation	Weighing Systems	Spill Containment, Spill Response, Absorbents, Drain Protection	Food Waste Management / Vacuum Systems, Pulping, Digestors	Composting	Waste Cooking Oil Systems	Smoking Management	Bins (General), Bin Stands	Bin Cleaning Equipment	Sorting Equipment
Rubbermaid https://rubbermaidcommercial.com.au/products/waste-management							✓				✓				✓	✓		
Sulo http://www.sulo.com.au							✓						✓			✓		
Australian Waste Management https://www.australianwastemanagement.com.au/products								✓								✓		

B.6 Refuse Management Service Providers

Specialist Waste Services	Food Waste	Waste Cooking Oil	Hazardous Waste	Liquid Waste	Electronic Waste	Industrial Waste	Construction & Demolition Waste	Waste Water	Secure Document Destruction
Cleanaway * https://www.cleanaway.com.au		✓	✓				✓	✓	
JJ Richards * https://www.jjrichards.com.au		✓	✓	✓		✓	✓	✓	
Veolia * https://www.veolia.com/anz			✓	✓	✓		✓	✓	✓
Suez * https://www.suez.com.au				✓	✓		✓	✓	
SecondBite https://www.secondbite.org	✓								
OZ Harvest https://www.ozharvest.org	✓								
Cookers https://www.cookers.com.au		✓							
ToxFree https://www.toxfree.com.au			✓		✓	✓			
AceWaste https://www.acewaste.com.au			✓			✓			

Appendix C Refuse Signage

C.1 Refuse Signage

All waste stream signage used should be colour coded to be compliant with *AS 4123.7–2006 Mobile waste containers – Part 7: Colours, markings and designation requirements.*

signage guideline are provided by the Queensland government: https://www.qld.gov.au/environment/pollution/management/waste/recovery/recycling/signage.

General Refuse Signage

Other Refuse Signage

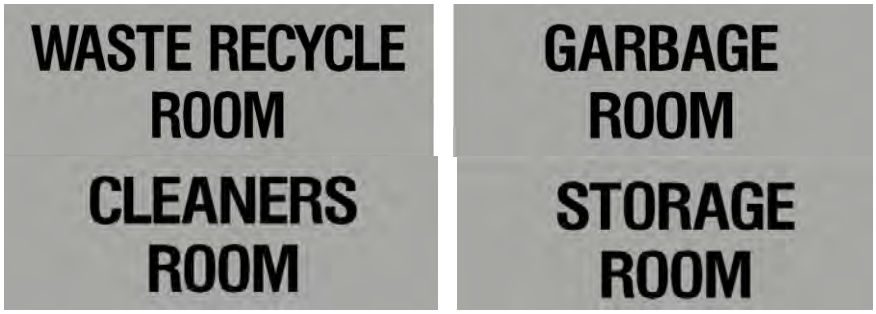
Colour coding as per AS 4123.7-2006

Mixed (Commingled) Recycling	*PMS 108*
General waste (landfill)	*PMS 032C*
Organics	*PMS 15-0343*
Paper and cardboard recycling	*PMS Process Blue C*
Soft Plastics	*PMS 1655*
Used Cooking Oil	*Grey*

C.2 Other Refuse, Facility and Safety Signage

Various signage including refuse area, safety and facility signage should be arranged through certified signage providers. Example signs can be found at http://www.signblitz.com.au, https://www.wayout.com.au or https://www.smartsign.com.

Example Refuse Room Signage



Example Facility Signage

Example Safety Signage

Appendix D Terms and Abbreviations

In this OWMP, a term or abbreviation has the following meaning unless indicated otherwise:

TERM	ABBREVIATION	DEFINITION
Equipment		
Bin (Refuse Bin)		A plastic or steel container for disposal and temporary storage of waste or recycling items. Various types and sizes exist for different items and purposes. Examples include residential unit bins, bulk bins, MGB, steely bins and specialised for medical waste or cigarette butts.
Bin Storage Area		An enclosed area designated for storing on-site refuse bins or a refuse compactor within the property.
Bulk Bin		A galvanized or steel bin receptacle that is greater than 360L in capacity generally ranging from 1.00m³ to 4.50m³ used for the storage of refuse that is used for on-site refuse collection.
Bulk Mobile Garbage Bin	Bulk MGB	A plastic (polypropylene) receptacle that is greater than 360L in capacity generally ranging from 660L to 1100L used for the storage of refuse.
Collection Point		An identified position where refuse bins are stored for collection and emptying. The collection point can also be the bin storage area.
Compactor		A receptacle that provides for the mechanical compaction and temporary storage of refuse. It allows to reduce bin numbers and collection frequency.
Composter		A container or machine used for composting specific food scraps and/or organic materials.
Food Waste Recycling System		Defined as a vacuum or pump-based system for shredding, macerating or pulping of food waste. The food waste is transferred through pressure (service) pipes to sealed liquid storage tanks.
Green Waste		All vegetated organic material such as small branches, leaves and grass clippings, tree and shrub pruning, plants and flowers.
Liquid Waste		Non-hazardous liquid waste generated by commercial premises should be connected to sewer or collected for treatment and disposal by a liquid waste contractor (including grease trap waste).
Mobile Garbage Bin	MGB	A plastic (polypropylene) bin or bins used for the temporary storage of refuse that is up to 360L in capacity and may be used in kerbside refuse collection or on-site collection.
Putrescible Waste		Putrescible waste is the component of the waste stream liable to become putrid and usually breaks down in a landfill to create landfill gases and leachate. Typically applies to food, animal and organic products.
Recycling		Recycling contains all material suitable for re-manufacture or re-use, e.g. glass bottles and jars; plastics such as PET, HDPE and PVC; aluminium aerosol and steel cans and lids; milk and juice cartons; soft drink, milk and shampoo containers; paper, cardboard, junk mail, newspapers and magazines.
Refuse		Refuse is material generated and discarded from residential and commercial buildings including general waste, recyclables, green waste and bulky items.
Refuse Storage Room		An area identified for storing on-site MGBs or Bulk Bins within the property.
Refuse Tolley		A cart on wheels that can be used to collect smaller quantities of refuse from different areas or rooms of a building or site, and wheel the collected refuse to a (bulk) bin storage area where it is disposed. Refuse trolleys are commonly used in hotels or offices.
Regulated Waste		Regulated waste is waste prescribed under legislation as regulated waste.

TERM	ABBREVIATION	DEFINITION
Transfer (Manual Transfer)		Manual transfer means physical transfer of refuse material and associated bulk bins or trolleys without assistance.
Waste		Waste is referred to as refuse material with the exclusion of recycling, green waste, hazardous waste, special waste, liquid waste and restricted solid waste.
Waste (General Waste)		General waste is generally referred to as material free of any actual or apparent contamination such as pathological / infectious, radioactive materials and / or hazardous chemical. Reporting use is for material considered to be free of food waste.
Wheelie Bin		A MGB of up to 360L, usually with 2 wheels for easy transfer. A common type is a 240L wheelie bin used for kerbside collection in many residential areas.
Measures		
Cubic Metre	m^3	Volume in cubic metre(s) related to refuse management equipment.
Ground Floor Area	GFA	The GFA of all storeys of a building is measured from the outside of the external walls or the centre of a common wall. It is commonly measured in square metres.
Kilogram	kg	Kilogram(s) related to refuse weight.
Litre	L	Litre(s) related to refuse volumes.
Square Metre	m^2	Square metre(s) related to refuse areas.
Ton	T	Ton(s) related to refuse weight.
Collection Vehicles		
Body Truck		A conventional heavy vehicle with a covered loading area. It is generally not specifically designed for emptying the content of bins into the truck during refuse collections, but can be used to carry entire (full) bins for servicing by bin swap-over.
Waste Collection Vehicle	WCV	A vehicle specifically designed for collecting and emptying refuse bins and refuse compactors.
Rear-End-Loading Waste Collection Vehicle	REL WCV	A truck specially designed to collect municipal solid waste and recycling, typically 240L wheelie bins to 1100L bulk bins, from rear loading mechanism and haul the collected waste to a solid waste treatment facility.
Tank Truck		An WCV that is specifically designed to collect liquid wastes such as waste cooking oil and food waste pulp. The waste is typically pumped from a waste storage tank into the truck via a hose. Liquid waste management equipment is often provided by the contractor who collects the waste and operates the truck.