Section 4
SPECIALIST REPORTS

Zone Planning Group

Section 4 - SPECIALIST REPORTS

Statement of Landscape Intent
Prepared by LDG Landscape Architecture

Zone Planning Group

Arthur St

37 Arthur St, Mermaid Beach

Project No: LA248101

27 March 2025



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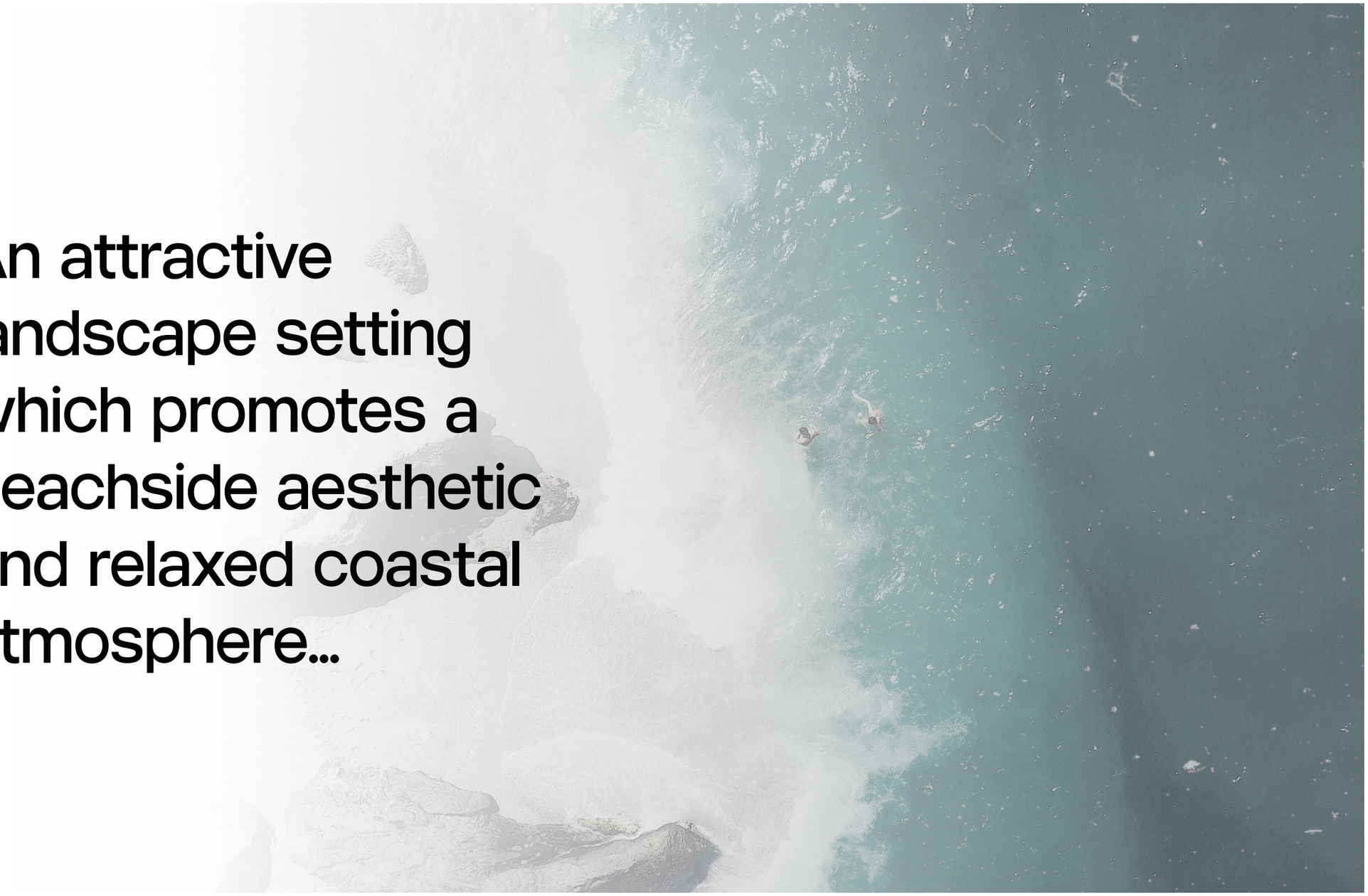
Part Three

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Part Four

Design Analysis

An attractive landscape setting which promotes a beachside aesthetic and relaxed coastal atmosphere...





Feature Palms



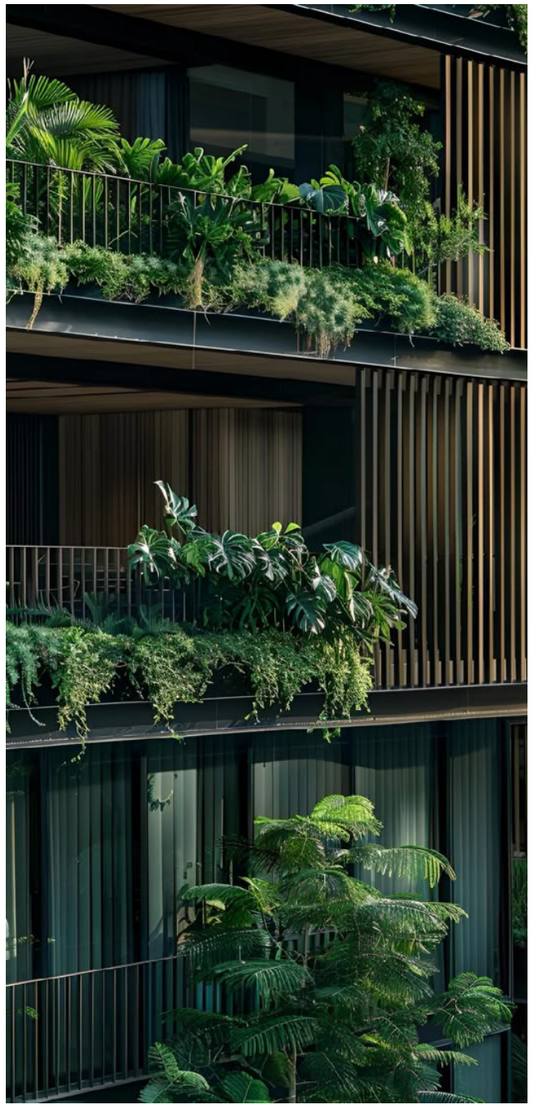
Resort Style Recreation



Timeless Elegance



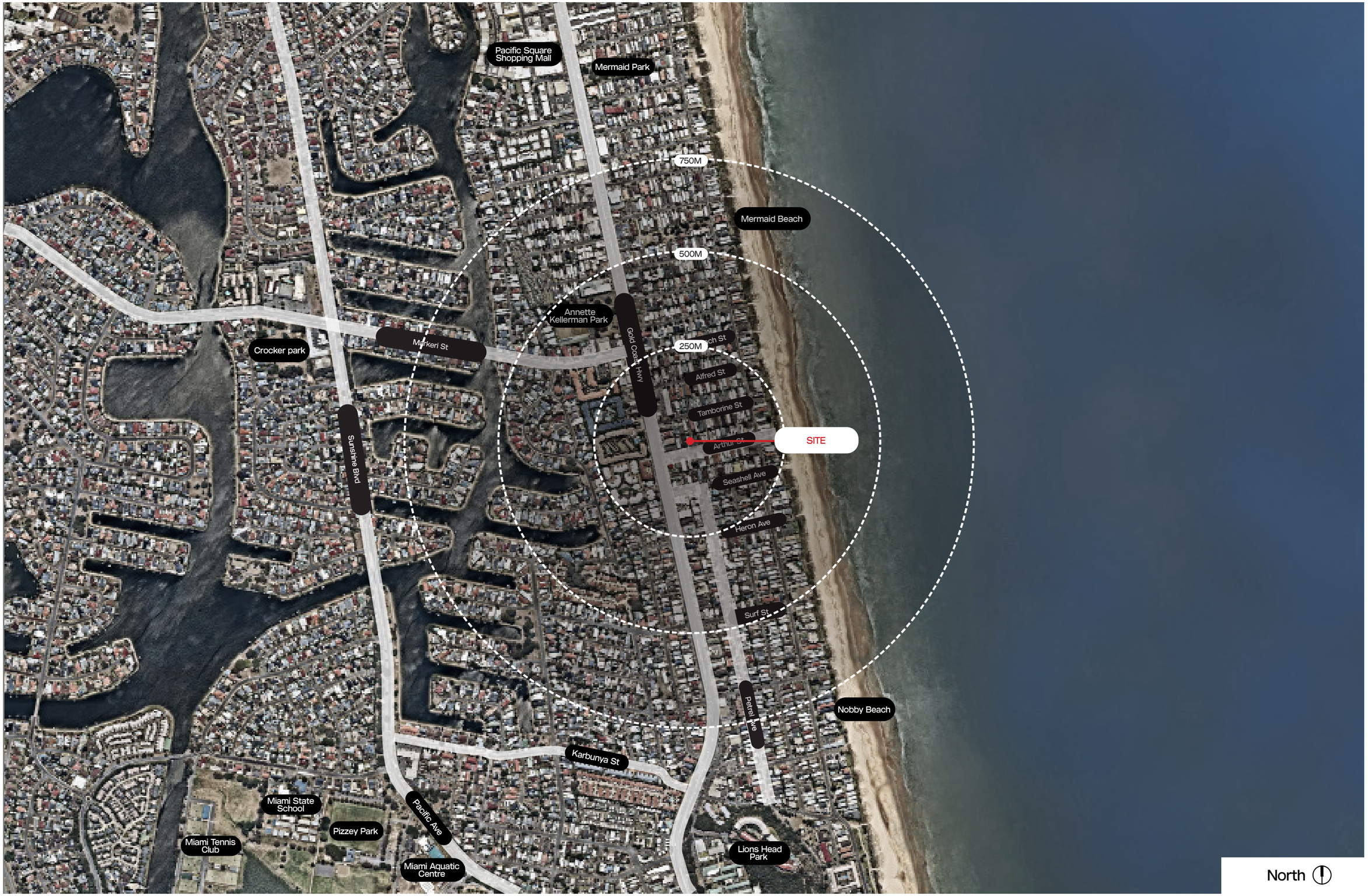
Textural Blends



Soften Built Form

Part One

Site Analysis


Pacific Square Shopping Mall
Mermaid Park
750M
Mermaid Beach
500M
Annette Kellerman Park
Crocker park
Markeri St
Gold Coast Hwy
250M
Alfred St
Tamborine St
Arthur St
SITE
Seashell Ave
Heron Ave
Surf St
Sunshine Blvd
Petrel Ave
Nobby Beach
Karbunya St
Miami State School
Pizzey Park
Pacific Ave
Miami Tennis Club
Miami Aquatic Centre
Lions Head Park
North

Part Two

Landscape Concept

Introduction

This Landscape Intent Statement has been prepared for the development of 37 Arthur St, Mermaid Beach. The site is bordered by existing residential dwellings & units blocks. It is within close proximity to the Nobby beach, Mermaid Beach, Miami State School, Miami Tennis Club, Pacific Square Shopping Mall, Mermaid Park, Annette Kellerman Park, Lions Head Park. This Landscape Intent Statement is to be read in conjunction with allied project consultant documentation and reports.

Design Intent

The landscape design provides a unique, contemporary and sophisticated character. The design complements the proposed architectural style whilst acknowledging the prominent coastal location of the site and context within Mermaid Beach and the Gold Coast region.

The design intends to cater for its residents' modern lifestyle requirements and encourage outdoor living and an active engagement with the beach environment.

The landscape provides a place of sanctuary with relaxed leisure opportunities, comfortable pedestrian access and spatial and visual variety for interest. Clean lines and uncomplicated design layouts provide an uncluttered, comfortable and visually legible landscape. A sophisticated yet understated elegance complements the building's finishes, blurring the spatial divide from inside to out.

Sense of Place

All softscape and hardscape elements reinforce the contemporary coastal lifestyle and modern urban living that resonates throughout the Mermaid Beach area. The architectural themes proposed for the development have been translated into the landscape design, taking direct and subtle cues that relate to architectural symmetry and the interior layouts.

Hardscape

The architectural language will be acknowledged into the landscape design through sympathetic colour, finishes and furniture suite selections. Hardscape elements including: pool, fences, arbour structures, benches etc. Take direct cues from the proposed architectural forms.

Softscape

The beachside ambience of the setting will be reinforced through the careful selection of appropriate plant species. The softscape palette will be selected in response to the site's location with contextually appropriate species chosen to provide a variety of forms to file niche roles within the landscape. Species will be chosen to provide screening, visual interest, low maintenance, shading and amenity and be carefully integrated with the surrounding hardscape elements.

Trees, palms and shrubs spatially define areas whilst contributing to the amenity of the precinct. Mature tree species will be selected to reinforce CoGC streetscape guidelines to provide a sense of enclosure, shade and visual softening for these important public connections.


PROPERTY BOUNDARY
Arthur St
PROPERTY BOUNDARY
PROPERTY BOUNDARY
PROPERTY BOUNDARY
FALL
FALL
FALL
Recycling
General
Foyer
Lift
Bed 2
Bed 1
Pump
Living
Dining
Kitchen
Bed 1
Bed 2
Kitchen
Living
Dining
Bin Stand
HYD
Booster
Cupboard

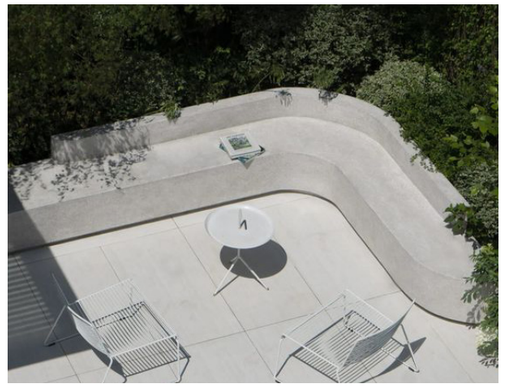
Legend

1. Feature sculptural tree (3m building offset & 500mm boundary offset show yellow dashed lines)
2. Large feature shrub
3. Screening shrubs
4. Tropical screening shrubs
5. Feature lush understorey groundcover mix
6. Trellis system with climbing plants to wall structure
7. Pool
8. Pool fence w/ gate
9. Built-in seating bench
10. Outdoor lounge terrace
11. Outdoor bbq
12. Bike parking
13. Walkway
14. Driveway
15. Letter boxes - refer Architect
16. Sight triangle (max. landscape height 500mm)
17. Boundary fence - refer Architect
18. Turf Verge
19. Footpath

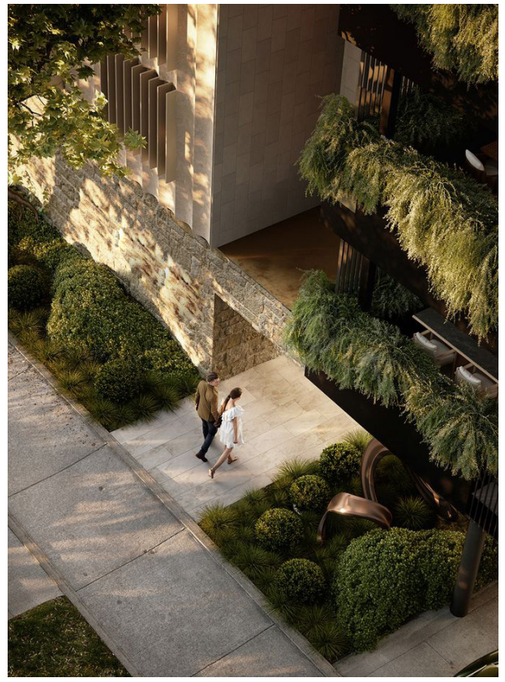












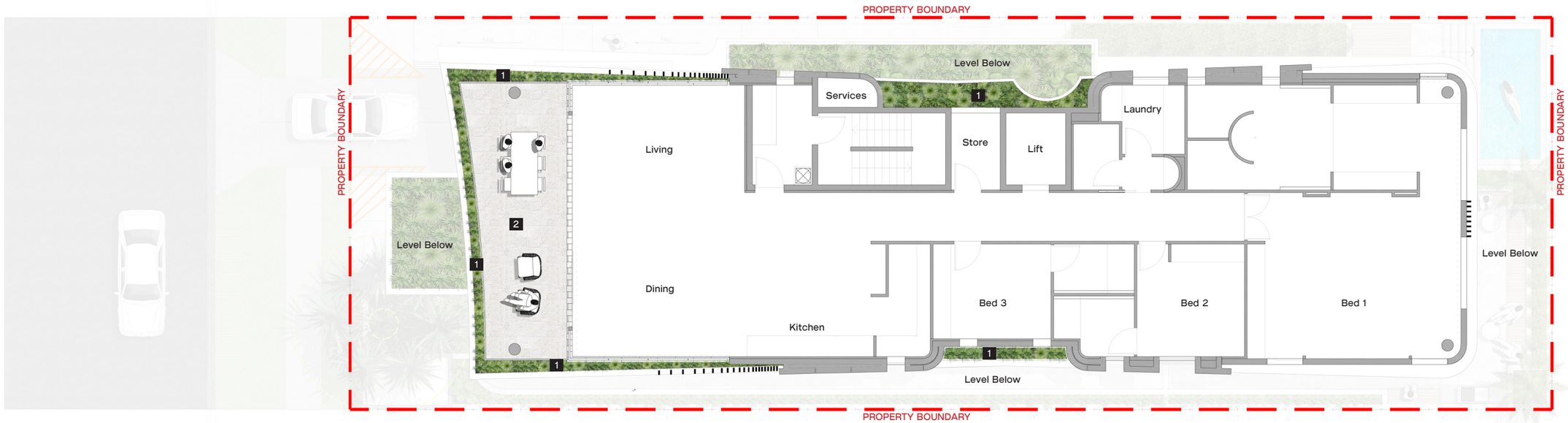
Legend

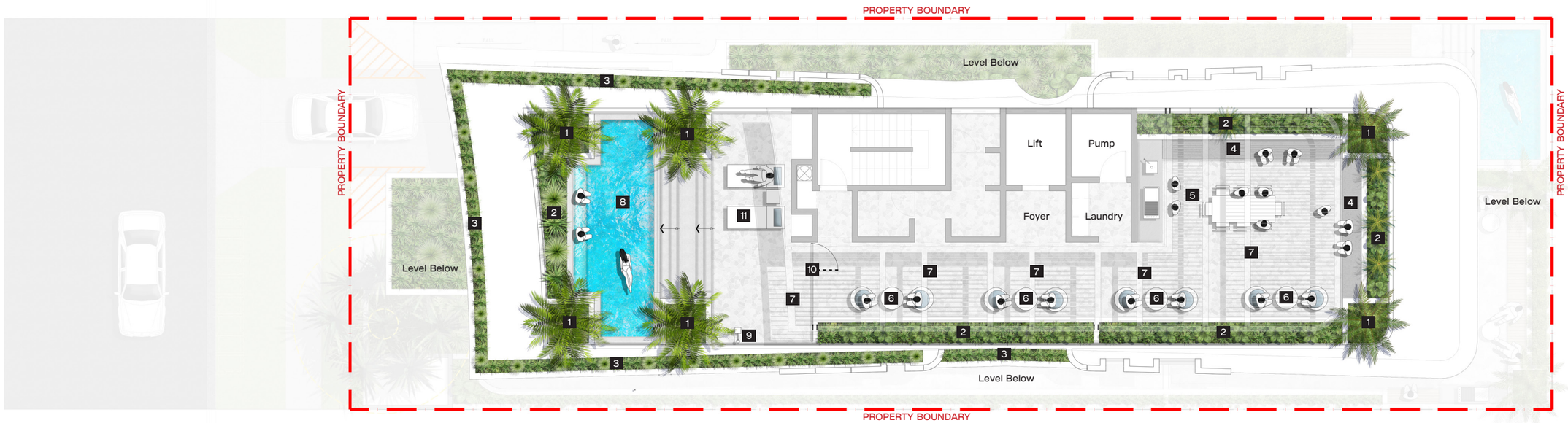
1. Low groundcovers and small succulent accent species
2. Balcony



Legend

1. Low groundcovers and small succulent accent species
2. Balcony




PROPERTY BOUNDARY
PROPERTY BOUNDARY
PROPERTY BOUNDARY
Level Below
Level Below
Level Below
Level Below
Lift
Pump
Foyer
Laundry

Legend

1. Large feature shrub
2. Feature lush understorey planting mix
3. Low groundcovers and small succulent accent species
4. Built-in seating
5. BBQ/outdoor dining terrace
6. Outdoor lounge terrace
7. Arbour structure
8. Pool
9. Outdoor shower
10. Pool fence w/ gate
11. Pool lounge terrace













Part Three

Landscape Finishes



Softscape

Softscape Plan

Indicative Softscape Palette

Hardscape

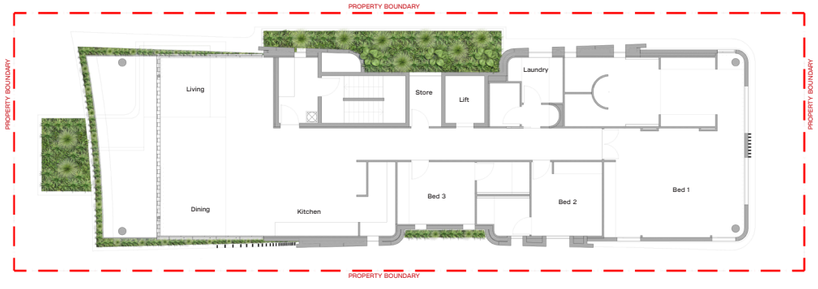
Hardscape Plan

Indicative Hardscape Palette

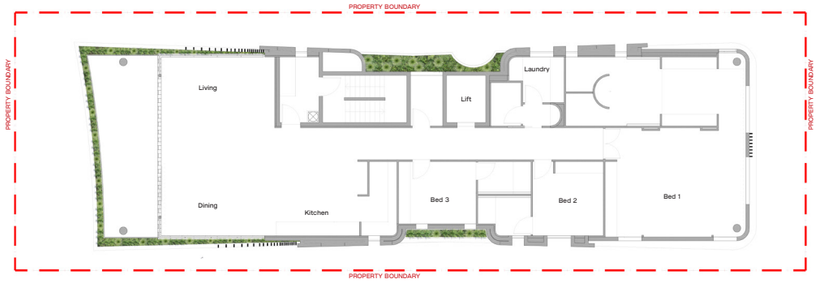




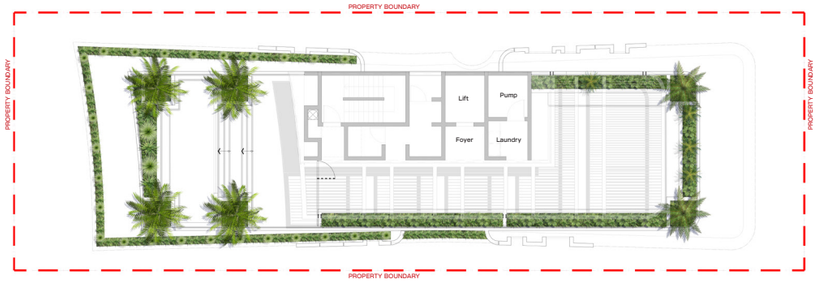
Ground Level Floor Plan



Level 1 Plan



Level 2–4 Plan



Level 5 Plan

0 5M
SCALE 1 : 75 @ A1

Tree & Palm Species

1. Acmena Smithii ‘Sublime’
2. Agathis Robusta
3. Alectryon Coriaceus
4. Atractocarpus Fitzalanii
5. Cocos Nucifera
6. Dracaena Draco
7. Elaeocarpus Reticulatus
8. Hibiscus Tiliaceus Rubra
9. Howea Forsteriana
10. Livistona Australis
11. Magnolia Grandiflora ‘Teddy Bear’
12. Pandanus Tectorius
13. Plumeria obtusa

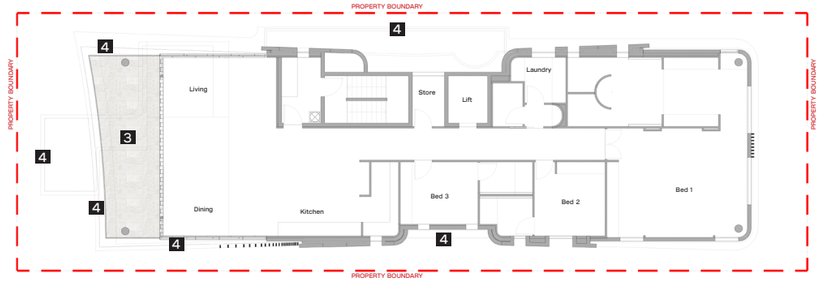
Shrubs & Groundcover Species

14. Alcantarea imperialis
15. Alocasia Brisbanensis
16. Asplenium Nidus
17. Carpobrotus Glaucescens
18. Casuarina Glauca ‘Cousin It’
19. Cordyline Petiolaris
20. Crassula Ovata
21. Dichondra ‘Silver Falls’
22. Doryanthes Excelsa
23. Ficus Microcarpa ‘Green Island’
24. Ficus Pumila
25. Heliconia Hot Rio Nights
26. Hymenocallis Littoralis
27. Myoporum Species
28. Philodendron Imperial Green
29. Rhapis Excelsa
30. Senecio Serpens
31. Syzygium Species
32. Trachelospermum Jasminoides
33. Viola Hederacea
34. Westringia Fruticosa
35. Zamia Furfuracea

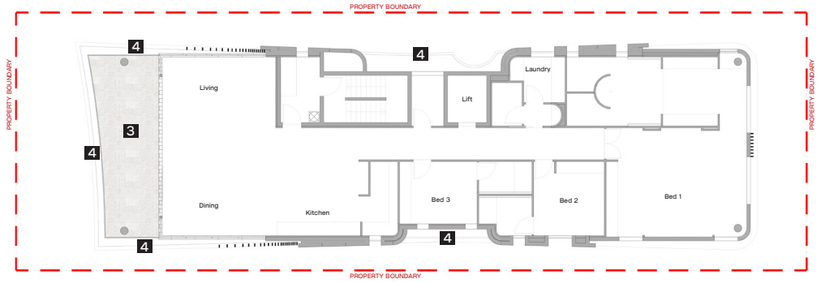




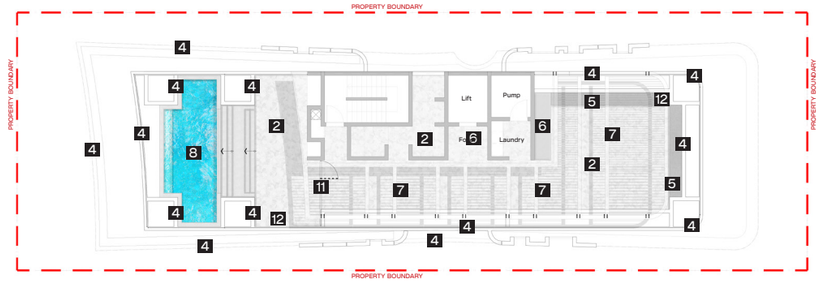
Ground Level Floor Plan



Level 1 Plan



Level 2–4 Plan



Level 5 Plan

0 5M
SCALE 1 : 75 @ A1

1



Concrete Footpath/Driveway
Colour: To Cogc Requirements
Size: Tbc
Finish: Tbc

2



Natural Stone/Porcelain Pavers
Colour: Light Grey/Bluestone
Size: Random 600-800mm
Finish: Tbc

3



Natural Stone/Porcelain Pavers
Colour: Light Grey Limestone
Size: 300 X 600
Finish: Tbc

4



General Walls
Colour: White
Size: Tbc
Finish: Rendered & Painted

5



Honed Concrete Bench Seating
Colour: /White
Size: N/A
Finish: Honed

6



Bbq Bench
Colour:tbc
Size: Tbc
Finish: Tbc

7



Arbour
Colour: Off White
Size: Tbc
Finish: Tbc

8



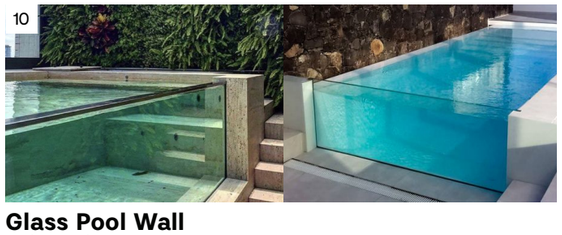
Pool Tile Finish
Colour: White Mix
Size: 20x20mm
Finish: Trowelled

9



Spa
Colour: Tbc
Size: Tbc
Finish: Tbc

10



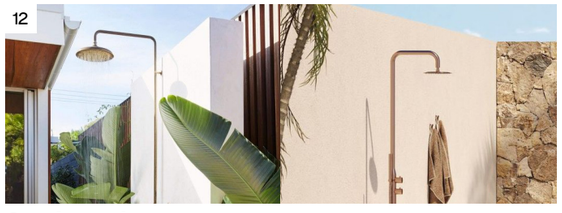
Glass Pool Wall
Colour: Tbc
Size: Tbc
Finish: Tbc

11



Frameless Glass Fence / Balustrade
Colour: Clear
Size: 1200mm High
Finish: Tbc

12



Outdoor shower
Colour: Tbc
Size: Tbc
Finish: Tbc

Part Four

Design Analysis

Soil Depth Analysis

Soil Depth Analysis Plans

Soil Depth Analysis Details

Recreation Analysis

Recreation Analysis Plans

Recreation Analysis Details

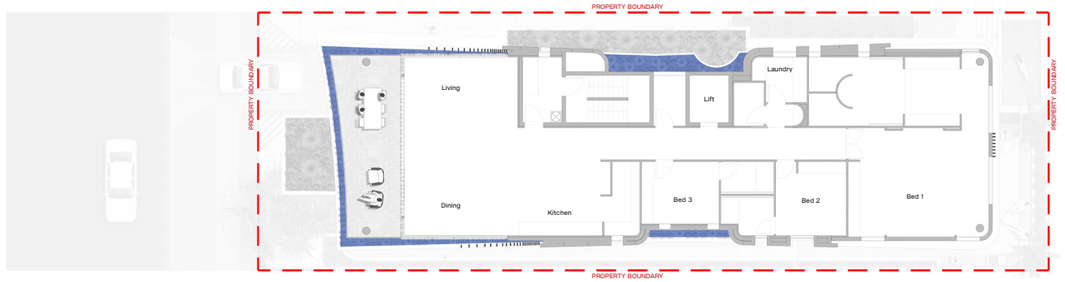




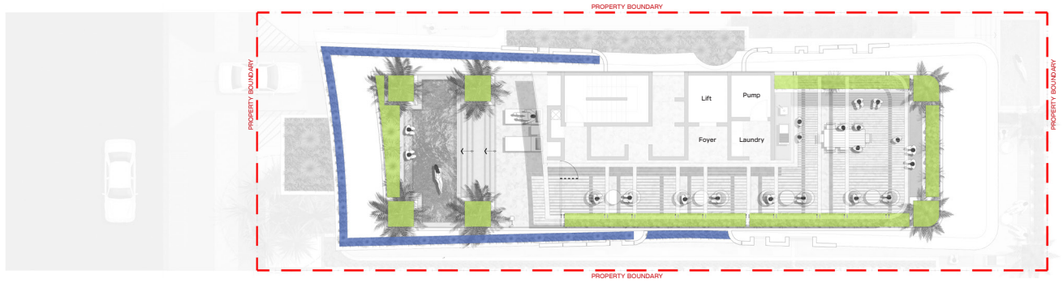
Ground Level Floor Plan



Level 1 Plan



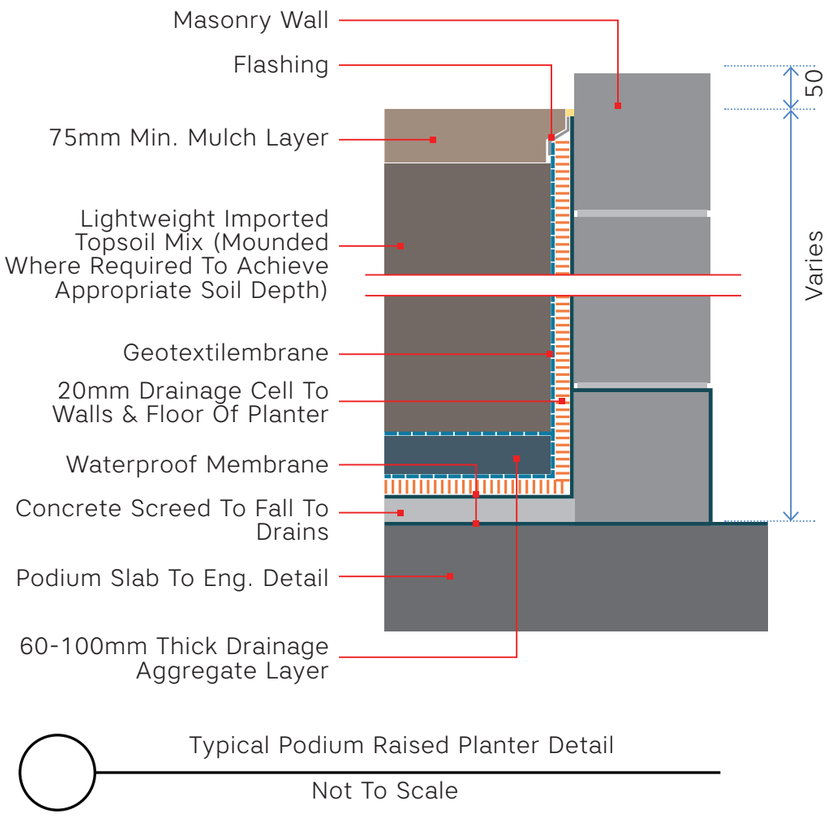
Level 2–4 Plan



Level 5 Plan

Legend

- 250mm Depth Raised Planter
- 650-750mm Depth Raised
- 1000mm Depth Raised Planter
- 1200mm Depth Raised Planter
- In Ground Planting



Typical Podium Raised Planter Detail

Not To Scale







Reference images in this presentation are intended for in–house discussions only. LDGLA does not claim authorship. These images have been sourced from various publications.

15 Christine Avenue
Miami 4220. Queensland

E: admin@ldgla.com.au
P: 07 5654 5198

Section 4 - SPECIALIST REPORTS

Traffic Impact Statement
Prepared by Zeka Corp

Zone Planning Group

W: ZEKACORP.COM
P: 07 2111 6379
E: ADMIN@ZEKACORP.COM

31 March 2025
Project#: 25-011 (v01a)

Chief Executive Officer
City of Gold Coast
PO Box 5042
GOLD COAST MC 9726

TECHNICAL MEMORANDUM

37 ARTHUR STREET, MERMAID BEACH (OTHER CHANGE – TRANSPORT ASSESSMENT)

Revision / Version		Date	Description	Status	Prepared By	Approved by: Name	Signature	Qualification RPEQ ☒	Qualification Other ☐
V01	a	31 Mar 25	Traffic Impact Statement	☐ Draft ☒ Final	Maja Krvina	Dare Janzekovic		27561	

Document No: 25-011	Associated DA	MCU2024/478	Approved on	13 February 2025

1. INTRODUCTION

1.1. OVERVIEW

Zekacorp Traffic and Transport has been engaged by Cuecorp Property Group to prepare a Traffic Impact Statement to address the proposed other change to the approved development at 37 Arthur Street in Mermaid Beach QLD.

The following submission forms part of a Development Application to be lodged with The City of Gold Coast (CoGC).

The following issues have been addressed as part of the study:

- Car parking supply and design;
- Provision for safe access;
- Provision for heavy vehicles.

A summary of the proposed change against the transport characteristics of the approval are shown in Section 1.2.

1.2. DEVELOPMENT APPROVAL

There is currently an Approval (MCU/2025/478) over the subject site issued on 13 February 2025. The subject approval comprises of a multiple dwelling development of four units, with parking achieved within the basement.

A summary of the proposed change against the approval is provided below in Table 1.1.

Table 1.1: Development Summary (Approved / Proposed)

DESCRIPTION	APPROVED DEVELOPMENT	PROPOSED DEVELOPMENT	NET CHANGE
Land Use	Residential (Multiple Dwelling)	Residential (Multiple Dwelling)	**NO CHANGE**
Dwellings	4 units (10 bedrooms) 2 bedroom unit: 2x 3 bedroom unit: 2x	6 units (16 bedrooms) 2 bedroom unit: 2x 3 bedroom unit: 4x	**+2x UNITS (+6x BEDS)** **2BR UNIT: NO CHANGE** **3BR UNIT: +2x UNITS**
Car Parking	11 spaces Resident: 10x spaces Visitor: 1x space	11 spaces Resident: 10x spaces Visitor: 1x space	**NO CHANGE**
Access	Single VXO via Arthur St	Single VXO via Arthur St	**NO CHANGE**
Servicing	Waste: Kerbside Servicing: Kerbside	Waste: Kerbside Servicing: Kerbside	**NO CHANGE**

As identified above, the proposal is to increase the density of the site to accommodate two additional three bedroom units. The proposal retains the general characteristics of the site, with other change to the basement car park configuration and parking allocation to support the additional units.

The Approved basement and ground level plans are provided as Attachments A, with the proposed plan of development (ground and basement level plans) provided as Attachment B.

2. CAR PARKING

2.1. CAR PARKING SUPPLY

Car parking rates for various development types are set out in Table 9.4.13-3 of the Transport Code of the City of Gold Coast City Plan. The following car parking rates are applicable for the proposed use:

Multiple Dwelling: *1 per 1 bedroom unit or dwelling*

1.25 per 2 bedroom unit or dwelling

1.5 per 3 bedroom unit or dwelling

2 per 4 bedroom unit or dwelling

Plus

where 3 to 4 dwellings, 1 space for visitor parking, or;

where 5 to 6 dwellings, 2 spaces for visitor parking, or;

where 7 to 9 dwellings, 3 spaces for visitor parking,

Where 10 or more dwellings, and 3+ 1 space per 10 units thereafter.

Application of the above rate to the proposed development yield result in an estimated need for 11 (10.5) car parking spaces. The proposal provides a total of 11 car parking spaces and therefore satisfies Council's Acceptable Outcome in relation to the overall supply. However, it is noted that the design includes a turning bay and a single space for visitors instead of the two dedicated bays stipulated in the Transport Code.

The proposed outcome is considered to be satisfactory given that the proposed increase in yield comprises of only two additional dwellings, with the total provided (6 units) not considered to be such that would generate a regular demand for two visitors. However, in the event that such is demanded on an occasion, the car parking survey carried out in August 2024 (Attachment C) indicates that there is ample opportunity along Arthur Street for such to be absorbed in the supply without exhausting the availability for others.

Furthermore, the site is also located within comfortable walking distance to the Nobby Beach precinct providing local dining and entertainment options and is also in the immediate proximity of existing and future reliable high frequency public transport nodes. This allows the opportunity for visitors to arrive by alternate means of transport and also encourages use of the local precinct rather than gathering at the site.

2.2. CAR PARKING DESIGN

The general characteristics of the basement car parking arrangements, ramp design and access function have been retained. As shown in Figure 2.1, the modified parking arrangement achieves a reduced extension of 0.5 metres at the end of the parking aisle. Such is provided on the basis that additional reversing distance can be accommodate within the widened 6.5 metre aisle.

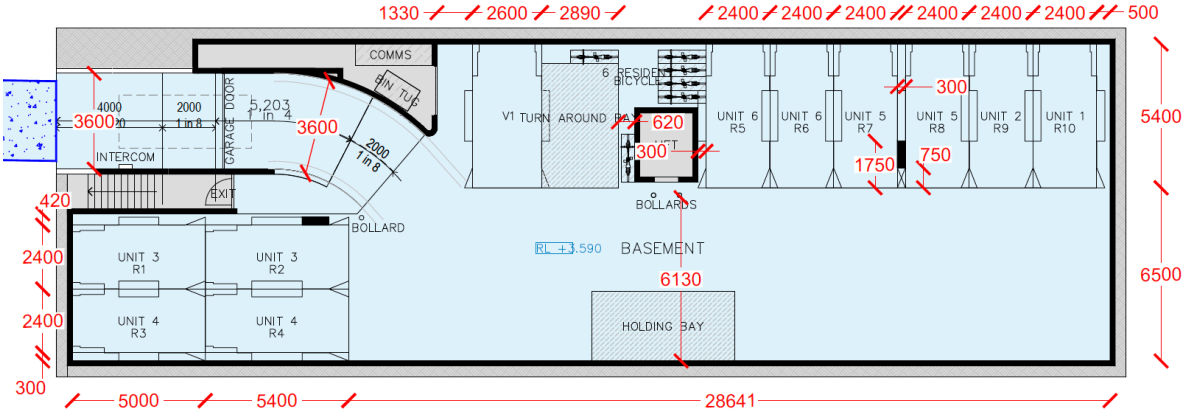


Figure 2.1: Dimensioned Basement Car Parking Facility

A swept path analysis has been prepared for the proposed car parking arrangement, including the end space adjacent to the reduced end of aisle treatment. The analysis has been carried out in accordance with AS2890.1:2004. Swept path for a B85 design vehicle negotiating the end parking spaces is provided as Figure 2.2, with the full analysis of car park manoeuvring provided as Attachment D.

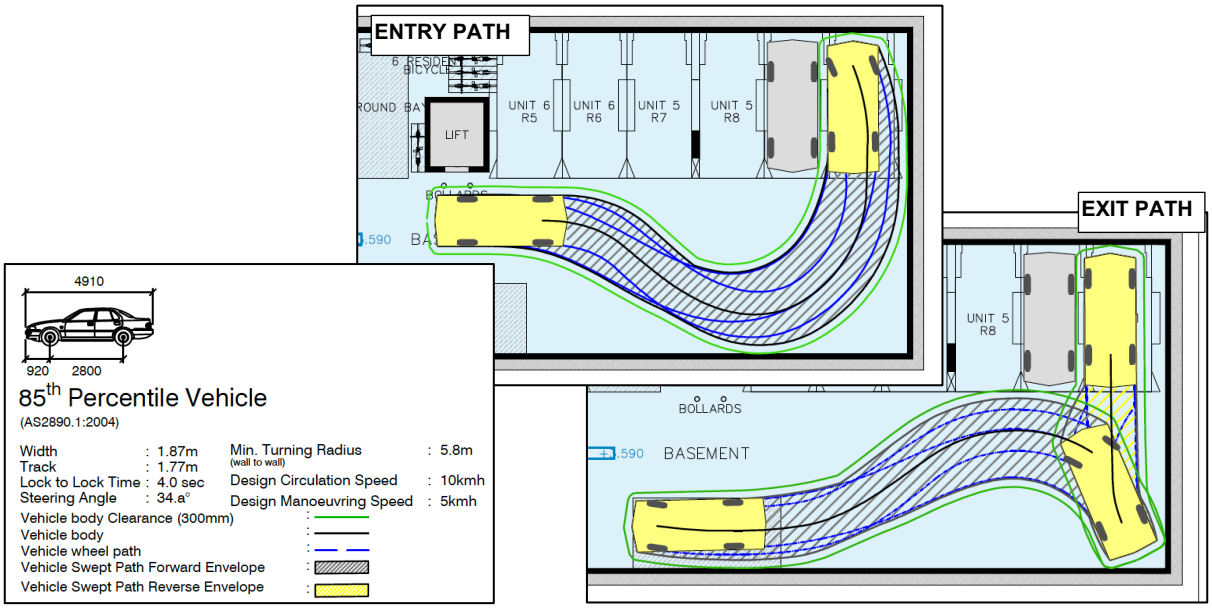


Figure 2.2: 85th Percentile Vehicle Manoeuvring (End Parking Space)

Given the change in internal parking configuration, whilst the geometry of the ramp remains, a swept path assessment of a B99 design vehicle has been carried out to demonstrate that such is able to negotiate the ramp when entering and exiting the basement. Swept paths for the B99 negotiating the ramp are shown as Attachment E.

3. BICYCLE PARKING

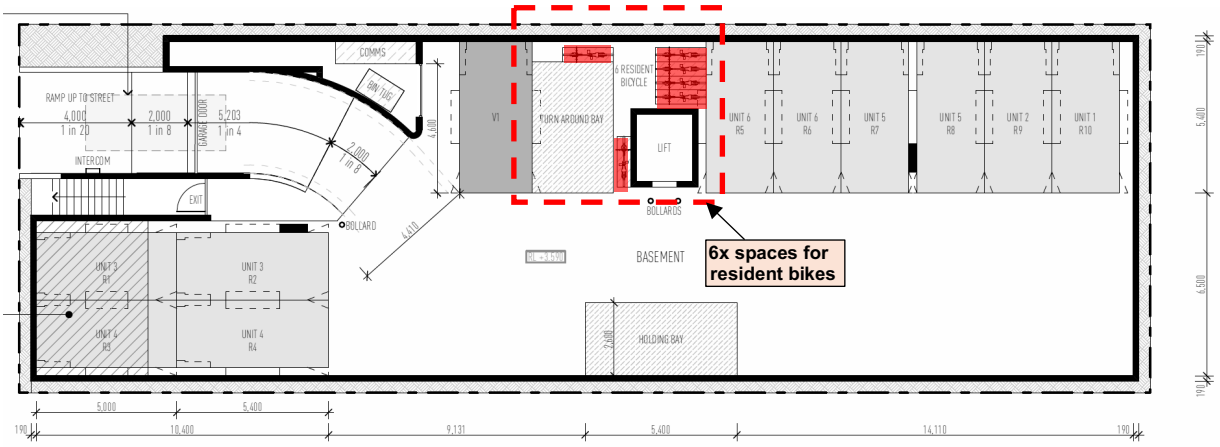
Table 9.4.13-10: Bicycle Parking Rates of 9.4.13 Transport code of the City of Gold Coast City Plan prescribes the following bicycle parking rates for the proposed development:

Multiple Dwelling: *1 bicycle per 1 dwelling or unit for residents, plus;*

1 bicycle per 12 dwellings or units to a maximum of 20 spaces.

Based on the above, the proposed plan requires a facility suitable for 6 bicycles for residents and a single bicycle rail on the ground floor for visitors. As shown in Figure 3.1, the site makes appropriate provision to satisfy Council's Acceptable Outcome for bicycle parking.

BASEMENT LEVEL



GROUND LEVEL

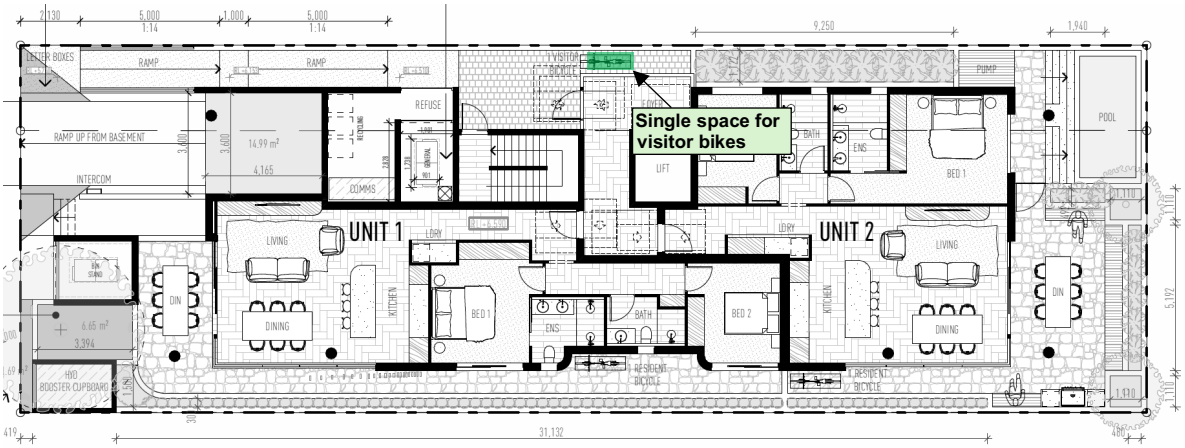


Figure 3.1: Bicycle Parking Facilities
(Resident and Visitor)

4. ACCESS AND SERVICING

No changes to the site access and servicing provisions are proposed. Therefore, such remain in accordance with that which is approved by the City of Gold Coast and are considered to be suitable for the site.

5. TRAFFIC IMPACT

As identified in Section 1.2, the proposal results in an increase in yield from 4 units to 6 units. As demonstrated in Table 5.1, based on the traffic generation rates prescribed in the Department or Transport and Main Roads – Road Planning and Design Manual: Appendix 3A (0.4 trips per unit), the proposal is not expected to result in a significant increase in traffic turnover over the access in comparison to the demand generated under the approved yield (4 units).

Table 5.1: traffic Generation Estimate (DTMR – RPDM: App 3A)

Element	Yield	Traffic Generation Rate	Resultant Traffic Generation Estimate
Residential Units (Approved)	4 units	0.4 trips / unit	**2 (1.6) trips**
Residential Units (Proposed)	6 units	0.4 trips / unit	**3 (2.4) trips**
		NET CHANGE	**+ 1 trip**

On this basis. It is considered that the resultant impact of the change is negligible in the context of the surrounding road network and is not expected to compromise the operation and safety of the frontage road.

6. SUMMARY

Based on the above assessment information it is concluded that:

- The geometric design elements adopted in the modified basement layout are consistent with the approved scheme dimensions and / or comply with AS2890.
- The proposed access and servicing arrangements remain in line with the approved scheme.
- The net increase in the traffic generation of the site is considered to be negligible in the scope of the surrounding road network, and therefore the approved impact assessment remains unchanged and valid.

Zekacorp Traffic and Transport have reviewed the revised parking, access and servicing arrangements for the proposed development. Overall, with regard to traffic engineering aspects the revised development scheme is considered to be generally in accordance with that currently approved over the site.

The information contained in this letter and the accompanying attachments has been reviewed by a Registered Professional Engineer of Queensland (RPEQ) and is considered appropriate, fit for purpose, and unlikely to adversely affect the safety or operational performance of the site.

Feel free to contact the undersigned in relation to any queries in relation to the above matter.

Yours faithfully



Principal Traffic Engineer
Dare Janzekovic
B Eng (Civil), RSA, TMD, NER RPEQ 27561

ATTACHMENTS

Attachment A – Approved Plans
Attachment B – Proposed Ground and Basement Level Plans
Attachment C – Car Parking Utilisation Survey (August 2024)
Attachment D – B85 Swept Path Analysis
Attachment E – B99 Swept Path Analysis

ATTACHMENT A – APPROVED PLANS

Floor Plan - Basement Level

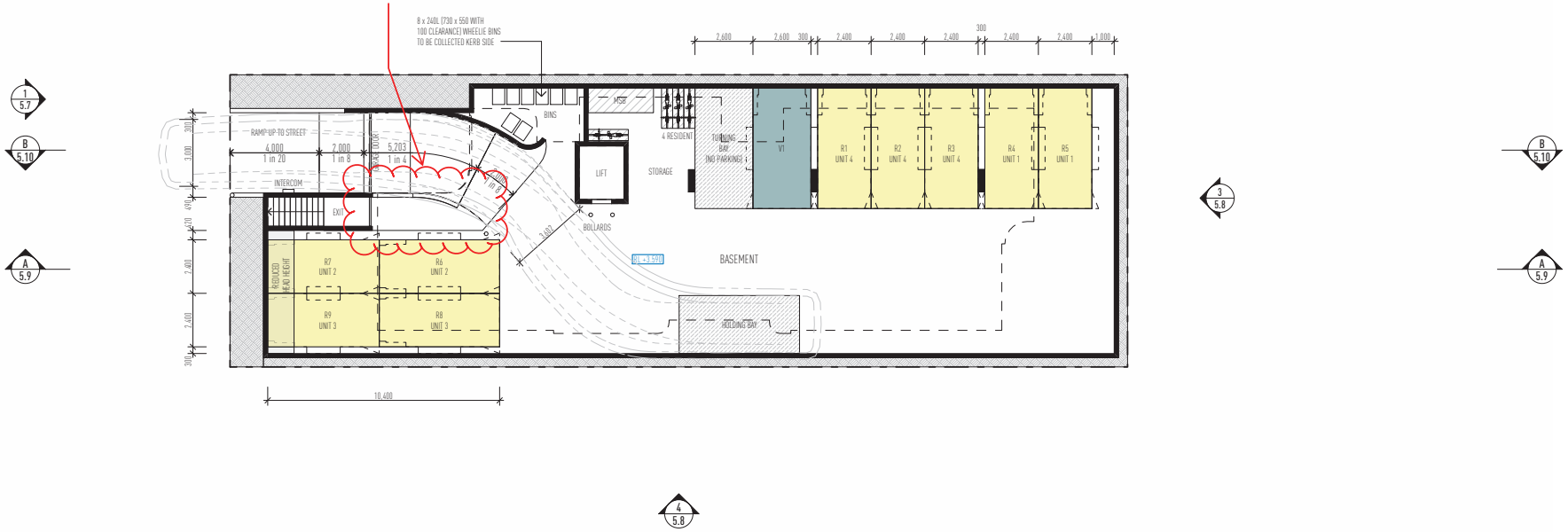
PLANS AND DOCUMENTS referred to in the DEVELOPMENT APPROVAL

Application No: MIN/2024/478

Dated: 13 February 2025

Development shall comply with the conditions of approval as detailed in the Decision Notice and Council's Planning Scheme, Local Laws and Planning Policies

Basement ramp to be widened to fully contain swept path and applicable clearances for a B99 vehicle (300mm clearance on the inside of the swept path, 600mm clearance on the outside), to ensure compliance with AS2890.1



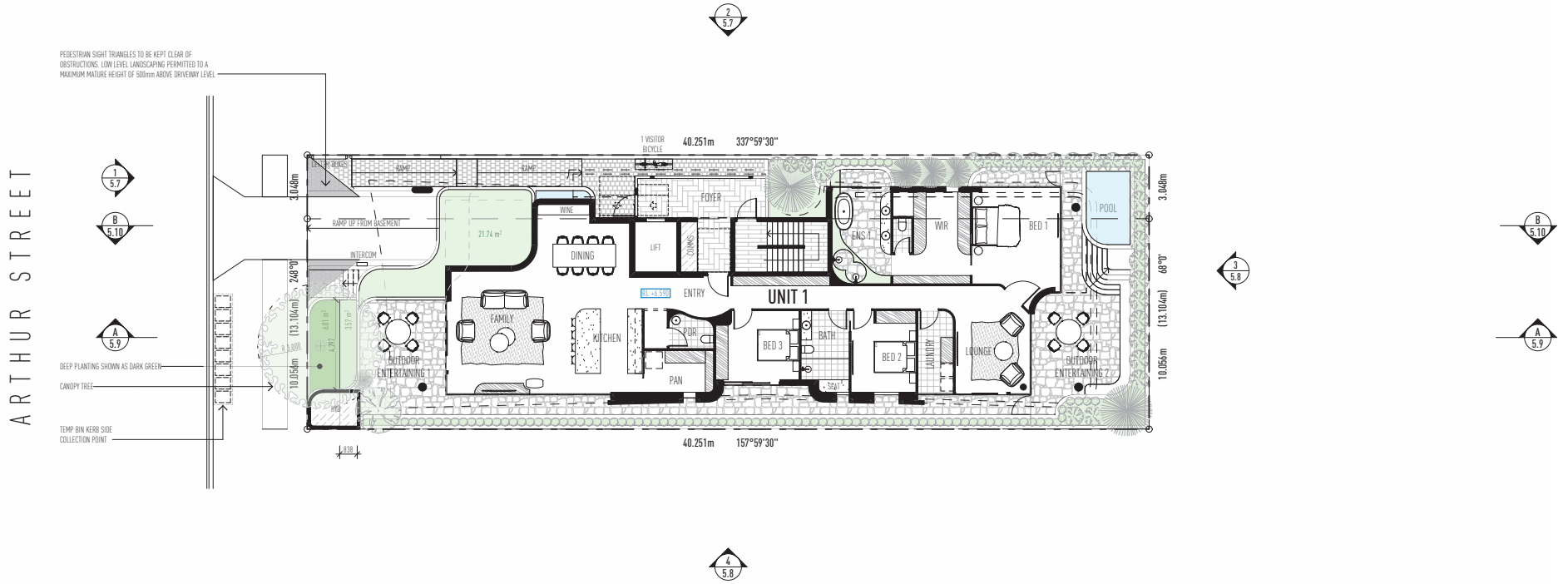
Floor Plan - Ground Level

PLANS AND DOCUMENTS referred to in the DEVELOPMENT APPROVAL

Application No: MIN/2024/478

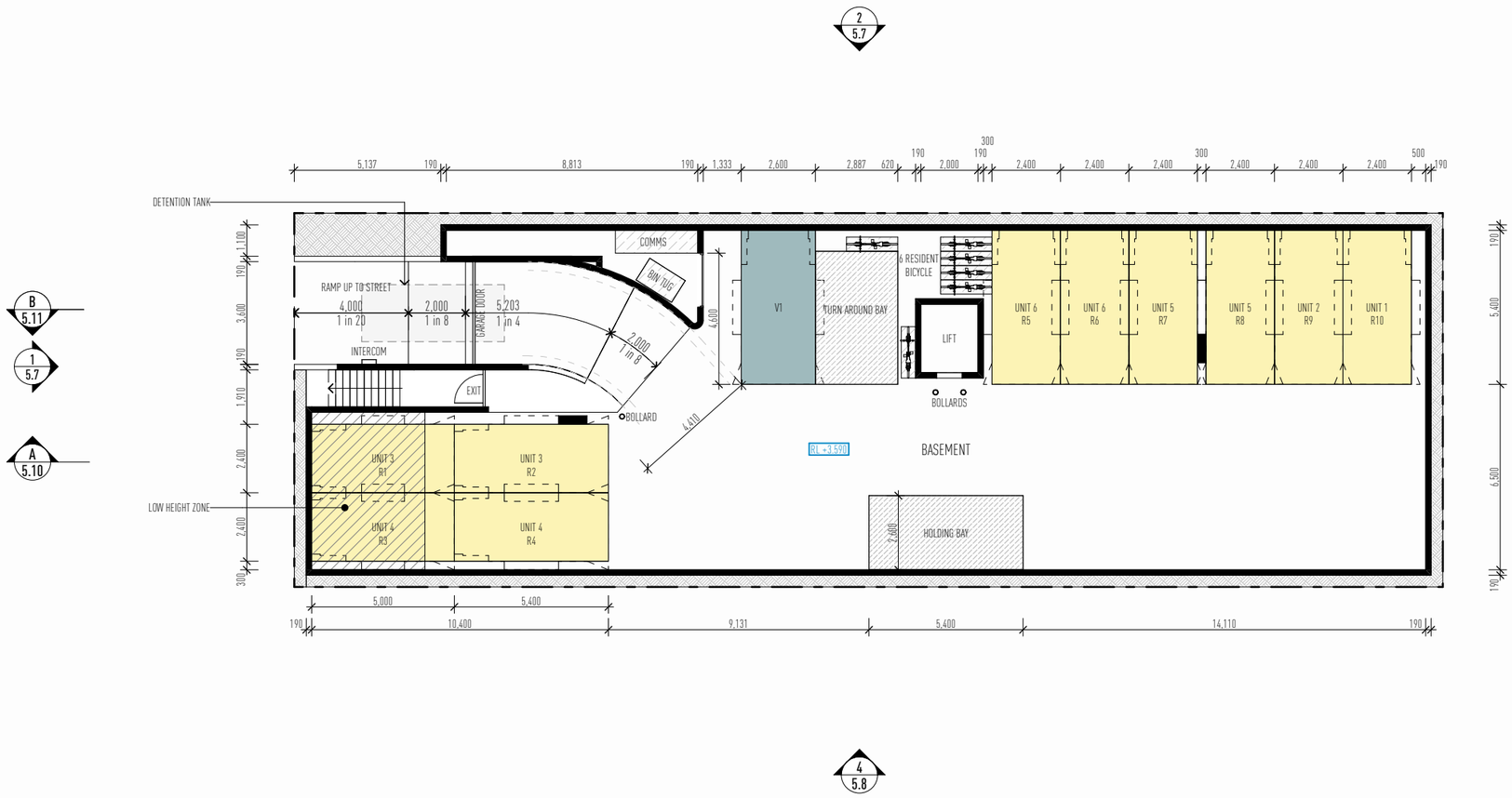
Dated: 13 February 2025

Development shall comply with the conditions of approval as detailed in the Decision Notice and Council's Planning Scheme, Local Laws and Planning Policies

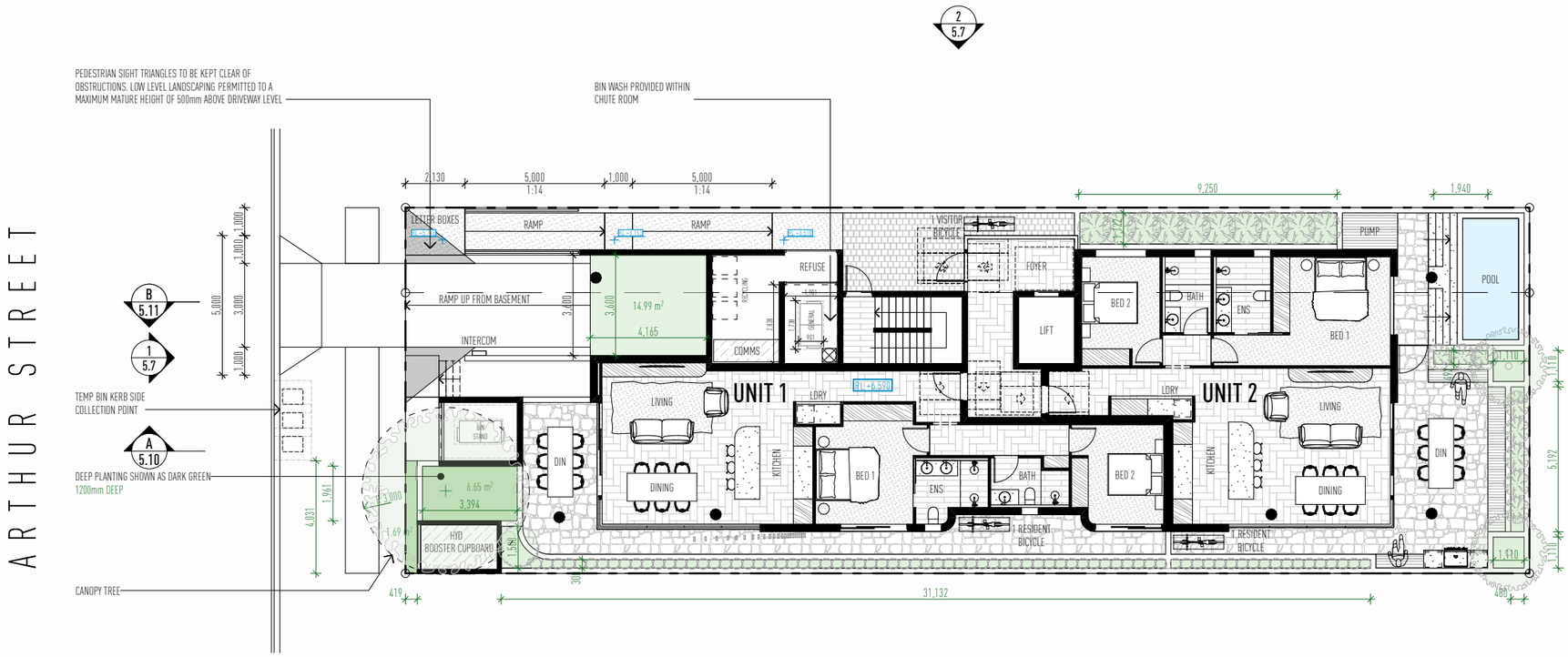


ATTACHMENT B – PROPOSED GROUND FLOOR AND BASEMENT PLANS

Floor Plan - Basement Level



Floor Plan - Ground Level



ATTACHMENT C – CAR PARKING UTILISATION SURVEY (AUGUST 2024)

ARTHUR STREET: 15TH TO 17TH AUGUST 2024

SURVEY REFERENCE

SITE DETAIL

Method: PARKING UTILISATION SURVEY
Location: Arthur St, Mermaid Beach
Survey Dat Aug, 15 - 17 2024

SURVEY PERIOD	AM	6:00 am - 12:00 pm
	PM	12:00 pm - 6:00 pm

ZEKACORP
DEVELOPMENT SOLUTIONS



PARKING SURVEY FORM

THURSDAY	Date:	15-Aug-24

ZEKACORP
DEVELOPMENT SOLUTIONS

TIME	ZONE A			ZONE B			ZONE C			ZONE D			ZONE E			ZONE F			TOTAL AVAILABLE PARKING		TOTAL OCCUPIED PARKING		TOTAL PARKING
	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	#	%	#	%	#
6:00	4	3	1	8	6	2	8	6	2	4	2	2	2	2	0	5	3	2	9	29.03%	22	70.97%	31
6:15	4	3	1	8	6	2	8	6	2	4	2	2	2	2	0	5	3	2	9	29.03%	22	70.97%	31
6:30	4	3	1	8	4	4	8	6	2	4	2	2	2	2	0	5	2	3	12	38.71%	19	61.29%	31
6:45	4	3	1	8	4	4	8	4	4	4	3	1	2	2	0	5	2	3	13	41.94%	18	58.06%	31
7:00	4	3	1	8	5	3	8	5	3	4	3	1	2	2	0	5	3	2	10	32.26%	21	67.74%	31
7:15	4	3	1	8	5	3	8	4	4	4	3	1	2	2	0	5	3	2	11	35.48%	20	64.52%	31
7:30	4	3	1	8	5	3	8	4	4	4	3	1	2	2	0	5	4	1	10	32.26%	21	67.74%	31
7:45	4	2	2	8	5	3	8	4	4	4	2	2	2	2	0	5	4	1	12	38.71%	19	61.29%	31
8:00	4	2	2	8	5	3	8	4	4	4	2	2	2	2	0	5	4	1	12	38.71%	19	61.29%	31
8:15	4	2	2	8	5	3	8	5	3	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
8:30	4	2	2	8	5	3	8	5	3	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
8:45	4	2	2	8	4	4	8	4	4	4	1	3	2	1	1	5	3	2	16	51.61%	15	48.39%	31
9:00	4	2	2	8	4	4	8	4	4	4	1	3	2	1	1	5	3	2	16	51.61%	15	48.39%	31
9:15	4	2	2	8	4	4	8	5	3	4	1	3	2	1	1	5	3	2	15	48.39%	16	51.61%	31
9:30	4	3	1	8	4	4	8	5	3	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
9:45	4	3	1	8	4	4	8	5	3	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
10:00	4	3	1	8	4	4	8	5	3	4	1	3	2	1	1	5	2	3	15	48.39%	16	51.61%	31
10:15	4	3	1	8	3	5	8	5	3	4	1	3	2	1	1	5	2	3	16	51.61%	15	48.39%	31
10:30	4	3	1	8	3	5	8	6	2	4	2	2	2	1	1	5	2	3	14	45.16%	17	54.84%	31
10:45	4	3	1	8	4	4	8	6	2	4	2	2	2	1	1	5	3	2	12	38.71%	19	61.29%	31
11:00	4	3	1	8	4	4	8	6	2	4	1	3	2	1	1	5	3	2	13	41.94%	18	58.06%	31
11:15	4	3	1	8	5	3	8	6	2	4	0	4	2	1	1	5	3	2	13	41.94%	18	58.06%	31
11:30	4	3	1	8	5	3	8	4	4	4	0	4	2	1	1	5	3	2	15	48.39%	16	51.61%	31
11:45	4	3	1	8	4	4	8	4	4	4	0	4	2	1	1	5	3	2	16	51.61%	15	48.39%	31
12:00	4	3	1	8	4	4	8	3	5	4	1	3	2	1	1	5	2	3	17	54.84%	14	45.16%	31
12:15	4	3	1	8	5	3	8	3	5	4	1	3	2	1	1	5	3	2	15	48.39%	16	51.61%	31
12:30	4	3	1	8	6	2	8	3	5	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
12:45	4	3	1	8	6	2	8	3	5	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
13:00	4	3	1	8	6	2	8	3	5	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
13:15	4	3	1	8	5	3	8	4	4	4	2	2	2	1	1	5	3	2	13	41.94%	18	58.06%	31
13:30	4	3	1	8	5	3	8	4	4	4	2	2	2	1	1	5	3	2	13	41.94%	18	58.06%	31
13:45	4	3	1	8	5	3	8	5	3	4	2	2	2	2	0	5	3	2	11	35.48%	20	64.52%	31
14:00	4	3	1	8	5	3	8	5	3	4	3	1	2	2	0	5	3	2	10	32.26%	21	67.74%	31
14:15	4	3	1	8	5	3	8	6	2	4	3	1	2	2	0	5	3	2	9	29.03%	22	70.97%	31
14:30	4	3	1	8	5	3	8	6	2	4	3	1	2	2	0	5	3	2	9	29.03%	22	70.97%	31
14:45	4	2	2	8	6	2	8	6	2	4	2	2	2	2	0	5	3	2	10	32.26%	21	67.74%	31
15:00	4	2	2	8	6	2	8	4	4	4	2	2	2	2	0	5	2	3	13	41.94%	18	58.06%	31
15:15	4	2	2	8	5	3	8	4	4	4	2	2	2	2	0	5	2	3	14	45.16%	17	54.84%	31
15:30	4	2	2	8	5	3	8	4	4	4	2	2	2	2	0	5	2	3	14	45.16%	17	54.84%	31
15:45	4	2	2	8	6	2	8	4	4	4	2	2	2	2	0	5	2	3	13	41.94%	18	58.06%	31
16:00	4	2	2	8	6	2	8	4	4	4	2	2	2	2	0	5	2	3	13	41.94%	18	58.06%	31
16:15	4	4	0	8	6	2	8	5	3	4	2	2	2	2	0	5	2	3	10	32.26%	21	67.74%	31
16:30	4	4	0	8	6	2	8	6	2	4	2	2	2	2	0	5	2	3	9	29.03%	22	70.97%	31
16:45	4	4	0	8	6	2	8	6	2	4	2	2	2	2	0	5	2	3	9	29.03%	22	70.97%	31
17:00	4	4	0	8	7	1	8	6	2	4	3	1	2	2	0	5	2	3	7	22.58%	24	77.42%	31
17:15	4	2	2	8	7	1	8	6	2	4	3	1	2	2	0	5	1	4	10	32.26%	21	67.74%	31
17:30	4	2	2	8	7	1	8	5	3	4	2	2	2	2	0	5	2	3	11	35.48%	20	64.52%	31
17:45	4	2	2	8	7	1	8	5	3	4	2	2	2	2	0	5	1	4	12	38.71%	19	61.29%	31
18:00	4	2	2	8	7	1	8	4	4	4	1	3	2	2	0	5	1	4	14	45.16%	17	54.84%	31
																			13	40.36%	18	59.64%	
																			13	42.84%	18	57.16%	
																			12	38.45%	19	61.55%	

PARKING SURVEY FORM

ZEKACORP DEVELOPMENT SOLUTIONS

FRISDAY	Date:	16-Aug-24

CELL LEGEND:
- X - SPACE ADJACENT TO ANOTHER UNOCCUPIED CAR PARK
- X - TOTAL AVAILABLE PARKING WITHIN PARKING ZONE

TIME	ZONE A			ZONE B			ZONE C			*ZONE D			ZONE E			ZONE F			TOTAL AVAILABLE PARKING		TOTAL OCCUPIED PARKING		TOTAL PARKING
	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	#	%	#	%	#
6:00	4	3	1	8	5	3	8	7	1	4	4	0	2	2	0	5	3	2	7	22.58%	24	77.42%	31
6:15	4	3	1	8	5	3	8	7	1	4	4	0	2	2	0	5	3	2	7	22.58%	24	77.42%	31
6:30	4	3	1	8	5	3	8	7	1	4	4	0	2	2	0	5	3	2	7	22.58%	24	77.42%	31
6:45	4	3	1	8	5	3	8	7	1	4	4	0	2	2	0	5	3	2	7	22.58%	24	77.42%	31
7:00	4	3	1	8	5	3	8	7	1	4	4	0	2	2	0	5	3	2	7	22.58%	24	77.42%	31
7:15	4	3	1	8	5	3	8	7	1	4	4	0	2	2	0	5	3	2	7	22.58%	24	77.42%	31
7:30	4	3	1	8	5	3	8	7	1	4	4	0	2	2	0	5	3	2	7	22.58%	24	77.42%	31
7:45	4	3	1	8	5	3	8	7	1	4	4	0	2	2	0	5	3	2	7	22.58%	24	77.42%	31
8:00	4	3	1	8	5	3	8	6	2	4	3	1	2	2	0	5	3	2	9	29.03%	22	70.97%	31
8:15	4	3	1	8	5	3	8	6	2	4	3	1	2	2	0	5	3	2	9	29.03%	22	70.97%	31
8:30	4	4	0	8	5	3	8	6	2	4	3	1	2	2	0	5	3	2	8	25.81%	23	74.19%	31
8:45	4	3	1	8	5	3	8	6	2	4	3	1	2	1	1	5	3	2	10	32.26%	21	67.74%	31
9:00	4	3	1	8	5	3	8	7	1	4	3	1	2	1	1	5	4	1	8	25.81%	23	74.19%	31
9:15	4	3	1	8	5	3	8	7	1	4	3	1	2	1	1	5	4	1	8	25.81%	23	74.19%	31
9:30	4	3	1	8	5	3	8	8	0	4	3	1	2	1	1	5	4	1	7	22.58%	24	77.42%	31
9:45	4	3	1	8	5	3	8	8	0	4	3	1	2	1	1	5	3	2	8	25.81%	23	74.19%	31
10:00	4	3	1	8	5	3	8	7	1	4	2	2	2	1	1	5	3	2	10	32.26%	21	67.74%	31
10:15	4	3	1	8	5	3	8	7	1	4	2	2	2	1	1	5	3	2	10	32.26%	21	67.74%	31
10:30	4	4	0	8	5	3	8	7	1	4	3	1	2	1	1	5	3	2	8	25.81%	23	74.19%	31
10:45	4	4	0	8	6	2	8	6	2	4	3	1	2	1	1	5	3	2	8	25.81%	23	74.19%	31
11:00	4	4	0	8	5	3	8	6	2	4	4	0	2	2	0	5	4	1	6	19.35%	25	80.65%	31
11:15	4	4	0	8	6	2	8	6	2	4	4	0	2	2	0	5	4	1	5	16.13%	26	83.87%	31
11:30	4	4	0	8	6	2	8	5	3	4	4	0	2	2	0	5	5	0	5	16.13%	26	83.87%	31
11:45	4	4	0	8	6	2	8	6	2	4	4	0	2	2	0	5	5	0	4	12.90%	27	87.10%	31
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12:30	4	4	0	8	5	3	8	7	1	4	3	1	2	2	0	5	4	1	6	19.35%	25	80.65%	31
12:45	4	4	0	8	5	3	8	7	1	4	3	1	2	2	0	5	4	1	6	19.35%	25	80.65%	31
13:00	4	4	0	8	5	3	8	8	0	4	4	0	2	2	0	5	4	1	4	12.90%	27	87.10%	31
13:15	4	4	0	8	4	4	8	8	0	4	4	0	2	2	0	5	4	1	5	16.13%	26	83.87%	31
13:30	4	4	0	8	6	2	8	8	0	4	4	0	2	2	0	5	4	1	3	9.68%	28	90.32%	31
13:45	4	4	0	8	6	2	8	8	0	4	4	0	2	2	0	5	5	0	2	6.45%	29	93.55%	31
14:00	4	4	0	8	6	2	8	8	0	4	4	0	2	2	0	5	5	0	2	6.45%	29	93.55%	31
14:15	4	4	0	8	6	2	8	8	0	4	4	0	2	2	0	5	5	0	2	6.45%	29	93.55%	31
14:30	4	4	0	8	6	2	8	7	1	4	4	0	2	2	0	5	5	0	3	9.68%	28	90.32%	31
14:45	4	4	0	8	6	2	8	6	2	4	4	0	2	2	0	5	5	0	4	12.90%	27	87.10%	31
15:00	4	4	0	8	5	3	8	6	2	4	4	0	2	2	0	5	5	0	5	16.13%	26	83.87%	31
15:15	4	3	1	8	4	4	8	6	2	4	4	0	2	2	0	5	5	0	7	22.58%	24	77.42%	31
15:30	4	3	1	8	4	4	8	7	1	4	4	0	2	2	0	5	5	0	6	19.35%	25	80.65%	31
15:45	4	3	1	8	4	4	8	7	1	4	4	0	2	2	0	5	5	0	6	19.35%	25	80.65%	31
16:00	4	3	1	8	4	4	8	6	2	4	4	0	2	2	0	5	5	0	7	22.58%	24	77.42%	31
16:15	4	3	1	8	4	4	8	6	2	4	3	1	2	2	0	5	5	0	8	25.81%	23	74.19%	31
16:30	4	3	1	8	4	4	8	6	2	4	3	1	2	2	0	5	5	0	8	25.81%	23	74.19%	31
16:45	4	3	1	8	4	4	8	6	2	4	3	1	2	2	0	5	5	0	8	25.81%	23	74.19%	31
17:00	4	3	1	8	4	4	8	6	2	4	2	2	2	2	0	5	4	1	10	32.26%	21	67.74%	31
17:15	4	3	1	8	4	4	8	5	3	4	2	2	2	2	0	5	4	1	11	35.48%	20	64.52%	31
17:30	4	3	1	8	4	4	8	5	3	4	2	2	2	2	0	5	4	1	11	35.48%	20	64.52%	31
17:45	4	3	1	8	4	4	8	5	3	4	2	2	2	2	0	5	4	1	11	35.48%	20	64.52%	31
18:00	4	3	1	8	4	4	8	6	2	4	2	2	2	2	0	5	4	1	10	32.26%	21	67.74%	31
																			7	21.86%	24	78.14%	
																			7	23.61%	24	76.39%	
																			6	19.74%	25	80.26%	

PARKING SURVEY FORM

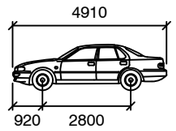
ZEKACORP

SATURDAY	Date:	17-Aug-24

CELL LEGEND: X - SPACE ADJACENT TO ANOTHER UNOCCUPIED CAR PARK
X - TOTAL AVAILABLE PARKING WITHIN PARKING ZONE

TIME	ZONE A			ZONE B			ZONE C			*ZONE D			ZONE E			ZONE F			TOTAL AVAILABLE PARKING		TOTAL OCCUPIED PARKING		TOTAL PARKING
	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	TOTAL PARKING	OCCUPIED PARKING	AVAILABLE PARKING	#	%	#	%	#
6:00	4	3	1	8	6	2	8	6	2	4	2	2	2	2	0	5	3	2	9	29.03%	22	70.97%	31
6:15	4	3	1	8	6	2	8	6	2	4	2	2	2	2	0	5	3	2	9	29.03%	22	70.97%	31
6:30	4	3	1	8	4	4	8	6	2	4	2	2	2	2	0	5	2	3	12	38.71%	19	61.29%	31
6:45	4	3	1	8	4	4	8	4	4	4	3	1	2	2	0	5	2	3	13	41.94%	18	58.06%	31
7:00	4	3	1	8	5	3	8	5	3	4	3	1	2	2	0	5	3	2	10	32.26%	21	67.74%	31
7:15	4	3	1	8	5	3	8	4	4	4	3	1	2	2	0	5	3	2	11	35.48%	20	64.52%	31
7:30	4	3	1	8	5	3	8	4	4	4	3	1	2	2	0	5	4	1	10	32.26%	21	67.74%	31
7:45	4	2	2	8	5	3	8	4	4	4	2	2	2	2	0	5	4	1	12	38.71%	19	61.29%	31
8:00	4	2	2	8	5	3	8	4	4	4	2	2	2	2	0	5	4	1	12	38.71%	19	61.29%	31
8:15	4	2	2	8	5	3	8	5	3	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
8:30	4	2	2	8	5	3	8	5	3	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
8:45	4	2	2	8	4	4	8	4	4	4	1	3	2	1	1	5	3	2	16	51.61%	15	48.39%	31
9:00	4	2	2	8	4	4	8	4	4	4	1	3	2	1	1	5	3	2	16	51.61%	15	48.39%	31
9:15	4	2	2	8	4	4	8	5	3	4	1	3	2	1	1	5	3	2	15	48.39%	16	51.61%	31
9:30	4	3	1	8	4	4	8	5	3	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
9:45	4	3	1	8	4	4	8	5	3	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
10:00	4	3	1	8	4	4	8	5	3	4	1	3	2	1	1	5	2	3	15	48.39%	16	51.61%	31
10:15	4	3	1	8	3	5	8	5	3	4	1	3	2	1	1	5	2	3	16	51.61%	15	48.39%	31
10:30	4	3	1	8	3	5	8	6	2	4	2	2	2	1	1	5	2	3	14	45.16%	17	54.84%	31
10:45	4	3	1	8	4	4	8	6	2	4	2	2	2	1	1	5	3	2	12	38.71%	19	61.29%	31
11:00	4	3	1	8	4	4	8	6	2	4	1	3	2	1	1	5	3	2	13	41.94%	18	58.06%	31
11:15	4	3	1	8	5	3	8	6	2	4	0	4	2	1	1	5	3	2	13	41.94%	18	58.06%	31
11:30	4	3	1	8	5	3	8	4	4	4	0	4	2	1	1	5	3	2	15	48.39%	16	51.61%	31
11:45	4	3	1	8	4	4	8	4	4	4	0	4	2	1	1	5	3	2	16	51.61%	15	48.39%	31
12:00	4	3	1	8	4	4	8	3	5	4	1	3	2	1	1	5	2	3	17	54.84%	14	45.16%	31
12:15	4	3	1	8	5	3	8	3	5	4	1	3	2	1	1	5	3	2	15	48.39%	16	51.61%	31
12:30	4	3	1	8	6	2	8	3	5	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
12:45	4	3	1	8	6	2	8	3	5	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
13:00	4	3	1	8	6	2	8	3	5	4	1	3	2	1	1	5	3	2	14	45.16%	17	54.84%	31
13:15	4	3	1	8	5	3	8	4	4	4	2	2	2	1	1	5	3	2	13	41.94%	18	58.06%	31
13:30	4	3	1	8	5	3	8	4	4	4	2	2	2	1	1	5	3	2	13	41.94%	18	58.06%	31
13:45	4	3	1	8	5	3	8	5	3	4	2	2	2	2	0	5	3	2	11	35.48%	20	64.52%	31
14:00	4	3	1	8	5	3	8	5	3	4	3	1	2	2	0	5	3	2	10	32.26%	21	67.74%	31
14:15	4	3	1	8	5	3	8	6	2	4	3	1	2	2	0	5	3	2	9	29.03%	22	70.97%	31
14:30	4	3	1	8	5	3	8	6	2	4	3	1	2	2	0	5	3	2	9	29.03%	22	70.97%	31
14:45	4	2	2	8	6	2	8	6	2	4	2	2	2	2	0	5	3	2	10	32.26%	21	67.74%	31
15:00	4	2	2	8	6	2	8	4	4	4	2	2	2	2	0	5	2	3	13	41.94%	18	58.06%	31
15:15	4	2	2	8	5	3	8	4	4	4	2	2	2	2	0	5	2	3	14	45.16%	17	54.84%	31
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15:45	4	2	2	8	6	2	8	4	4	4	2	2	2	2	0	5	2	3	13	41.94%	18	58.06%	31
16:00	4	2	2	8	6	2	8	4	4	4	2	2	2	2	0	5	2	3	13	41.94%	18	58.06%	31
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16:30	4	4	0	8	6	2	8	6	2	4	2	2	2	2	0	5	2	3	9	29.03%	22	70.97%	31
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17:30	4	2	2	8	7	1	8	5	3	4	2	2	2	2	0	5	2	3	11	35.48%	20	64.52%	31
17:45	4	2	2	8	7	1	8	5	3	4	2	2	2	2	0	5	1	4	12	38.71%	19	61.29%	31
18:00	4	2	2	8	7	1	8	4	4	4	1	3	2	2	0	5	1	4	14	45.16%	17	54.84%	31
																			13	40.36%	18	59.64%	
																			13	42.84%	18	57.16%	
																			12	38.45%	19	61.55%	

ATTACHMENT D – B85 SWEPT PATH ANALYSIS



85th Percentile Vehicle

(AS2890.1:2004)

Width	: 1.87m	Min. Turning Radius (wall to wall)	: 5.8m
Track	: 1.77m		
Lock to Lock Time	: 4.0 sec	Design Circulation Speed	: 10kmh
Steering Angle	: 34.a°	Design Manoeuvring Speed	: 5kmh

Vehicle body Clearance (300mm) :
Vehicle body :
Vehicle wheel path :
Vehicle Swept Path Forward Envelope :
Vehicle Swept Path Reverse Envelope :

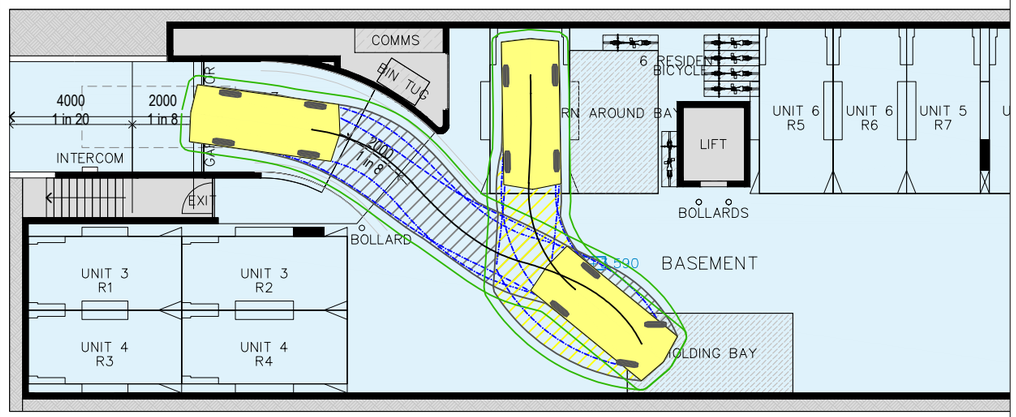
GENERAL NOTES (SWEPT PATH)

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5. ANY CONFLICT WITH SERVICES OR PHYSICAL OBSTRUCTIONS RESTRICTING MOVEMENTS REPRESENTED ON THE PLAN ARE TO BE IDENTIFIED ON SITE AND ARE TO BE REMOVED OR RELOCATED AS DETERMINED BY ON SITE MANAGEMENT.

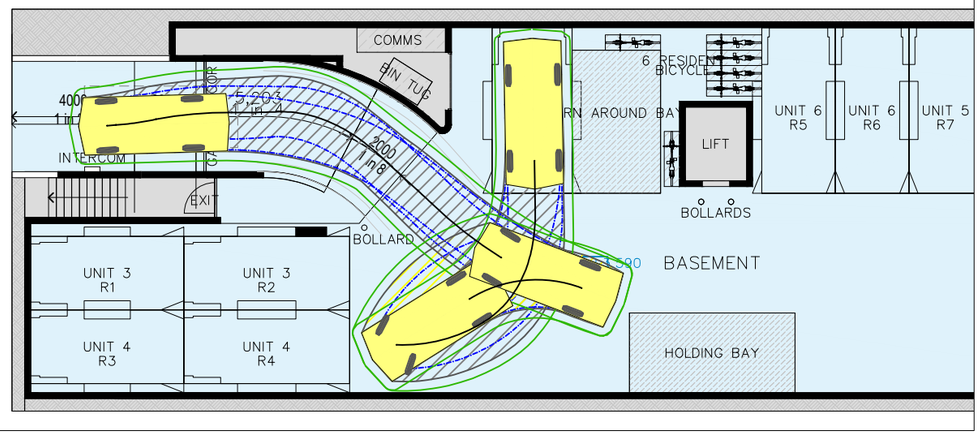
ATTENTION: THIS DRAWING IS BEST VIEWED IN COLOR AND ON AN ELECTRONIC DEVICE.

INFORMATION
FOR DISCUSSION PURPOSES ONLY

ENTRY PATH



EXIT PATH



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E: ADMIN@ZEKACORP.COM

NORTHPOINT

DRAWING PREPARED FOR:

SCALE 0 2.5 5.0 7.5 10.0 1:200 (metres) ORIGINAL DRAWING SIZE A3

DRAWING TITLE: PROPOSED MULTIPLE DWELLING DEVELOPMENT (85TH PERCENTILE VEHICLE MANOEUVRING-VISITOR)

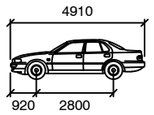
PROJECT NUMBER	DRAWING NUMBER	REVISION	LOCATION
25-011	04-1	B	37 ARTHUR ST, MERMAID BEACH

DESIGN ENGINEER CERTIFIED: D. JANZEKOVIC SIGNED
DATE: 3-25 RPEQ No. 27561
DRAWN BY: J. GAVIN DATE: 25-03-25

DRAWING LINK (HIGH-RES / CAD): 37 ARTHUR ST. MERMAID BEACH

REVISIONS		DRAWN BY	CHECKED	DATE
B	Review of modified plans	J. GAVIN	D. JANZEKOVIC	25-03-25
A	Original Issue			

CITY OF GOLDCOAST.



85th Percentile Vehicle

(AS2890.1:2004)

Width	: 1.87m	Min. Turning Radius (wall to wall)	: 5.8m
Track	: 1.77m		
Lock to Lock Time	: 4.0 sec	Design Circulation Speed	: 10kmh
Steering Angle	: 34.a°	Design Manoeuvring Speed	: 5kmh

Vehicle body Clearance (300mm) :
Vehicle body :
Vehicle wheel path :
Vehicle Swept Path Forward Envelope :
Vehicle Swept Path Reverse Envelope :

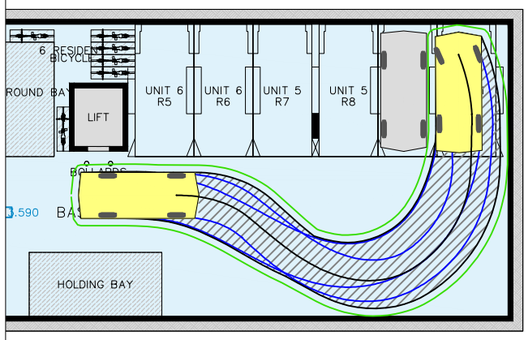
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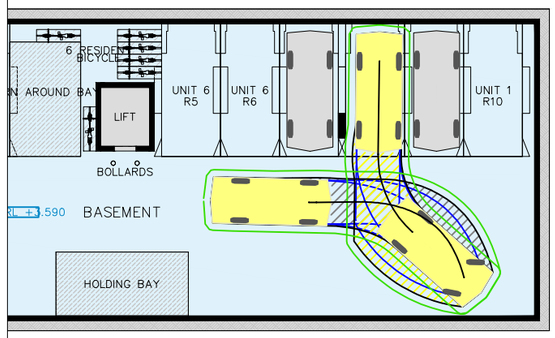
ATTENTION: THIS DRAWING IS BEST VIEWED IN COLOR AND ON AN ELECTRONIC DEVICE.

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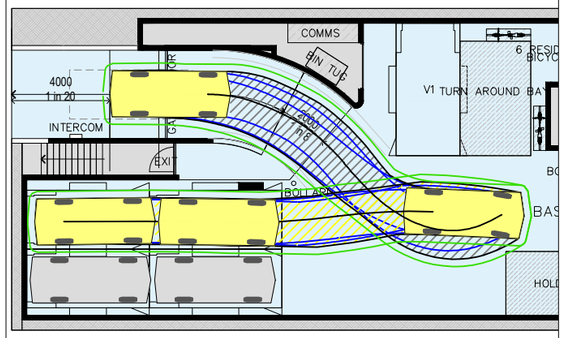
ENTRY PATH



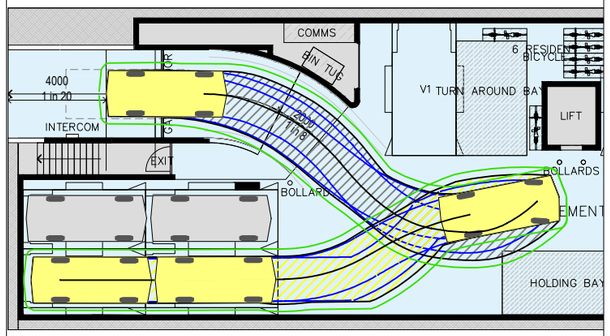
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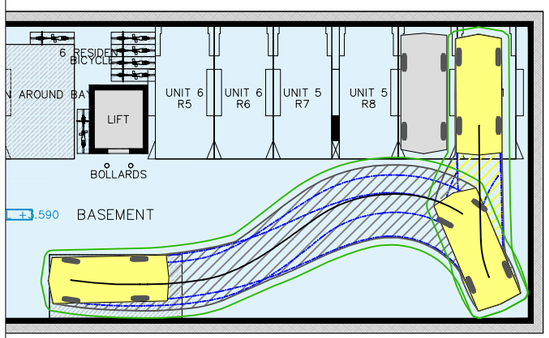
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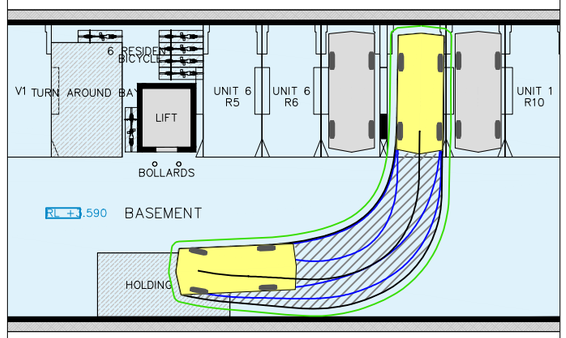
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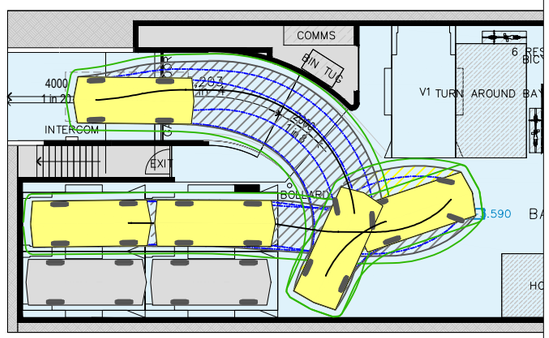
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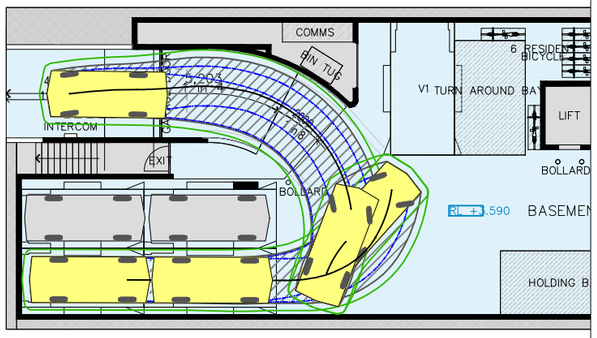
EXIT PATH



EXIT PATH



EXIT PATH



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NORTHPOINT

DRAWING PREPARED FOR:

SCALE 0 2.5 5.0 7.5 10.0 1:250 (metres) ORIGINAL DRAWING SIZE A3

DRAWING TITLE
PROPOSED MULTIPLE DWELLING DEVELOPMENT
(85TH PERCENTILE VEHICLE MANOEUVRING-RESIDENT)

PROJECT NUMBER	DRAWING NUMBER	REVISION	LOCATION
25-011	04-2	B	37 ARTHUR ST, MERMAID BEACH

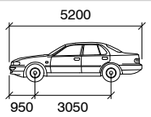
DESIGN ENGINEER CERTIFIED D. JANZEKOVIC SIGNED
DATE 3-25 RPEQ No. 27561
DRAWN BY J. GAVIN DATE 25-03-25

DRAWING LINK (HIGH-RES / CAD) 37 ARTHUR ST. MERMAID BEACH

REVISIONS		DRAWN BY	CHECKED	DATE
B	Review of modified plans	J. GAVIN	D. JANZEKOVIC	25-03-25
A	Original Issue			

CITY OF GOLDCOAST.

ATTACHMENT E – B99 SWEPT PATH ANALYSIS



99th Percentile Vehicle

(AS2890.1:2004)

Width	: 1.94m	Min. Turning Radius (wall to wall)	: 6.3m
Track	: 1.84m		
Lock to Lock Time	: 4.0 sec	Design Circulation Speed	: 10kmh
Steering Angle	: 37.2°	Design Manoeuvring Speed	: 5kmh

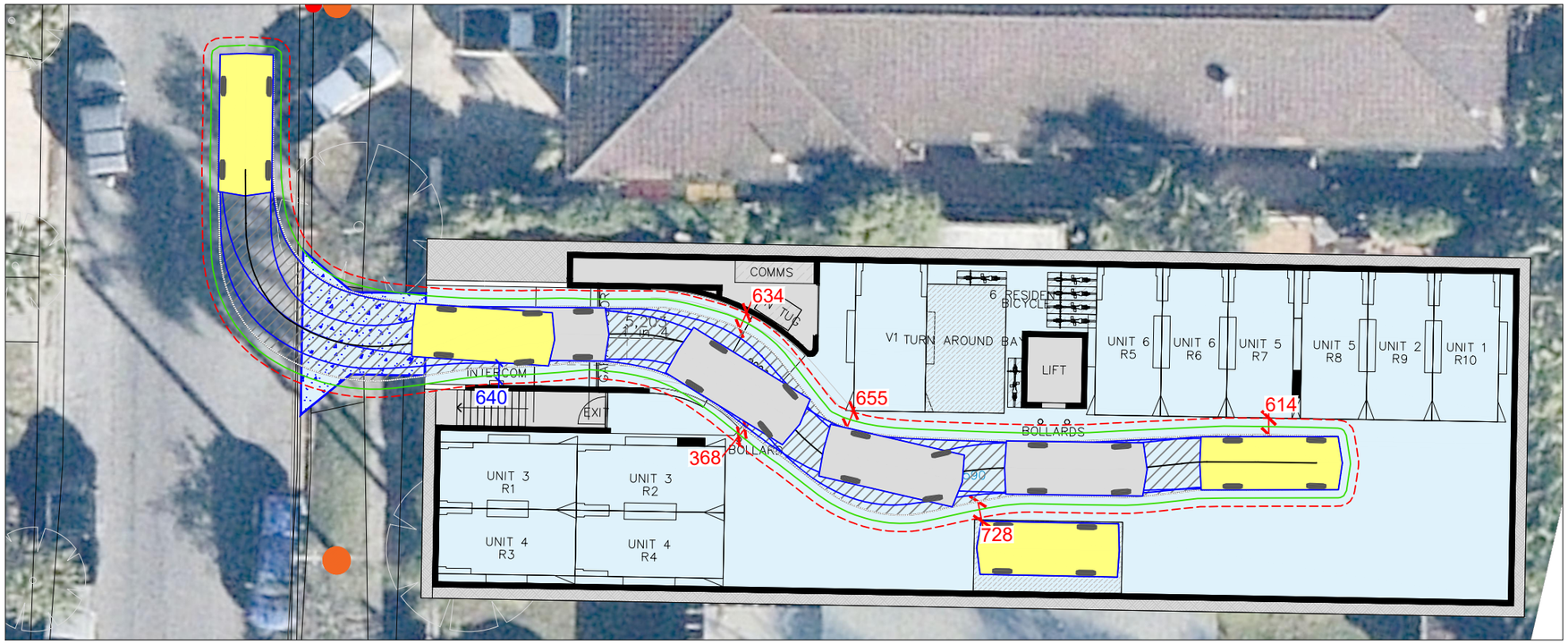
Vehicle body Clearance (300mm) :
Vehicle body Clearance (600mm) :
Vehicle body :
Vehicle wheel path :
Vehicle Swept Path Forward Envelope :
Vehicle Swept Path Reverse Envelope :

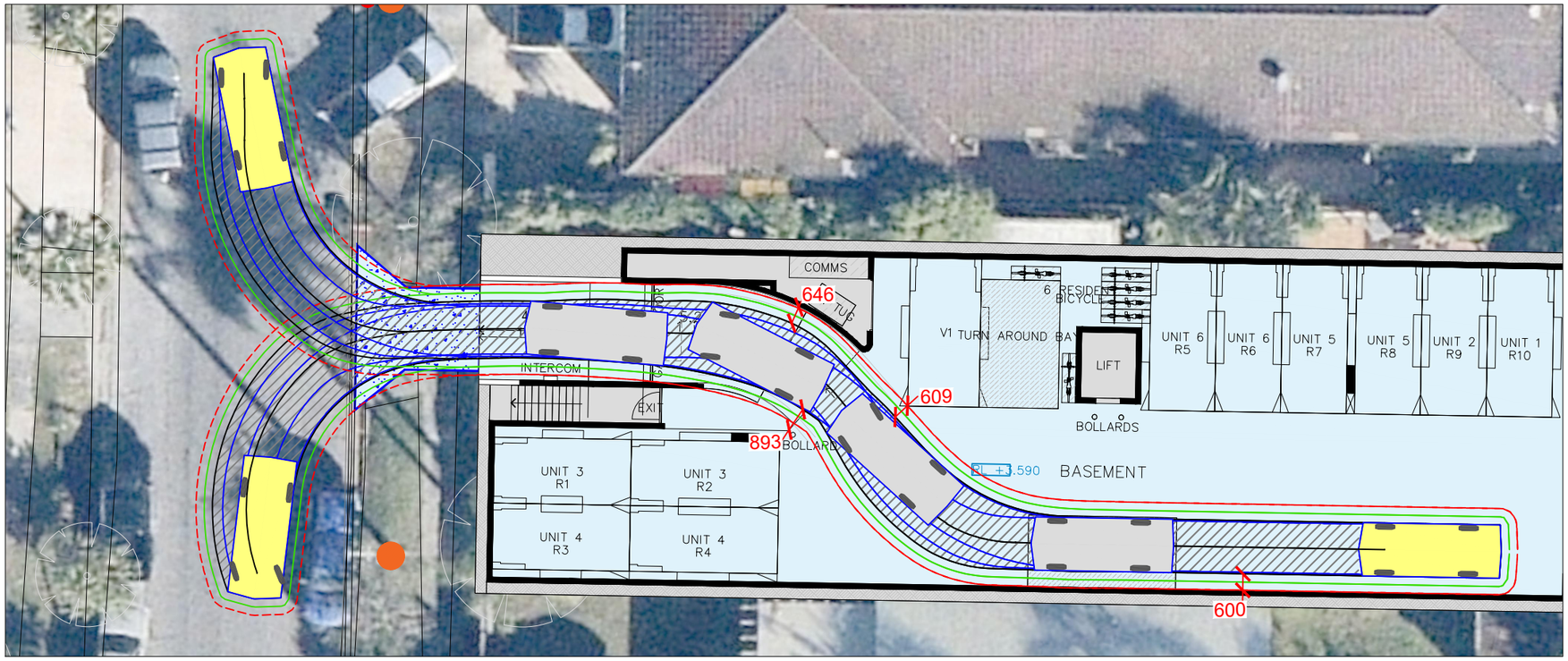
GENERAL NOTES (SWEPT PATH)

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ATTENTION: THIS DRAWING IS BEST VIEWED IN COLOR AND ON AN ELECTRONIC DEVICE.

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NORTHPOINT

DRAWING PREPARED FOR:

SCALE 0 2.5 5.0 7.5 10.0 1:200 (metres) ORIGINAL DRAWING SIZE A3

DRAWING TITLE
PROPOSED MULTIPLE DWELLING DEVELOPMENT
(B99 VEHICLE MANOEUVRING)

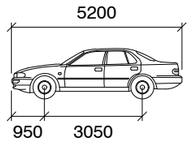
PROJECT NUMBER	DRAWING NUMBER	REVISION	LOCATION
25-011	05-1	B	37 ARTHUR ST, MERMAID BEACH

DESIGN ENGINEER CERTIFIED D. JANZEKOVIC SIGNED
DATE 3-25 RPEQ No. 27561
DRAWN BY J. GAVIN DATE 25-03-25

DRAWING LINK (HIGH-RES / CAD) 37 ARTHUR ST. MERMAID BEACH

REVISIONS		DRAWN BY	CHECKED	DATE
B	Review of modified plans	J. GAVIN	D. JANZEKOVIC	25-03-25
A	Original Issue			

CITY OF GOLDCOAST.



99th Percentile Vehicle

(AS2890.1:2004)

Width	: 1.94m	Min. Turning Radius (wall to wall)	: 6.3m
Track	: 1.84m		
Lock to Lock Time	: 4.0 sec	Design Circulation Speed	: 10kmh
Steering Angle	: 37.2°	Design Manoeuvring Speed	: 5kmh

Vehicle body Clearance (300mm) :
Vehicle body :
Vehicle wheel path :
Vehicle Swept Path Forward Envelope :
Vehicle Swept Path Reverse Envelope :

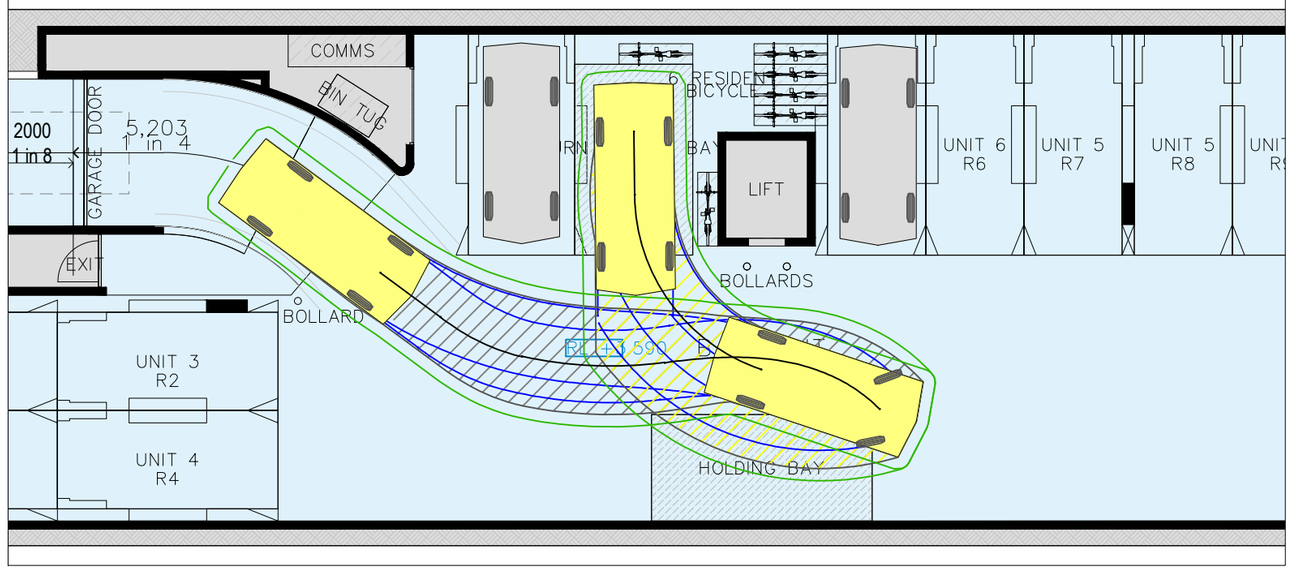
GENERAL NOTES (SWEPT PATH)

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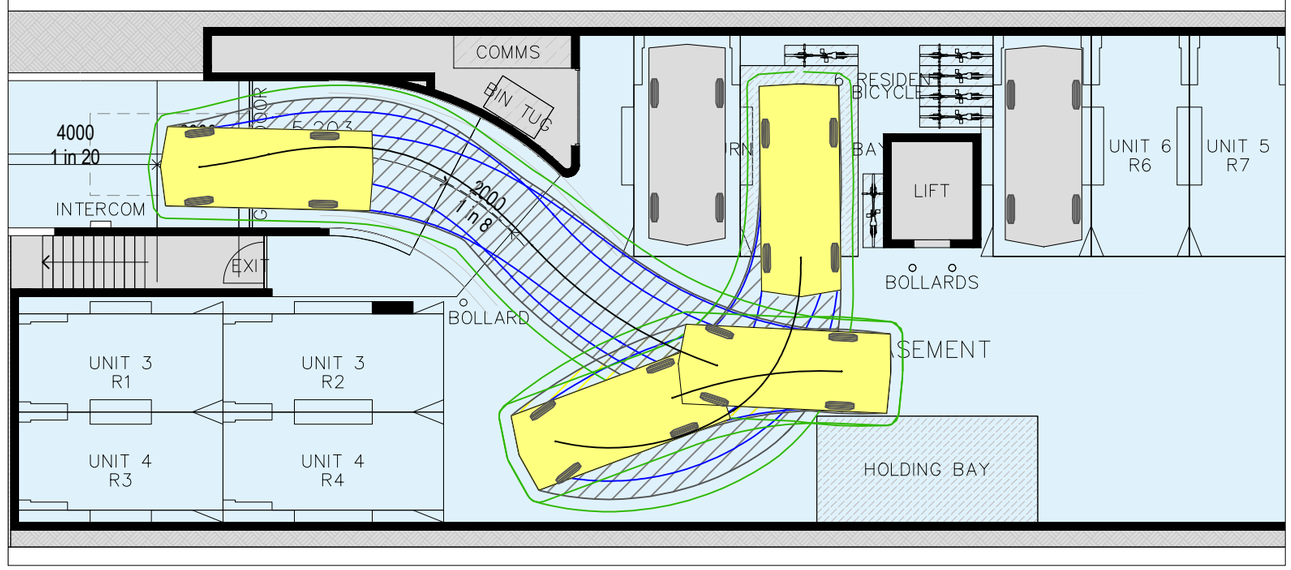
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INFORMATION
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ENTRY PATH



EXIT PATH



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NORTHPOINT

DRAWING PREPARED FOR:

SCALE 0 1.5 3.0 4.5 7.5 6.0 1:150 (metres) ORIGINAL DRAWING SIZE A3

DRAWING LINK (HIGH-RES / CAD) 37 ARTHUR ST, MERMAID BEACH

DRAWING TITLE
PROPOSED MULTIPLE DWELLING DEVELOPMENT
(B99 VEHICLE TURNING)

PROJECT NUMBER	DRAWING NUMBER	REVISION	LOCATION
25-011	04-3	B	37 ARTHUR ST, MERMAID BEACH

DESIGN ENGINEER CERTIFIED D. JANZEKOVIC SIGNED
DATE 3-25 RPEQ No. 27561
DRAWN BY J. GAVIN DATE 25-03-25

REVISIONS		DRAWN BY	CHECKED	DATE
B	Review of modified plans	J. GAVIN	D. JANZEKOVIC	25-03-25
A	Original Issue			

CITY OF GOLDCOAST.

END OF DOCUMENT
(25-011) v01 Rev. A

Section 4 - SPECIALIST REPORTS

Acoustic Report
Prepared by CRG Acoustics

Zone Planning Group

CRGACOUSTICS

Postal PO Box 441 Mermaid Beach Qld 4218
Telephone 07 5527 7333
Email jay@crg.net.au
CRG Acoustics Pty Ltd
ACN 151 847 255 ABN 11 708 556 182

Other Change to Development Approval
Residential Development
37 and 37A Arthur Street, Mermaid Beach
(Lot 23 on RP41194 and Lot 1 on RP85529)

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

Prepared For:

Cuecorp Property Group Pty Ltd

27 March 2025

crgref: 24024 report REV 2

1.0 INTRODUCTION

This report is in response to a request by Cuecorp Property Group Pty Ltd for an environmental noise impact assessment of an approved residential development along Arthur Street in Mermaid Beach.

Gold Coast City Council issued a Development Permit for a Material Change of Use for Multiple Dwellings over the subject site on 13th February 2025 (MCU/2024/478) which comprised four units, over three floor levels with basement carparking and rooftop recreation for Unit 4. The current proposal comprises 6 units over five floor levels with basement carparking and rooftop recreation for Unit 6.

In undertaking the above, noise monitoring was conducted and through modelling, predictions of onsite rooftop (Level 5) recreation activity noise emissions were produced. Based upon the predicted noise impact levels, recommendations regarding acoustic treatment to the development have been provided.

2.0 SITE & DEVELOPMENT DESCRIPTION

The subject site is described as 37 and 37A Arthur Street, Mermaid Beach (Lot 23 on RP41194 and Lot 1 on RP85529). The site is bounded by Arthur Street to the south and residential properties to the north, east and west. The subject site and surrounding properties are zoned *"Medium Density Residential"*. For site location refer to Appendix A.

The proposal is to construct a five level residential tower building constructed over a basement carpark level, yielding six apartments. Apartments are proposed from Ground Floor to Level 4, with outdoor recreation areas for Unit 6 at rooftop (Level 5). For development plans refer to Appendix B.

Onsite activities from the outdoor recreation areas for Unit 6 at rooftop have been assessed to determine likely acoustic treatments to ensure an acceptable level of acoustical amenity can be achieved at nearest offsite noise sensitive receivers which are as follows (for the location of the offsite receiver refer to Figure 2 in Appendix A):

R1: Single and two storey dwellings and units to the north along Tamborine Street.
R2: Single storey dwelling to the immediate east at 35 Arthur Street.
R3: Single and two storey dwellings and units to the south across Arthur Street.
R4: Two storey apartments to the immediate west at 41 Arthur Street.

3.0 AMBIENT NOISE SURVEY

3.1 Instrumentation and Measurement Methodology

The following equipment was used to record noise levels at the subject site locale:

- Rion NC 73 Calibrator; and
- Larson Davis 721 Soundexpert Sound Level Meter Logger.

All instrumentation used in this assessment hold current calibration certificate from a certified NATA calibration laboratory.

3.2 Unattended Measurement Methodology

A noise logger was positioned towards the southern end of the eastern boundary of the subject site. The microphone was in a free-field location, approximately 1.4m above ground. Refer to Figure 2 for the measurement location.

The logger was set to record noise statistics in 15 minute blocks continually between Thursday 14/11/2024 and Thursday 21/11/2024.

Noise measurements were conducted generally in accordance with Australian Standard AS1055 1997 *"Acoustics – Description & Measurement of Environmental Noise"*. The operation of the sound level equipment was field calibrated before and after the measurement session, with no significant drift from the reference signal recorded.

Daily weather observations were obtained from the Bureau of Meteorology Coolangatta weather station. Weather conditions during the assessed monitoring period were generally fine but overcast, except for 16mm of rain on Tuesday 19/11 and 10mm of rain on Wednesday 20/11, with a temperature range between approximately 17 and 30°C.

3.3 Unattended Measurement Results

Table 1 below presents the Rating Background Levels calculated from noise levels recorded at the logger measurement location. Determination of the RBL was undertaken in accordance with the methodology cited in the Queensland Environmental Protection Agency's document *"Planning for Noise Control"*. Data collected on Tuesday 19/11 and Wednesday 20/11 have been excluded from the results presented in Table 1 due to the occurrence of rain. Graphical presentation of the measured levels is presented in Appendix C.

Time Period	Rating Background Level dB(A)
7am to 6pm	42
6pm to 10pm	42
10pm to 7am	32

Table 1: Rating Background Levels at the logger measurement location.

The measured noise levels are typical of a built-up suburban environment, with the acoustical environment primarily comprised of road traffic noise from the local streets, and from the Gold Coast Highway.

4.0 NOISE CRITERION

Performance Outcome PO2 of the *"General Development Provisions Code"* states the following with respect to noise emissions:

Performance outcomes	Acceptable outcomes
Amenity protection	
PO2 The proposed development prevents loss of amenity and threats to health and safety, having regard to: (a) noise; (b) hours of operation; (c) traffic; (d) signage; (e) visual amenity; (f) wind effects; (g) privacy; (h) vibration; (i) contaminating substances; (j) hazardous chemicals; (k) odour and emissions; and (l) safety.	**AO2** No acceptable outcome provided.

As there is no defined criteria, we have applied the criteria defined in the Environmental Protection (Noise) Policy 2019.

Section 6 of the Environmental Protection (Noise) Policy 2019 provides the following framework for environmental values to be enhanced or protected:

> **6 Environmental values**
>
> The environmental values to be enhanced or protected under this policy are—
>
> (a) the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and
>
> (b) the qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following—
>
> (i) sleep;
>
> (ii) study or learn;
>
> (iii) be involved in recreation, including relaxation and conversation; and
>
> (c) the qualities of the acoustic environment that are conducive to protecting the amenity of the community.

Section 9 of the Environmental Protection (Noise) Policy 2019 provides the following framework for management intent for noise:

> **9 Management intent for noise**
>
> (1) This section states the management intent for an activity involving noise that affects, or may affect, an environmental value to be enhanced or protected under this policy.
>
> *Note—*
>
> See section 35 of the *Environmental Protection Regulation 2019*.
>
> (2) To the extent it is reasonable to do so, noise must be dealt with in a way that ensures—
>
> (a) the noise does not have any adverse effect, or potential adverse effect, on an environmental value under this policy; and
>
> (b) background creep in an area or place is prevented or minimised.
>
> (3) Despite subsection (2)(b), if the acoustic quality objectives for an area or place are not being achieved or maintained, the noise experienced in the area or place must, to the extent it is reasonable to do so, be dealt with in a way that progressively improves the acoustic environment of the area or place.
>
> (4) In this section—
>
> ***background creep***, for noise in an area or place, means a gradual increase in the total amount of background noise in the area or place as measured under the document called the 'Noise measurement manual' published on the department's website.

Schedule 1 of the Environmental Protection (Noise) Policy 2019 provides the following specific *"Acoustic Quality Objectives"* to ensure that the above is achieved:

Column 1	Column 2	Column 3			Column 4
Sensitive receptor	**Time of day**	**Acoustic quality objectives (measured at the receptor) *dB(A)***			**Environmental value**
		$L_{Aeq,adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$	
residence (for outdoors)	daytime and evening	50	55	65	health and wellbeing
residence (for indoors)	daytime and evening	35	40	45	health and wellbeing
	night-time	30	35	40	health and wellbeing, in relation to the ability to sleep

Table 2: Criterion from Schedule 1 of the Environmental Protection (Noise) Policy 2019.

It is noted that the EPP Noise 2019 provides no numeric criteria for control of background creep. For this reason, we have applied the previous criteria applied under the EPP Noise 2008, as follows.

Based upon the measured rating background levels (RBLs), the *"Background Creep"* criterion (as previously defined under the Environmental Protection (Noise) Policy 2008) equates to the following levels at the nearest offsite receivers:

Time Varying Noise Source	**Noise Limit, SPL dB(A) L_{eq}**
Daytime 7am to 6pm	47 (RBL level 42 + 5 dB)
Evening 6pm to 10pm	47 (RBL level 42 + 5 dB)
Night-time 10pm to 7am	37 (RBL level 32 + 5 dB)
Continuous Noise Source	**Noise Limit, SPL dB(A) L_{90}**
Daytime 7am to 6pm	42 (RBL level 42 + 0 dB)
Evening 6pm to 10pm	42 (RBL level 42 + 0 dB)
Night-time 10pm to 7am	32 (RBL level 32 + 0 dB)

Table 3: Noise limit criterion for *"Background Creep"*.

5.0 RESULTS & CALCULATIONS

All noise source levels used in the assessment have been collected from similar assessments. All noise levels assessed under the *"Acoustic Quality Objectives"* criterion have been corrected for impulsiveness or tonality as per Australian Standard AS 1055 *"Acoustics-Description and measurement of environmental noise*".

The following noise source levels would typically occur at the rooftop recreation areas and have been assessed within this report.

Activity/Noise Source	**Distance To Source**	**Event Duration Noise Level, SPL dB(A)**		
		L_{eq}	**L_{10}**	**L_{01}**
10 residents' active recreation at Unit 6 rooftop (based on Hayne et al)	1m	71	74	80

***** Denotes + 5 dB correction for impulsiveness in accordance with AS1055. ****** Denotes + 5 dB correction for tonality in accordance with AS1055.

Table 4: Typical noise source levels associated with the rooftop recreation areas.

With regards to the $L_{A10\ 1hr}$ and $L_{A01\ 1hr}$ levels, in many cases, particularly during the night-time period, noise events such as car door closures may not register as L_{A10} or L_{A01} levels if the events do not occur for 10% or 1% of the time period respectively. For example, a 1 second event would have to occur 360 times during a one hour period to register as an L_{A10}, and 36 times during a one hour period to register as an L_{A01} as these noise descriptors are statistically defined. If the events do not occur for the minimum number of iterations (or time period) we have presented the results as "N/A" in Table 5.

It is noted that for the L_{Aeq} levels, we have presented both the adjusted 10 minute duration and the adjusted one hour duration. For assessment of the *"Background Creep"* criterion we have adopted the $L_{Aeq\ 10\ minute}$ duration levels. It is noted that the Environmental (Noise) Policy 2019 differs from the previous version in that the numeric definition, the "Background +" criteria has been removed, but requires to the extent that it is reasonable to do so, that background creep is prevented or minimised. We have maintained application of the Background + criteria as at this stage as there are no known precedents to assess against the concept of a "reasonable extent". As the Noise Measurement Manual states background noise is measured for a minimum time of 10 minutes (re: Page 31, Checklist point 6iii), we have assessed background creep to a 10 minute period.

Based upon the proposed onsite activities in relation to the surrounding offsite noise sensitive receivers (building façade and inside rooms with windows open for dwellings), we predict the following noise impact levels as presented in Table 5.

The predicted levels assume that the recommended treatments detailed in Section 6 are incorporated into the development. For point source calculations refer to Appendix C.

Fluctuating Noise Source	Predicted Noise Impact, SPL dB(A)						
	Nearest Façade				Inside Windows Open		
	$L_{eq\ 15min}$	$L_{eq\ 1hr}$	$L_{10\ 1hr}$	$L_{01\ 1hr}$	$L_{eq\ 1hr}$	$L_{10\ 1hr}$	$L_{01\ 1hr}$
R1: Single and two storey dwellings and units to the north along Tamborine Street							
Residents' recreation at Unit 6 rooftop	35	35	38	44	28	31	37
R2: Single storey dwelling to the immediate east at 35 Arthur Street							
Residents' recreation at Unit 6 rooftop	36	36	39	45	28	31	37
R3: Single and two storey dwellings and units to the south along Arthur Street							
Residents' recreation at Unit 6 rooftop	32	32	35	41	24	27	33
R4: Two storey apartments to the immediate west at 41 Arthur Street							
Residents' recreation at Unit 6 rooftop	37	37	40	46	30	33	39
Applicable Criterion	**B. Creep**	**Acoustic Quality Objectives**					
7am to 10pm Criterion **10pm to 7am Criterion**	**47 / 47** **37**	**50**	**55**	**65**	**35** **30**	**40** **35**	**45** **40**

Table 5: Predicted onsite activity short duration noise impacts at nearest receivers.

Continuous activity noise source levels have been compiled from similar previous investigations. All noise levels have been corrected for impulsiveness or tonality as per Australian Standard AS 1055 *"Acoustics-Description and measurement of environmental noise*".

It should be stressed that mechanical plant selections have yet to be undertaken, for this reason we have applied noise levels from other similar sites as follows:

- Pool plant assumed inside services / pump room (assumed at 65 dB(A) at 1m).

Based upon the assumed locations of the onsite mechanical plant in in relation to the noise sensitive receivers (building façades and inside rooms with windows open), we predict the following noise impact levels as presented in Table 6.

The predicted levels assume that the recommended treatments detailed in Section 6 are incorporated into the development. For point source calculations refer to Appendix C.

Continuous Noise Source	Predicted Noise Impact, SPL L_{eq} dB(A)	
	Nearest Façade	Inside Windows Open
R1: Single and two storey dwellings and units to the north along Tamborine Street		
Pool pump inside services / pump room	19	< 15
R2: Single storey dwelling to the immediate east at 35 Arthur Street		
Pool pump inside services / pump room	24	17
R3: Single and two storey dwellings and units to the south along Arthur Street		
Pool pump inside services / pump room	23	15
R4: Two storey apartments to the immediate west at 41 Arthur Street		
Pool pump inside services / pump room	24	17
7am to 10pm Criterion **10pm to 7am Criterion**	**42 / 42** **32**	**35** **30**

Table 6: Predicted onsite pool pump noise impact levels at offsite noise sensitive receivers.

6.0 RECOMMENDED ACOUSTIC TREATMENTS

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

- Construction of the solid acoustic balustrades as detailed in Sketch 1 in Appendix A. Solid balustrades are to be free of gaps or holes except for minimum drainage holes as per BCA requirements) above the rooftop (Level 5) finished floor level. Typical materials include 9mm FC sheet, toughened glass, Perspex, masonry, blockwork, or a combination of the above (a minimum surface mass of 11kg/m2 is required).

- Floor impact isolation to the rooftop (Level 5) recreation areas / apartments below should be considered in the design, to ensure that noise annoyance in apartments is not caused by people with hard sole shoes walking across the communal recreation area. This is a note only and should not be considered part of a Development Permit Condition, as it is not part of an environmental noise assessment, as this falls under the requirements of the Building Code of Australia.

- Vibration / shock wave noise from the use of rooftop (Level 5) pool be deigned to meet the requirements of the Building Code of Australia. This is a note only and should not be considered part of a Development Permit Condition, as it is not part of an environmental noise assessment, as this falls under the requirements of the Building Code of Australia.

- Mechanical plant (pool pump) be designed and installed to comply with the noise criterion presented in Section 4. As final plant selection and plant locations has not been completed, additional acoustic assessment/s should be undertaken once plant selections and locations are finalised. Such assessments should be undertaken prior to Building Approval; and be conditioned within the Development Approval.

7.0 DISCUSSION and CONCLUSIONS

This report is in response to a request by Cuecorp Property Group Pty Ltd for an environmental noise impact assessment of an approved residential development along Arthur Street in Mermaid Beach.

Gold Coast City Council issued a Development Permit for a Material Change of Use for Multiple Dwellings over the subject site on 13th February 2025 (MCU/2024/478) which comprised four units, over three floor levels with basement carparking and rooftop recreation for Unit 4. The current proposal comprises 6 units over five floor levels with basement carparking and rooftop recreation for Unit 6.

In undertaking the above, noise monitoring was conducted and through modelling, predictions of onsite rooftop (Level 5) recreation activity noise emissions were produced. Based upon the assumed source levels and acoustic treatments, onsite activity noise emissions are predicted to impact the nearest offsite noise sensitive receivers within the *"Background Creep"* and *"Acoustic Quality Objectives"* criterion for all assessment time periods.

Floor impact isolation treatment should be applied to the rooftop (Level 5) / apartments below to ensure that noise intrusion is not unreasonable inside the apartments below. Vibration / shock wave noise from the use of rooftop (Level 5) pool be designed to meet the requirements of the Building Code of Australia. This is a note only and should not be considered part of a Development Permit Condition, as it is not part of an environmental noise assessment, as this falls under the requirements of the Building Code of Australia.

We have also provided an indication of potential noise impacts and possible acoustic treatments for onsite mechanical plant (i.e. pool pump); although the levels are merely a guide as no plant selections or plant locations have yet been completed. For this reason, more detailed assessment/s should be conducted upon determination and location of plant. Such assessments should be undertaken prior to Building Approval; and be conditioned within the Development Approval.

Overall, the proposed development will generally be within acceptable levels of the adopted criterion, subject to the acoustic treatments recommended in Section 6 being integrated into the design, construction, and operation of the development.

Report Reviewed By:



JAY CARTER BSc
Director

Report Compiled by:



Matthew Lopez BEng
Consultant

APPENDIX A

Subject Site Location, Monitoring Location, Offsite Receivers and Acoustic Treatment Sketch

Figure No. 1: Subject Site Location (Google Maps).

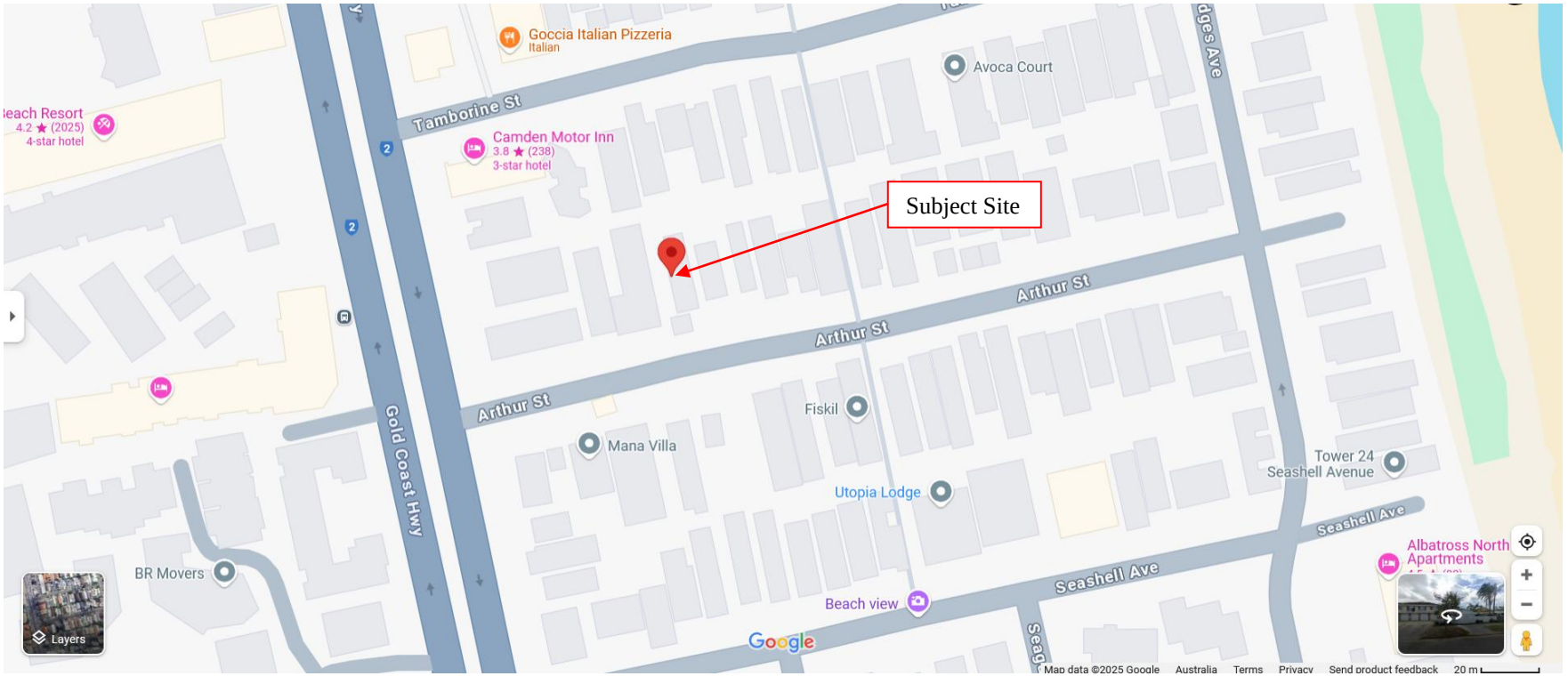
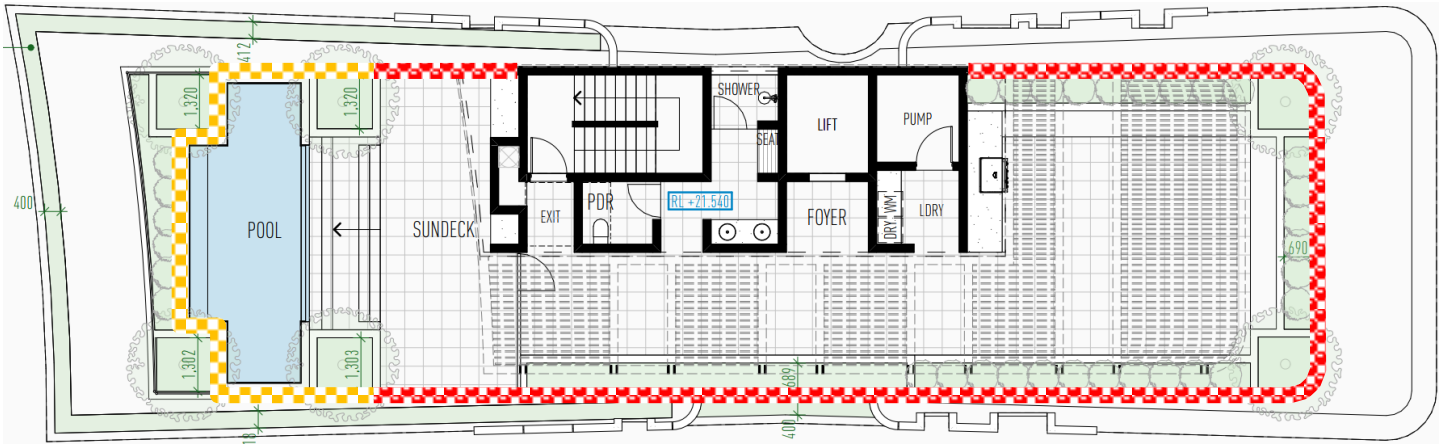


Figure No. 2: Subject Site, Monitoring Locations and Offsite Noise Sensitive Receivers (QLD Globe).



Sketch No.1: Rooftop Layout and Recommended Acoustic Treatments (Not to Scale).



ACOUSTIC TREATMENT LEGEND

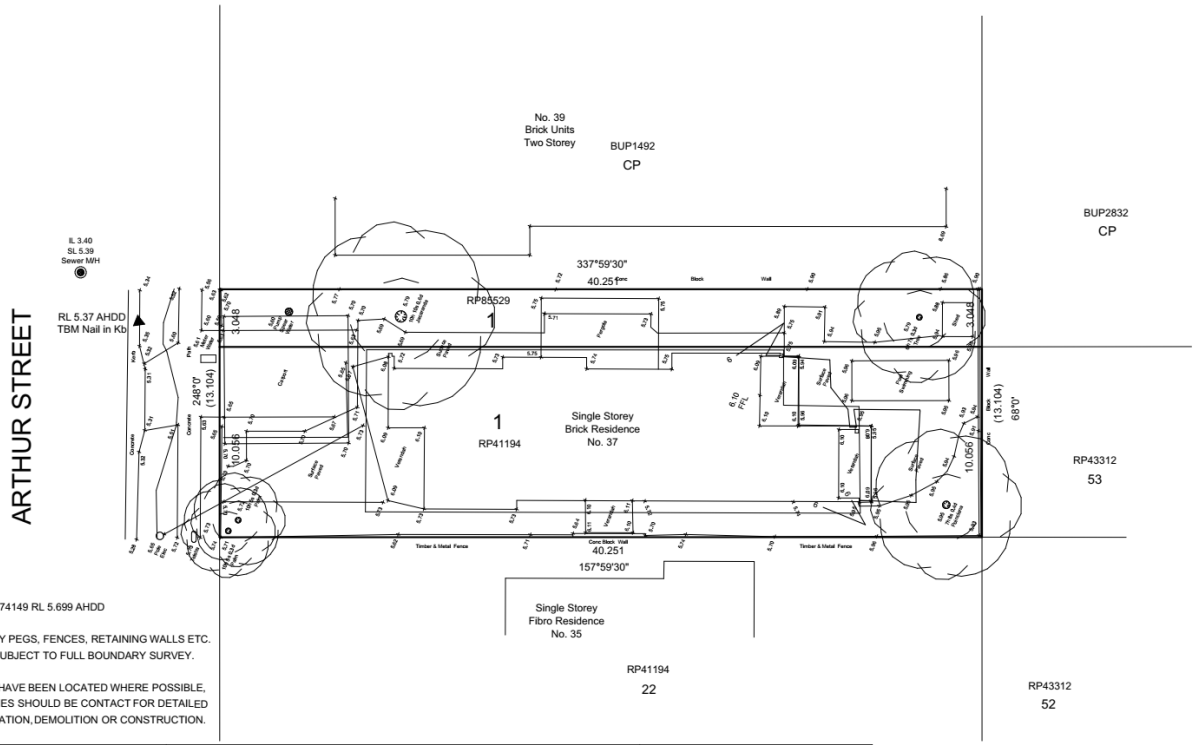
Recommended 1.2m high solid balustrade above the rooftop (Level 5) finished floor level

Recommended 1.7m high solid balustrade above the rooftop (Level 5) finished floor level

Solid balustrades are to be free of gaps or holes except for minimum drainage holes as per BCA requirements). Typical materials include 9mm FC sheet, toughened glass, Perspex, masonry, blockwork, or a combination of the above (a minimum surface mass of 11kg/m2 is required).

APPENDIX B

Development Plans



NOTES

DATUM - AHD DERIVED FROM PM74149 RL 5.699 AHDD

SHOWN LOCATION OF BOUNDARY PEGS, FENCES, RETAINING WALLS ETC. ARE DIAGRAMMATIC ONLY AND SUBJECT TO FULL BOUNDARY SURVEY.

ALL SERVICES SHOWN HEREON HAVE BEEN LOCATED WHERE POSSIBLE, HOWEVER RELEVANT AUTHORITIES SHOULD BE CONTACT FOR DETAILED LOCATION PRIOR TO ANY EXCAVATION, DEMOLITION OR CONSTRUCTION.

BOYD & MOORE PTY LTD
ACN 109 294 260
SURVEYORS

24 GALAPAGOS WAY,
PACIFIC PINES QLD 4211

Correspondence to:
PO BOX 3060
NERANG MDC QLD 4211

Ph/Fax: (07) 55804205

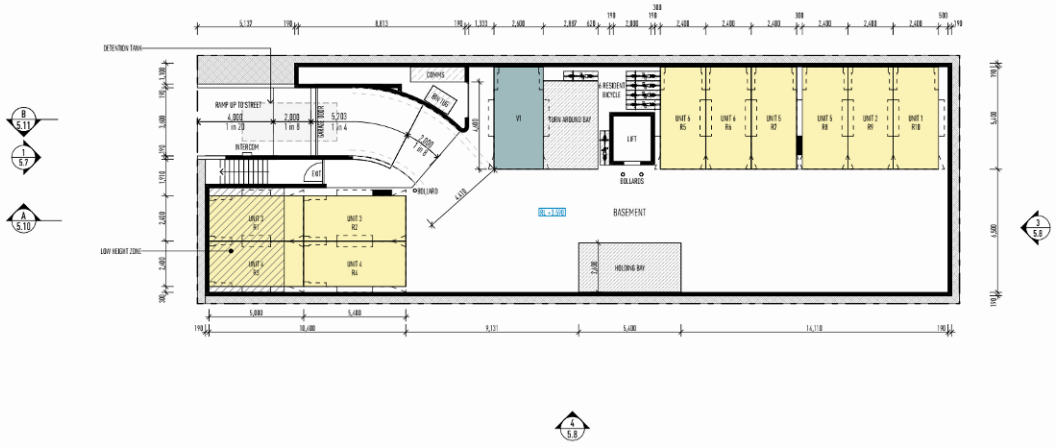
Email: boydsurv@bigpond.net.au

DETAIL SURVEY OVER
LOT 23 ON RP41194 &
LOT 1 ON RP85529
37 ARTHUR STREET,
MERMAID BEACH

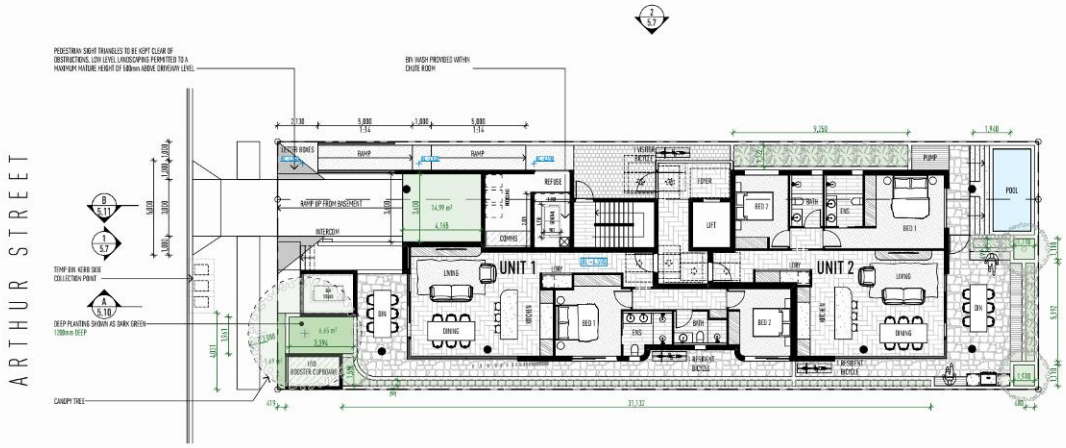
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Date:	15/12/2008
Drawn: MJB	REF : 638-1-A3

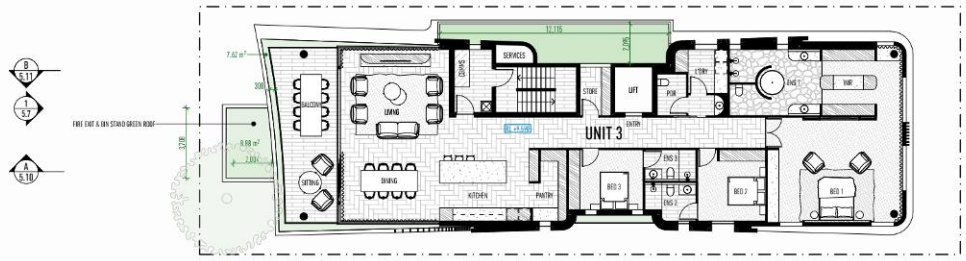
Floor Plan - Basement Level



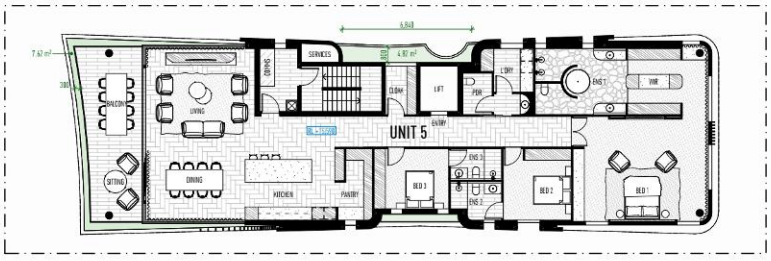
Floor Plan - Ground Level



Floor Plan - Level 1



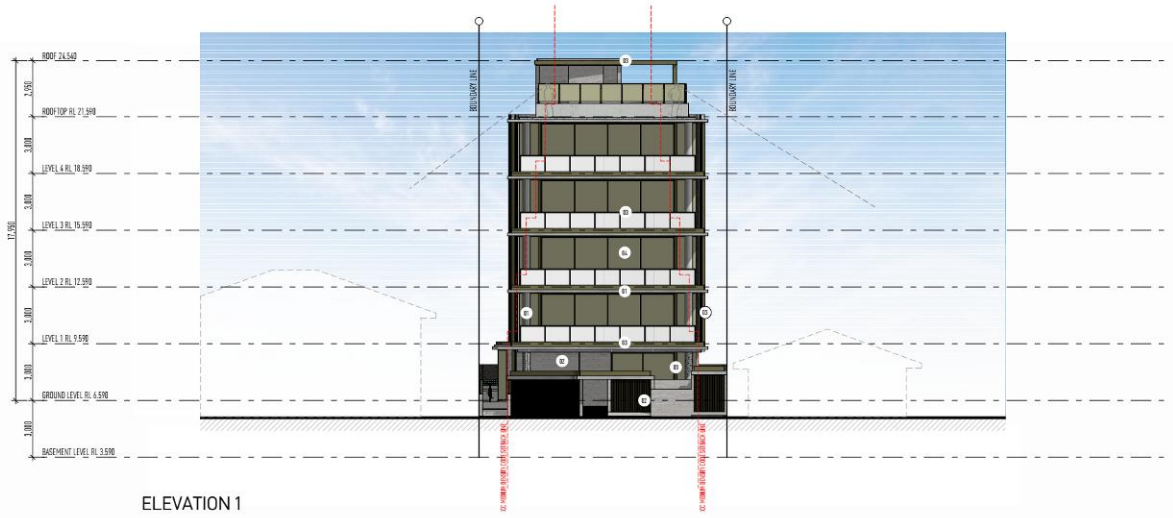

UNIT 4
LIVING
BALCONY
SITTING
DINING
KITCHEN
PANTRY
SERVICES
LIFT
ENTRY
LOBBY
BED 1
BED 2
BED 3
ENS 1
ENS 2
ENS 3
WIR


UNIT 5
LIVING
BALCONY
SITTING
DINING
KITCHEN
PANTRY
SERVICES
LIFT
ENTRY
LOBBY
BED 1
BED 2
BED 3
ENS 1
ENS 2
ENS 3
WIR

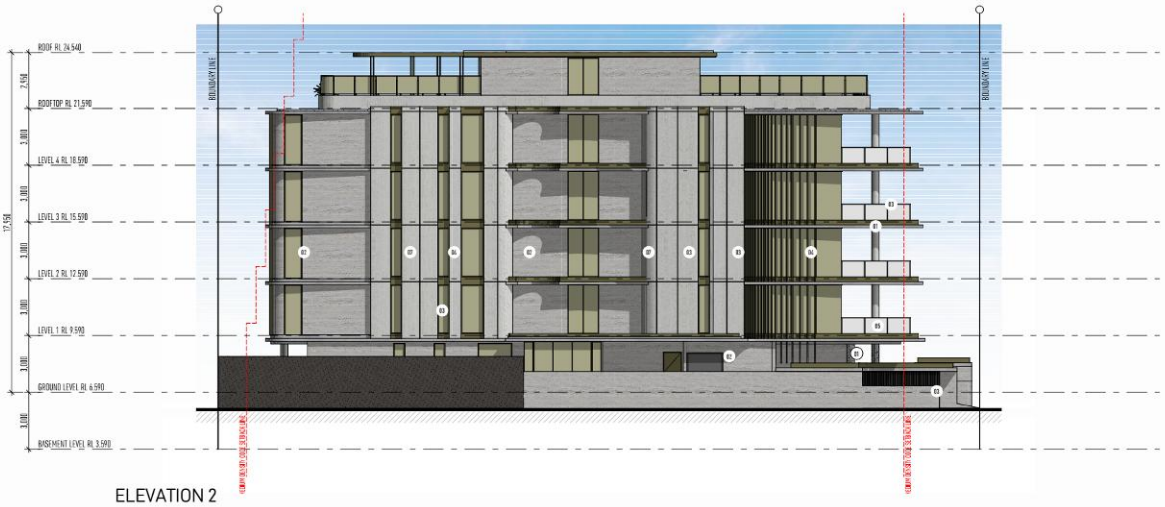

UNIT 6
BALCONY
LIVING
SITTING
DINING
KITCHEN
PANTRY
SERVICES
LIFT
PDR
ENTRY
BED 3
ENS 2
ENS 1
BED 2
BED 1
ENS
WIR
LAUNDRY


POOL
SUNDECK
LIFT
PUMP
FOYER
PDR
SHOWER
LIFT
LIFT

Elevations 1 & 2



ELEVATION 1

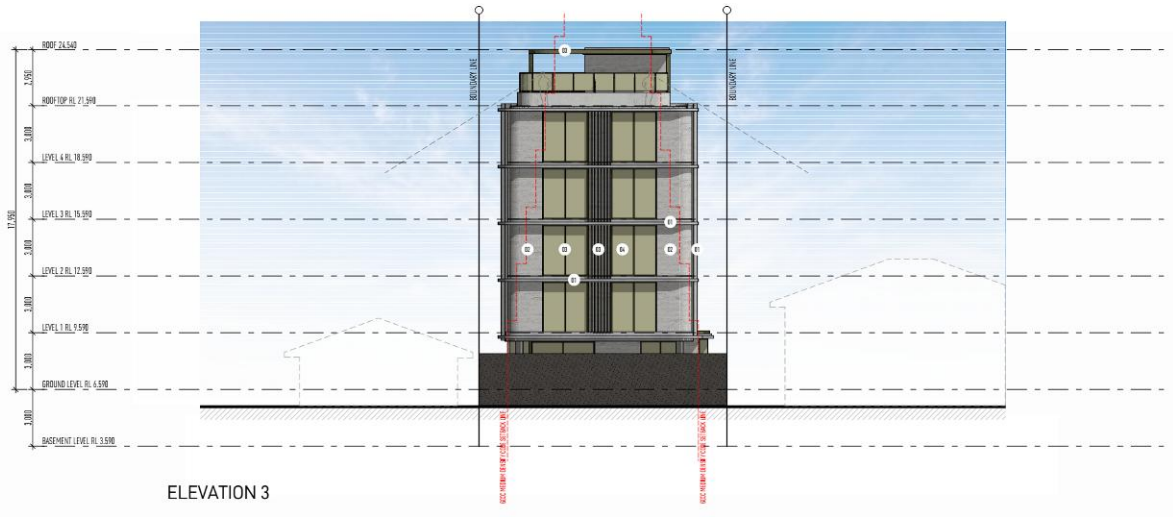


ELEVATION 2

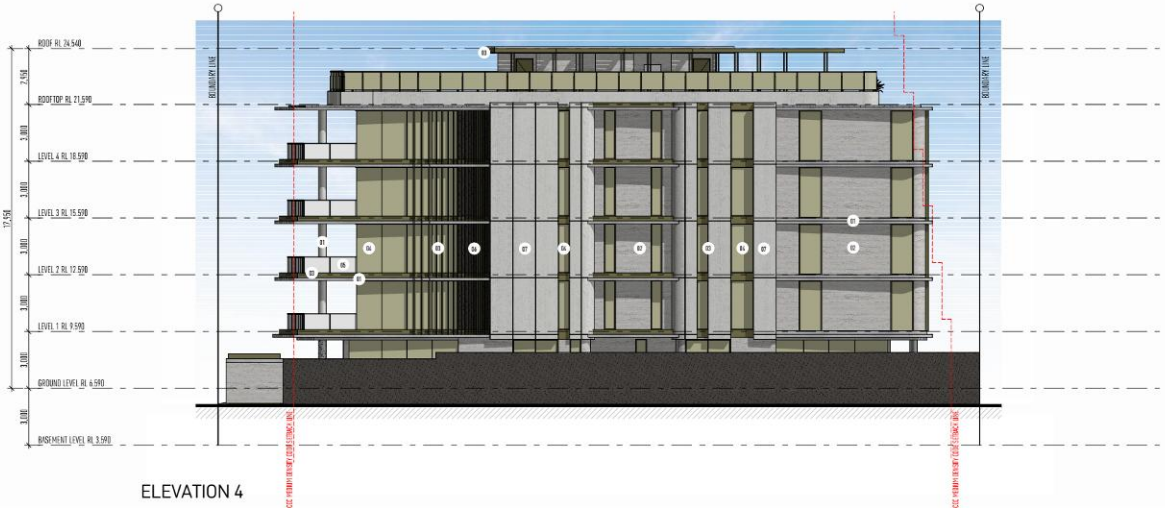
LEGEND

01. CONCRETE, OFF-FORM, CLASS 1
02. STONE, TRAVERTINE, "WHITE"
03. WINDOW & DOOR FRAMES, BATTEN SCREENS, BALUSTRADE TOP RAIL, OUTSIDE EDGE PLANTERS. POWDER COATED "NATURAL BRONZE"
04. GLASS, TINTED, "BRONZE"
05. GLASS BALUSTRADE "CLEAR"
06. RENDER, SELECT TEXTURE FINISH, DULUX "KADE'S CABIN"
07. RENDER, SELECT TEXTURE FINISH, "WHITE"

Elevations 3 & 4



ELEVATION 3

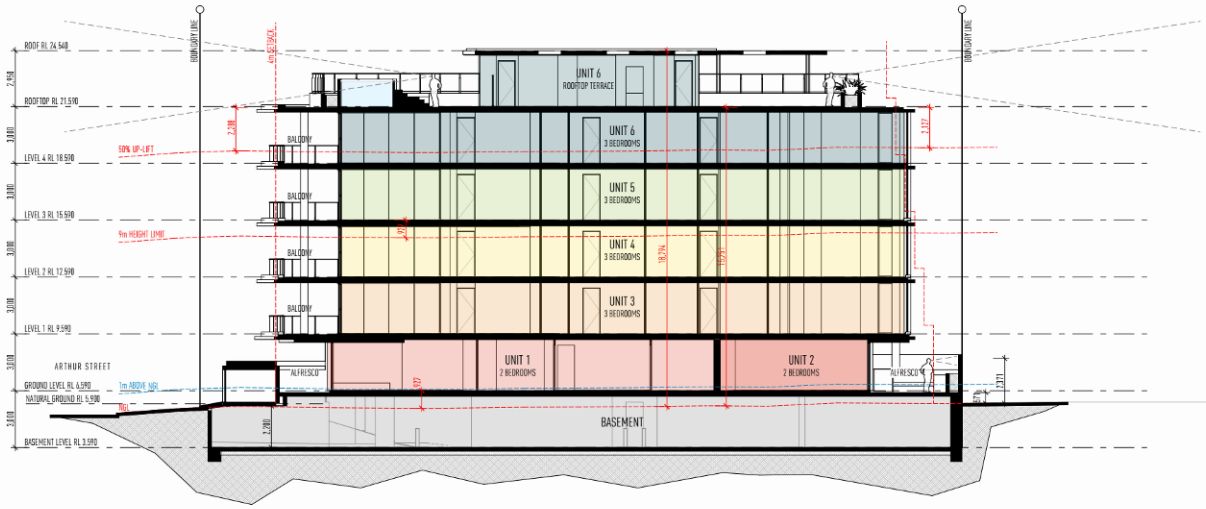


ELEVATION 4

LEGEND

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03. WINDOW & DOOR FRAMES, BATTEN SCREENS, BALUSTRADE TOP RAIL, OUTSIDE EDGE PLANTERS. POWDER COATED "NATURAL BRONZE"
04. GLASS, TINTED, "BRONZE"
05. GLASS BALUSTRADE "CLEAR"
06. RENDER, SELECT TEXTURE FINISH, DULUX "KADE'S CABIN"
07. RENDER, SELECT TEXTURE FINISH, "WHITE"

Section A



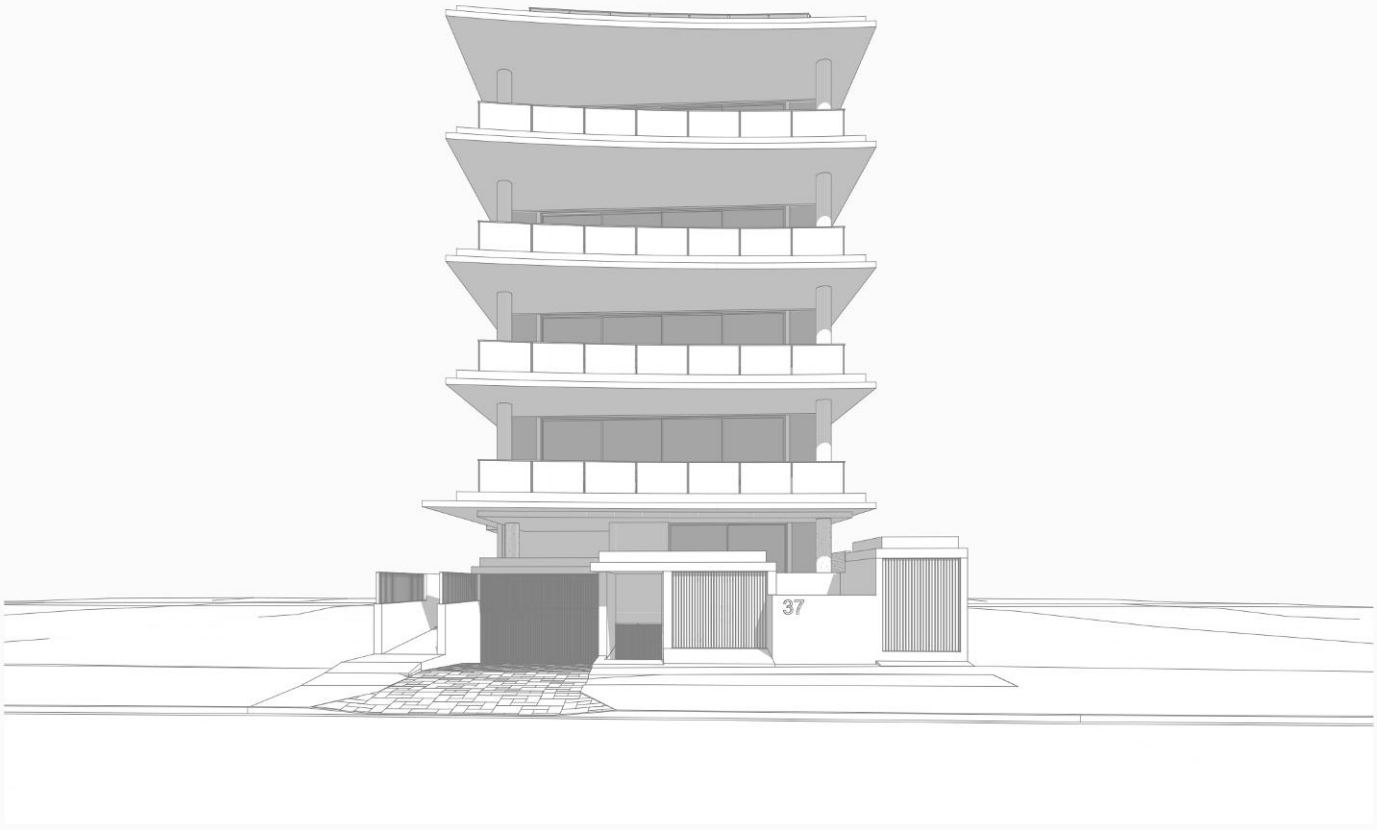
Section B



Perspective 1



Perspective 2



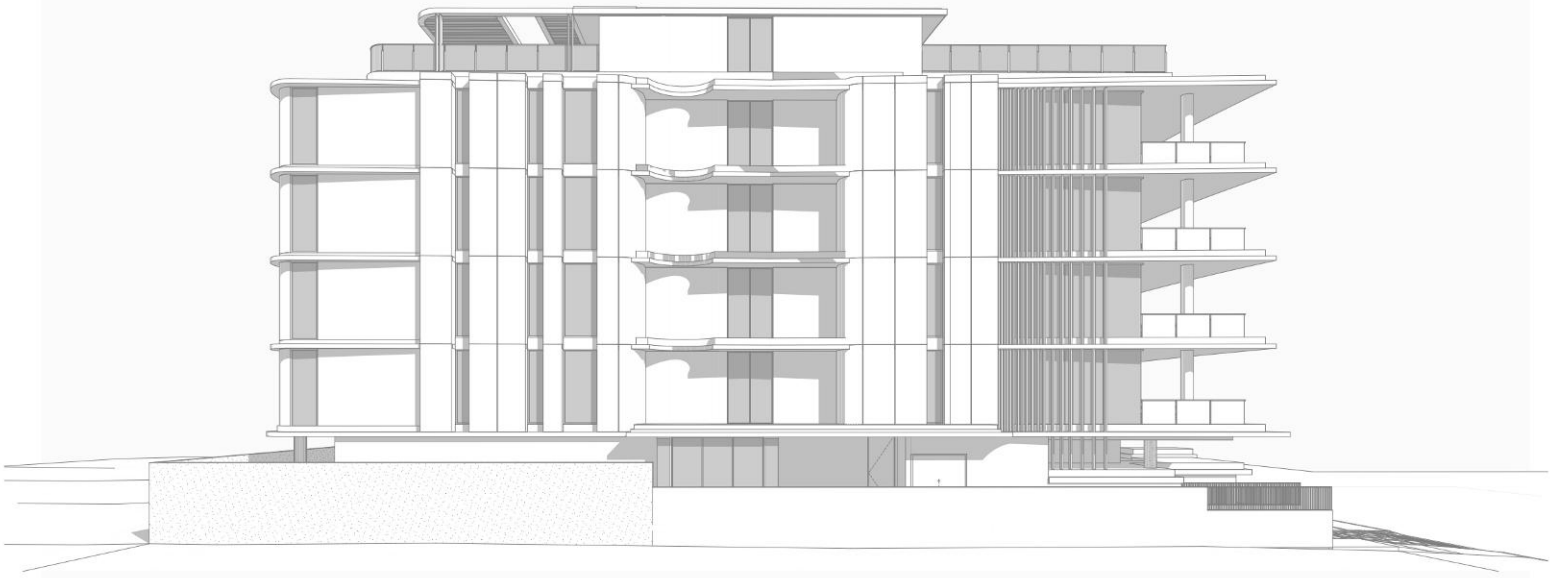
Perspective 3



Perspective 4



Perspective 5



Perspective 6



Colours & Materials







CONCRETE
OFF FORM
CLASS 1



STONE
TRAVERTINE
WHITE



- FEATURE SCREEN BATTENS
- DOOR & WINDOW FRAMES
- BALUSTRADE TOP RAIL
- OUTSIDE EDGE OF PLANTER
POWDER COATED
NATURAL BRONZE (OR SIMILAR)



GLASS
TINTED
BRONZE



GLASS BALUSTRADE
CLEAR



RENDER
SELECTED TEXTURE COATED FINISH
DULUX KADE'S CABIN (OR SIMILAR)



RENDER
SELECTED TEXTURE COATED FINISH
WHITE



STONE
TRAVERTINE
WHITE

Artistic Visualisation 1



Artistic Visualisation 2



Artistic Visualisation 3



Artistic Visualisation 4



Artistic Visualisation 5



Artistic Visualisation 6

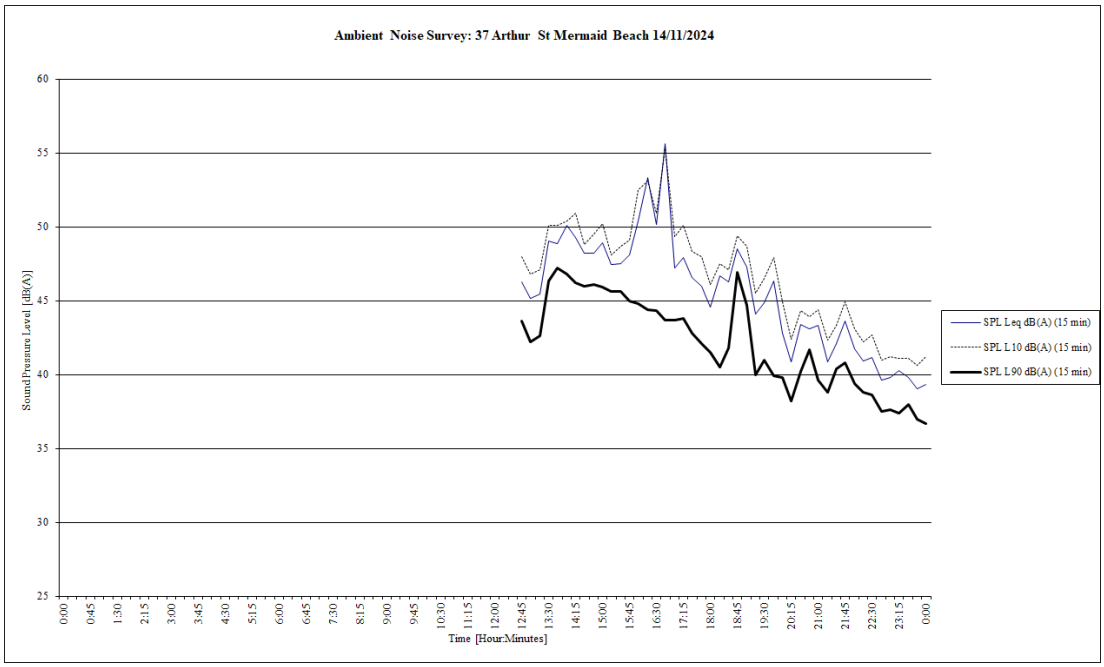


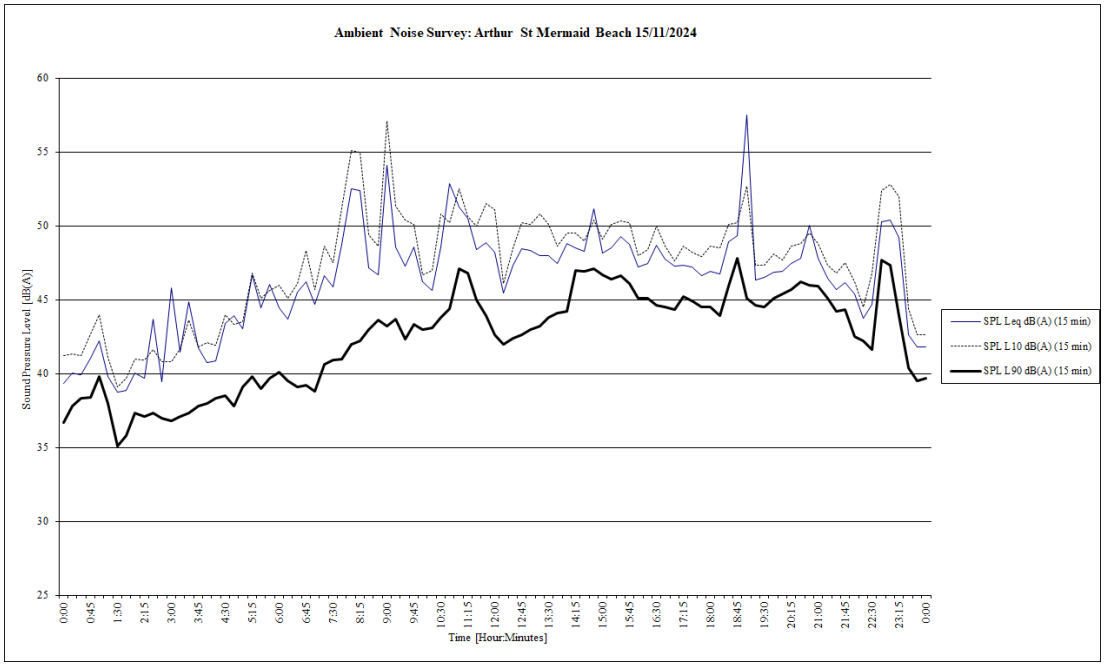
Artistic Visualisation 7

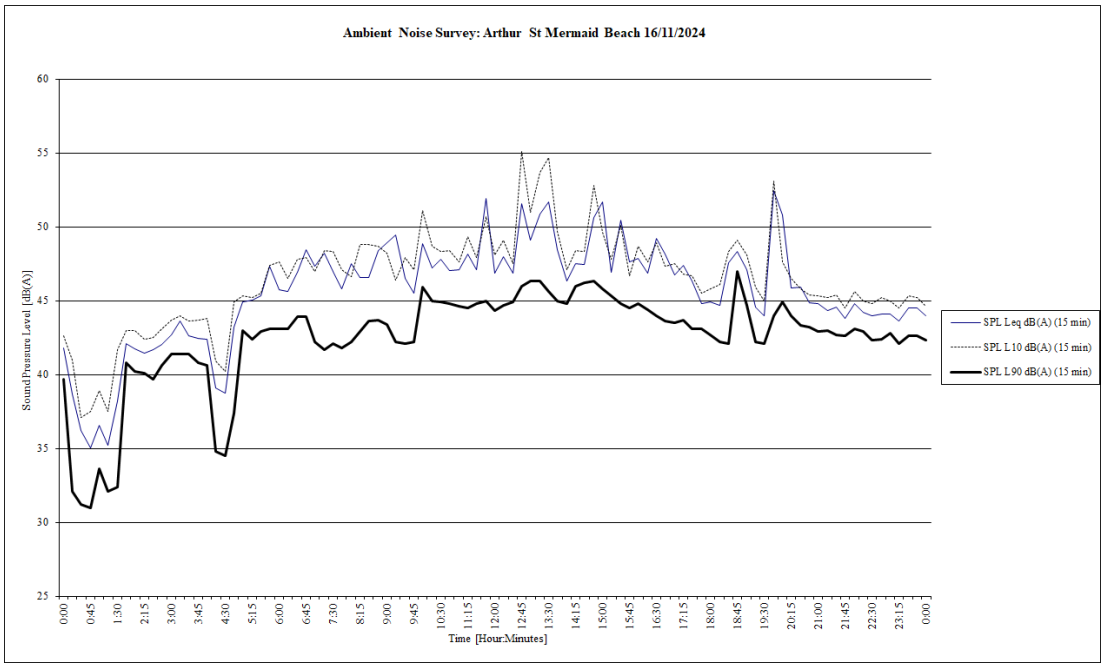


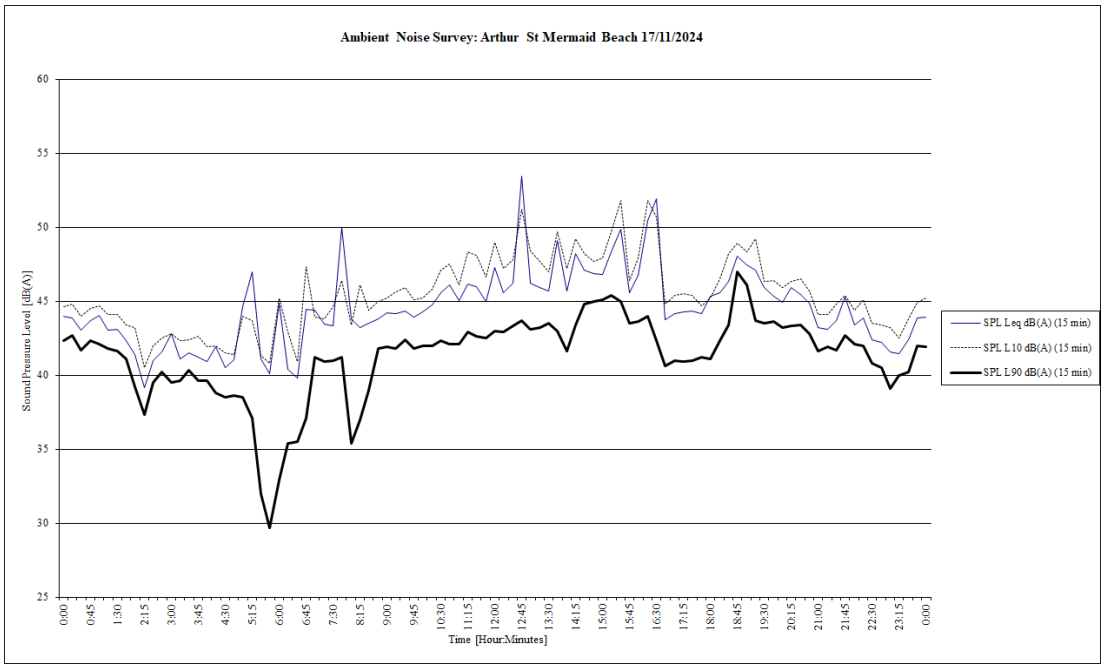
APPENDIX C

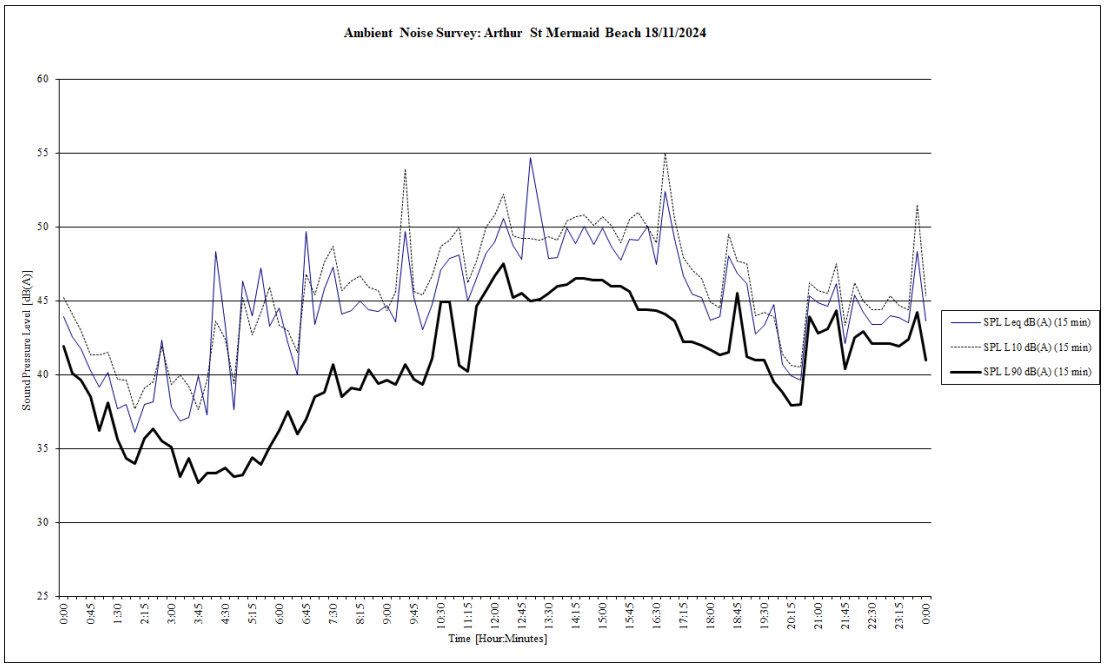
Measurement Results and Model Calculations / Predictions

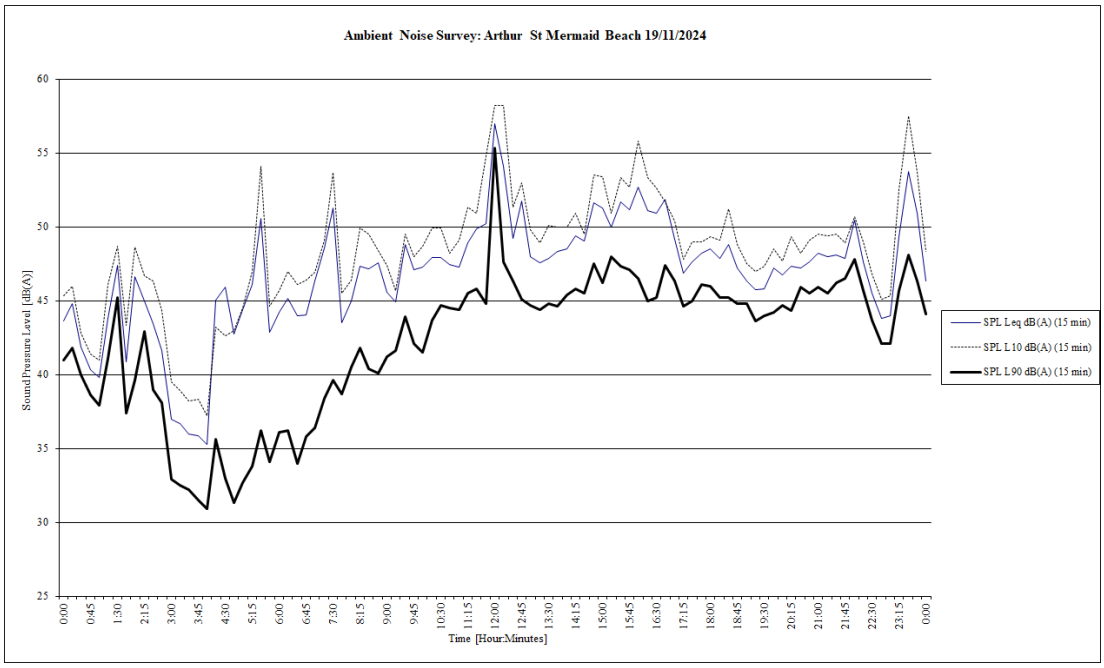

Ambient Noise Survey: 37 Arthur St Mermaid Beach 14/11/2024
Sound Pressure Level [dB(A)]
60
55
50
45
40
35
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25
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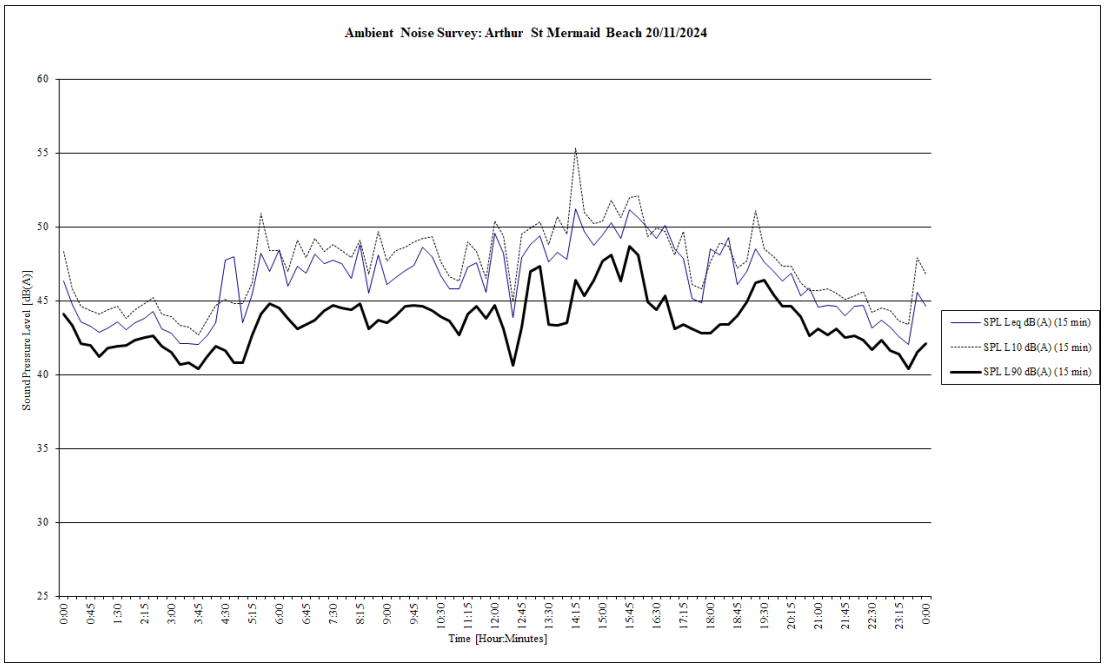

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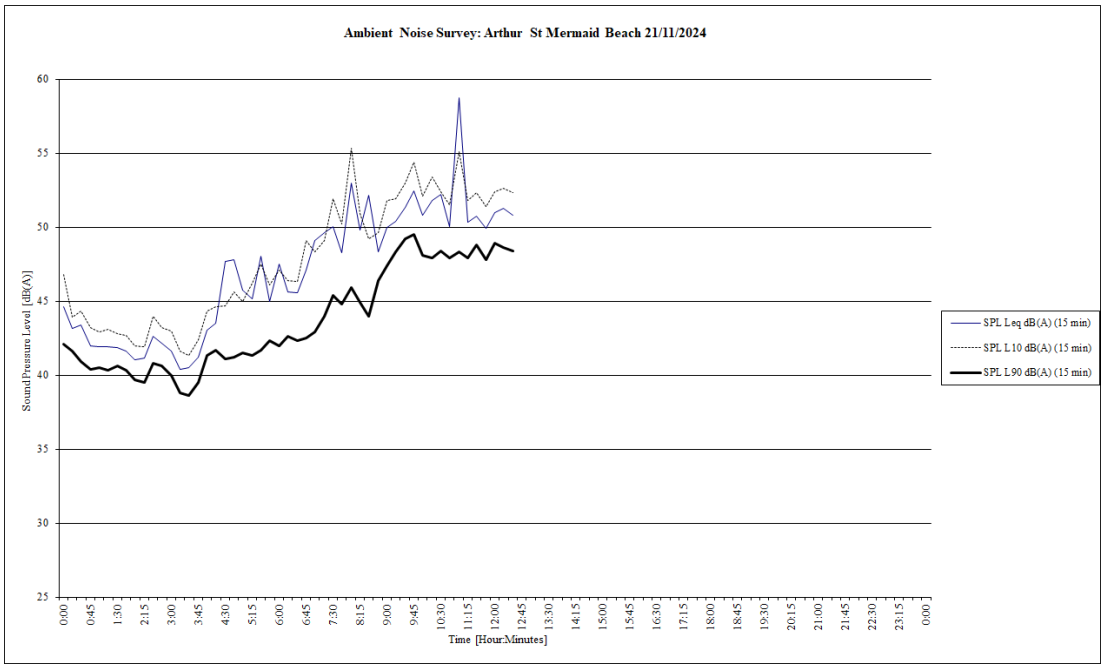

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Ambient Noise Survey: Arthur St Mermaid Beach 20/11/2024
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Ambient Noise Survey: Arthur St Mermaid Beach 21/11/2024
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Time [Hour:Minutes]
SPL Leq dB(A) (15 min)
SPL L10 dB(A) (15 min)
SPL L90 dB(A) (15 min)

ONSITE ACTIVITY NOISE PREDICTION CALCULATIONS: ($L_{A10\ 1hr}$ and $L_{A01\ 1hr\ levels}$ are represented as N/A if the duration of events do not occur for 10% or 1% of the 1 hour period)

R1: Single and two storey dwellings and units to the north along Tamborine Street

ROOFTOP RESIDENT ACTIVE RECREATION	Creep	Acoustic Quality Objectives			
	LAeq	LAeq	LA10	LA01	
Noise source level for single event	71		74	80	dB(A)
Duration of single event	600				Seconds
Number of events in the measurement period	1	6			Events
Total time duration of combined events	600.0	3600.0			Seconds
	LAeq	LAeq 1hr	LA10 1hr	LA01 1hr	
Noise source level for assessment time period	71	71	74	80	dB(A)
Tonality / Impulsiveness correction	0	0			dB
Minimum distance to receiver	19.5				m
Distance attenuation (-6 dB per doubling of distance)	-26				dB
Onsite building screening	0.0				dB
Solid balustrade screening	-12.3				dB
Façade reflection	2.5				dB
Impact at nearest façade	**35**	**35**	**38**	**44**	**dB(A)**
Reduction through open window		-5	-5	-5	dB
Impact inside open window (excludes façade)		**28**	**31**	**37**	**dB(A)**

R2: Single storey dwelling to the immediate east at 35 Arthur Street

ROOFTOP RESIDENT ACTIVE RECREATION	Creep	Acoustic Quality Objectives			
	LAeq	LAeq	LA10	LA01	
Noise source level for single event	71		74	80	dB(A)
Duration of single event	600				Seconds
Number of events in the measurement period	1	6			Events
Total time duration of combined events	600.0	3600.0			Seconds
	LAeq	LAeq 1hr	LA10 1hr	LA01 1hr	
Noise source level for assessment time period	71	71	74	80	dB(A)
Tonality / Impulsiveness correction	0	0			dB
Minimum distance to receiver	16.9				m
Distance attenuation (-6 dB per doubling of distance)	-25				dB
Front wall at pool screening	0.0				dB
Solid balustrade screening	-13.2				dB
Façade reflection	2.5				dB
Impact at nearest façade	**36**	**36**	**39**	**45**	**dB(A)**
Reduction through open window		-5	-5	-5	dB
Impact inside open window (excludes façade)		**28**	**31**	**37**	**dB(A)**

R3: Single and two storey dwellings and units to the south along Arthur Street

ROOFTOP RESIDENT ACTIVE RECREATION	Creep	Acoustic Quality Objectives			
	LAeq	LAeq	LA10	LA01	
Noise source level for single event	71		74	80	dB(A)
Duration of single event	600				Seconds
Number of events in the measurement period	1	6			Events
Total time duration of combined events	600.0	3600.0			Seconds
	LAeq	LAeq 1hr	LA10 1hr	LA01 1hr	
Noise source level for assessment time period	71	71	74	80	dB(A)
Tonality / Impulsiveness correction	0	0			dB
Minimum distance to receiver	38.8				m
Distance attenuation (-6 dB per doubling of distance)	-32				dB
Front wall at pool screening	0.0				dB
Solid balustrade screening	-10.1				dB
Façade reflection	2.5				dB
Impact at nearest façade	**32**	**32**	**35**	**41**	**dB(A)**
Reduction through open window		-5	-5	-5	dB
Impact inside open window (excludes façade)		**24**	**27**	**33**	**dB(A)**

R4: Two storey apartments to the immediate west at 41 Arthur Street

ROOFTOP RESIDENT ACTIVE RECREATION	Creep	Acoustic Quality Objectives			
	LAeq	LAeq	LA10	LA01	
Noise source level for single event	71		74	80	dB(A)
Duration of single event	600				Seconds
Number of events in the measurement period	1	6			Events
Total time duration of combined events	600.0	3600.0			Seconds
	LAeq	LAeq 1hr	LA10 1hr	LA01 1hr	
Noise source level for assessment time period	71	71	74	80	dB(A)
Tonality / Impulsiveness correction	0	0			dB
Minimum distance to receiver	14.5				m
Distance attenuation (-6 dB per doubling of distance)	-23				dB
Front wall at pool screening	0.0				dB
Solid balustrade screening	-12.9				dB
Façade reflection	2.5				dB
Impact at nearest façade	**37**	**37**	**40**	**46**	**dB(A)**
Reduction through open window		-5	-5	-5	dB
Impact inside open window (excludes façade)		**30**	**33**	**39**	**dB(A)**

ONSITE ACTIVITY MECH PLANT NOISE PREDICTION CALCULATIONS

R1: Single and two storey dwellings and units to the north along Tamborin

ROOFTOP Pool Pump	65	dB(A) @ 1m	##
Number of condensor units	1	units	##
Total of all plant	65	dB(A) @ 1m	
Distance to receiver	25.7	m	
Distance attenuation	-28	dB(A)	
Inside to outside attenuation	-20	dB(A)	
Solid balustrade attenuation	0	dB(A)	
Façade reflection	2.5	dB(A)	
Impact at façade	19	dB(A)	85
Impact inside open windows (excludes façade)	12	dB(A)	

R2: Single storey dwelling to the immediate east at 35 Arthur Street

ROOFTOP Pool Pump	65	dB(A) @ 1m
Number of condensor units	1	units
Total of all plant	65	dB(A) @ 1m
Distance to receiver	15.1	m
Distance attenuation	-24	dB(A)
Inside to outside attenuation	-10	dB(A)
Solid balustrade attenuation	-9.77	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	24	dB(A)
Impact inside open windows (excludes façade)	17	dB(A)

R3: Single and two storey dwellings and units to the south along Arthur St

ROOFTOP Pool Pump	65	dB(A) @ 1m	##
Number of condensor units	1	units	##
Total of all plant	65	dB(A) @ 1m	
Distance to receiver	53.6	m	
Distance attenuation	-35	dB(A)	
Inside to outside attenuation	-10	dB(A)	
Solid balustrade attenuation	0	dB(A)	
Façade reflection	2.5	dB(A)	
Impact at façade	23	dB(A)	##
Impact inside open windows (excludes façade)	15	dB(A)	

R4: Two storey apartments to the immediate west at 41 Arthur Street

ROOFTOP Pool Pump	65	dB(A) @ 1m
Number of condensor units	1	units
Total of all plant	65	dB(A) @ 1m
Distance to receiver	14.8	m
Distance attenuation	-23	dB(A)
Inside to outside attenuation	-20	dB(A)
Solid balustrade attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	24	dB(A)
Impact inside open windows (excludes façade)	17	dB(A)

Section 4 - SPECIALIST REPORTS

Waste Management Plan
Prepared by MRA Environmental

Zone Planning Group

MRA ENVIRONMENTAL

YOUR TRUSTED ENVIRONMENTAL PARTNER

WASTE MANAGEMENT PLAN

37 ARTHUR ST
MERMAID BEACH QLD 4218



CLIENT

Cuecorp Property Group Pty Ltd

April 2025

DOCUMENT INFORMATION

Contact Details:

MRA Environmental
Suite 1/37 Commerce Drive
ROBINA QLD 4226
ABN: 21 082 910 218

waste@mraenvironmental.com.au

MRA Environmental
PO BOX 480
ROBINA QLD 4226

Project Manager:
Allison Reiser
P 07 5578 7040
E areiser@mraenvironmental.com.au

Client Details:

Client:	Cue Property Group Pty Ltd
Client contact:	Fleur Vocale
Client Phone:	0414 097 279

Document Details:

Title:	Waste Management Plan 37 Arthur St Mermaid Beach, Qld 4218
Project Number:	MRA24-235

Revision	Date	Author	Reviewed By	Issued By
V.1	13 April 2025	A Reiser	M Rigby	A Reiser

Destination	Draft	Final	Rev
Cuecorp Property Group Pty Ltd	V.1	V.1	
MRA Environmental	V.1	V.1	

LIMITATIONS

Mark Rigby & Associates Pty Ltd (MRA Environmental) has prepared this Waste Management Plan for the sole use of Cuecorp Property Group Pty Ltd, to support a Development Application for the proposed residential development located at 37 Arthur St, Mermaid Beach Qld 4218.

Specifically, this report supports the Development Application and relates to the waste storage and collection activities for the operational phase of the planned development in accordance with the City of Gold Coast *City Plan - SC6.16 City Plan Policy v.11 - Solid Waste Management*. This WMP will be submitted to Council as a component of the Development Application.

This report is for the sole use of Cuecorp Property Group Pty Ltd and in relation to the Development Application to be submitted to City of Gold Coast. It may not contain sufficient information for the purposes of other parties, for other uses or at other locations.

We have performed our services for this project in accordance with our current professional standards. No other warranty, expressed or implied, is made as to the professional advice included in this submission.

Opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions. The report also contains comments and information provided by others. MRA Environmental cannot take responsibility for advice provided by any third party.

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ATTACHMENTS

Attachment A: Solid Waste Management Code

1.0 GLOSSARY OF TERMS

Bin carting route – the proposed route to move bins between the storage point and the servicing point.

Bulk bins – bins fitted with lids and side pockets to allow them to be serviced by a front-lift truck.

Clinical or related waste – waste that has the potential to cause disease, including, for example, animal waste, discarded sharps, human tissue waste or laboratory waste.

Commercial accommodation – for the purposes of this report means commercial development that includes a domestic or residential component, such as Retirement facility, Community care centre, Rooming accommodation, Short term accommodation or Resort complex.

Commercial premises – for the purpose of this report means any of the following types of premises:

- a Hotel, Short term accommodation, Tourist park, Food and drink outlet;
- an assembly building, institutional building, Childcare centre, Educational establishment;
- premises where a sport or game is ordinarily played in public;
- an exhibition ground, show ground or racecourse; or
- an Office, Shop or other premises where business or work other than a manufacturing process is carried out.

Commercial waste – means waste, other than green waste, recyclable waste, and interceptor waste or waste discharged to a sewer, produced as a result of the ordinary use or occupation of commercial developments.

Common servicing point – a common area where more than two dwellings/tenancies stand their wheelie bins for servicing.

Common storage point – a common area where more than two dwellings/tenancies store their wheelie bins.

Constructed hardstand area – a hardstand area, for example a concrete pad which has been constructed for bin storage.

Digesters and dehydrators - machines specifically designed to reduce food waste volumes to allow for efficient disposal. Digesters typically process the material into sludge while dehydrators remove liquid from food waste generating a fertiliser as the end product. Disposal of end product can be used on either internal gardens or on external gardens/farms.

Drive-on service – where the waste collection vehicle services bulk bins on site, bins are to be positioned for direct access/servicing without the need for manual handling by the waste vehicle driver or other person.

General waste – waste, other than domestic clean-up waste, green waste, recyclable waste, interceptor waste or waste discharged to a sewer, produced as a result of the ordinary use or occupation of domestic or commercial premises.

Glass crushers - machines that can reduce the volume of glass waste by up to 75%, saving valuable space.

Hazardous waste - solid waste that is toxic or contains toxic material, for example, light bulbs, fluorescence lights, batteries.

Internal servicing roadway – is a driveway, private roadway or other path intended for use by vehicles, in which the waste collection vehicle is required to use to service a bin.

Mixed-use development – for the purpose of this report, any building or development complex used, or intended to be used, for residential purposes in combination with other commercial uses (e.g. Offices, Food and drink outlets etc).

Non-serviced area – an area within the boundaries of City of Gold Coast which is not serviced by Council's waste collection contractor.

Organic waste - is waste that comes from plants or animal that is biodegradable for example green waste and food waste.

Recycling chute - a duct in which recycling descends from one point to another.

Recyclable waste – for a local government's area, means clean and inoffensive waste that is declared by the local government to be recyclable waste for the area. In the City of Gold Coast the following wastes are deemed recyclable:

- all household plastics, bottles and containers;
- aluminium and steel cans and aerosols;
- bottles and jars made only of glass;
- clean cardboard, newspaper, loose paper, junk mail, magazines and cartons.

Related waste – means waste that constitutes, or is contaminated with, chemicals, cytotoxic drugs, human body parts, pharmaceutical products or radioactive substances.

Roll-on roll-off bin (Ro-Ro bin) – large steel open top skip bins or enclosed bins. Bins are collected by a hook-lift truck.

Solid waste – any general or recyclable waste, be it commercial or domestic. Solid waste does not include waste discharges to sewer/water or the atmosphere.

Servicing point – the designated area allocated to the temporary storage of waste bins for the period of servicing only. The point may be within or external to a development.

Storage point – the area allocated to the permanent storage of waste bins. This is the normal location of the waste bins and excludes the period where the bin is serviced. A storage point may be a common storage point or an individual bin storage point.

Waste – includes anything, other than a resource that is:

- left over, or an unwanted by-product from an industrial, commercial, domestic or other activity; or
- surplus to the industrial, commercial, domestic or other activity generating the waste.

Waste carting distance – the distance required for a person to transport their waste from the nearest point of exit of their dwelling/tenancy to a storage point (or in the case of a multi-level building, to the nearest waste disposal point).

Waste chute – a duct in which waste descends from one point/level to a collection bin.

Waste disposal point – the point where waste is disposed of into the chute, also known as waste hopper. It consists of a fixed frame and hood unit, covered with a hinged or pivoted door.

Waste storage room – the room at the base of the chute used for the storage of waste bins.

Wheelie bin – two wheeled mobile garbage bins, made from high density polyethylene (HDPE). Wheelie bins are collected by a side-lift truck

2.0 INTRODUCTION

2.1 BACKGROUND

MRA Environmental (MRA) has been commissioned by Cuecorp Property Group Pty Ltd to prepare a Waste Management Plan (WMP) for the proposed residential development located at 37 Arthur St, Mermaid Beach Qld 4218.

We understand that the development has a current Development Permit for four (4) apartments subject to conditions contained in the decision notice for MCU/2024/478 dated 13 February 2025. Since the approval was granted, design changes have been proposed which include an increase in building height and an additional two (2) apartments, increasing from a total of four (4) to six (6) dwellings. A Change Application has been prepared to seek approval for the proposed changes.

Therefore, this WMP is to be submitted to the City of Gold Coast (Council) as part of the Change Application being prepared for the site and ensures that the waste storage and collection activities for the operational phase of the development are in accordance with *SC6.16 City Plan Policy v.11 - Solid Waste Management*.

2.2 SITE DETAILS

The subject site is located at 37 Arthur St, Mermaid Beach QLD on two (2) parcels of land described as Lot 1 on RP85529 and Lot 23 on RP41194 (Refer to **Figure 1**). The site is bound by Arthur Street to the south and is generally surrounded by existing residential properties to the north, east, south and west.

The subject site has an area of approximately 527m^2, with approximately 13m frontage onto Arthur Street. The proposed development is a five (5) storey building offering a total of six (6) dwellings, comprised of 2 x 2-bedroom apartments & 4 x 3-bedroom apartments. There will be a single basement level for carparking, two (2) apartments on ground level, with full floors apartments on levels 1-4 and recreational space on the rooftop terrace.

2.3 PURPOSE & SCOPE OF REPORT

This report represents a Waste Management Plan for the operational phase of the development, which includes:

- Details on the anticipated type and quantity of waste (**Section 3.0**);
- Details of the waste storage point requirements and waste storage bins (**Section 4.0**); and
- Details of the proposed waste collection arrangements (**Section 5.0**).

2.4 WMP OBJECTIVES & STRUCTURE

The main objectives of this report are to provide details for optimal waste management in the operational phase of the development.

The structure of this report will be as follows:

- An introduction including the site details, summary, purpose and scope of the report along with the objectives and structure;
- Development figures including the site location and outlining the waste storage and servicing infrastructure and locations;
- Waste quantities including the type of waste, quantities of waste and the proposed development uses;
- Proposed waste storage and servicing areas including waste storage infrastructure and locations within the development; and
- Details of the waste collection including servicing frequencies, the waste servicing area and collection vehicle access.



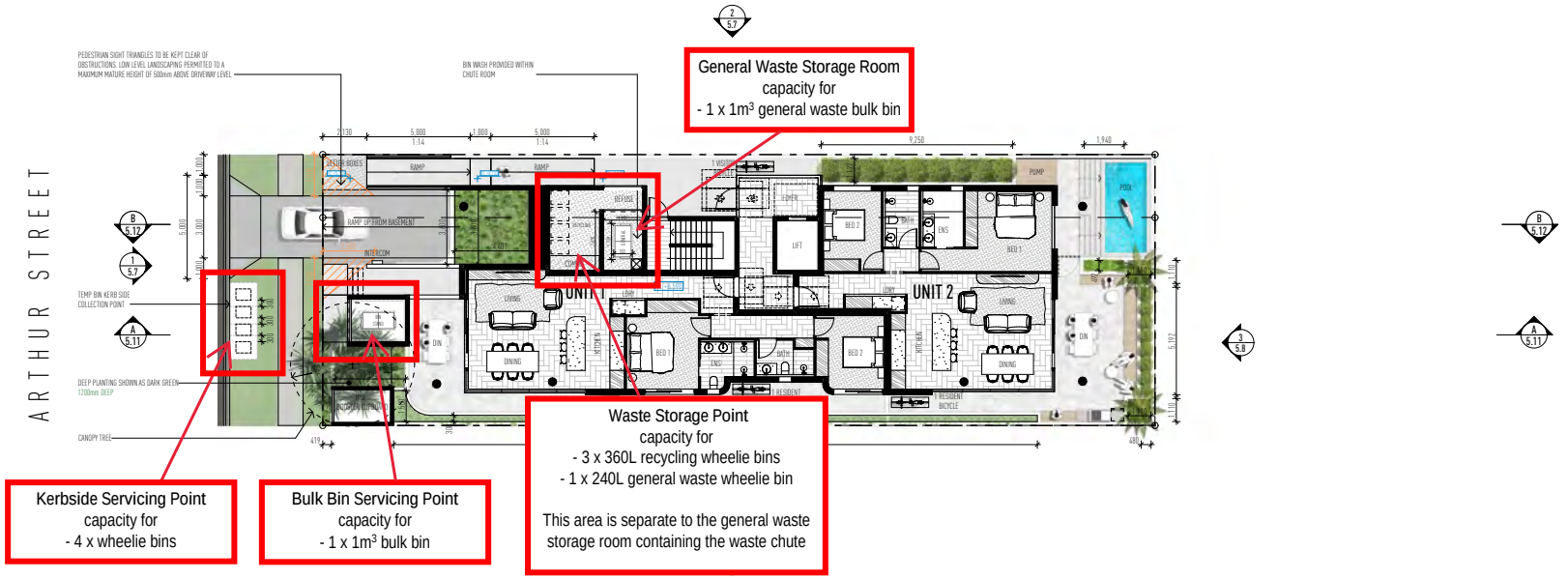
Ormeau
Pimpama
South Stradbroke Island
Coomera
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4
Helensvale
Tamborine Mountain
2
90
Southport
Beaudesert
M1
90
Gold Coast
90
13
97
42
Robina
N
Burleigh Heads

MRA ENVIRONMENTAL
YOUR TRUSTED ENVIRONMENTAL PARTNER

Suite 1, 37 Commerce Drive, Robina
PO Box 480 Robina Qld 4226

PH (07) 5578 7040
FAX (07) 5578 7313
MOB 0417 797486

DESIGNED RP	SCALE NTS	CLIENT CUECORP PROPERTY GROUP PTY LTD	JOB NUMBER MRA24-235
DRAWN RP	LEVEL DATUM -	PROJECT WASTE MANAGEMENT PLAN 37 ARTHUR ST, MERMAID BEACH	DRAWING Figure 1
CHECKED AR	SHEET SIZE A4		
APPROVED AR	CAD FILE	TITLE SITE LOCATION	
DATE APRIL 2025	ISSUE FINAL		REV FINAL

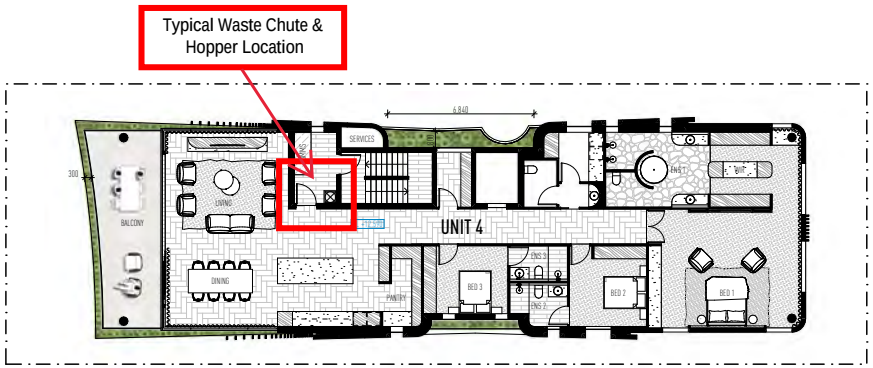


MRA ENVIRONMENTAL
YOUR TRUSTED ENVIRONMENTAL PARTNER

Suite 1, 37 Commerce Drive, Robina
PO Box 480 Robina Qld 4226

PH (07) 5578 7040
FAX (07) 5578 7313
MOB 0417 797486

DESIGNED RP	SCALE NTS	CLIENT	CUECORP PROPERTY GROUP PTY LTD	JOB NUMBER	MRA24-235
DRAWN RP	LEVEL DATUM -	PROJECT	WASTE MANAGEMENT PLAN 37 ARTHUR ST, MERMAID BEACH	DRAWING	Figure 2
CHECKED AR	SHEET SIZE A4				
APPROVED AR	CAD FILE	TITLE	GROUND FLOOR WASTE STORAGE & SERVICING POINTS	REV	A
DATE APRIL 2025	ISSUE FINAL				



MRA ENVIRONMENTAL
YOUR TRUSTED ENVIRONMENTAL PARTNER

Suite 1, 37 Commerce Drive, Robina
PO Box 480 Robina Qld 4226

PH (07) 5578 7040
FAX (07) 5578 7313
MOB 0417 797486

DESIGNED RP	SCALE NTS	CLIENT CUECORP PROPERTY GROUP PTY LTD	JOB NUMBER MRA24-235
DRAWN RP	LEVEL DATUM -	PROJECT WASTE MANAGEMENT PLAN 37 ARTHUR ST, MERMAID BEACH	DRAWING Figure 3
CHECKED AR	SHEET SIZE A4		
APPROVED AR	CAD FILE	TITLE TYPICAL WASTE CHUTE & HOPPER LOCATION	
DATE APRIL 2025	ISSUE FINAL		REV A

3.0 WASTE QUANTITIES

3.1 TYPE OF WASTE

Table 1 outlines the predicted types of waste that are expected to be generated from the proposed development.

Table 1: Predicted waste types to be generated

Tenancy Type	Predicted Waste Types
Residential	General waste and recycling

3.2 WASTE QUANTITIES

Calculations of the anticipated waste quantities have been separated into the general waste and recycling components. The waste calculations were performed using typical waste generation rates as provided in Appendix A of Council's *SC6.16 City Plan Policy v.11 - Solid Waste Management.*

3.3 RESIDENTIAL APARTMENTS

Table 2 displays the general waste quantities and **Table 3** displays the recycling quantities that are anticipated for the residential apartments.

Table 2: Anticipated general waste quantities

Room Type	No.	Total Required Waste Capacity (L/week)	Estimated Waste Generation (m^3/week)	Estimated Daily Waste Generation (m^3/day)
2 bedroom	2	200	0.20	0.03
3 bedrooms	4	480	0.48	0.07
TOTAL	**6**	**680**	**0.68**	**0.10**

Table 3: Anticipated recycling quantities

Room Type	No.	Total Required Waste Capacity (L/week)	Estimated Recycling Generation (m^3/week)	Estimated Daily Recycling Generation (m^3/day)
2 bedroom	2	120	0.12	0.02
3 bedrooms	4	320	0.32	0.05
TOTAL	**6**	**440**	**0.44**	**0.07**

3.4 TOTAL WASTE CAPACITY

The residential apartments of the development are estimated to generate a total of approximately **0.10m^3 per day** of general waste and **0.07m^3 per day** of recycling waste.

4.0 WASTE AND RECYCLING STORAGE

This section outlines the general design criteria of the general waste storage room, waste storage point, waste chute and hoppers as required by *SC6.16 City Plan Policy v.11 - Solid Waste Management* along with a description of the proposed bins to be used.

4.1 WASTE STORAGE POINTS

General waste from the residential apartments will be disposed of via a single waste chute terminating in the general waste storage room located on the ground floor adjacent to the fire stairwell. The general waste storage room will house one (1) x 1.0m^3 general waste bulk bin contained under the waste chute system.

Residents will manually place their recycling into three (3) x 360L recycling wheelie bins provided in a separate waste storage point located on the ground floor. Residents will travel an approximate distance of 20 metres from the lift to deposit waste into the recycling wheelie bins.

It is also noted that the ground floor apartments will not have access to the waste chute, therefore one (1) x 240L general waste wheelie bin will be provided in the waste storage point for these residents to use. Ground floor residents will travel an approximate distance of 20 metres to deposit waste into the general waste wheelie bin.

The waste storage point containing the wheelie bins is located adjacent but separate to the general waste storage room containing the chute. The general waste storage room containing the waste chute will be for authorised personnel only (body corporate/site management) to ensure that the safety of residents is maintained.

Please refer to **Figure 2** for the locations of the general waste storage room & waste storage point.

The general waste storage room & waste storage point will be constructed to meet the requirements listed below:

1. Designed to allow the bins to be easily transported to a separate servicing point (no steps or lips on bin carting route);
2. Waste carting distance generally should not exceed 60 metres and in any case be reasonable to ensure ease of use. Waste hoppers for general waste are provided on residential levels and the waste carting distances to wheelie bins is approximately 20m;
3. Located at least five (5) metres from any door, window or fresh air intake within the development or any adjoining site;
4. Screened to ensure bins are not visible from a public place or sensitive land use;
5. Provided with safe access to the disposal area;
6. Of sufficient size to accommodate the required number of bins allowing for adequate clearances surrounding each bin;

7. Provides adequate storage for recyclable waste that all users can safely and easily access;
8. Constructed hardstand area with a solid concrete base or acceptable equivalent;
9. Roofed and designed to prevent entry to rainwater:
10. The general waste storage room will be graded to fall to a drainage point that is connected to sewer and provided with a hose-cock for cleaning. This bin wash facility will be utilised for the washing of the bulk bins and wheelie bins within the development; and
11. Not be located within a building structure unless it is in purpose-built storage area which is air-locked, fly and vermin proofed and used solely for the storage of waste.

In addition to the above, the general waste storage room containing the waste chute system will be constructed to meet the requirements below:

1. Insect and vermin proof;
2. Fire rated and ventilated in accordance with the *National Construction Code – Building Code of Australia*;
3. Doors must be wide enough to allow for the easy removal of the largest container to be stored;
4. The walls, ceiling, floor and equipment of the general waste storage room are to be designed and constructed of impervious material with a smooth finish to allow for easy cleaning;
5. Provided with adequate artificial lighting;
6. Not located adjacent to or within any habitable portion of a building or place used in connection with food preparation (including food storage); and
7. Permit unobstructed access for removal of the containers to the service point and for positioning of the containers correctly in relation to the waste chute.

4.2 WASTE CHUTE

Waste hoppers will be located on levels 1-4 of the development to provide a general waste disposal point for residents. As outlined in **Section 4.1**, the ground floor apartments will not have access to the waste chute, therefore one (1) x 240L general waste wheelie bin will be provided in the waste storage point for these residents to use.

The waste chute will be constructed to meet the requirements listed below:

1. Adequate in strength for its purpose, including additional reinforcing where necessary at joins, bends and hopper intersections;
2. Insect and vermin proof;
3. Constructed and installed to prevent the following during use and operation of the system:
    - transmission of vibration to the structure of the premises;
    - excessive odour – there must not be a noticeable odour beyond the waste disposal and storage points;

- excessive noise to the occupants of the building.

4. Installed in a 'fire rated' duct and ventilated in compliance with building requirements of the *National Construction Code – Building Code of Australia*.
5. Comply with the waste chute manufacturer's technical specifications and/or operational limitations, including installation design features and ancillary equipment required to prevent blockages and noise disturbances, to achieve compliance with the section; and
6. Fitted with a shutter at the base of each chute for closing off the chute manually during bin exchange and automatically in the case of fire. The manual closing mechanism must be in a safe location to protect the operator from waste discharging from the chute when activating the closure.

4.3 WASTE HOPPER CONSTRUCTION

Waste hoppers will be in a dedicated compartment adjacent to the fire stairwell on levels 1-4 of the development (Refer to **Figure 3**).

The waste disposal points will be constructed to meet the requirements listed below:

1. Located on each residential floor in a position which is:
   - in a dedicated room or compartment;
   - easily accessible by the occupants of each apartment;
   - separated from any habitable portion of a building or place used in connection with food preparation or storage;
2. Located to ensure the handle of the hopper is at least 1200 millimetres above finished floor level;
3. Hopper door automatically returns to the closed position after use;
4. Designed to permit free flow of waste into the chute;
5. Constructed so that the diameter or largest dimension of the service opening (the diagonal of a rectangular opening) does not exceed three-quarters (3/4) of the diameter of the chute with which the hopper is connected; and
6. The floor adjacent to the hopper is paved with a durable impervious material with a smooth finished surface.

4.4 PROPOSED WASTE BINS

To ensure that the general waste storage room & waste storage point are sufficiently sized, details of the type and quantity of waste and number of bins to be stored within each area is detailed in **Table 4**. Dimensions of the proposed containers are detailed in **Section 4.5**.

Table 4: Details of proposed waste bins & servicing frequency

Waste Type	Anticipated Waste Quantity (m^3/week)	Bins Proposed in Area	Collection Frequency
General waste	0.68	1 x 1.0m^3 bulk bin & 1 x 240L wheelie bin	Once per week
Recycling	0.44	3 x 360L wheelie bins	Once per fortnight

4.5 DIMENSIONS OF WASTE CONTAINERS

Table 5 below provides dimensions of the bins to be used on-site. The 1.0m^3 bulk bins will be composed of galvanised or rust-free metal with lightweight plastic lids. The wheelie bins will be composed of heavy-duty plastic with lightweight plastic lids.

Table 5: Dimensions of proposed bins

Bin Type	Volume	Length (mm)	Width/ Diameter (mm)	Height (mm)	Collection Vehicle Type
Bulk bins	1.0m^3	1,738	901	1,310	Front lift truck
Wheelie	240L	730	550	1,060	Side lift truck
Wheelie	360L	865	650	1,100	Side lift truck

4.6 DRAINAGE AND BIN WASH

A bin wash facility (including hose cock) will be provided in the general waste storage room, which will be graded to a drainage point that is connected to sewer in accordance with trade waste requirements.

This area will be utilised as the bin washing facility for both the general waste bulk bin and all wheelie bins. It will be the responsibility of site management to wash bins and to maintain the cleanliness of the waste storage points.

5.0 DETAILS OF COLLECTION

5.1 FREQUENCY

The collection frequency for residential bins is shown in **Table 4**. The residential general waste is anticipated to be serviced once per week, and the recycling will be serviced fortnightly as per the standard domestic kerbside collection service.

5.2 SERVICING POINTS

It is proposed that wheelie bins will be serviced from the kerbside directly in front of the development on Arthur Street as per the standard domestic kerbside collection service.

There will be one (1) general waste wheelie bin on the kerbside weekly with a total of four (4) wheelie bins presented once a fortnight when both the general waste and recycling is collected. Adequate space (1m frontage) is available on the kerbside for a maximum of four (4) wheelie bins once each fortnight (Refer to **Figure 2**).

A bulk bin servicing point is also provided for the general waste bulk bin and is located adjacent to the driveway within 5m from the property boundary. This servicing point can accommodate one (1) x 1.0m^3 bulk bin (Refer to **Figure 2**).

Site management will transfer the wheelie bins from the waste storage point to the kerbside on Arthur St for servicing when scheduled.

Site management will also transfer the bulk bin from the general waste storage room to/from the servicing point when scheduled. It is noted that the ramp that will be utilised to transfer the bulk bin to/from the servicing point is currently shown at a 1:14 gradient and it is understood that the design in this area will be further refined to provide a 1:20 gradient along the bin-carting path.

The bulk bin will be transferred by the engaged waste contractor from the bulk bin servicing point to Arthur St for servicing and will return it to the bulk bin servicing point once servicing is complete.

The bulk bin servicing point will be designed to meet the following requirements:

1. Provided with sufficient access and clearance for the waste and recycling collection vehicles to service the bins, including adequate unobstructed overhead space for the swinging arm action of the waste collection vehicle;
2. Bins serviced safely while minimising the impediment of traffic flow during servicing;
3. Clearly separated from car parking bays, loading bays, footpaths and pedestrian access, and any other similar areas;
4. Clear of speed control devices or similar provisions which inhibit direct access to the bins for servicing;

5. Bin carting route must allow bins to be easily manoeuvred and be devoid of steps or steep rises;
6. Bin carting route must not extend through habitable parts of a building, or a food premises, and only occur through common property or publicly accessible locations;
7. Over five metres from any door, window or fresh air intake within the development or any adjoining site;
8. Bins to be removed from and returned to the storage point;
9. Constructed hardstand with a solid concrete base or acceptable equivalent;
10. Positioned on a level pad within the site, level with the kerbside and adjacent to a driveway or other approved crossover on the public roadway;
11. Allow for at least 500mm clearance surrounding the bulk bin container and any barrier around the location to allow for ease of movement;
12. Screened to minimise the view of bins from neighbouring properties, or passing vehicles and pedestrian traffic external to the site;
13. Bin carting is to be via hard stand pathways and can be easily moved to the temporary storage area either side of the property entry point and is not stored on a section of the driveway that falls away.; and
14. Positioned away from entrances to shops or residential premises.

5.3 COLLECTION VEHICLE ACCESS

Table 6 details the dimensions of the Front lift & Side lift truck waste collection vehicles that will service the development. The engaged contractor will service the development from Arthur St as outlined in **Section 5.2**.

Table 6: Front Lift & Side Lift truck dimensions

Parameter	Front lift truck	Side Lift truck
Height	4.3m	4.1m
Width	2.5m	2.5m
Length	10.2m	9.8m
Working Height	6.5m*	4.35*m
Total Tonnage	27.5 tonne maximum	23 tonne maximum
Min Turning Circle	13.2m (wall-wall)	11.5 (wall-wall)
Min Turning Circle	12.3m (kerb-kerb)	10.5 (kerb-kerb)

*Note that the waste collection vehicle clearance height (working height) is to be calculated according to the following formula as a minimum:

SUITABLE CLEARANCE = VEHICLE OPERATING DIMENSIONS + 100mm + CLEARANCE FOR SERVICES + CALCULATION FOR ROADWAY GRADIENT

6.0 SUMMARY

Details of this Waste Management Plan are summarised below:

- The subject site is located at 37 Arthur St, Mermaid Beach QLD on two (2) parcels of land described as Lot 1 on RP85529 and Lot 23 on RP41194 (Refer to **Figure 1**);
- We understand that the development has a current Development Permit for four (4) apartments subject to conditions contained in the decision notice for MCU/2024/478 dated 13 February 2025. Since the approval was granted, design changes have been proposed which include an increase in building height and an additional two (2) apartments, increasing from a total of four (4) to six (6) dwellings. A Change Application has been prepared to seek approval for the proposed changes;
- The subject site has an area of approximately 527m^2, with approximately 13m frontage onto Arthur Street. The proposed development is a five (5) storey building offering a total of six (6) dwellings, comprised of 2 x 2-bedroom apartments & 4 x 3-bedroom apartments. There will be a single basement level for carparking, two (2) apartments on ground level, with full floors apartments on levels 1-4 and recreational space on the rooftop terrace;
- The development is expected to generate a total of approximately **0.10m^3 per day** of general waste and **0.07m^3 per day** of recycling waste;
- General waste from the residential apartments will be disposed of via a single waste chute terminating in the general waste storage room located on the ground floor adjacent to the fire stairwell. The general waste storage room will house one (1) x 1.0m^3 general waste bulk bin contained under the waste chute system;
- Residents will manually place their recycling into three (3) x 360L recycling wheelie bins provided in a separate waste storage point located on the ground floor. Residents will travel an approximate distance of 20 metres from the lift to deposit waste into the recycling wheelie bins;
- It is also noted that the ground floor apartments will not have access to the waste chute, therefore one (1) x 240L general waste wheelie bin will be provided in the waste storage point for these residents to use. Ground floor residents will travel an approx. distance of 20 metres to deposit waste into the general waste wheelie bin;
- It is proposed that wheelie bins will be serviced from the kerbside directly in front of the development on Arthur Street as per the standard domestic kerbside collection service. There will be one (1) general waste wheelie bin on the kerbside weekly with a total of four (4) wheelie bins presented once a fortnight when both the general waste & recycling is collected. Adequate space (1m frontage) is available on the kerbside for a maximum of four (4) wheelie bins once each fortnight;
- A bulk bin servicing point is also provided for the general waste bulk bin and is located adjacent to the driveway within 5m from the property boundary. This servicing point can accommodate one (1) x 1.0m^3 bulk bin;
- A bin wash facility (including hose cock) will be provided in the general waste storage room, which will be graded to a drainage point that is connected to sewer in accordance with trade waste requirements. This area will be utilised as the bin washing facility for both the general waste bulk bin and all wheelie bins.

ATTACHMENT A

Solid Waste Management Code (9.4.12 v.11)

ASSESSABLE DEVELOPMENT CRITERIA
9.4.12 SOLID WASTE MANAGEMENT CODE (v.11)

Performance Outcomes	Acceptable Outcomes	Compliance Achieved	Comments
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 **SC6.16 City Plan policy – Solid waste management**.	✓	The Waste Management Plan confirms that the development includes waste storage points of sufficient size to accommodate the required number of waste and recyclable bins generally in accordance with **SC6.16 City Plan policy – Solid waste management.**
	AO1.2 Waste and recycling storage points are located, designed and sized consistent with **SC6.16 City Plan policy – Solid waste management**.	✓	The Waste Management Plan confirms that the development includes waste and recycling storage points that are located, designed and sized generally in accordance with **SC6.16 City Plan policy – Solid waste management**.
	AO1.3 Development with a dwelling above the third storey include appropriate waste removal systems which incorporate: (a) waste chutes; (b) hoppers; and (c) separate waste storage rooms. **Note: Waste removal system design is to be consistent with SC6.16 City Plan policy – Solid waste management.**	✓	The Waste Management Plan confirms that the development includes a waste chute; hoppers and separate waste storage rooms consistent with **SC6.16 City Plan policy – Solid waste management**.
	AO1.4 Developments that include a commercial kitchen or generate clinical or related waste incorporate additional waste facilities consistent with **SC6.16 City Plan policy – Solid waste management**.	N/A	The development does not include a commercial kitchen.
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 **SC6.16 City Plan policy –Solid waste management**.	✓	The Waste Management Plan confirms that the development includes appropriately sized and located bin wash-down facilities consistent with **SC6.16 City Plan policy –Solid waste management.**

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.	✓	The Waste Management Plan confirms that direct unobstructed paths exist between waste and recycling storage and servicing points and road frontages.
	AO3.2 Waste and recycling storage points are screened by solid fencing or vegetation to ensure they are not visible from a public place or sensitive land use.	✓	The Waste Management Plan confirms that waste and recycling storage points are screened by solid fencing or vegetation to ensure they are not visible from a public place or sensitive land use.
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 **SC6.16 City Plan policy –Solid waste management**. **Note: Regulation of the access, stopping and manoeuvring of refuse collection vehicles are subject to meeting, Part 9.4.13 Transport code and associated City Plan guidelines.**	✓	The Waste Management Plan confirms that the waste and recycling servicing points are designed and sufficiently sized generally in accordance with **SC6.16 City Plan policy –Solid waste management.**
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 Waste management plan, prepared in accordance with SC6.16 City Plan policy – Solid waste management, is Council's preferred method of addressing the above outcome.***	**AO5** No acceptable outcome provided.	N/A	The development is located in a serviced area.

Section 4 - SPECIALIST REPORTS

Engineering Infrastructure Report
Prepared by Pinnacle Engineering Group

Zone Planning Group

PINNACLE
ENGINEERING GROUP

ENGINEERING SERVICES REPORT

PROPOSED MULTI-UNIT RESIDENTIAL DEVELOPMENT

37 Arthur Street, Mermaid Beach QLD

CUECORP™
PROPERTY GROUP

APRIL 2025

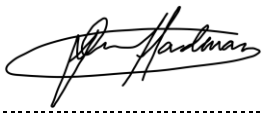
REVISION 02

Pinnacle Engineering Group
ABN: 80 608 431 625
P.O. Box 517 Paradise Point QLD 4216

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In accordance with the requirements of the *Queensland Professional Engineers Act 2002*, this document was prepared under the supervision of, reviewed and approved by the following experienced Registered Professional Engineer of Queensland (RPEQ).



Jesse Hardman (RPEQ No. 27335)

Pinnacle Engineering Group
P.O. Box 517
Paradise Point, QLD 4216

PH: +61 433 266 457
E: michael@pinnacleeng.com.au

www.pinnacleeng.com.au

Document control

Rev	Date issued	Review	Approved	Approved on	Revision type
01	31-January-2025	A. Cresswell	B. Popa	31-January-2025	Issued for comment
02	1-April-2025	A. Cresswell	J. Hardman	1-April-2025	Issued for approval

Distribution of copies

Revision	Quantity	Distribution
01	1.pdf	Cuecorp Property Group
02	1.pdf	Cuecorp Property Group

Printed:	01/04/2025
Last saved:	01/04/2025 09:59
File name:	P:\Projects\PEG1310_37 Arthur Street, Mermaid Beach\03 Reports\01 Engineering Report\250401_PEG1310_37 Arthur Street, Mermaid Beach_ESR_R002.docx
Author:	Jesse Hardman
Project manager:	Michael Binger
Name of organisation:	Pinnacle Engineering Group
Name of project:	37 Arthur Street, Mermaid Beach QLD
Name of document:	250401_PEG1310_37 Arthur Street, Mermaid Beach_ESR_R002.docx
Document version:	REV 02
Project number:	PEG1310

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1 Introduction

Pinnacle Engineering Group (Pinnacle) was engaged by Cuecorp Property Group to undertake the preliminary engineering investigations to provide supporting documentation for the proposed multi-unit residential complex located at 37 Arthur Street, Mermaid Beach QLD within the local authority of the City of Gold Coast (CoGC).

1.1 Scope of Investigation

This report covers the following civil engineering elements associated with the proposed development including:

- Water Supply;
- Sewerage Reticulation;
- Stormwater Drainage;
- Bulk Earthworks; and
- Gas, Electrical and Telecommunications.

1.2 Site Description

1.2.1 Site Location

Street Address	-	37 Arthur Street, Mermaid Beach QLD 4218
RP Description	-	Lot 1 on RP85529 and Lot 23 on RP41194
Site Area	-	0.0527 Hectares
Current Zoning	-	Medium Density Residential
Proposed Use	-	Multi-Unit Residential Development
Local Authority	-	CoGC

Refer to Figure 1.1 for site location.

1.2.2 Existing Site Conditions and Topography

The subject site is currently occupied a single storey residential dwelling located centrally within the site, a carport within the south-west corner of the site, and a swimming pool within the northwest corner of the site. The balance of the site is comprised of paved surfaces and landscaped areas.

The highest elevation of the subject site of RL6.11m AHD is reached adjacent to the existing building slab while the lowest elevation of approximately RL5.62m AHD is reached within the southwest corner of the site, adjacent to the front property boundary.

The topographic survey for the site is included in Appendix B. Refer to Figure 1.2 for the existing aerial view of the subject site.

1.2.3 **Proposed Development**

The proposed development will deliver a multi-unit residential building comprised of 6 units, basement level carparking and associated infrastructure across the site. The subject site will have direct access to the Arthur Street road reserve to the south via a new heavy-duty vehicular crossover.

Architectural drawings of the proposed development are included within in Appendix A.

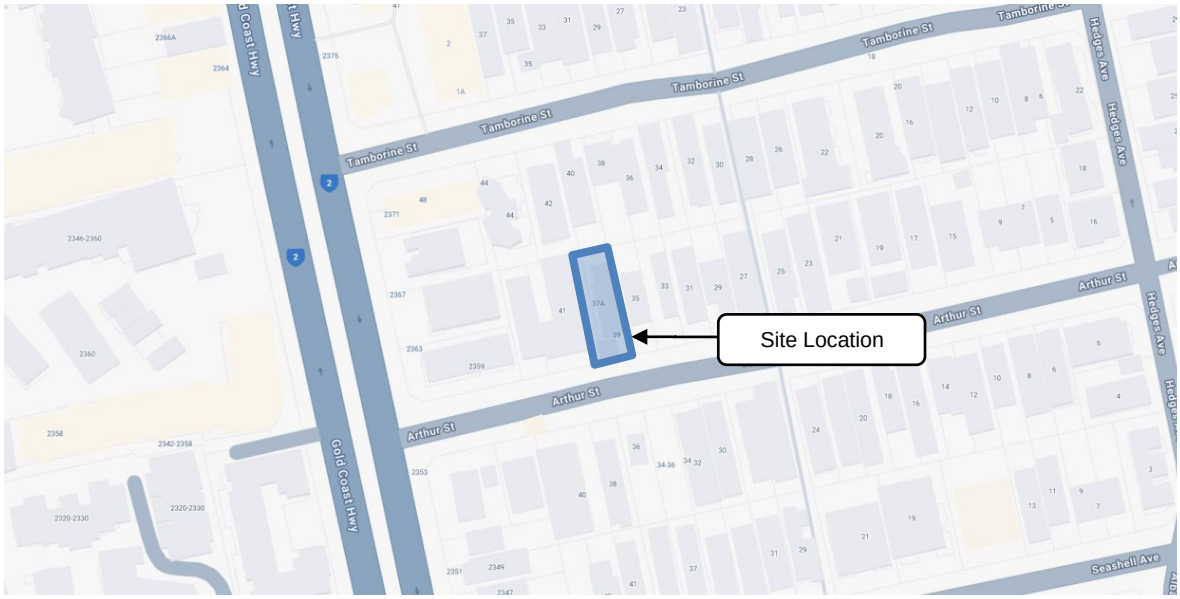


Figure 1.1: Map View (Source: Google Maps)



Figure 1.2: Aerial View (Source: www.nearmap.com.au)

2 Water Reticulation

2.1 Existing Infrastructure

A review of the topographic survey and Council records has confirmed the location of an existing 100mm diameter Asbestos Cement (AC) water main within the southern verge of Arthur Street to the south of the site.

The location of the existing and proposed infrastructure is included on the engineering layout contained within Appendix C with the Before You Dig Australia (BYDA) data included within Appendix D. The topographic survey for the site is included in Appendix B.

2.2 Development Water Reticulation Demand

The proposed development's water reticulation demands on the existing potable water infrastructure were established using the rationale described in the SEQ WS&S D&C Code. These demands were used to determine the consumption rates for the proposed development. Potable water demand factors and flow parameters were sourced from Table 4.1 and Appendix A1 respectively, to determine the potable water consumption rates for the proposed development. The results are presented in Table 2.1.

Table 2.1: Water Demand Factors and Consumption Rates

Design Parameter	Potable Water Factors and Consumption Rates
Area of Land	0.0527 Hectare
Development Type	Multi-unit Residential
Number of Units (2 bed)	2
Number of Units (3+ bed)	4
EP/Unit (2 bed)	1.76 EP/Unit
EP/Unit (3+ bed)	2.51 EP/Unit
EP	13.56
Estimated Non-Revenue Water (NRW)	20 L/EP/day
Average Day Flow (AD)	220 L/EP/day + NRW (240L/EP/day)
Mean Day Max Month (MDMM) / AD	1.27
Peak Day (PD) / AD	1.45
Peak Hour (PH) / PD	2.05
PH / AD	2.97
AD	3,254 L/day or 0.038 L/sec
MDMM	4,060 L/day or 0.047 L/sec
PD	4,597 L/day or 0.053 L/sec
PH (Maximum)	9,131 L/day or 0.106 L/sec
Fire Flow	15L/sec for 4 hours
Peak Hour Demand	15.106 L/sec

Note: No peaking factors applied to NRW.

The proposed multi-unit residential development will result in a 15.106L/sec water demand. With a maximum velocity of 2.5m/s, in accordance with the SEQ WS&S D&C Code, the proposed development would require a connection with a minimum internal diameter of 88mm. The hydraulic consultant is to confirm if fire flow can be provided by the existing street hydrant. Therefore, until such confirmation, a proposed dual fire and domestic service is proposed.

2.3 Proposed Water Reticulation Works

The proposed multi-unit residential development will be serviced by the existing 100mm diameter AC water main located within the southern verge of the Arthur street road reserve. The development will be serviced via a new large water meter assembly comprising of both a domestic and fire service, to be located on-lot and aboveground in accordance with current Gold Coast Water and Waste and SEQ WS&S D&C Code standards. The location of the proposed infrastructure is included on the engineering layout contained within Appendix C.

It is envisaged that the internal water reticulation detailed design will be undertaken by a Hydraulic Consultant during the detailed design phase of the project with any external water service connection and large meter subject to future Operational Works approval by Council.

A plan detailing the proposed services for the site is included in Appendix C.

3 Sewerage Reticulation

3.1 Existing Infrastructure

A review of the topographic survey, BYDA data and Council records has confirmed that there is an existing 225mm diameter AC sewerage main within the Arthur Street carriageway fronting the subject site, grading from the east to the west. The subject site is currently serviced by an existing 100mm diameter AC property connection that connects into the aforementioned sewer main at the existing 1050mm diameter maintenance hole immediately in front of the site.

The topographic survey is included in Appendix B with the BYD report included within Appendix D.

3.2 Proposed Works

The demands on the existing sewer infrastructure were established using the rationale described in the SEQ WS&S D&C Code. These demands were used to determine the consumption rates for the proposed development. The sewer demand factors and flow parameters were sourced from Table 10 and Appendix A1 respectively, to determine the consumption rates for the proposed development. The results are presented in Table 3.1 below.

Table 3.1: Sewerage Demand Factors and Consumption Rates

Design Parameter	Sewer Factors and Consumption Rates
Area of Land	0.0527 Hectares
Development Type	Multi-unit Residential
Number of Units (2 bed)	2
Number of Units (3+ bed)	4
EP/Unit (2 bed)	1.76 EP/Unit
EP/Unit (3+ bed)	2.51 EP/Unit
EP	13.56
Average Dry Weather Flow (ADWF)	210 L/EP/Day
C_2 (C_2= 4.7 x $EP^{-0.105}$)	3.752
ADWF	2.848 kL/day or 0.033 L/sec
PDWF (C_2 x ADWF)	10.179 kL/day or 0.118 L/sec
PWWF (5 x ADWF)	14.238 kL/day or 0.165 L/sec
Design Flow	0.165 L/sec

Based on the above assessment it is envisaged that the proposed development will place a demand of 0.165L/sec during PWWF on the downstream sewerage network. An engineering services plan detailing the proposed sewerage infrastructure is included in Appendix C.

3.3 Proposed Sewerage Reticulation Works

The proposed multi-unit residential development will be serviced by the existing 225mm diameter AC trunk sewer located within the Arthur Street road reserve to the south via a new 150mm sewer property connection.

It is envisaged that the internal sewerage system sizing and detailed design will be undertaken by a Hydraulic Consultant with the proposed works subject to future Plumbing and Drainage approval. Any works required on Council infrastructure will be subject to detailed engineering design and future Operational Works applications and approval by Council.

4 Stormwater Drainage

The strategy and constraints associated with stormwater drainage were assessed as part of a separate investigation by Pinnacle and are not covered in detail within this report. We refer Council to the Site Based Stormwater Management Plan for the subject site prepared by Pinnacle for an in-depth analysis of the prevailing stormwater conditions.

A brief summary of the stormwater drainage elements is provided in the following sections of this report.

4.1 Lawful Point of Discharge

The Lawful Point of Discharge for the subject site is taken as the existing kerb and channel / stormwater network located within the Arthur Street road reserve fronting the subject site.

4.2 Existing Drainage Network

Currently, the stormwater runoff from the existing dwelling discharges to the Arthur Street kerb and channel via multiple kerb adaptor outlets. The balance of the site discharges via overland flow to the road reserve.

The existing stormwater network downstream of the site comprises of a pit and pipe system. The nearest Council gully pit is located within the Gold Coast Highway road reserve to the west of the subject site. An existing 1200mm x 1200mm manhole is located within the southern verge of Arthur Street, with the pipe downstream on the manhole being a 1050mm reinforced concrete pipe (RCP). This stormwater network ultimately drains to the west, discharging into the nearby canals.

4.3 Proposed Drainage Works

It is intended to utilise private infrastructure, as applicable and required, to attenuate and treat the site's stormwater discharge during the post-development scenario prior to discharge to the Lawful Point of Discharge.

In accordance with QUDM, the minor 10% AEP storm discharge (Q_{10}) will be conveyed to the Lawful Point of Discharge via a piped drainage network with the major 1% AEP storm discharge (Q_{100}) being conveyed by piped and overland flow.

For additional details on the prevailing stormwater drainage conditions, strategy and constraints please refer to the Stormwater Management Plan for the site prepared by Pinnacle.

Engineering services layouts detailing the proposed services for the site is included in Appendix C.

4.4 Flood Assessment

A search of Council's records and online interactive mapping system has confirmed that the subject site is located outside of the mapped flood affected area. An extract from Council's interactive mapping system is included within Appendix E.

5 Bulk Earthworks

5.1 Earthworks Design

Earthworks for the site will be designed generally in accordance with the requirements of the CoGC City Plan and as appropriate to the regulatory control and the Australian Standard for Earthworks for Commercial and Residential Development (AS3798-2007).

A preliminary site grading has been prepared for the proposed development and is included within Appendix C.

5.2 General Site Earthworks

A soil assessment report shall be prepared by a geotechnical engineer to provide guidance to the treatment of the subject site prior to and during the earthworks excavation and suitability for building foundation construction. It is intended that with minimal site earthworks the proposed layout will be achieved.

The key variables associated with the site's earthworks are the depth and distribution of the existing materials and the strength and depth profile of the substrata material. It is advised that the soil report for the site investigates these key items in depth to ensure that suitable soil treatments, accurate cost estimation and building design can be facilitated.

5.3 Erosion and Sediment Management

Due to the expected erosive soil onsite, erosion protection measures will be incorporated into the construction phase of the project with these measures being designed and documented as a part of the detailed civil works for the site in accordance with industry best practice and IEAust Guidelines.

Ultimately, during the operational phase of the project, the sediment management will be undertaken through the use of soft landscaping to ensure onsite erosion is kept to a minimum.

For additional details on the proposed preliminary erosion and sediment control strategy for the site, please refer to the Stormwater Management Plan for the site prepared by Pinnacle.

5.4 Acid Sulphate Soils

A review of Council's interactive mapping system has concluded that the subject site located outside of the mapped Acid Sulphate Zone.

6 Gas, Electrical and Telecommunications

A BYDA investigation was undertaken to confirm the location of existing gas, electrical and telecommunications services in the vicinity of the site.

The BYDA investigation confirmed the location of underground telecommunications infrastructure, owned and operated by Telstra and NBN, within the northern and southern verges of the Arthur Street road reserve to the south.

Similarly, overhead powerlines, owned and operated by Energex, are located within the northern verge of the Arthur Street road reserve along the site frontage.

The BYDA investigation has not revealed any existing gas infrastructure immediately adjacent to the subject site.

It is envisaged that the proposed development will connect to the existing services within the Arthur Street road reserve as outlined above. The connections to the electrical and telecommunications networks will be undertaken by specialist consultants during the detailed design phase of the project.

The BYDA data is included in Appendix D with the location of the existing telecommunications and electrical infrastructure shown on the engineering services layouts included in Appendix C.

7 Impacts on Local Infrastructure and Likely Upgrades

The proposed multi-unit residential development will result in minor additional loading on the surrounding local infrastructure.

Further discussions with the relevant service providers may be required to ascertain if there is sufficient residual capacity within the surrounding local infrastructure to accommodate the additional demands from the proposed development. Initial investigations indicate that there is sufficient capacity within the existing infrastructure to accommodate the proposed development.

The potential impacts on the local infrastructure and likely upgrades are summarised in Table 7.1 below.

Table 7.1: Local Infrastructure Impacts and Requirements

Infrastructure Type	Authority	Impacts	Connection and/or Upgrade Requirements
Water Reticulation	Gold Coast Water and Waste	Additional water loadings due to development	Connect to the existing 150mm AC water main located within the Arthur Street road reserve as required. A new large dual domestic meter and fire service assembly will be located on-lot and above ground in accordance with current Gold Coast Water and Waste and SEQ WS&S D&D Code standards.
Sewerage Reticulation	Gold Coast Water and Waste	Additional water loadings due to development	Connect to the existing 225mm AC sewer main located within the Arthur Street road reserve as required.
Stormwater	CoGC	Additional loading due to development	Treat and attenuate stormwater prior to discharge to the Lawful Point of Discharge being the Arthur Street road reserve as required.
Telecommunications	Telstra/NBN	New connections	New connection to existing telecommunications infrastructure located within the Arthur Street road reserve.
Electrical	Energex	New Connections	New connection to existing electrical infrastructure located within the Arthur Street road reserve.
Gas	APA Group	N/A	N/A

8 Reference Documentation

City of Gold Coast City Plan (Planning Scheme Policies) (CoGC, Version 11 2024)

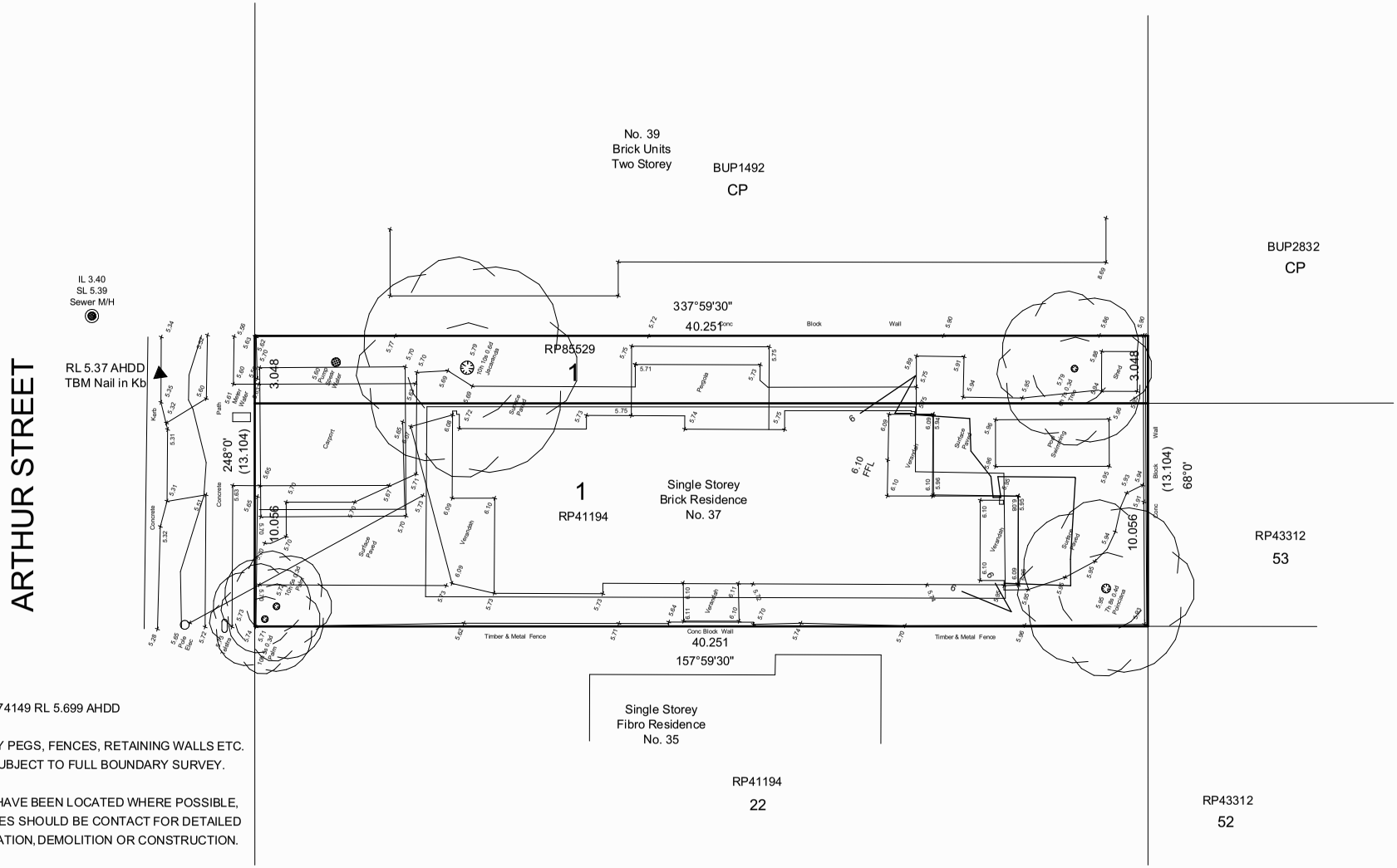
SEQ Water Supply and Sewerage Design & Construction Code – Version 2.0, Feb 2020

Water Services Association of Australia, 2014. “Sewerage Code of Australia. WSA 02-2014”, Second Edition, Version 3.1

Water Services Association of Australia, 2011. “Water Supply Code of Australia. WSA 03-2011”, Second Edition, Version 3.1

Appendix A

Proposed Development Plans



NOTES

DATUM - AHD DERIVED FROM PM74149 RL 5.699 AHDD

SHOWN LOCATION OF BOUNDARY PEGS, FENCES, RETAINING WALLS ETC. ARE DIAGRAMMATIC ONLY AND SUBJECT TO FULL BOUNDARY SURVEY.

ALL SERVICES SHOWN HEREON HAVE BEEN LOCATED WHERE POSSIBLE, HOWEVER RELEVANT AUTHORITIES SHOULD BE CONTACT FOR DETAILED LOCATION PRIOR TO ANY EXCAVATION, DEMOLITION OR CONSTRUCTION.

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ACN 109 294 260
SURVEYORS

24 GALAPAGOS WAY,
PACIFIC PINES QLD 4211

Correspondence to:
PO BOX 3060
NERANG MDC QLD 4211

Ph/Fax: (07) 55804205

Email: boydsurv@bigpond.net.au

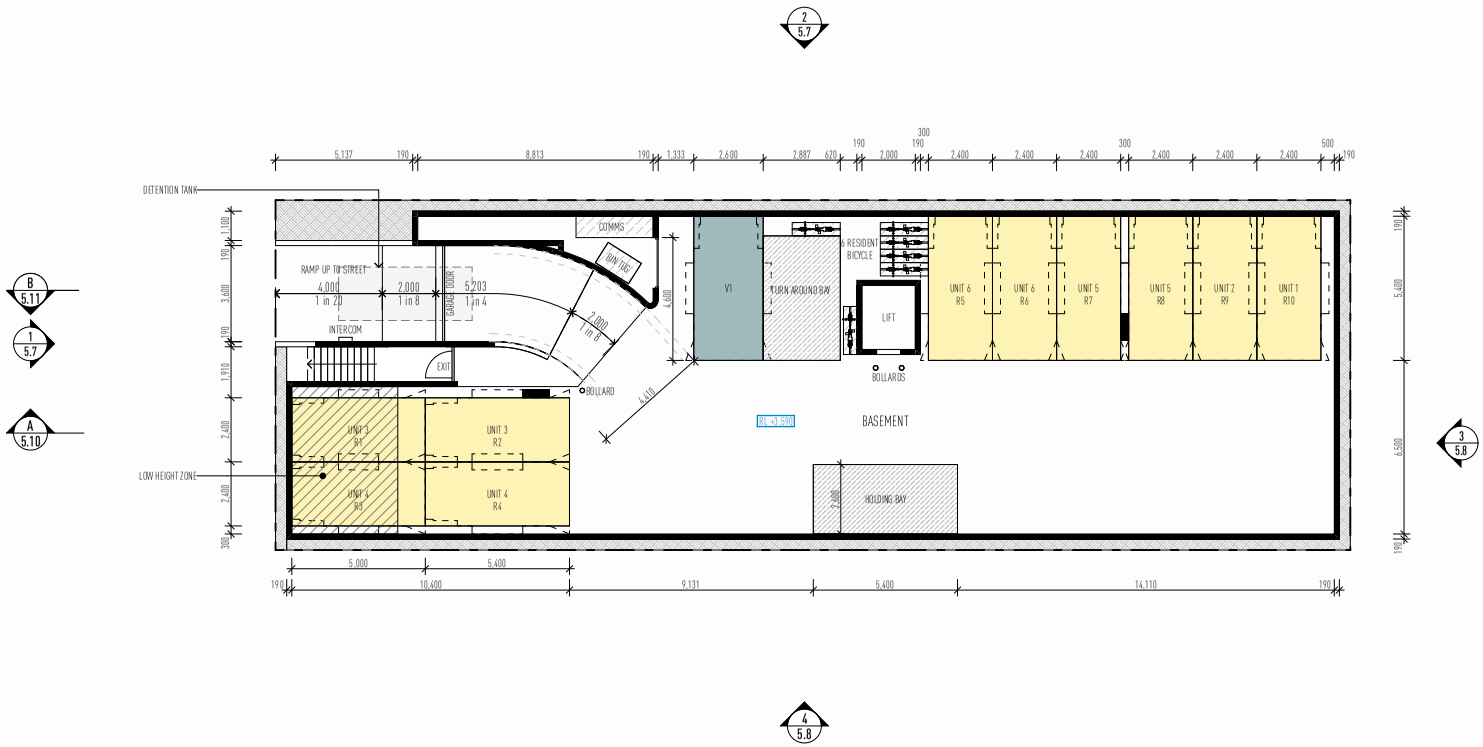
DETAIL SURVEY OVER LOT 23 ON RP41194 & LOT 1 ON RP85529

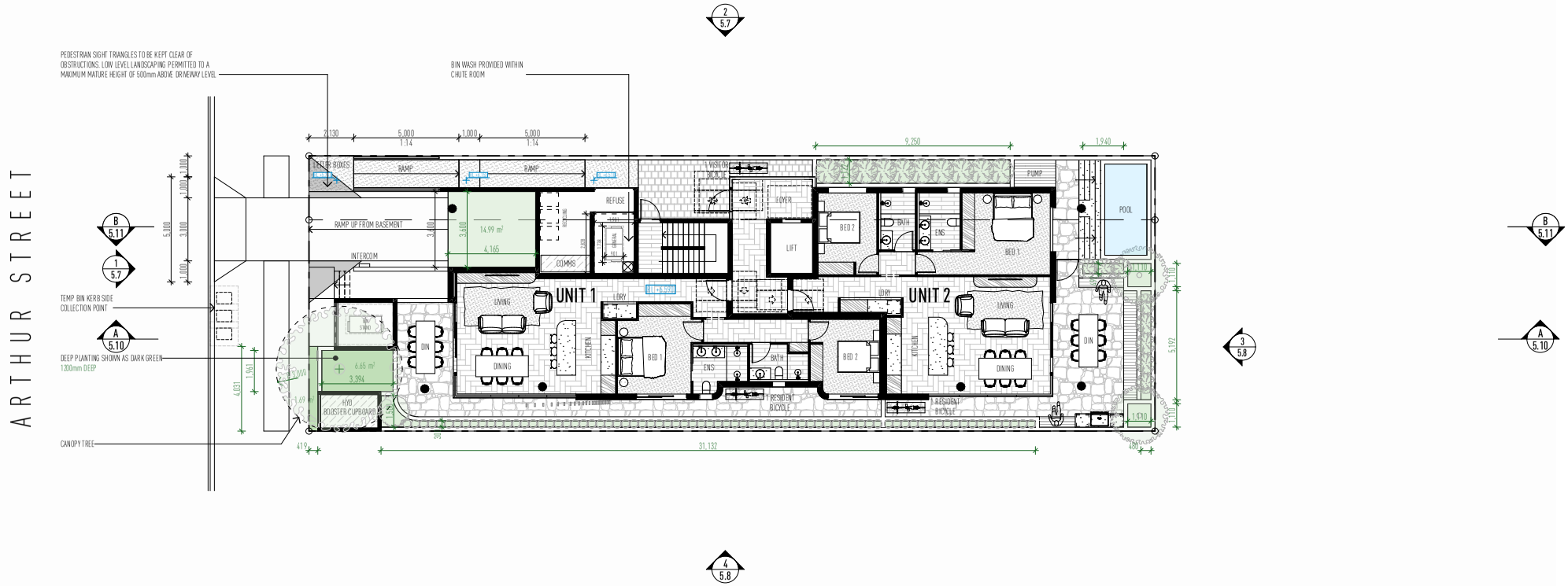
37 ARTHUR STREET,
MERMAID BEACH

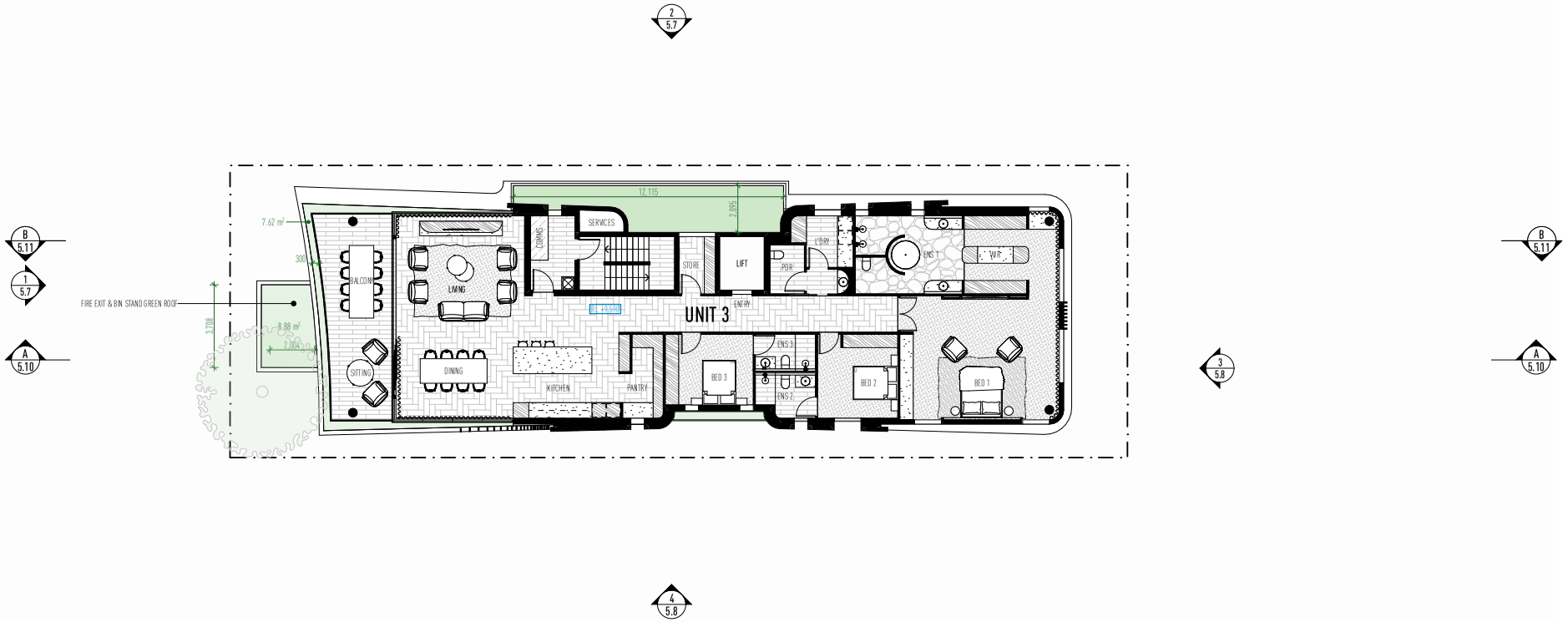
PARISH : GILSTON COUNTY : WARD

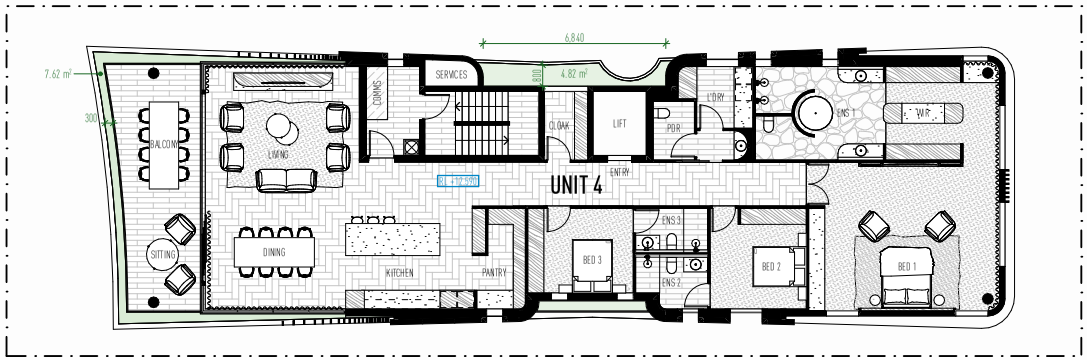
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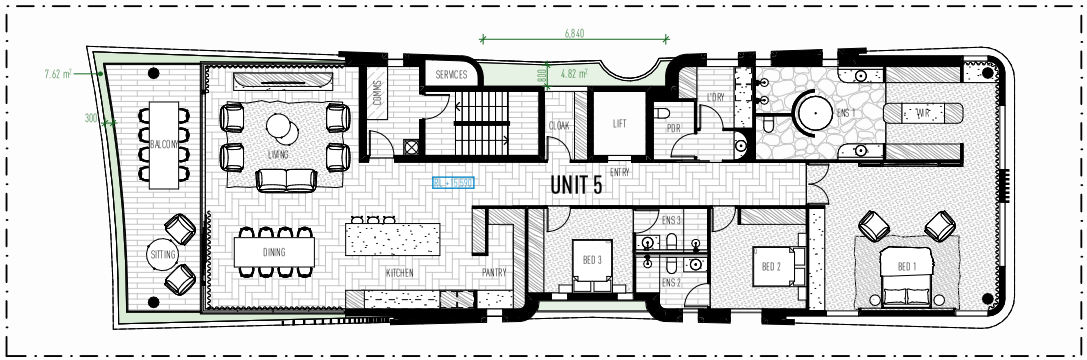
Floor Plan - Basement Level



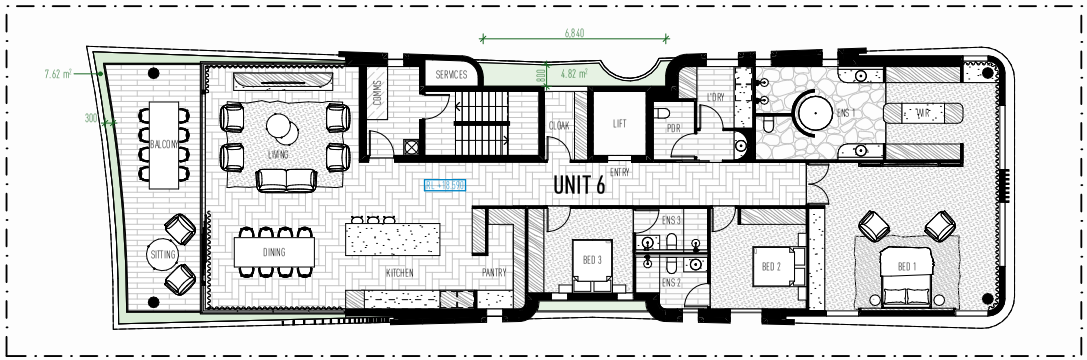

ARTHUR STREET
PEDESTRIAN SIGHT TRIANGLES TO BE KEPT CLEAR OF OBSTRUCTIONS. LOW LEVEL LANDSCAPING PERMITTED TO A MAXIMUM MATURE HEIGHT OF 500mm ABOVE DRIVEWAY LEVEL
BIN WASH PROVIDED WITHIN CHUTE ROOM
TEMP BIN KERB SIDE COLLECTION POINT
DEEP PLANTING SHOWN AS DARK GREEN 1200mm DEEP
CANOPY TREE
LETTER BOXES
RAMP
RAMP UP FROM BASEMENT
INTERCOM
REFUSE
COMMS
VISITOR
LOBBY
LIFT
POOL
PUMP
UNIT 1
UNIT 2
LIVING
DINING
KITCHEN
LDRY
BED 1
BED 2
ENS
BATH
RESIDENT BICYCLE
HYD BOOSTER CUPBOARD
31,132
2
5.7
B
5.11
1
5.7
A
5.10
3
5.8
4
5.8

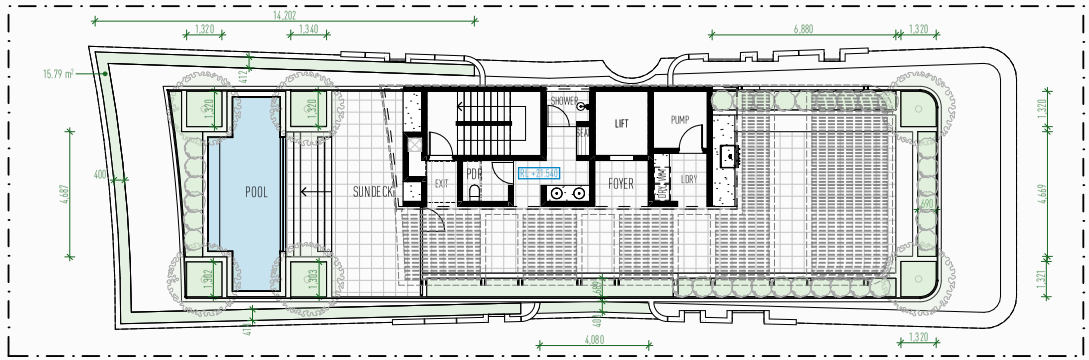

2
5.7
B
5.11
1
5.7
A
5.10
FIRE EXIT & BIN STAND GREEN ROOF
7.62 m²
3000
8.88 m²
2.004
3.708
BALCONY
LIVING
SITTING
DINING
KITCHEN
PANTRY
CURTAINS
SERVICES
12.115
2.095
STORE
LIFT
PDR
ENTRY
UNIT 3
LOBBY
ENS 1
WIR
BED 1
ENS 2
ENS 3
BED 2
BED 3
3
5.8
4
5.8
B
5.11
A
5.10

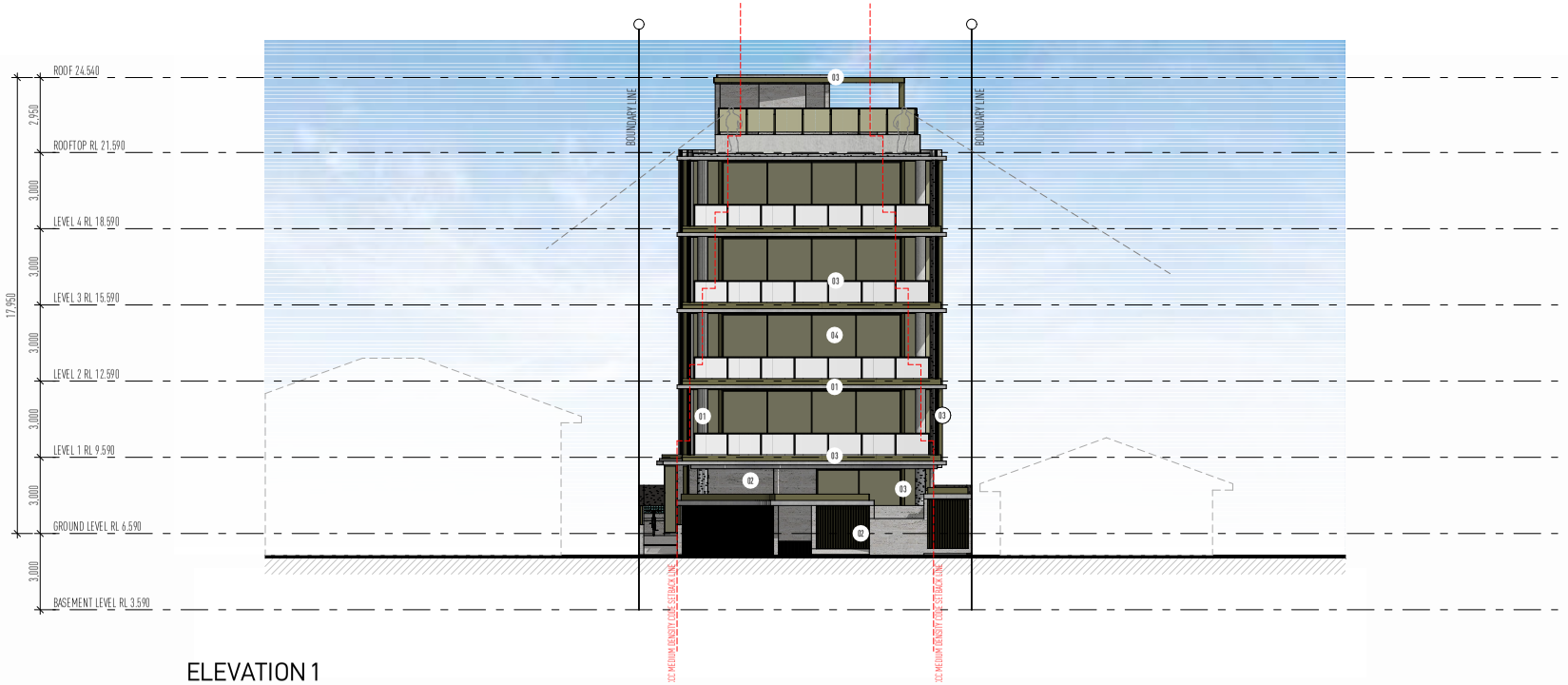

6.840
7.62 m²
300
BAL.CONST
LIVING
CURTAINS
SERVICES
4.82 m²
CL.OAK
LIFT
PDR
LDRY
ENS 1
WIR
UNIT 4
ENTRY
SITTING
DINING
KITCHEN
PANTRY
BED 3
ENS 3
ENS 2
BED 2
BED 1
2
5.7
4
5.8
B
5.11
1
5.7
A
5.10
3
5.8


6,840
7.62 m²
4.82 m²
300
BAL.CONY
LIVING
CORNS
SERVICES
CL.OAK
LIFT
PDR
L'DRY
ENS 1
WIR
ENTRY
UNIT 5
SITTING
DINING
KITCHEN
PANTRY
BED 3
ENS 3
ENS 2
BED 2
BED 1
2
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B
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1
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A
5.10
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5.8
4
5.8

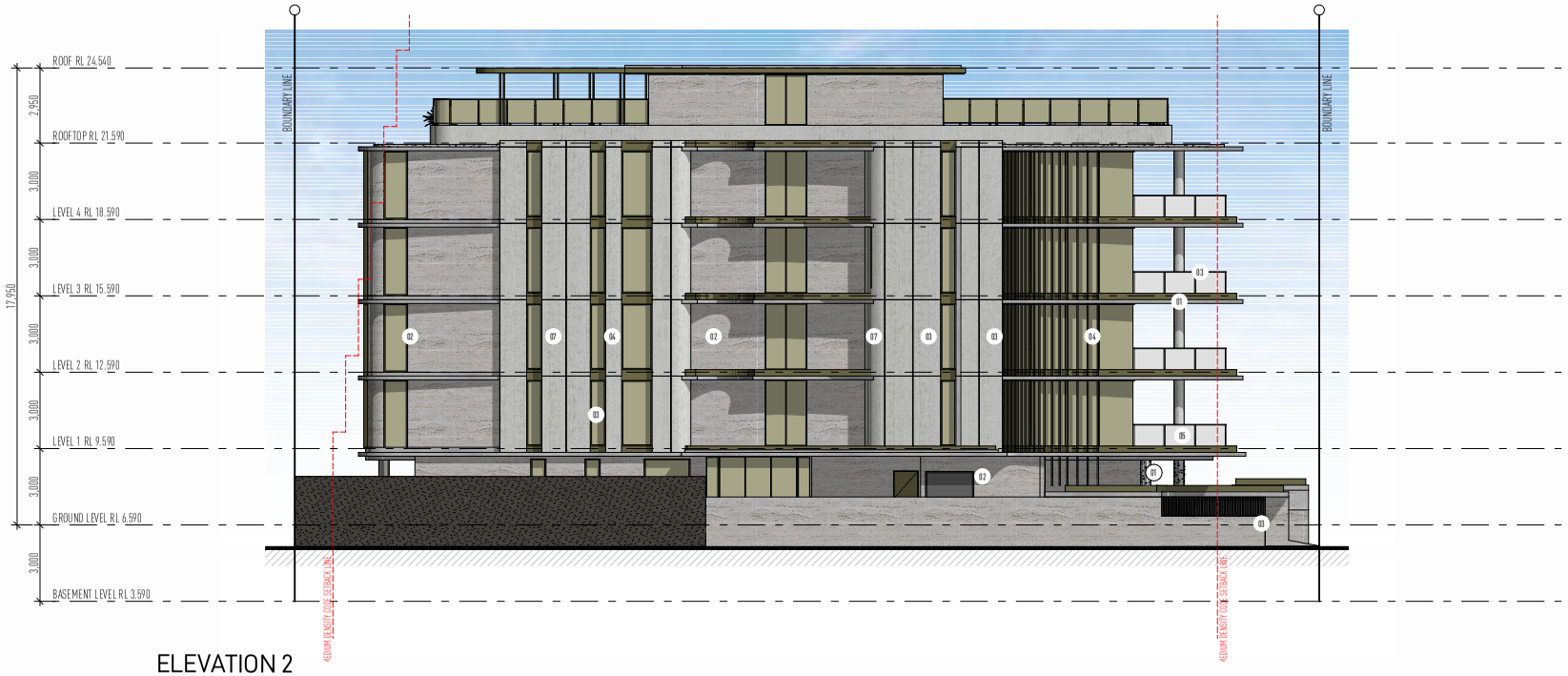
Floor Plan - Level 4




14,200
1,320
1,340
6,880
1,320
15.79 m²
POOL
SUNDECK
EXIT
PDR
SHOWER
STAIR
LIFT
PUMP
FOYER
LDRY
4,687
4,669
4,080
1,320
B 5.11
1 5.7
A 5.10
2 5.7
3 5.8
4 5.8



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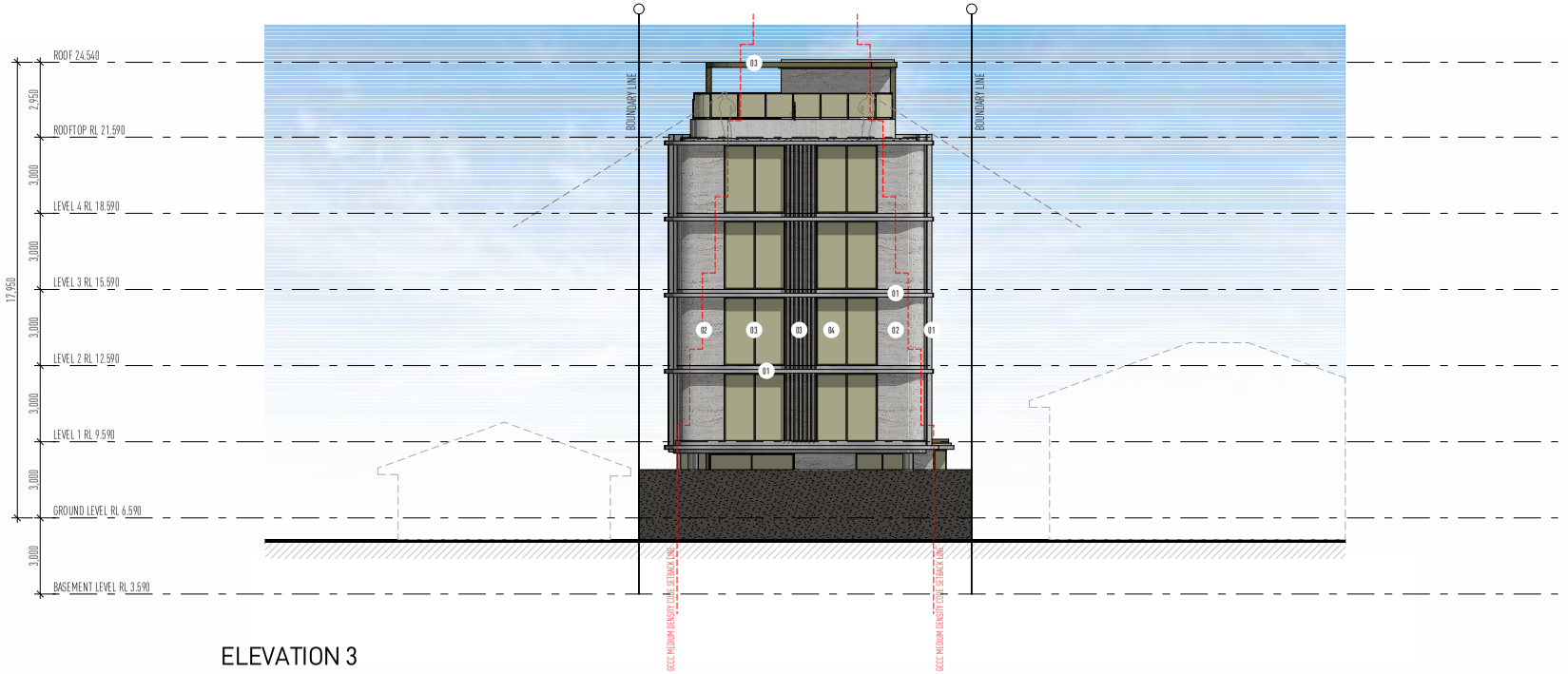


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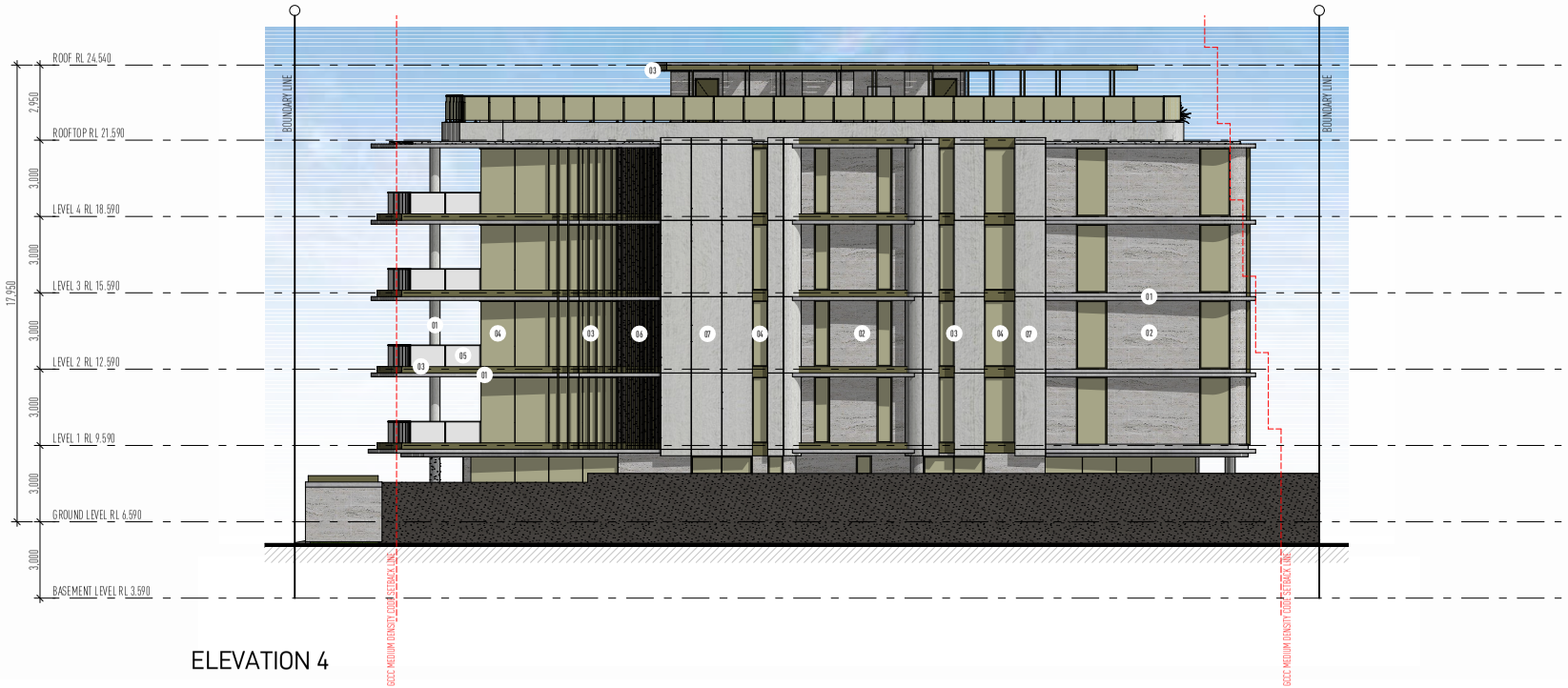
LEGEND

01. CONCRETE, OFF-FORM, CLASS 1
02. STONE, TRAVERTINE, 'WHITE'
03. WINDOW & DOOR FRAMES, BATTEN SCREENS, BALUSTRADE TOP RAIL, OUTSIDE EDGE PLANTERS. POWDER COATED 'NATURAL BRONZE'
04. GLASS, TINTED, 'BRONZE'
05. GLASS BALUSTRADE 'CLEAR'
06. RENDER, SLECT TEXTURE FINISH, DULUX 'KADE'S CABIN'
07. RENDER, SELECT TEXTURE FINISH, 'WHITE'

Elevations 3 & 4



ELEVATION 3

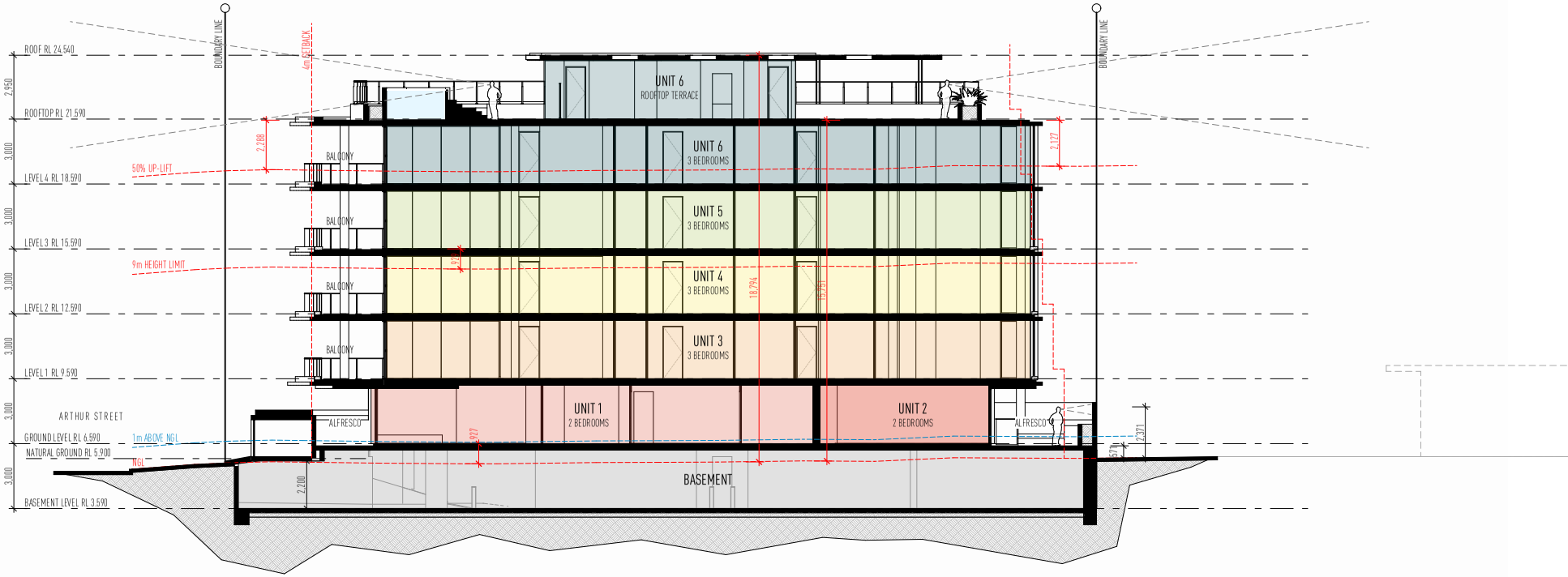


ELEVATION 4

LEGEND

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04. GLASS, TINTED, 'BRONZE'
05. GLASS BALUSTRADE 'CLEAR'
06. RENDER, SLECT TEXTURE FINISH, DULUX 'KADE'S CABIN'
07. RENDER, SELECT TEXTURE FINISH, 'WHITE'

Section A

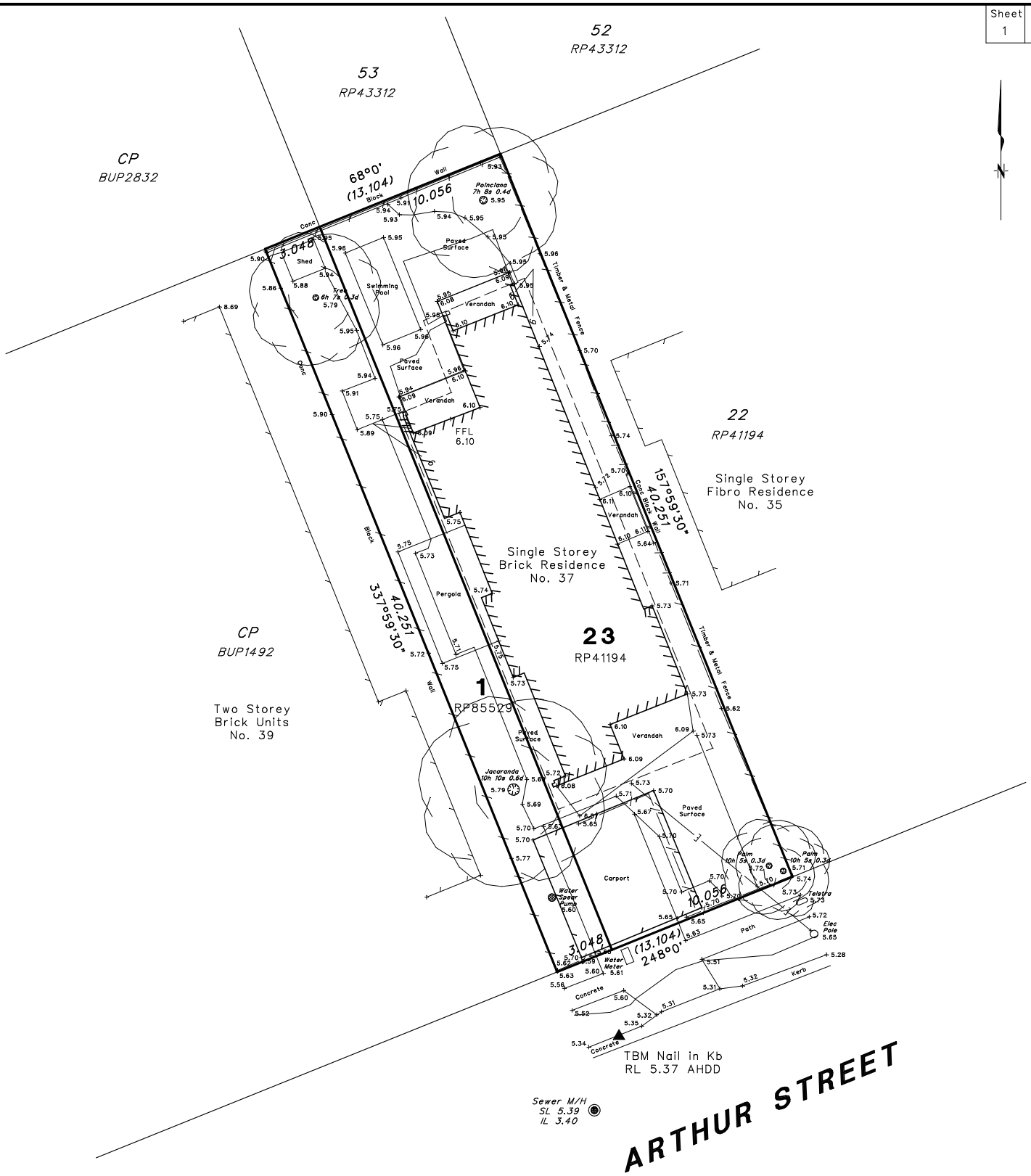

ROOF RL 24.540
ROOFTOP RL 21.590
LEVEL 4 RL 18.590
LEVEL 3 RL 15.590
LEVEL 2 RL 12.590
LEVEL 1 RL 9.590
GROUND LEVEL RL 6.590
NATURAL GROUND RL 5.900
BASEMENT LEVEL RL 3.590
2,950
3,000
3,000
3,000
3,000
3,000
3,000
BOUNDARY LINE
4m SETBACK
50% UP-LIFT
9m HEIGHT LIMIT
1m ABOVE NGL
NGL
ARTHUR STREET
UNIT 6
ROOFTOP TERRACE
UNIT 6
3 BEDROOMS
UNIT 5
3 BEDROOMS
UNIT 4
3 BEDROOMS
UNIT 3
3 BEDROOMS
UNIT 1
2 BEDROOMS
UNIT 2
2 BEDROOMS
BALCONY
BALCONY
BALCONY
BALCONY
ALFRESCO
ALFRESCO
BASEMENT
2,288
2,122
18,794
16,951
2,927
2,100
2,371
570

Section B


ROOF RL 24.540
ROOFTOP RL 21.590
LEVEL 4 RL 18.590
LEVEL 3 RL 15.590
LEVEL 2 RL 12.590
LEVEL 1 RL 9.590
GROUND LEVEL RL 6.590
BASEMENT LEVEL RL 3.590
2,950
3,000
3,000
3,000
3,000
3,000
3,000
BOUNDARY LINE
BOUNDARY LINE
50% UP-LIFT
9m HEIGHT LIMIT
1m ABOVE NGL
NGL
2,159
2,590
18,930
4m SETBACK
2,323
880
UNIT 6
ROOFTOP TERRACE
UNIT 6
ROOFTOP TERRACE
POOL
UNIT 6
3 BEDROOMS
UNIT 5
3 BEDROOMS
UNIT 4
3 BEDROOMS
UNIT 3
3 BEDROOMS
UNIT 2
2 BEDROOMS
UNIT 6
3 BEDROOMS
UNIT 5
3 BEDROOMS
UNIT 4
3 BEDROOMS
UNIT 3
3 BEDROOMS
BALCONY
BALCONY
BALCONY
BALCONY
POOL
BASEMENT
BASEMENT
DETENTION TANK
ARTHUR STREET
5,310

Appendix B

Topographic Survey



NOTES

DATUM - AHD DERIVED FROM PM74149 RL 5.699 AHDD

SHOWN LOCATION OF BOUNDARY PEGS, FENCES, RETAINING WALLS ETC. ARE DIAGRAMMATIC ONLY AND SUBJECT TO FULL BOUNDARY SURVEY.

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Michael Boyd
Director/Licensed Surveyor

0 50mm 100mm 150mm

BOYD & MOORE PTY LTD
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SURVEYORS

24 GALAPAGOS WAY, PACIFIC PINES QLD 4211
Correspondence to: PO BOX 3060 NERANG MDC QLD 4211
Ph/Fax: (07) 55804205
Email: boydsurv@bigpond.net.au

DETAIL SURVEY OVER LOT 23 ON RP41194 & LOT 1 ON RP85529

37 ARTHUR STREET, MERMAID BEACH

PARISH : GILSTON COUNTY : WARD

Scale:	1 : 200
Sheet Size :	A3
Date:	15/12/2008
Drawn:	MJB
REF :	638-1-A3

PINNACLE ENGINEERING GROUP

Appendix C

Engineering Layouts

LEGEND

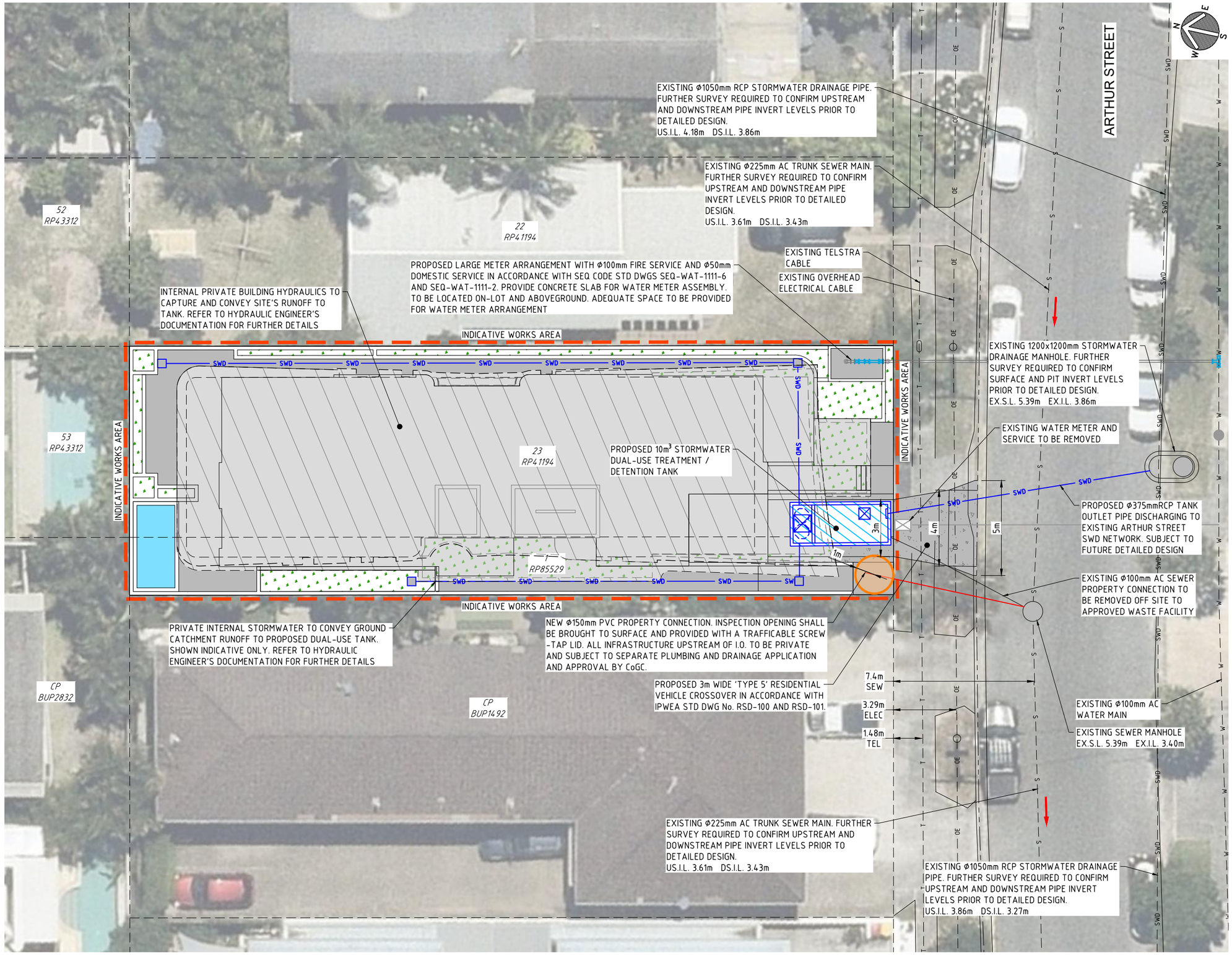
- EXISTING TELSTRA CABLE
- EXISTING SEWERAGE RETICULATION
- EXISTING WATER RETICULATION
- EXISTING STORMWATER PIPE
- EXISTING OVERHEAD ELECTRICAL
- EXISTING CONTOURS
- PROPOSED SEWERAGE RETICULATION
- PROPOSED WATER RETICULATION
- PROPOSED STORMWATER PIPE
- ROOF / BUILDING HARDSTAND AREA
- CONCRETE DRIVEWAY / PAVED AREA
- PERVIOUS AREA
- EXISTING LOT BOUNDARY
- INDICATIVE WORKS AREA
- SEWER RETICULATION FLOW DIRECTION

NOTES

1. THE LOCATION OF THE EXISTING SERVICES HAS BEEN PLOTTED FROM SURVEY AND RECORDS AND IS TO BE CONFIRMED PRIOR TO CONSTRUCTION.
2. THE FINAL ALIGNMENT AND SIZING OF THE SERVICES INTERNAL TO THE PROPOSED DEVELOPMENT IS PRELIMINARY ONLY AND SUBJECT TO DETAILED DESIGN AND FUTURE OPERATIONAL WORKS APPLICATIONS TO COUNCIL.

BEFORE YOU DIG www.byda.com.au

UNDERGROUND PUBLIC UTILITY PLANT EXISTS IN THIS VICINITY. THE CONTRACTOR IS ADVISED TO CONTACT THE RELEVANT AUTHORITIES TO CONFIRM THE EXACT LOCATION OF PUBLIC UTILITY PLANT ON SITE PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION OR CONSTRUCTION WORKS.



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PINNACLE ENGINEERING GROUP
LEVEL 1 19 SHORT STREET, SOUTHPORT QLD 4215
(PO BOX 517, PARADISE POINT QLD 4216)
WWW.PINNACLEENG.COM.AU

REV	DESCRIPTION	DRAWN	DATE
A	ORIGINAL ISSUE	J.H.	31.01.2025
B	ISSUED FOR APPROVAL	J.H.	01.04.2025

TASK	BY	INITIAL	DATE
REVIEW	M. BINGER		01.04.2025
DESIGN	J. HARDMAN		01.04.2025
DRAWN	J. HARDMAN		01.04.2025

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

(SCALE ABOVE DENOTES ORIGINAL SHEET SIZE - A1)

CLIENT: CUECORP PROPERTY GROUP PTY LTD

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT 37 ARTHUR STREET MERMAID WATERS QLD 4218 (LOT 23 ON RP41194 & LOT 1 ON RP85529)

DRAWING TITLE: ENGINEERING SERVICES LAYOUT

STATUS: PRELIMINARY (NOT TO BE USED FOR CONSTRUCTION)

APPROVED RPEQ No

DRAWING NUMBER: PEG1310-DA-SK05 REVISION: B

PEG1310-DA-SK05 ENGINEERING SERVICES LAYOUT.dwg 01.04.2025 setter @ A3 x 1:1.00 by/Nick Jessie Hardman

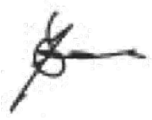
Appendix D

BYD Data

Guidelines for Works Near Existing Gas Assets

400-STD-AM-0001

Revision 2

OWNER NAME:	Alan Creffield
OWNER TITLE:	Manager of Integrity
APPROVER NAME:	Anastasia Coutie
APPROVER TITLE:	Team Lead – 3rd Party Engagement
APPROVAL SIGNATURE:	
APPROVAL DATE:	18/08/2023

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DOCUMENT CONTROL & APPROVAL INFORMATION

Summary of Changes

Below is a brief summary of the changes made to the document since the previous issued version.

Revision	Description	Date	Author
0.0	Issue for Use	29.06.2018	Matthew Read
1.0	Issued for Use – document periodic update / major overhaul	01.03.2022	Kahil Parsons
2.0	Removal of incorrect table 2 references to 1. proximity of HV cables 2. Updating separation distances to AS2885.3 BYDA reference update Table 4 Note	16.08.2023	Dale Russell

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The purpose of this document is to provide guidelines for third parties planning to install new infrastructure or conduct works near existing APA Networks (**APA**) operated assets.

It is intended that this document will be provided to third parties proposing works around existing gas assets for their use during the design and planning phase following initial planning BYDA enquiries. This document does not provide authorisation to undertake the works but provides APA requirements to ensure that any review and acceptance of proposed works is completed as quickly as possible.

1 INTRODUCTION

1.1 Scope of this Document

This document addresses APA's requirements for considering how a third party's proposed works and APA managed works may impact APA Networks operated assets under the following parts:

Part 1 – APA Notification and Authorisation Requirements

Part 2 – Design and Asset Protection Requirements

Part 3 – Construction and Land Use Requirements

Part 4 – Alteration of Existing Gas Assets

APA Networks acts as the asset operator on behalf of entities Australian Gas Networks (**AGN**), Allgas, APA, Origin and Queensland Nitrates (**QNP**) and operates in New South Wales, Northern Territory, Queensland, South Australia and Victoria. The criteria provided in this document only applies to the assets managed by APA Networks on behalf of these companies.

APA also owns and operates natural gas transmission infrastructure on all mainland states and territories of Australia. These assets are operated by a separate APA entity and are out of scope for this document.

A glossary of all terms and abbreviations used in this document is contained in **Section 7**.

A list of all relevant external standards and APA reference documents is contained in **Section 8**.

1.2 Asset Types

APA Networks' operated gas assets include buried pipe, above and below ground stations (e.g. pressure regulation, valves, meters), electrical cables, cathodic protection systems (e.g. test points, anode beds), pits and electrical cabinets. Depending on the gas type and the operating pressure, gas assets are classified as natural gas transmission, natural gas distribution and Liquefied Petroleum Gas (**LPG**) distribution as shown in **Figure 1**.

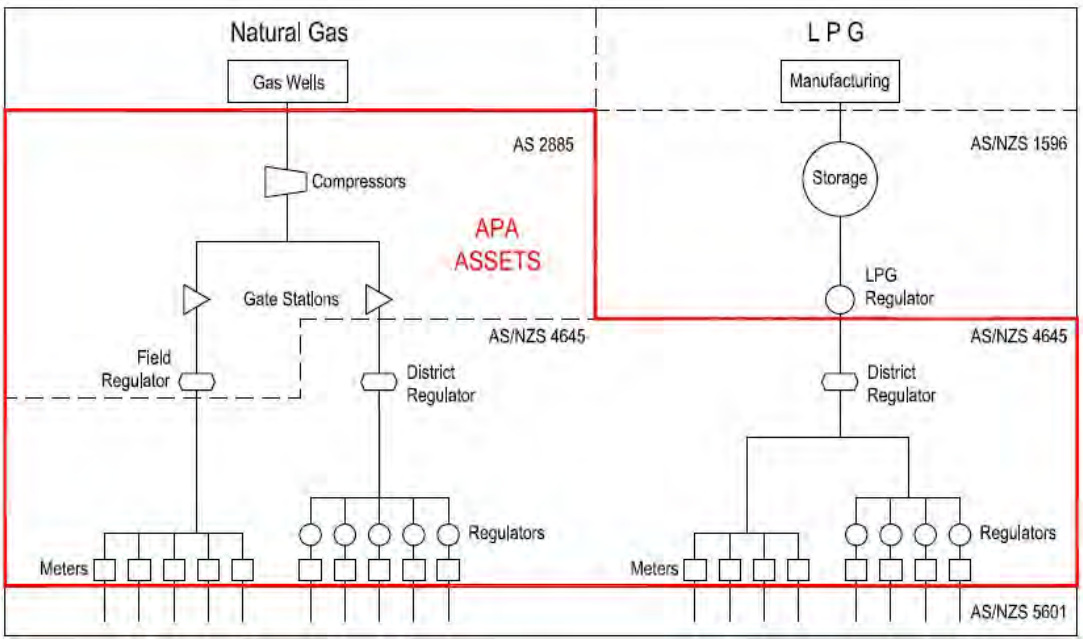


Figure 1 Asset Types and Standards Operated by APA Networks

1.2.1 Natural Gas Transmission

Natural gas transmission pressure assets operate at pressures above 1,050 kPag, and are generally used for transporting large quantities of gas across country. Design, construction and operation of these assets is governed by the AS 2885 suite of Australian Standards (**AS**).

Due to the higher pressure and energy density, there are severe safety, supply and environmental consequences which can result from third party interference. Hence, more stringent requirements and controls are applied to third party works in the vicinity of these assets.

Buried transmission pipelines are constructed from coated steel pipe where the appearance can vary depending on the year of construction, but will generally appear as yellow, black or grey when physically exposed.

1.2.2 Natural Gas Distribution

Natural gas distribution pressure assets operate at pressures below or equal to 1,050 kPag from offtakes of transmission pressure assets, and are generally used to supply consumers such as businesses and homes. Design, construction and operation of these assets is governed by the AS/NZS 4645 suite of Australian Standards.

Due to the lower energy density compared to transmission assets, less stringent requirements and controls are applied to distribution assets. Some distribution assets are deemed critical by APA Networks due to the safety and supply implications that may arise due to a third party strike. These critical distribution assets will be defined on BYDA responses, and some of the controls which are applied to transmission pressure assets (e.g. permit and site watch) will be required.

Buried distribution pressure pipes may be constructed from the following materials and physical appearances when exposed:

- Cast Iron (black);
- Polyethylene (**PE**) (yellow or black with yellow stripes);
- Steel coated or uncoated (generally yellow, black or grey); and
- Other plastic such as Polyvinyl Chloride (**PVC**) or nylon (yellow).

Some legacy materials such as cast iron and nylon may require additional protection during construction works due to the unpredictable nature of the materials.

1.2.3 LPG Distribution

LPG distribution pressure assets operate at pressures below 140 kPag from storage compounds and are generally used to supply consumers such as businesses and homes in parts of Queensland, South Australia and Northern Territory. Design, construction and operation of these assets is governed by the AS/NZS 4645 suite of Australian Standards.

Additional safety considerations are required in addition to the requirements for natural gas, as LPG is heavier than air and will pool at the leak point and can accumulate in a trench or excavation.

The same materials used for buried distribution pressure pipes (**Section 1.2.2**) may be used on LPG distribution networks.

1.3 Damage and Emergencies

If you smell gas or damage has occurred, or is suspected, on any gas asset call APA emergency number **1800 GAS LEAK (1800 427 532) or 1800 808 526 for LPG assets**.

Any unreported damage has the potential to escalate and endanger public safety.

Where damage has resulted in a release of gas, you are advised to take the following immediate action:

- Clear the area of all people. Do not under any circumstance re-enter the damage area;
- Where safe to do so, shut off or remove all ignition sources and devices in the area e.g. naked flames, vehicle engines, power tools, mobile phones;
- Do not attempt to stop the flow or repair the damage:
- Allow the gas to vent to air; and
- Once clear of the area, contact the emergency number **1800 427 532** or **1800 808 526 for LPG assets**.

The conditions in this document or as provided by APA Networks are intended to protect the gas assets as well as keep safe any construction crews or general public in the vicinity. Depending on the circumstances, some variation to the conditions in this document may be required or may be provided by an approved APA Networks site watch representative. It is legislated in all jurisdictions that the direction provided by APA is followed.

1.4 General Duty of Care and Responsibility to Obtain Information

Anybody working near a gas asset, or responsible for such work, has a duty of care to exercise caution, to maintain a safe working environment and to meet requirements of all relevant laws and Occupational Health and Safety legislation.

For general enquiries about results from BYDA please contact:

- DBYDNetworksAPA@apa.com.au for Northern Territory, South Australia, Southern New South Wales and Victoria, and;
- PermitsQLD@apa.com.au for Queensland and Northern NSW (incl. Tamworth).

The third party shall make contact with APA through the BYDA process if any clarification is required to determine the approval processes for any proposed land use changes (within the Measurement Length), design works and construction activities within 3 m of a gas asset or within a pipeline easement.

Any works proposed by the third party will only be authorised if APA is satisfied that the works will not affect the integrity of the APA Networks operated assets.

Any person undertaking work near an APA Networks operated asset, or responsible for such work, must ensure that they familiarise themselves with APA requirements.

Working around any gas asset, especially transmission pressure pipelines, without appropriate planning and controls as specified by APA Networks can be extremely dangerous. Damage to a gas asset could result in:

- Possible explosion and fire with the risk of loss of equipment, property, personal injury, and death;
- Loss of gas supply to thousands of customers;
- Substantial repair and gas restoration liability costs to the authority or principal responsible; and,
- Prosecution under the relevant laws governing pipeline and gas safety.

Prior to the commencement of any works within the Protected Zone of transmission pressure or critical gas assets, the Contractor performing the work must receive an Authority to Work Permit (ATWP).

Any works within the Protected Zone of critical assets must comply with any conditions attached to an ATWP and depending upon the nature of the asset and works supported by an approved construction methodology.

Written authorisation in the form of the ATWP must be kept on site at all times, and the holder of the authorisation must comply with all the conditions of the ATWP. The performance of any works near critical APA Networks operated assets without a valid ATWP and full compliance with its conditions will constitute a safety incident and may also result in an infringement notice and associated penalties issued by the regulator of the APA Networks asset.

1.4.1 Additional Transmission Pressure Pipeline Requirements

Where the works proposed by the third party may result in a change in land use within the Measurement Length for a transmission pressure pipeline (as defined in AS/NZS 2885.6 for Pipelines – Gas and Liquid Petroleum), such works may also be subject to formal approval requirements through APA Networks and applicable local and state government planning processes. This may also require a Safety Management Study (**SMS**) Report to be completed and approved by APA Networks. The SMS Report is generated from an SMS workshop involving an SMS facilitator, the third party and APA Networks. APA Networks is the owner of the SMS Report and any resulting recommendations/ actions must be implemented to the satisfaction of APA prior to the commencement of any physical works.

Certain categories of development/ land use change are not appropriate to be located within the Measurement Length of transmission pressure pipelines. In certain circumstances, the otherwise unacceptable risks associated with such developments may be alleviated with the aid of installing protective slabbing over the asset or undertaking other protection and mitigation measures.

2 PROTECTION PROCESS

APA is committed to working cooperatively with third parties to ensure that existing gas assets will be appropriately protected from any proposed works.

The process to be followed for any proposed works is outlined in **Table 1**. This table cross references the relevant section of this document which provides any specific requirements for each gas asset classification. The steps in this table are to be followed in conjunction with the process outlined by BYDA[1], a flow chart is also provided in **APPENDIX A**.

Table 1 Protection Process Summary

Section	Step	Purpose
3	**Notification and Authorisation**	**Identify and locate existing gas assets in the vicinity of any proposed works.** Submit BYDA requests to obtain indicative plans of gas assets. Notify APA Networks and obtain approval to verify the exact position by physically proving the position of gas assets at the cost of the third party.
4	**Design and Protection Requirements**	**Review APA Networks design and protection requirements for any proposed infrastructure near gas assets.** If acceptable clearance is available in accordance with this section review impact of construction methodology on existing gas assets. If acceptable clearance is not available in accordance with this section and the proposed infrastructure cannot be modified, alteration or protection of the existing gas assets will be required at the cost of the third party.
5	**Construction and Land Use Requirements**	**Review construction methodology for adverse impact to existing gas assets.** Some additional protection measures may be required depending on the existing gas assets, the construction methodology and whether land use changes are required. If works meet the requirements of this document, submit work package to APA Networks for review and approval. If approval is given, then undertake works in accordance with APA Networks conditions/ permits. If approval is not given modify work package accordingly. If works do not meet the requirements of this document or APA Networks approval cannot be reached, alteration or protection of the existing gas assets will be required.
6	**Alteration**	**Request alteration of existing gas infrastructure if there is insufficient clearance or construction methods will adversely impact existing gas assets.** Alteration of existing gas assets are fully recoverable and may result in delays if not identified early.

2.1 Assessment Information

Throughout the protection process, APA Networks assessment may be required to determine if the proposed works/ installation has sufficient separation or if work can be undertaken with a suitable construction methodology. If APA Networks assessment is required, the following information must be provided to enable an efficient and comprehensive review.

- Due dates or a work program;
- The location / address and extent of proposed works;

[1] BYDA process is available at https://www.1100.com.au/safety-information/digging-safely/

- Scope / description of the work impacting APA assets;
- A work package containing detailed design or construction issue drawings with the location of APA assets and the extent of works marked and / or georeferenced. Sufficient details must be provided on the plans to verify locations against APA information, which is typically measured from property boundaries. Plan and cross sectional drawings are typically required, including any proving locations;
- The proposed construction methodology (if available); and
- For critical assets only, a completed permit request form. This form is automatically provided in response to a BYDA enquiry when it is required, with direction for this form included in the BYDA response (refer to **Section 5.2**).

If the information provided is incomplete, or irrelevant information is provided, it may result in a delay of the assessment process and provision of a response. Due to the varying nature of potential works, it is not possible to develop a comprehensive listing of information that will be required for each work type, but the above is provided as a general guideline for what will normally be required.

3 PART 1 - APA NOTIFICATION AND AUTHORISATION REQUIREMENTS

3.1 BYDA Request

The fastest method for obtaining APA Network gas asset locations is to lodge a BYDA request. A response can be expected from APA within two business days, and may include one of three responses as outlined in **APPENDIX A**, depending on the location of the works in relation to existing APA operated gas assets in the vicinity.

For some BYDA requests, APA Networks may provide different responses to different assets affected by the proposed works. In all instances it is the responsibility of the third party to review and follow the direction of all BYDA responses.

The information provided by APA Networks in response to a BYDA request, along with any other plans or subsequent information provided by APA, show only the indicative location of the asset at the time and are a guide only. In most instances it will be necessary to prove the location of all buried assets within the proposed work area.

The following items must be considered when using asset information provided by APA Networks:

- Gas service lines from buried distribution pressure supply mains to consumers may not be shown on plans. Service lines are usually laid at right angles from main to a meter position, except where road conduits are provided; and
- Plans become rapidly outdated and so should be used within 30 days and then destroyed. It is the responsibility of the third party to contact APA Networks to seek the updated or renewal of any information after this time.

APA shall not be liable or responsible for the accuracy of any information supplied.

3.2 Provings and Site Identification

Electronic location (e.g. ground penetrating radar, pipe locators) of gas assets is required to verify the onsite locations and any plans that have been provided.

Physical proving of existing gas assets is required at key locations to verify that the separation and protection criteria provided in this document have been achieved. The location and quantity of provings will depend on the scope of proposed work, but provings will at least be required at infrastructure crossing points or where changes to surface level condition are planned.

Additional verifications are required for works parallel and in close vicinity to existing gas assets. Physical provings at maximum 10 m intervals along straight sections of pipe, along with all bends, branch lines and customer service offtakes to verify asset locations.

Note: Live service offtakes which no longer supply consumers may protrude from the gas asset and are not traceable or identifiable from records.

Note: The maximum physical proving intervals for straight sections of pipe may be adjusted based upon the discretion of APA personnel for extenuating circumstances.

The following items must be considered when proving the location of an existing gas asset:

- Provings must be conducted safely and in accordance with the requirements of **Section 5.5.2.** If damage to a gas asset does occur it should be reported immediately to APA as described in **Section 1.3**.
- Permit and site watch by an APA Networks representative may be required for some proving activities in accordance with **Section 5.2**.

3.3 APA Notification and Authorisation Process

Prior to the third party undertaking any works/ activities or as part of the planning and design phase, the third party shall ensure a BYDA request is submitted. The automated response received from the BYDA system will be tailored based on the criticality of the assets.

For assets operated at distribution pressures and not considered critical mains, a Duty of Care Notice is provided with the BYDA response for the third party to consider. Site watch may be necessary under a duty of care notice where additional protection or other integrity concerns require it.

In the event that works are conducted within the Protected Zone of a transmission pipeline and/ or critical distribution main, these works will require a review approval received from APA prior to commencement of works. Works subject to this requirement are deemed to include, but not limited to, the following activities that fall under **Table 3**;

- Non Destructive Digging (**NDD**);
- Mechanical excavation including trenchless excavation i.e. drilling (boring, horizontal direction drilling (**HDD**), pipeline bursting and tunnelling) for installing infrastructure such as the following; o Roadways, driveways, railways, pavements;
    - o Electrical equipment (cables, overhead transmission lines, telecommunication cable or power poles);
    - o Installation of culverts/ pipes (water, drainage, sewer or reticulation); o Landscaping.

APA will not approve certain activities and structures in the transmission pipeline easement (if applicable), including the following;

- Permanent storage;
- Installation of billboard structures;
- Use and storage for explosives, flammables or corrosives;
- Blasting;
- Structures forming part of any house, house extensions, carports or entertainment areas;
- Dams and other manmade water features. Locations of dams off the pipeline easement/ protected zone must not create run off or drainage towards the pipeline easement;
- Chemically treated effluent coming in contact with the pipeline easement/ protected zone;
- Garbage, sand fill, refuse disposal;
- Airstrips.

The Third Party must submit an enquiry to APA at the earliest possible stage to allow sufficient time for assessment. Submissions should include the following information;

- Land description and map identifying location of the proposed works;
- Types of works to be carried out;
- Intended future use of the land (where relating to change in land use)
- Type and weight of machinery that will be used;
- Any plans or diagrams of the works;
- Timeframe for the works.

The sequence of obtaining APA approval is as follows;

a) Submit enquiry for Initial Review – The Third Party submits the request prior to works commencing and APA Networks will complete an ‘Initial Review’. The third party must not progress any works on site until they receive a response from APA Networks. The two possible outcomes of this stage are a ‘No Impact’ response or;

b) Enquiry Escalated for Standard Assessment – The request will be forwarded to APA Networks Field or System Operations personnel for a more detailed appraisal, which may involve contacting the third party, site visits, locating of assets of site, and/or request for additional information. The third party must not progress any work on site until they receive a response from APA Networks. The two possible outcomes of this stage are a ‘No Objection under standard conditions’ response or;

c) Enquiry Escalated for Engineering Assessment – The request has been forwarded to the Integrity Third Party Engagement team for additional appraisal and determination of specific conditions. The third party must not progress any works on site until they receive a response from APA Networks. The two possible outcomes of this stage are a ‘No Objection under special conditions response’ or;

d) Enquiry Escalated for Alteration – The Integrity Third Party Engagement team triggers the alteration process for this enquiry. The third party will be contacted for additional information and must not progress any work on site until they receive a response from APA Networks.

e) No Impact – The third party receives a 'No Impact' response and can proceed with the works under appropriate APA Networks requirements e.g. Duty of Care, Authority to Work Permit and/or Site Watch.

f) No Objection Under Conditions – The third party will receive a No Objection under standard or special conditions response and can progress with the planning of the works under the conditions specified in the response and appropriate APA Networks requirements e.g. Duty of Care, Authority to Work Permit and/or Site Watch.

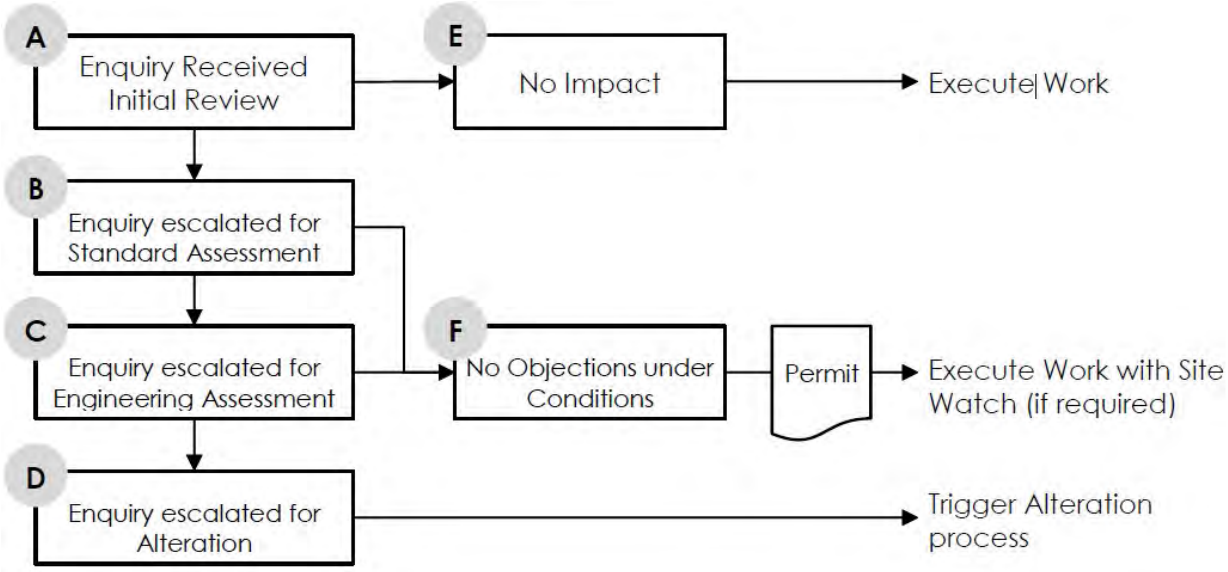


Figure 2 Stages for Third Party Works Authorisation Request

For works around APA Networks transmission pipelines or critical mains the documents take precedence in the following order;

- APA Authority to Work Permit (**ATWP**)
- APA accepted Third Party Construction Drawings
- APA accepted Third Party Construction Methodology
- APA Networks Guidelines for Works Near Existing Gas Assets (this document)
- APA accepted Third Party Safe Work Method Statement (**SWMS**) (if applicable)

3.4 Commercial Agreement and Service Delivery

APA will undertake a review of Third Party Works, as required. At APA's discretion cost recovery for these works may be required. Where APA Networks requires cost recovery a commercial service agreement in the form of a Works Agreement will be required.

Note: Any third party works requiring blasting, seismic and/or tunnelling work near APA Networks operated assets will not be considered "low risk" and cost recovery for detailed review maybe required.

3.5 Decommissioned Gas Assets

Decommissioned gas assets that remain in the ground are not always shown on BYDA plans.

Where unknown assets are identified or suspected on site but are not on APA plans, they must be treated as being live. In this instance, the third party must contact all utility owners and operators in the area of the BYDA and notify them of the findings.

Following review, if APA accepts that it is a decommissioned gas asset, the asset must be treated as per the requirements of this document. APA will take no further action where it is not considered to be a decommissioned gas asset.

In some cases, decommissioned gas assets are required for future use by APA (sometimes noted as “Idle” on APA plans). These assets must be treated as live using the same criteria outlined in this document, and must not be removed or altered without APA’s express written approval.

Where APA confirms there is no future use of a decommissioned gas asset (sometimes noted as “Abandoned” on APA plans), removal of the asset can be undertaken by the third party under the following conditions:

- For assets considered by APA to be decommissioned gas assets, APA must be engaged to verify that the asset is gas free;
- End caps must be permanently sealed, using an APA approved methodology, on any decommissioned sections that are to be left in place to prevent future water ingress into the remaining sections of the decommissioned gas asset;
- An as-built drawing must be submitted by the third party for any section(s) of a decommissioned gas asset removed by the third party or its sub-contractors to ensure BYDA can be updated accordingly; and
- Payment for costs associated with any verification or alteration activities must be provided prior to APA undertaking works.

4 PART 2 - DESIGN AND ASSET PROTECTION REQUIREMENTS

4.1 Standard Clearances

Minimum clearance dimensions outlined in this section must be met to allow for safe future maintainability and protection of existing gas assets. If separation clearances cannot be achieved, APA will review the proposed infrastructure on a case-by-case basis to determine whether a resolution can be achieved before alteration of any existing gas assets is considered. Authorisation of works by APA is still required, regardless of being able to achieve the required separation distances.

Clearances specified in **Table 2** are measured from the closest edges of the existing gas asset to the proposed infrastructure. Depending on the exact nature of proposed infrastructure, additional clearance may be required.

Note: Clearances specified herein are from gas assets, third party utilities may have their own standard separations that exceed APA's minimums specified in **Table 2.**

The future access zone required around a gas asset depends upon a number of factors such as size, operating pressure, depth and soil conditions, but typically this access zone is at least 1000 mm either side and 700 mm below the gas asset. As an aid for design and / or installation, the minimum clearances presented in **Table 2** are provided to allow for safe future access to gas assets. These minimum clearances assume that the asset have been proven and the location verified. There may be circumstances where additional clearances are required.

Table 2 Minimum Clearances

Clearance Type (Note 2, 9)	Minimum Transmission Pressure Asset Clearance	Minimum Distribution Pressure Asset Clearance
Any installation up to 0.6 metres wide which is crossing the gas asset	500 mm Vertical **(Note 2)**	300 mm Vertical **(Note 2)**
Any installation over 0.6 metres wide which is crossing the gas asset	500 mm Vertical	300 mm Vertical **(Note 2)**
Any installation laid by trenchless excavation e.g. HDD, boring, etc.	3000 mm Vertical	600 mm Vertical
	Refer to **Section 5.6** for minimum horizontal separation distances	
Any installation laid parallel to a steel gas asset	600 mm Horizontal **(Note 2, 3)**	
Any installation laid parallel to any gas asset other than steel	N/A	300 mm Horizontal **(Note 2, 3)**
Trenching separation from edge of gas asset to edge of trench **(Note 4)**	500 mm Horizontal	300 mm Horizontal
Underground electrical cables laid parallel to any gas asset other than steel	N/A	300 mm Horizontal
Electrical conduits and cables (<11 kV) laid parallel to a steel gas asset	Engineering assessment required **(Note 2, 3)**	
Electrical conduits and cables (≥ 11kV) laid parallel to a steel gas asset	**(Note 2, 3)** Engineering assessment required **(Note 7)**	

Electrical earthing systems near a steel gas asset	High Voltage: Engineering Assessment Required Low Voltage: 300 mm Horizontal **(Note 7)**	
Electrical earthing system near any gas asset other than steel	N/A	300 mm Horizontal
Clearance Type (Note 2, 9)	**Minimum Transmission Pressure Asset Clearance**	**Minimum Distribution Pressure Asset Clearance**
Undisturbed cover from the top of the gas asset to the underside of trenching or road pavement boxing	500 mm Vertical	300 mm Vertical **(Note 1)**
Distance from predominant building line	3000 mm Horizontal Where applicable outside pipeline easement	Refer to **Section 4.2**
Distance from Sensitive Use Locations (Refer **Section 7** for Glossary of Terms and Abbreviations)	APA Engineering Assessment Required **(Note 8)**	N/A
Canopies longer than 15 m parallel to the edge of the gas asset	3000 mm Horizontal **(Note 10)**	Refer to **Table 4** **(Note 10)**
Any installation that could add excessive loads to the gas asset or restrict access to the gas asset	3000 mm Horizontal **(Note 2)**	
Any installations that may need require underpinning were APA to expose the gas asset	3000 mm Horizontal	
Any temporary stake, e.g. star picket	300 mm Horizontal	
Electrical poles including street lighting and traffic signals	3000 mm Horizontal Where applicable outside pipeline easement	1000 mm **(Note 3, 5, 6, 7)**
Fence post, including road safety barriers	3000 mm Horizontal when installed per APA requirements	500 mm Horizontal when installed per APA requirements
Pile or pier	3000 mm Horizontal when installed per APA requirements	500 mm Horizontal when installed per APA requirements
Permanent Heavy Vehicle Loads (Greater than 4.5T)	Refer to **Section 4.7** Temporary and Permanent Vehicle Loads	
Tree Root Barrier	3000 mm Horizontal	1000 mm Horizontal Refer to **Section 4.3** Landscaping Plans
Separation distances for vegetation	Refer to **Section 4.3** Landscaping Plans	

Note 1: For distribution main crossings, where the vertical separation distance is less than 300 mm physical protective slabbing, e.g. HDPE or concrete, shall be installed where the other utility is crossing beneath the APA pipeline/distribution main.

HDPE or concrete, shall be installed where the other utility is crossing above the APA pipeline/distribution main.

No protective slabbing is required for utility crossings greater than 500 mm separation.

Note 2: Structures and large utilities crossing APA Networks operated assets need to be self-supporting so that future repairs or maintenance of the asset can occur as per **Section 4.2 Third Party Assets and Structures**.

Note 3: Horizontal separation includes utility surface access pits, thrust blocks and/ or footings.

Note 4: Additional horizontal separation may be required depending on the extent of the planned works, local soil conditions and trench stability of the existing gas asset. This is particularly relevant where works occur within the angle of repose of the existing gas asset (e.g. parallel trenching that is deeper than the existing gas asset) and may result in undermining.

Note 5: In accordance with 'AS/NZS 4853 – Electrical hazards on metallic pipelines' without further information and APA engineering assessment, no electrical power poles for 66kV or above are permitted within the following separation distances of steel gas assets;

- If the power line has an Overhead Earth Wire (**OHEW**) – 15 m;
- If power line does not have an OHEW – 100 m;

Note 6: Where electrical poles (including street lighting and traffic signals) are proposed which place the gas asset within the no dig zone specified by the electrical authority either of the following shall occur;

a) The poles shall be designed with deeper foundations to be self-supporting if the gas asset needs to be excavated. Or;

b) For non-metallic assets relocated into a conduit that extends past the no dig zone.

Note 7: Clearance for electrical cables and earthing systems from steel gas assets must be reviewed in accordance with **Section 4.6 Earthing and Electrical Effects**. Electrical cables, substations and/or earthing systems installed in the vicinity of steel gas assets require an Earth Potential Risk (**EPR**) and Low Frequency Induction (**LFI**) assessment to AS/NZS 4853.

Note 8: Requires a setback distance to stay away from the Measurement Length (refer to **Table 14 Glossary of Terms and Abbreviations**). Alternatively, the setback distance may be reduced if protection slabbing is installed along the Sensitive Use Location where interaction with the Measurement Length occurs. This may also be limited to the development area subject to APA engineering assessment.

Note 9: Pipeline protection needs to be assessed and shown on the design plans with design clearances. This includes recoating, bridge slab or asset strike protection slab.

Note 10: Clearance may be dependent on demonstrating that there is sufficient continuous ventilation.

For construction and land use activities around gas assets the minimum horizontal clearances referenced in **Table 3** must be followed.

Table 3 Minimum Clearances for Construction Works and Land Use Activities

Construction and Land Use Activities	Minimum Horizontal Clearance	
	Transmission Pressure & Critical Distribution Mains	Non-Critical Distribution Pressure Mains
Excavation without APA representative present **(Note 1)**	3000 mm	N/A
Trenchless Excavation **(Note 1)**	3000 mm Refer to **Section 5.6**	1000 mm Refer to **Section 5.6**
Temporary Heavy Vehicle Traffic (greater than 4.5T)	If the load has not been assessed, maintain a Horizontal separation of 3000 mm. APA engineering assessment must be completed if crossing asset. Refer to **Section 4.7** Temporary and Permanent Vehicle Crossings	Refer to **Section 4.7** Temporary and Permanent Vehicle Crossings
Installation of Piles, Piers or Poles	Refer to **Table 2** and **Section 5.7**	
Hot Works from Construction Activities	Any hot works within 5000 mm of an open trench containing gas asset or where cover is less than 300 mm. Refer to **Section 5.8**. **(Note 2)**	
Compaction	**Section 5.10** for Compaction Limits Maximum Compaction Limits	
Vibration Limits	No vibration within 3000 mm of the pipeline and greater distance to comply with **Section 5.9**	
Blasting, Seismic Survey or the use of Explosives	Approval required for works within 100m. Refer to **Section 5.11**.	
Lifting over exposed gas asset	Not permitted over the gas asset. Refer to **Section 5.12** for Suspended Materials above Gas Assets and No Go Zones for Cranes.	
Clearance of crane outriggers to gas assets	Not permitted within 3000 mm of gas asset. Refer to **Section 5.12** for Suspended Materials above Gas Assets and No Go Zones for Cranes.	
Clearance of temporary material from pipeline	Not permitted within 3000 mm of gas assets. Refer to **Section 5.13** for Temporary Materials.	

Note 1: Excavation covers NDD, mechanical excavation and trenchless excavation (boring, HDD, pipeline bursting and tunnelling).

Note 2: Horizontal separation distance also applies to any pits or valve covers.

4.2 Third Party Assets and Structures

Structures, including but not limited to buildings, walls, canopies, footings, pile caps or retaining walls, must not transfer any load to or be installed over any gas asset.

The design of any third party asset or structure must take into account future safe access of any gas assets in the vicinity. The proposed third party asset or structure must be installed in a way that prevents the angle of repose from encroaching into the future access zone as specified in **Section 4.1** around the existing gas asset.

Any third party asset or structure installed within proximity to a transmission pipeline or critical distribution pressure main must be designed to be self-supporting and allow for a minimum excavation window 1m on either side of the asset and 700 mm below the edge of the asset, for maintenance of the asset. This self-supporting design information is required to be shown on the construction drawings supported by geotechnical data and calculations. Construction of structures on pipeline easements are not permitted without explicit consent from APA.

Distribution pressure gas mains must be offset from the expected predominant building line at a distance in accordance with **Table 4**. Transmission pressure gas assets shall be per **Table 2**.

Table 4 Minimum Building Offset Distances for Distribution Pressure Gas Mains

Diameter (DN)	MAOP (kPag)			
	≤210	>210 ≤ 420	>420 ≤ 600	>600
≤110	0.5 m	0.5 m	1.0m	3 m
>110 ≤ 160	0.5 m	0.5 m	3 m	5 m
>160	0.5 m	3 m	3 m	8 m

Gas assets may be located underneath curbing or strip footings for road safety barriers for short sections up to 10 m to allow for tapers. The integrity of the gas asset to be located underneath the curbing or strip footing may require inspection, repair, recoating and / or slabbing depending on the existing condition and extent of proposed works.

Posts or poles which are located in road reserve, or otherwise exposed to vehicle impact, must be designed such that there will be no damage to the gas asset in the event of a vehicle impact.

For works in Victoria, consent from the relevant State Minister is required under Section 120 of the *Pipelines Act 2005* (VIC) for the erection of structures or buildings within 3,000 mm of a transmission pressure asset. Ministerial consent must be arranged through Energy Safe Victoria (**ESV**) following review and acceptance of the proposed designs by APA Networks.

4.3 Landscaping Plans

Vegetation may limit line of site, access and passage along an existing gas asset alignment, while the associated roots may damage existing buried pipe, coating or other ancillary equipment (e.g. cables). Above ground gas infrastructure may also be exposed to hazards from falling vegetation and increased fire risk. Additionally, trees and tree roots may limit access to the gas asset in an emergency, during normal operations and when make new connections or modifications.

Landscaping plans which include vegetation should select tree species which do not have vigorous root activity and do not exceed above 5m in height when fully mature when planted within 3m of gas assets. The pre-selection of trees considered suitable for planting within road reserves and near gas assets should also consider interference with, or damage to, other underground and overhead services.

For all landscaping works within 3 m of transmission pressure or critical distribution pressure gas assets the following details must submitted to APA for review and approval prior to planting.

- Tree species – botanical and common name
- Mature tree buttress and canopy diameter
- Mature tree height

- Maximum root ball diameter
- Offset from gas asset
- Method of protection to gas asset

Trees to be planted within 3 m of transmission pressure or critical distribution pressure gas assets, should also adhere to **Table 5** below.

Note: Horizontal separation is measured from pipe edge to edge of mature trunk or mature drip line, whichever is the greater.

Strata cells are not considered an appropriate protection from tree roots. If strata cells are to be installed in the vicinity of existing buried gas assets, the controls identified in **Table 5** must be used for protection.

Table 5 Protection of Distribution Gas Assets from Vegetation

Vegetation Types	Requirements	Horizontal Separation from Pipe Edge to Vegetation			
		Greater than 3 m	1.5 to 3m	1.5 to 0.5 m	<0.5 m
Trees or Large Shrubs	Min. separation of 3 m is required between trees and pipe if no protection methods are utilised.				
Medium and Small Shrubs	Within 1.5 m – 0.5 m protection methods must be utilised.				
Ground cover and grasses	No protection methods required.				

Gas Protection Methods	
	No protection methods required, provided separation limits are followed.
	Within 3 m, tree species which have mature buttress diameters less than 0.15 m and do not have invasive or deep roots may be accommodated without protection methods after consultation with APA Networks **(Note 1)**. For trees with mature buttress diameters greater than 0.15 m one of the following gas protection methods must be implemented; 1. Lowering or relocation of the gas asset to a minimum of 1.2 m cover. 2. Installation of new gas conduit beyond the structural root zone (**SRZ**) of the mature tree species for future use. **(Note 2)** 3. Installation of a root barrier system. System to be 1 m deep or extend 250mm below the gas asset, whichever is the greater.
	Within 1.5 m installation of a root barriers system is mandatory and gas protection methods are as follows; 1. Installation of a robust root barrier system. System to be 1 m deep or extend 250 mm below the gas asset, whichever is the greater. **AND** 2. Lowering or relocation of the gas asset to a minimum of 1.2 m cover. **OR** 3. Installation of new gas conduit beyond the SRZ of the mature tree species for future use. **(Note 2)**
	Planting directly over gas assets is not permitted in any location, as it prevents emergency and maintenance access. Tree roots can damage gas asset resulting in gas leaks.

Note 1: Refers to the minimum 1.5 m structural root zone for a mature buttress diameter less than 0.15 m mandated under AS 4970 – Protection of trees on development sites.

Note 2: Suitable protection method for PE mains only. Conduits to be recorded in Geographic Information System (**GIS**) for future referencing.

Note 3: On transmission pressure assets vegetation must not limit line of site along the buried gas assets alignment, all signage must remain each in sight of the other.

4.4 Surface Levels and Conditions

Decreases or increases to surface levels must consider depth of cover requirements for gas assets specified in **Table 6**. This is in addition to maintaining a minimum working cover from the top of the gas asset to the underside of trenching or road box out works during construction as specified in **Table 2**. Vehicles must not cross gas assets at covers less than those specified in **Table 6** unless in accordance with **Section 5.10** for Compaction Limits or **Section 4.7** for Temporary and Permanent Vehicle Crossings.

Where existing surfaces are to be modified, finished cover levels are not to be reduced to less than existing levels, unless meeting the minimum requirements of **Table 6**. The requirement for, and the extent of, protective slabbing over any APA Networks operated asset will be determined by APA at its sole discretion with adherence to minimum depth of cover without physical protection as the preference. Depending on the location, local councils and relevant road/ rail authorities may have minimum depth of cover requirements that APA are required to meet which are more stringent than those listed in **Table 6**. Depth of cover requirements for individual consumer offtakes (service connections) are also provided in **Table 7**.

Details of any additional fill proposed to be placed on or within 3 metres of a gas asset, or within any applicable easement, must be clearly shown on plans and must be approved by APA Networks in writing. A maximum depth of cover of 2,500 mm for transmission pressure assets and 2000 mm for distribution assets apply in all locations; however, it is preferred not to exceed 1500 mm for both types of assets.

Table 6 Minimum Depth of Cover Requirements for Pipelines and Mains

Asset Location	Minimum Depth of Cover (Note 3)	
	Transmission Pressure Asset	Distribution Pressure Asset
Under Minor Road Pavement **(Note 1)**	• 1,200 mm • 1,200 mm to 1,000 mm with physical protection slabbing and APA engineering load assessment	• 750 mm • 750 mm to 600 mm with physical protection slabbing and APA engineering load assessment
Under Major Road Pavement **(Note 2)**	• 1,200 mm • 1200 mm to 1,000 mm with bridging slabs **(Note 4)**	• 1,200 mm • 1200 mm to 750 mm with bridging slabs **(Note 4)**
In Road Reserve but not Under Road Pavement	• 900 mm • 900 mm to 750 mm with protective slabbing contingent upon pipeline location class	• 750 mm • 750 mm to 600 mm with protective slabbing
Not in Road Reserve	• 900 mm • 750 mm with protective slabbing contingent upon pipeline location class	• 750 mm for > 210 kPa • 600 mm for ≤ 210 kPa
Railway Reserve	2000 mm **(Note 5)**	
Large Open Drain or Major Water Crossing	2000 mm **(Note 6)**	

Note 1: Minor road pavements typically are owned by local councils.

Note 2: All roads owned by state and federal authorities are major roads. Roads owned by council may be major or minor roads. Covers less than 1200 mm may require dispensation from the relevant road authority.

Note 3: Protective slabbing must be installed where minimum depth of cover requirements cannot be met or are required to meet specific safety requirements. Bridging slabbing for transmission pressure assets may be replaced with protection slabbing following APA engineering assessment.

Note 4: The requirement for bridging slabs can be downgrade to physical protection slabbing where APA engineering assessment is completed and approved.

Note 5: Installation within railway reserve shall be in accordance with both AS 4799 and the respective operating standard for the gas assets i.e. AS 2885 and AS 4645.

Note 6: The minimum depth of cover of 2,000 mm shall consider future scour of the drain or waterway crossing. For man-made drains the depth of cover can be reduced to 1200 mm if sealed (i.e. concreted) and appropriately designed. For transmission pressure assets, waterway crossings shall be designed in accordance with AS 2885.1 – 2018 Clause 5.8.6.2. For all assets, as a minimum the following shall be considered;

a) A hydrological investigation to determine the stream power under peak stream, watercourse or waterway flows. The investigation shall determine the 1 in 100 year flood and the probable maximum flood and intermediate (optional) flood conditions.

b) A geotechnical investigation to determine the physical parameters of the crossings, and using the information from the hydrological investigation, the erosion potential. This assessment should also consider the meander potential of the watercourse so that the limits of special construction can be defined.

Table 7 Minimum Depth of Cover Requirements for Customer Offtakes (Services)

Asset Location	Customer Offtake size	
	≤ DN50	> DN50 and ≤ DN110 (Note 1)
Roadway	450 mm	600 mm
Private Property	300 mm	450 mm

Note 1: Customer offtakes (services) with diameters greater than DN110 shall have depth of cover in accordance with **Table 6**.

Changes to surface conditions (e.g. changing from nature strip to road pavement) or which place the gas asset in an inaccessible position (e.g. with excessive cover) may require slabbing, recoating and / or relocation. Changes to surrounding surface levels or conditions must also consider drainage and the potential to result in erosion of cover for gas assets. Additionally, gas fittings such as valves, stopple fittings or flanges must not be located underneath road pavement. An APA Engineering assessment will be required if this is not feasible, refer to **Section 6**.

Where a new hardstand surface is installed on non-metallic distribution pressure mains (e.g. a painted concrete driveway), consideration should be given to including a casing or enveloper pipe to APA requirements for insertion of future gas assets. This will ensure that the new hardstand surface is not modified as part of the future gas installation. Where a casing or enveloper pipe is installed for future insertion works surveyed as-constructed records are to be provided to APA Networks for incorporation into the GIS records.

For transmission pressure gas assets, any landscaping material should be level within the easement or a minimum of 3 m (but preferably 6 m) to each side of the pipeline, to permit excavating equipment to operate without having to destroy the adjacent landscaping.

4.5 Casings Vent Stacks

Casings provide mechanical protection and protection to gas assets from external loadings. Some cased crossings are sealed and fitted with a casing vent stack, which gas leaks are identified via.

The following APA requirements are to be applied for works near casing vent stacks:

- Casing vent stacks cannot be removed unless an alternative arrangement has been approved by APA Networks or they have been assessed as being redundant;
- Unfettered access is to be maintained to casing vent stacks; and
- Minimum distance from casing vent stack discharge point to any electrical installation or overhead structure must be 1000 mm.

4.6 Earthing and Electrical Effects

Steel gas assets are susceptible to adverse effects from electrical sources such as above and below ground cables, substations, transformers, earth rods, cathodic protection systems or electrified tram / train lines.

Without any further information or engineering assessment, earthing systems for distribution (≥11kV) and transmission (≥66kV) power lines must satisfy the Earth Potential Rise (**EPR**) Level 1 (Conservative) compliance of AS/NZS 4853 – 2012 Table 4.3 & 4.5 which specifies separation distances from pipe appurtenances (e.g. valves, regulators, isolation joints), access points or earth points (including cathodic protection test points). For the potential hazards to be accepted as low risk on the basis of a Level 1 assessment the separation between a conductive structure or substation and pipeline subject to EPR shall be greater than the values given in **Table 8** below.

Table 8 Separation Distances for Pipeline Subject to EPR from Power Lines (Level 1 Assessment)

Fault Current or Actual Current (A) (Note 2, 3)	Separation Required (m) - Note 1			
	Distribution Power Line (≥11kV)		Transmission Power Line (≥66kV)	
	100 Ω.m	500 Ω.m	100 Ω.m	500 Ω.m
150	40	190	N/A	N/A
300	80	390	N/A	N/A
500	130	660	N/A	N/A
750	200	1,000	N/A	N/A
1,000	270	1,300	60	310
3,000	N/A	N/A	190	940
6,000	N/A	N/A	380	1,900
10,000	N/A	N/A	635	>3,500

Note 1: Earth resistivity of 500 Ω.m shall be used for dry sand or rock and 100 Ω.m for all other cases.

Note 2: If the fault current is unknown for a distribution power line (≥11kV), a fault current of 1000 A shall be used for the first pass assessment.

Note 3: If the transmission power line (≥66 kV) uses an OHEW, uses values up to 3,000 A (this assumes a current split of 30% of 10 kA). For lines without an OHEW, use values up to 10,000 A for current going down the structure.

Without any further information or engineering assessment, distribution (≥11 kV) and transmission (≥66 kV) power lines parallel to steel gas assets must satisfy the Low Frequency Induction (**LFI**) Level 1 (Conservative) compliance of AS/NZS 4853 – 2012 Table 4.2 & 4.4 which specifies maximum acceptable power line to pipeline exposure length.

Per AS/NZS 4853 – 2012 the pipeline expose length (average separation for the parallel section) under LFI conditions shall be less than the values given in **Table 9** below.

Table 9 Exposure Length for Pipeline Subject to LFI from Power Lines (Level 1 Assessment)

Power line to pipeline separation (m)	Exposure Length (m) – Note 1	
	Distribution Power Line (≥11kV) – 100 Ω.m	Transmission Power Line (≥66kV) – 100 Ω.m
5	180	95
10	210	110
20	240	127
50	310	165
100	400	210
200	550	290
500	950	500

Note 1: Without soil resistivity data, assessments are to be completed assuming 100 Ω.m. If soil resistivity data is available refer to AS/NZS 4853 – 2012.

Where AS/NZS 4853 Level 1 EPR or LFI requirements cannot be achieved a Level 2 and/or 3 assessment will be required.

The third party must provide to APA detailed plans of any source(s) of earthing and/ or electrical effects proposed to be located in the vicinity of steel gas assets, with an assessment report compliant with AS/NZS 4853 Electrical Hazards on Metallic Pipelines. This assessment report is to determine any effects to existing cathodic protection or induced voltage mitigation systems from these types of installations. The third party must address any relevant requirements and any recommendations and/or actions must be implemented to the satisfaction of APA Networks. All cost association with the study, and implementing its recommendations and/ or actions are to be borne by the third party. The third party must also complete validation testing upon completion of construction and provide all findings/ reports to APA Networks.

Hazards which may arise due to electrical systems located in the vicinity of steel gas assets include the following:

- Accidental contact between gas assets and electrical systems;
- Capacitive coupling;
- Conductive coupling;
- Electromagnetic induction;
- Low Frequency Induction (LFI);
- Earth Potential Rise (EPR), including due to fault current or lightning discharge; and,
- Adverse cathodic protection interference in excess of those allowed under AS 2832.1 or relevant state regulations

4.7 Temporary and Permanent Vehicle Crossings

Vehicle crossings over existing gas assets are limited to light vehicles (Gross Vehicle Mass not greater than 4.5 tonnes unless advised otherwise by APA Networks in writing) on unsealed surfaces or Heavy Vehicles (compliant General Access Vehicles) on established road pavements.

Any proposed new crossings must be assessed and authorised in writing by APA Networks.

A maximum surface pressure of 400 kPa is allowable directly above buried gas assets. However, any surface pressure exceeding this limit or where cover over the gas asset has been reduced from **Table 6** will require an APA Engineering Assessment and approval.

Where soil conditions exhibit poor compaction and load bearing characteristics, such as wet soil conditions, equipment is not permitted to cross the gas asset irrespective of weight without establishing a stable sealed surface or road plates.

Crane footings or bog mats must not be placed where the angle of repose can influence an existing gas asset without express written approval by APA. Where the existing gas asset is within the angle of response, the maximum surface pressure due to the crane must be provided.

5 PART 3 - CONSTRUCTION AND LAND USE REQUIREMENTS

Extreme care should be exercised at all times when working around existing gas assets, as repair works will be fully chargeable and may result in delays to any works. Refer to the duty of care outlined in **Section 1.4** and the requirements of this section when selecting construction methods.

5.1 Land Use Change

Where works proposed by a third party may result in a change in land use within the Measurement Length (as defined in AS/NZS 2885.6 for Pipelines – Gas and Liquid Petroleum) of transmission assets, such works may also be subject to formal approval requirements through APA Networks and applicable local and state government planning processes.

This may also require a Safety Management Study (SMS) report be completed and approved by APA Networks. This SMS report is generated from an SMS workshop involving an independent SMS facilitator, third party and APA Networks. APA Networks is the owner of the SMS report and any resulting recommendation/ actions must be implemented to the satisfaction of APA Networks prior to the commencement of any physical works.

Certain categories of development, such as Sensitive Use Locations (refer to **Table 14 Glossary of Terms and Abbreviations**), are not appropriate to be located with the Measurement Length. In certain circumstances, the otherwise unacceptable risks associated with such developments may be alleviated with the aid of installing protective slabbing over the transmission pipeline or undertaking other protection and mitigation measures.

Sensitive Use Locations near transmission pipelines are designated under AS/NZS 2885.6 and identify land where the consequences of a Failure Event may be increased because it is developed for use by sectors of the community who may be unable to protect themselves from the consequences of a pipeline Failure Event.

Sensitive uses are defined as follows;

- Schools, which includes colleges
- Hospitals and aged care facilities such as nursing homes, elderly people's homes
- Prisons and jails
- Sheltered housing
- Buildings with five or more stories
- Large community and leisure facilities, large open air gatherings
- Day care facilities
- Other potentially difficult to evacuate facilities
- Other structures as defined by relevant local councils.

For further information regarding the SMS process, refer to APA Networks Encroachment and Land Use Change SMS Trigger Procedure, **400-PR-L-0003**.

5.2 Permits and Site Watch

Transmission pressure assets and critical distribution pressure assets, must have a permit issued prior to proposed works in the vicinity of the existing assets, including any proving activities. Following the issue of a permit, a site watch inspector may be required to verify that the activities are carried out appropriately.

Other distribution pressure assets not considered critical will only require site watch as determined by APA Networks.

Where a permit is required, the response provided to the BYDA enquiry will include the relevant forms and process to be followed for submitting a permit request.

While BYDA recommends completing the request two business days prior to undertaking works, this is to ensure that the location information is obtained. This may not allow sufficient time for APA Networks to supply site watch. Further delays may be experienced if the proposed works are significantly complicated, do not meet the requirements of this document or if insufficient information is provided.

It is an offence in all jurisdictions to undertake activities in the vicinity of transmission pipelines without prior authorisation by the operator.

5.3 Coating Surveys and Leakage Surveys

Where proposed works have potential to indirectly damage pipe coating (i.e. due to compaction) or result in a leak of the gas asset (e.g. vibration of cast iron pipes), additional monitoring activities such as Direct Current Voltage Gradient (**DCVG**) or leakage surveys may be required.

If required, chargeable DCVG surveys will be conducted prior to works to establish any existing coating faults which exist on the gas asset. A subsequent DCVG survey will be conducted at the conclusion of works, and where new faults have developed on the gas asset, repairs shall be made with costs charged to the works owner. Surveys can be conducted prior to finalising road surfaces to avoid costly repairs.

A similar chargeable survey program can be applied where leakage surveys are required. However, additional surveys may be necessary throughout works to ensure work crews do not operate in a gaseous environment once leaks are caused.

5.4 Pipeline Repairs, Recoating and Slabbing

Buried steel assets operated by APA Networks are coated to provide protection from corrosion.

Where the surface conditions above a buried steel pipe are changed which may limit future access to the existing gas asset an assessment of the coating condition will likely be triggered.

The requirement for pipeline recoating is assessed by APA Networks on a case by case basis, based on the proposed works, but will generally be dependent on the following:

- The asset class;
- The existing coating type, age and condition;
- Increase in loading that can bring forward any pipeline anomalies; and,
- Changes limiting access to the existing asset(s), such as the installation of slabbing, road pavement, culverts, embankment ramps or any other feature.

A chargeable coating survey carried out in accordance with **Section 5.3** may be required to assess the condition of the existing gas asset coating.

Recoating and/ or associated slabbing works over any gas asset will be determined by APA Networks Engineering Assessments and any applicable risk assessments (Safety Management Study or Formal Safety Assessment).

Pipeline repairs, recoating and slabbing that form part of any third party commercial agreement will be charged to the third party.

The requirement for, and the extent of, slabbing over any APA Networks operated asset will be determined by APA at its sole discretion and may depend on factors other than only changes in depth of cover discussed in **Section 4.4**. Slabbing may be required for the following reasons:

- Removable protective slab to provide protection from third party mechanical excavation;
- Bridging slab to provide protection from external loadings e.g. insufficient depth of cover combined with vehicle traffic.

Slabbing must be installed with adequate separation from the pipe, which may impact the undisturbed cover requirement, and cannot be installed directly underneath road pavement or at surface level.

Any bridging slab designs prepared by a third party must be accompanied by certification from the registered practising structural engineer (Registered Professional Engineer Queensland (**RPEQ**) required for works in Queensland, and so on as required for other States and Territories) confirming that the design is adequate to prevent pipeline loading.

5.5 Exposure of Buried Gas Assets

5.5.1 General

Excavation works covers Non-Destructive Digging (**NDD**) and mechanical excavation. All such excavations must be completed in accordance with APA's direction.

The Third Party or its Contractor can perform exposure works on APA Networks operated assets via NDD using vacuum excavation and subsequent mechanical excavation works under the following conditions:

- **A current BYDA request is available for the works.**
- An approved Authority to Work Permit (**ATWP**) is issued for works near transmission pipelines or critical mains.
- APA Site Watch Officer is present for works near transmission pipelines or critical mains as outlined on the ATWP.
- The Third Party (or its Contractor) shall ensure they have their own SWMS, Risk Assessment, Environmental Management Plan, Tool Box Talk, Traffic Management and Pre-Start in line with their own corporate policy in place prior to works commencing.
- All underground assets have been identified by surface marking where within or close to the excavation area prior to proceeding with planned proving works (i.e. hand or NDD (e.g. Hydro-Vacuum Excavation). Any non-recorded assets should be identified prior to breaking ground (e.g. excavation or cutting).
- A check for gas leaks has been conducted prior to the commencement of work.
- If the mechanical excavation operator cannot see the spotter (where applicable, APA Site Watch Officer), he or she must stop moving immediately and not resume movement until contact has been established. Spotters must be aware of their surroundings and should never walk into the path of a vehicle, moving equipment or a swinging load. They need to scan the ground to become aware of any trip or fall hazards.
- If excavations are greater than 1.5 m or ground conditions are considered unstable benching/ battering/ shoring must be utilised. Additionally, appropriate ladders/ ramps or steps must be utilised to ensure safe access and egress.
- **Under no circumstances is mechanical equipment to be used within 300 mm of any gas asset.**

5.5.2 Physically Proving Gas Assets

Prior to mechanical excavation of the gas assets, the asset shall be physically proven by NDD or through the use of hand excavation. The method used will vary based on the criticality of the asset. The requirements in **Section 5.5.1** shall be implemented prior to physically proving the gas asset.

Technique 1 – Vacuum Excavation (Critical and Non-Critical Gas Assets)

A vacuum truck can be used to prove and expose the gas asset. Please ensure the requirements detailed in **Section 5.5.3** are adhered to.

Technique 2 – Hand Excavation (Critical and Non-Critical Gas Assets)

If the anticipated depth of cover of the gas asset is less than 1m (measured from the top of pipe) then hand excavation shall be used to expose the gas asset. The use of round edge shovels should be used to avoid damage to the pipe or coating. In the event that the anticipated depth of cover of the gas asset is greater than 1m then mechanical excavation can be undertaken in accordance with the requirements of **Section 5.5.4** but must stop when within 1m of the gas asset (i.e. 1.3m anticipated depth means that 300 mm of cover can be removed by mechanical excavation and the

remainder by hand excavation as described above. The anticipated depth shall be based on the shallowest result from BYDA or pipe locator.

Technique 3 – Hand + Excavation (Non-Critical Gas Assets ONLY)

If the gas asset is deemed non-critical then a combination of hand digging and excavation can be used. This technique requires the third party to hand excavate 300 mm then mechanically excavate the first 150 mm. In this technique the hand excavation shall always lead the mechanical excavation by 150 mm. Once within 300 mm of the gas asset then only hand excavation is allowed.

5.5.3 Hydro-Vacuum Excavation

Where hydro-vacuum excavation is used in the vicinity or to expose existing gas assets, the following conditions must be applied:

- Ensure the general requirements in **Section 5.5.1** are adhered to prior to the works commencing.
- Root cutting heads shall not be used at any time.
- When locating pipelines and mains, a maximum water pressure of 2500 PSI (17200 kPa) may be used to a depth no greater than 450 mm. Below this depth, the maximum water pressure shall be set in accordance with **Table 10** for the asset type in the vicinity.
- When locating customer offtakes (services), a maximum water pressure of 2500 PSI (17200 kPa) may be used to a depth no greater than 300 mm. Below this depth, the maximum water pressure shall be set in accordance with **Table 10** for the asset type in the vicinity.
- Where air is used in place of water the air pressure shall not exceed 175 PSI (1200 kPa).
- A minimum distance of 200 mm shall be maintained between the nozzle tip and subsoil and vertical movements avoided (i.e. nozzle shall not touch or be inserted into soil).
- The wand shall never remain motionless during excavation. Aiming directly at the gas asset shall be avoided at all times.
- NDD vacuum equipment must not come into contact (impact) with the pipe or coating.
- Once a gas asset has been exposed via hydro-vacuum methods, a visual check must be undertaken to ensure no damage has occurred to the pipe or its coating. Damage caused to the pipe coating by the third party will be chargeable.
- A dead man trigger or similar, shall be installed and used on the wand.
- If conduits are to be installed for identification of the gas assets location the conduit shall be offset to one side and recorded or a flexible conduit installed over the gas asset. The placement of PVC pipes directly on the gas asset may cause damage to the pipe coating and require repair at the contractor's expense.
- Vacuum excavated holes shall be cleaned of any rocks and debris and backfilled with a minimum 300 mm of sand.

Personnel operating NDD equipment shall monitor ground conditions to determine and adjust for the lowest water pressure setting and vacuum used to adequately expose the gas asset. The objective shall be to use the lowest possible pressure and vacuum required to adequately excavate in order to minimise risk of coating and/or pipe damage. **Table 10** provides the maximum water pressure to be used for various pipe and coating types.

Table 10 Maximum Water Pressure for Hydro-Vacuum Excavation

Pipe / Coating Type		Max. Water Pressure (PSI)	Pipe / Coating Type	Max. Water Pressure (PSI)
Steel	Coal Tar Enamel Coated	1,000	**Steel – Mummified fittings** (e.g. valves, flanges)	Not Permitted
	Polyethylene Tape Coated	1,000	**Cast Iron**	1,000
	Polyethylene Coated	2,000	**Polyethylene**	2,000
	Trilaminate Coated	2,000	**Nylon or PVC**	1,500
	FBE or HBE Coated	2,000	**Unknown Material or Steel Pipe Coating**	1,000
	Uncoated	2,500		

5.5.4 Mechanical Excavation

Prior to commencing any excavation works the general requirements in **Section 5.5.1** must be adhered to.

Where works are to be carried out within 3 m of the gas alignment and to 1 m of the known gas main depth, the contractor is required to pothole and expose the gas asset as outlined in **Section 5.5.5**.

Prior to the mechanical excavation commencing ensure the excavator is in working order and all pre-start equipment checks are completed.

Excavators with general purpose buckets (e.g. mud bucket, general purpose teeth) up to 30 tonnes are permitted to conduct mechanical excavations in the vicinity of existing APA gas assets in accordance with APA requirements. Any variation of excavator size or bucket type will require assessment and approval by APA Networks. Buckets with any type of tiger or penetration teeth are not permitted unless explicitly approved by APA Networks.

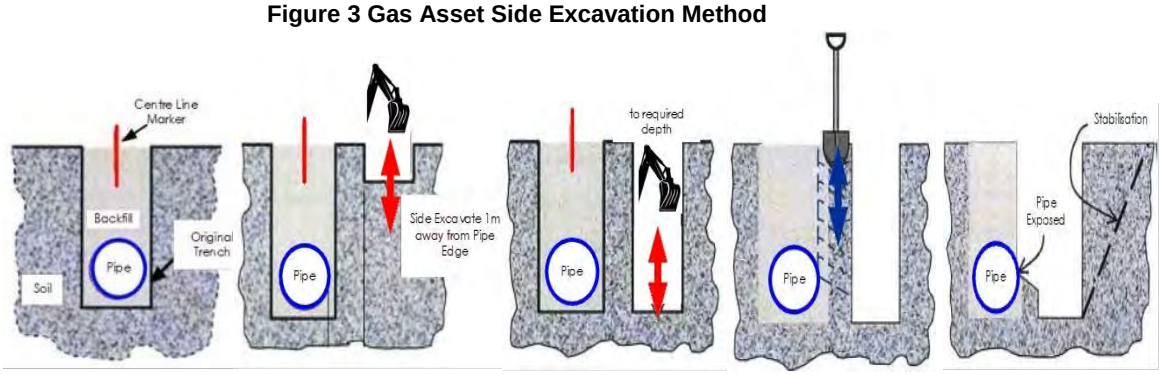
Critical Gas Assets

No mechanical equipment shall be used within 1 m of the potholed depth of the critical gas asset, except under explicit on site direction from an APA representative (i.e. APA Site Watch).

Under no circumstances is mechanical equipment to be used within 300 mm of any gas asset.

Once the gas asset has been positively proven, as outlined in **Section 5.5.2**, mechanical excavations can commence at a minimum of 300 mm offset from the outer edge of the pipe. The third party shall not mechanical excavate directly over a critical gas asset, with hand excavation only directly over the alignment or to expose the asset.

Figure 3 Gas Asset Side Excavation Method



Non-Critical Gas Assets

Mechanical excavation is permitted directly over the top of non-critical gas assets however **under no circumstances is mechanical excavation equipment to be used within 300 mm of any gas asset.** If the third party is in doubt with regards to the criticality of the gas asset, then the excavation method outlined for critical gas assets shall be used.

Prior to the mechanical excavation commencing, the asset shall be physically proved as outlined in **Section 5.5.2**. Once the depth has been physically proven the third party can proceed with excavating around the gas asset until within 300 mm. From this point hand excavation or NDD is required.

5.5.6 Protection During Exposure

Additional protection measures are required where an exposed gas asset may be subject to impact from construction activities, sagging of exposed pipe and trench instability. Any works requiring exposure and protection of the gas asset should have an accompanying methodology and approval by APA Networks.

Physical protection (e.g. structural steel protection, sandbags, wrapped with split PVC pipe) should be installed around the exposed gas asset when exposed, particularly when new infrastructure is planned to be installed crossing below the gas asset. If the gas asset is to be exposed for longer than one day or otherwise left unattended, suitable barricades, security fencing and/ or steel plates will be required to provide protection from vehicles, dropped objects (such as construction materials) or vandalism.

Unsupported exposed pipe lengths require protection from sagging by using suitable supports such as sandbags or slings. Where slings or other support types come into contact with the gas asset, protection methods must be employed (e.g. wrapped with split PVC pipe) to prevent damage to the existing pipe or coating. Exposed unsupported joints must also be identified and supported during works. The maximum allowable length of exposed pipe without support is provided in **Table 11**.

Table 11 Maximum Unsupported Lengths of Exposed Pipe

<table>
<tr><th>Gas Asset Diameter (mm)</th><th>Steel Maximum Unsupported Length (mm)</th><th>Polyethylene Maximum Unsupported Length (mm)</th><th>Other Material Maximum Unsupported Length (mm)</th></tr>
<tr><td>≤20</td><td>2,000</td><td>1,500</td><td rowspan="6">1,500
(Note 1)</td></tr>
<tr><td>>20 & ≤63</td><td>2,800</td><td>2,000</td></tr>
<tr><td>>63 & ≤100</td><td>3,600</td><td rowspan="4">3,000</td></tr>
<tr><td>>100 & ≤150</td><td>4,200</td></tr>
<tr><td>>150 & ≤250</td><td>5,000</td></tr>
<tr><td>>250</td><td>5,700</td></tr>
</table>

Note 1: Particular care should be taken for other materials include cast iron, PVC or nylon due to the unpredictable nature of the joints.

Additional protection and support during trench or bell-hole excavation works to minimise ground instability may also be necessary to protect the integrity of existing gas assets during exposure works. Trenches are to be inspected prior to commencing works each day and monitored by the onsite party responsible for the excavation. APA shall be notified of any condition likely to affect the stability of trench.

Any deep excavations, within 3 m of a gas asset, shall be designed and constructed such that the effects of subsidence, collapse or extreme weather will not affect the gas asset. Any such excavations prepared by a third party must be accompanied by certification from a registered practising engineer (RPEQ required for works in Queensland, and so on as required for other States and Territories) confirming that the design is adequate to protect the gas asset.

5.5.7 Backfill and Reinstatement

Prior to backfilling, a minimum of 150 mm of bedding sand must be placed around all gas assets. Bedding sand shall be in accordance with APA specification **400-SP-L-0002**, which can be provided to third parties upon request. The bedding must be compacted in accordance with **Section 5.10**, including suitable compaction and backfill of the underside of the gas asset to prevent any further vertical movement during subsequent layers above the asset. APA may require geo-fabric installation between different trench reinstatement products to prevent sand migration in which nonwoven fabric is required and needs to extend 1000 mm past either side of the utility crossing.

The bedding material shall be clean, free from all sharp objects, sandbags, clay material, vegetable matter, building debris and disused road paving material to the specification provided by APA. Recycled bedding material and stabilised sand must not be used unless explicitly approved by APA.

The remainder of the excavation shall be backfilled and compacted in accordance with **Section 5.10**, at maximum increments of 300 mm to a density which is similar to the surrounding sub-grade material. Only clean fill material shall be used, preferably the same as the natural soil in the area, and free from ash, weeds and pest plants, salt or any chemicals which could harm the gas assets. Where required, concrete slabbing shall be installed in accordance with **Section 5.4**.

In all circumstances gas warning tape / marker board shall be installed in accordance with the following requirements:

- Gas warning tape installed at 300 mm below finished surface level.
- Gas marker board installed 300 mm above the top of the pipe.

Note, where gas warning tape cannot be installed 300 mm below the finished surface level due to road pavement box out, marker board is to be installed 50 mm below the box out work zone.

In situations where a physical protection slab or bridging slab has been utilised an additional layer of gas marker board must be installed 50 mm above the slabbing.

The excavated area is to be reinstated to the original condition or as approved by APA and the relevant local council, road authority or landowner as applicable. Any marker signs removed during excavation works must also be reinstated in original positions. Additional marker signs may be required at new infrastructure crossings as directed by APA.

5.6 Trenchless Excavation

Trenchless excavation covers horizontal directional drilling (**HDD**), boring, pipe bursting and tunnelling. These activities are considered high risk that require additional controls to prevent damage to existing gas assets. This includes proving the existing gas asset location and depth for all horizontal bores, as well as providing a witness trench to verify that the bore will pass the asset with sufficient separation.

A witness trench must be used in addition to live electronic tracking of the bore head. The witness trench must be prepared to the specification provided in **Table 12**. The progressive measurement of the length of the bore must also be made and plotted along its proposed direction to ensure the bore head has not missed the witness trench. The bore head must be exposed in the witness trench, when the crossing is above the existing gas asset.

For all assets installed via trenchless excavation a vertical separation aligning with the maximum borehole diameter (e.g. reamed diameter) shall be demonstrated. For transmission pressure and distribution pressure assets this vertical separation distance is 1000 mm and 600 mm, respectively.

If the works run parallel to a transmission pressure or critical gas assets a minimum separation distance of 3 m must be maintained. For non-critical gas assets, the minimum separation distance of 1 m must be maintained. For works running parallel to gas assets, proving of the actual location of the gas asset must occur every 4 m.

Note: It is expected that HDD operators working near gas assets hold the national competency RIICCM202 – Identify, location and protect underground service.

Table 12 Minimum Witness Trench Dimensions

Crossing Type	Witness Trench Depth	Witness Trench Dimensions
Crossing Above Existing Gas Asset	To bottom (invert) of gas asset	Witness trench shall be 1000 mm to 2000 mm in front of the gas asset on the approach side. Witness trench shall be min. 1500 mm long and 300 mm wide centred on bore centre line.
Crossing Below Existing Gas Asset	To bottom (invert) of gas asset plus 500 mm	

Dispensation may be considered where detailed long sections are provided for assessment by APA and where depths of existing gas assets or separation to the bore are greater than 2500 mm.

Pipe bursting is not permitted within 1000 mm of an existing gas asset.

5.7 Piles, Piers or Poles

No piling such as pile-driving, sheet-piling or hammer-piling is permitted within 15 m of an existing gas asset unless explicit consent has been provided by APA. In all instances, vertical bored (augured) piles, piers or poles are preferred.

Where installation of piles, piers or poles are proposed between 500 mm and 1000 mm clearance from a gas asset (distribution and transmission pressures, respectively), the area directly below the proposed pile, pier or post location must be excavated to a level equivalent to the bottom (invert) of the existing gas asset, and works started from that depth.

Note: Proving of the gas asset must be completed in accordance with the requirements set out in **Section 5.5.2** prior to the commencement of any works.

Temporary steel plates may also be installed between the gas asset and the proposed pile, pier or post used for vertical bore methods within this clearance to provide extra protection.

Note: Direct vibration monitoring on the gas main may be required depending upon the installation method utilised. Refer to **Section 5.9** for APA Networks vibration limits.

5.8 Hot Works for Construction Activities

Typical hot works include grinding, welding, thermal or oxygen cutting or heating, and other related heat producing or spark-producing operations. Heat sources or hot works must not impact gas assets, taking into consideration that the ground or adjacent structures may also be capable of transmitting heat.

In order to safely undertake hot works, response procedures in the event of fire or flammable gas detection must be prepared and monitoring for flammable gases must be undertaken during works.

APA must approve any hot works where there is less than 300 mm ground cover to buried gas assets, or within 5,000 mm of any exposed gas assets (including any pits or valve covers). A heat shield or barrier may be required to provide protection if it cannot be demonstrated that works can be undertaken without impacting the gas asset.

5.9 Vibration Limits

Significant vibration may arise from activities such as blasting, piling, tunnelling and HDD/boring.

To avoid damage to existing APA Networks operated pipes and coatings, the following vibration limits must not be exceeded at any point on the pipe:

a) For cast iron mains: 5 mm/s maximum Peak Particle Velocity (**PPV**) measured on the pipe.

b) For steel pipe with a coal tar enamel (**CTE**) coating or with poor coating health: 10 mm/s maximum PPV measured on the pipe.

c) For non-coal tar enamel pipe coatings and other pipe materials (i.e. steel, PE, PVC or Nylon): 20 mm/s maximum PPV measured on the pipe.

d) For blasting, the above vibration limits can be increased if supported by calculations in accordance with Design Guidelines for Buried Steel Pipeline – American Lifelines Alliance American Society of Civil Engineers (**ASCE**) and approved in writing by an APA Networks Integrity Engineer.

Note: Cast iron mains are particularly susceptible to damage by vibration. The PPV limit may not prevent leaks from cast iron and may require additional gas leakage survey activities during works in accordance with **Section 5.3**.

For vibration monitoring adopt an alarm at 80% of the acceptable PPV value and when the alarm is activated, the work must stop and be re-assessed. Short incursions up to 100% are acceptable, for sustained periods of vibration longer than 5 minutes, works must be stopped.

The zone of influence for vibration assessment undertaken by the third party is shown below;

- For compaction, refer to **Table 13**.
- For trenchless excavation (HDD/ boring), refer to **Section 5.6**.
- For piling refer to **Section 5.7**.
- For blasting refer to **Section 5.11**.

5.10 Compaction Limits

Compaction activities such as establishing a base course for a road pavement may result in damage to the pipes and coatings of existing gas assets. Compaction limits in the vicinity of existing gas assets are summarised in **Table 13**.

Table 13 Maximum Compaction Limits

Horizontal Separation (m)	Minimum Cover to Top of Gas Asset (mm)	Compaction Limits
≤3 **(Note 1)**	300	Small handheld compactor only
	500	Large handheld compactor Maximum 4 tonne tandem drum static roller
	750	Maximum 8 tonne tandem drum static roller
	1200	Maximum 10 tonne tandem drum static roller subject to APA approval
>3 & ≤10	All	Maximum 8 tonne tandem drum vibrating roller
>10 & ≤15	All	Maximum 10 tonne tandem drum vibrating roller
>15	All	Any compaction method

Note 1: Compaction within 3 m of gas assets is limited to static rollers. If vibration compaction is necessary a robust vibration assessment and construction methodology signed off by an RPEQ for works in Queensland, and so on as required for other States and Territories, will need to be produced by the third party for review and approval by an APA Networks Integrity Engineer.

5.11 Blasting / Seismic Survey / Explosives

Blasting, seismic survey or the use of explosives is not permitted within 100 m of a gas asset unless explicit approval is provided by APA Networks. The size and quantity of the explosives to be used will determine how close to the pipeline blasting will be permitted. In all cases, blasting methods must be arranged to limit ground vibrations so that the peak particle velocity does not exceed acceptable limits. At no stages will blasting be permitted within 3 m of the pipeline.

5.12 Suspended Materials above Gas Assets and No Go Zones for Cranes

Where gas assets are exposed, no cranes, excavators or backhoes are permitted to carry or suspend materials directly over or across a gas asset without an APA Networks approved lifting plan and SWMS.

Outriggers must be set up outside a 3 m radius from gas assets unless otherwise approved by APA Networks in writing.

5.13 Temporary Materials

In all instances it is preferred that temporary materials (e.g. soil, shipping containers) are not stored on top of transmission pressure and critical gas assets. Temporary material must not restrict access and should be placed at least 1,500 mm from the alignment of these assets unless otherwise approved by APA Networks.

6 PART 4 - ALTERATION OF EXISTING GAS ASSETS

Where the proposed third party works do not comply with the requirements of this document, and adequate additional controls or a specialised engineering solutions cannot be developed, alteration of the existing gas assets will be required.

Gas asset alterations will only be undertaken under a Recoverable Works Agreement (**RWA**) appropriate to the scope and extent of the works required.

An Early Works Agreement (**EWA**) may also be required where works are proposed which require proving, engineering design activities or purchase of long lead items. This will allow for completion of these items prior to execution of a RWA and avoid delaying works.

If either or both these agreements are required, then APA Networks will enter negotiations with the relevant third party and any costs will be payable by that third party.

7 GLOSSARY OF TERMS AND ABBREVIATIONS

Table 14 Glossary of Terms and Abbreviations

Term/ Abbreviation	Meaning
AGN	Australian Gas Networks
APA	Each entity that forms part of the APA Group
APA Engineering Assessment	Covers technical assessments which may involve field integrity assessments that may or may not include the use of specialist Consultants managed by APA.
APA Networks Operated Assets	APA Networks acts as the asset operator on behalf of entities Australian Gas Networks (AGN), Allgas, APA, Origin and Queensland Nitrates (QNP) and operates in New South Wales, Northern Territory, Queensland, South Australia and Victoria.
APA Permit Issuing Officer	The APA Permit Issuing Officer is responsible for opening the Permit To Work, validating APA Networks assets have been located and being the Site Watch for works within the gas Easement or Protected Zone.
AS	Australian Standard
ASCE	American Society of Civil Engineers
ATWP	Authority to Work Permit
CTE	Coal Tar Enamel
Damage	Physical damage to and interference with APA's assets. Damage includes reducing design life, coating damage, dents, scratches, rupture, cutting of cathodic protection cables. Damage can also include potential impacts that APA pipelines can have on third party assets.
BYDA	Before You Dig Australia (previously known as Dial Before You Dig (DBYD))
DCVG	Direct Current Voltage Gradient
Depth of Cover	Vertical distance from the existing natural ground surface to the top of the buried gas asset
EPR	Earth Potential Rise
ESV	Energy Safe Victoria
EWA	Early Works Agreement

Excavation	Excavation refers to manual digging or mechanised digging operation with plant or equipment which involves trenching and trenchless excavation. Trenchless excavation covers boring, Horizontal Directional Drilling (HDD), pipe bursting and tunnelling.
FBE	Fusion Bonded Epoxy
GIS	Geographic Information System
HBE	High Build Epoxy
HDD	Horizontal Directional Drilling
Hot Works	Hot works are defined as grinding, welding, thermal or oxygen cutting or heating, and other related heat-producing or spark-producing operations. Heat sources or hot works must not impact pipelines, taking into consideration that the ground or adjacent structures may also be capable of transmitting heat.
LFI	Low Frequency Induction
LPG	Liquefied Petroleum Gas
MAOP	Maximum Allowable Operating Pressure
Measurement Length	The maximum length of pipeline route which presents an extended source of hazard on the basis that an event of failure could affect any part of the development or specific location relevant to the development. The maximum length corresponds to the heat radiation hazard associated with a 4.7 kW/m^2 heat radiation contour for an ignited full bore rupture calculated in accordance with AS/NZS 2885.6. If the pipeline is designed as a no rupture pipe, then the measurement length corresponds to a credible leak size.
NDD	Non-Destructive Digging (NDD) refers to either hand digging or Non-Destructive Pot Holing using a vacuum pipe connected to a vacuum truck with either a water lance or air lance. Hydro-Vacuum Excavation consists of a water lance and vacuum truck and is used to physically prove existing assets.
OHEW	Overhead Earth Wire
PE	Polyethylene
Pipe Bursting	Pipe bursting refers to a pipe being inserted to a larger pipe that results in the larger pipe being damaged. For an example of pipe bursting, refer to the following You-Tube video: https://www.youtube.com/watch?v=HX5beh0ubGY
Pipeline Easement	The pipeline area shown on a survey plan and referenced on the property title.
Predominate Building Line	The expected predominate building line relates to the façade of the building, not necessarily the property boundary.
Protected Zone	A Protected Zone is an area extending both horizontally and longitudinally along a gas asset. It is the area where loads and/or any hot works may potentially cause damage to the gas asset.

	The Protected Zone refers to works near APA Networks gas assets or works within the vicinity of the gas assets that may cause an unacceptable risk to the asset in accordance with Table 2 Minimum Clearances or Table 3 Minimum Clearances for Construction Works and Land Use Activities
PTW	Permit to Work
PPV	Peak Particle Velocity
PVC	Polyvinyl Chloride
QNP	Queensland Nitrates Plant
RPEQ	Registered Profession Engineer Queensland
RWA	Recoverable Works Agreement
Sensitive Use Locations	This is designated as Class "S" as per AS/NZS 2885.6 Pipelines - Gas and liquid petroleum - Pipeline safety management and refers to the sub location class. Sensitive Use Location Class (S) identifies land where the consequences of a FAILURE EVENT may be increased because it is developed for use by sectors of the community who may be unable to protect themselves from the consequences of a pipeline FAILURE EVENT. Sensitive uses are defined as follows: • Schools which includes colleges • Hospitals • Aged care facilities such as nursing homes, elderly people's homes • Prisons and jails • Convalescent homes • Sheltered housing • Buildings with five or more stories • Large community and leisure facilities, large open air gatherings • Day care facilities • Other potentially difficult to evacuate facilities • Other structures as defined by relevant local councils. The Sensitive Use Location Class "S" must be assigned to any section of a gas transmission pipeline where there is a sensitive development within the applicable Measurement Length.

Site Watch	An APA Site Watch representative can be the Permit Issuing Officer for excavation work within a gas Easement or Protected Zone and is referred to as the primary spotter for excavation works. The secondary spotter is provided by the Contractor. The primary spotter has the ultimate decision regarding works within the gas Easement or Protected Zone which includes the method of excavation, starting and stopping excavation work. The APA Site Watch representative is the nominated competent person responsible for the following; • Making themselves highly visible and everyone on the job site should be aware of the Site Watch's role; • Communication to personnel operating mobile plant and equipment ensuring minimum clearance to above and below ground assets is maintained and the construction methodology is adhered to and complies with APA Networks requirements. Ensuring personnel do not encroach within the swing radius of the operating machinery.
SMS	Safety Management Study
SMWS	Safe Work Method Statement used by APA or Contractors to execute field work. The risks and associated control measures risk assessments should be transferred to SWMS.
SRZ	Structural Root Zone
Structures	Structures refer to third party structures which includes, but is not limited to; temporary or permanent buildings, walls, canopies, footings, pile caps or retaining walls
Third Party	The person or entity and their agents or Contractors that propose to undertake work near APA assets.
Third Party Assets	Third Party Assets include roads, utilities and structures.
Third Party Excavation	Third Party Excavation which is **not** associated with APA (e.g. road works, utility installation, private development, fencing).
Third Party Works Classification	The Third Party Work Classification as shown in **Section 3.3** covers the following three work classifications: 1. No Impact to gas assets 2. No Objection Under Conditions 3. Enquiry Escalated for Alteration
Transmission Pipeline	Gas transmission pipeline which includes all associated equipment such as cathodic protection, earthing grid, instrumentation and electrical cables.
Utilities	Includes water, wastewater, drainage, telecommunications cables, power poles and cables owned by individuals or organisations other than APA Networks.
Voltage	Difference of potential normally between conductors or between conductors and earth as follows: a) Extra-low voltage – Not exceeding 50V a.c. or 120 V ripple-free d.c. b) Low voltage – Exceeding extra-low voltage, but not exceeding 1000 V a.c. or 1500 V d.c.

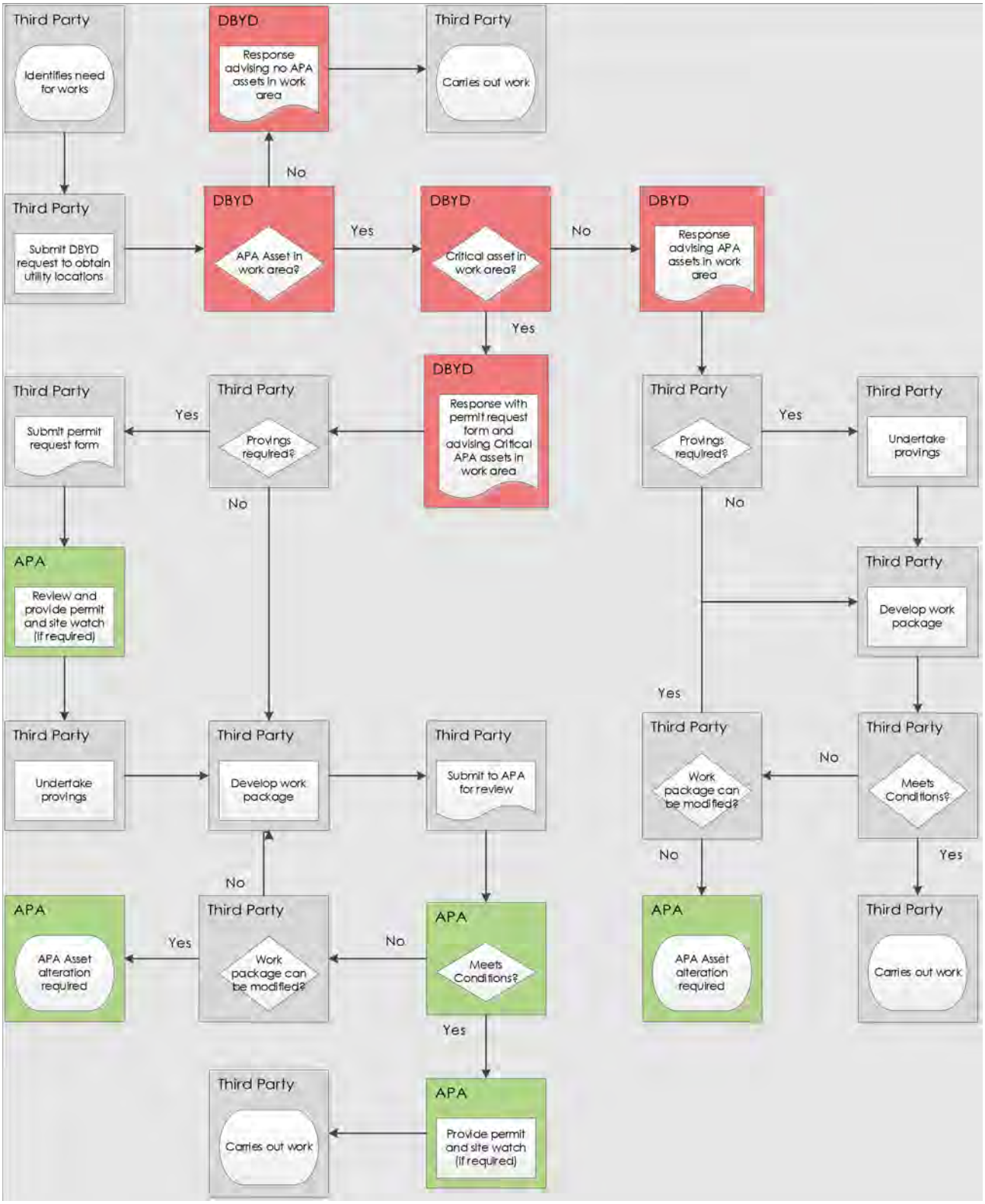
	c) High voltage – Exceeding low voltage.
Works	The development of any type of buildings, structures and other obstructions (including residential buildings, pools, sheds, carports, major developments, transport infrastructure, services, stockpiles, trees), and any work that causes changes to the ground (including movement of heavy vehicles, blasting, tunnelling, pile driving, ground compaction, earthworks, open and trenchless excavations)

8 DOCUMENT REFERENCES

Table 15 Document References

External Standards	
API RP 1102	Steel Pipeline Crossing Railroads and Highways
AS 2832.1	Cathodic protection of metals: Pipes and cables
AS 2885.0	Pipelines – Gas and liquid petroleum: General requirements
AS/NZS 2885.1	Pipelines – Gas and liquid petroleum: Design and Construction
AS/NZS 2885.2	Pipelines – Gas and liquid petroleum: Welding
AS 2885.3	Pipelines – Gas and liquid petroleum: Operations and Maintenance
AS 2885.5	Pipelines – Gas and liquid petroleum: Field Pressure Testing
AS/NZS 2885.6	Pipelines – Gas and liquid petroleum: Pipeline safety management
AS/NZS 4645.1	Gas Distribution Networks - Network Management
AS/NZS 4645.2	Gas Distribution Networks - Steel Pipe Systems
AS/NZS 4645.3	Gas Distribution Networks - Plastics Pipe Systems
AS 4799	Installation of Underground Utility Services and Pipelines Within Railway Boundaries
AS 4827.1	Coating defect surveys for buried pipelines Part 1: Direct current voltage gradient (DCVG)
AS/NZS 4853	Electrical Hazards on Metallic Pipelines
AS 4970	Protection of trees on development sites
Standard Policies, Procedures, Specifications, Guidelines, Forms and Templates	
400-SP-L-0002	Networks Bedding Material Specification
400-PR-L-0003	Encroachment and Land Use Change SMS Trigger Procedure

APPENDIX A GENERAL DBYD RESPONSE PROCESS



Before You Dig Australia

Classification: Networks

Enquiry Date:	19/12/2024
Sequence Number:	248972014
Work Site Address:	37 Arthur Street Mermaid Beach QLD 4218



BEFORE YOU DIG
www.byda.com.au
Zero Damage - Zero Harm



For your immediate information THERE IS A GAS PIPELINE OR INFRASTRUCTURE (Gas Assets) located in close vicinity to your works.

Enquiry Date: 19/12/2024
Enquirer: Jesse Hardman

Sequence Number: 248972014
Worksite Address: 37 Arthur Street
Mermaid Beach
QLD 4218

Thank you for your Before You Dig enquiry regarding the location of gas assets.

We confirm there are Gas Assets located in close vicinity of the above location. Damage to gas assets may result in explosion, fire and personal injury.

Please ensure you read all the relevant information contained in this response to your BYDA enquiry including reviewing the **APA Guidelines for Works Near Existing Gas Assets** and clearly understand and comply with all requirements relating to your scope of work.

If you have any queries relating to this information, contact the APA Before You Dig Officer for clarification. Refer to contact points listed on the following pages.

Before You Dig Checklist



1. Plan

- Review maps provided with this BYDA response and confirm the location of your work site is correct.
- Review the **APA Guidelines for Works Near Existing Gas Assets** and clearly understand requirements relating to my scope of work.



2. Prepare

- Electronically locate gas assets and mark locations.
- Note: Enquirers should still look for visible evidence of gas assets at the worksite not shown on plans.



3. Pothole

- Physically confirm ('prove') the location of gas assets by potholing by hand excavation or non- destructive vacuum excavation methods in accordance with **APA Guidelines for Works Near Existing Gas Assets**.
- Road authorities, councils, utilities and their authorised contractors and agents are responsible to pothole or use other suitable methods to verify the location and depth of all gas assets, including gas (inlet) services, prior to commencing any works.



4. Protect

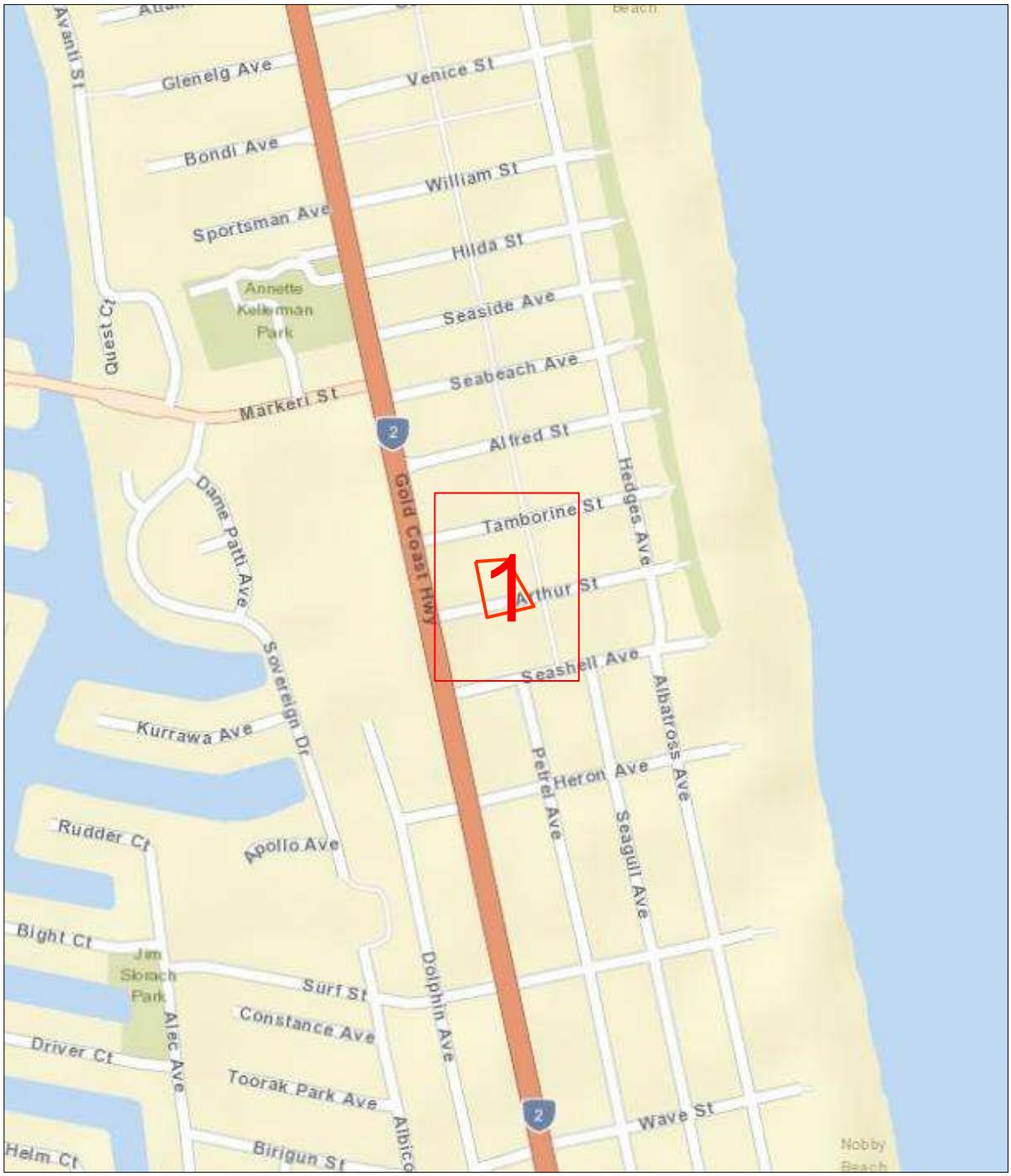
- Protect gas assets by maintaining clearances whilst excavating and following conditions provided by APA.
- Where required by APA, only conducting work in proximity to gas assets while Site Watch is on site.
- Where applicable, APA Authority To Work permit conditions are clearly understood and complied with.
- Strap and support exposed mains and inlet services. Cover exposed mains to prevent damage until the excavation can be restored permanently.



5. Proceed

- Only proceed with your work once you have completed all the planning, preparation, potholing and protection requirements.
- APA BYDA response (including maps) are on site for reference at all times, and less than 30 days old.

Site Address	37 Arthur Street Mermaid Beach QLD 4218	Sequence No 248972014



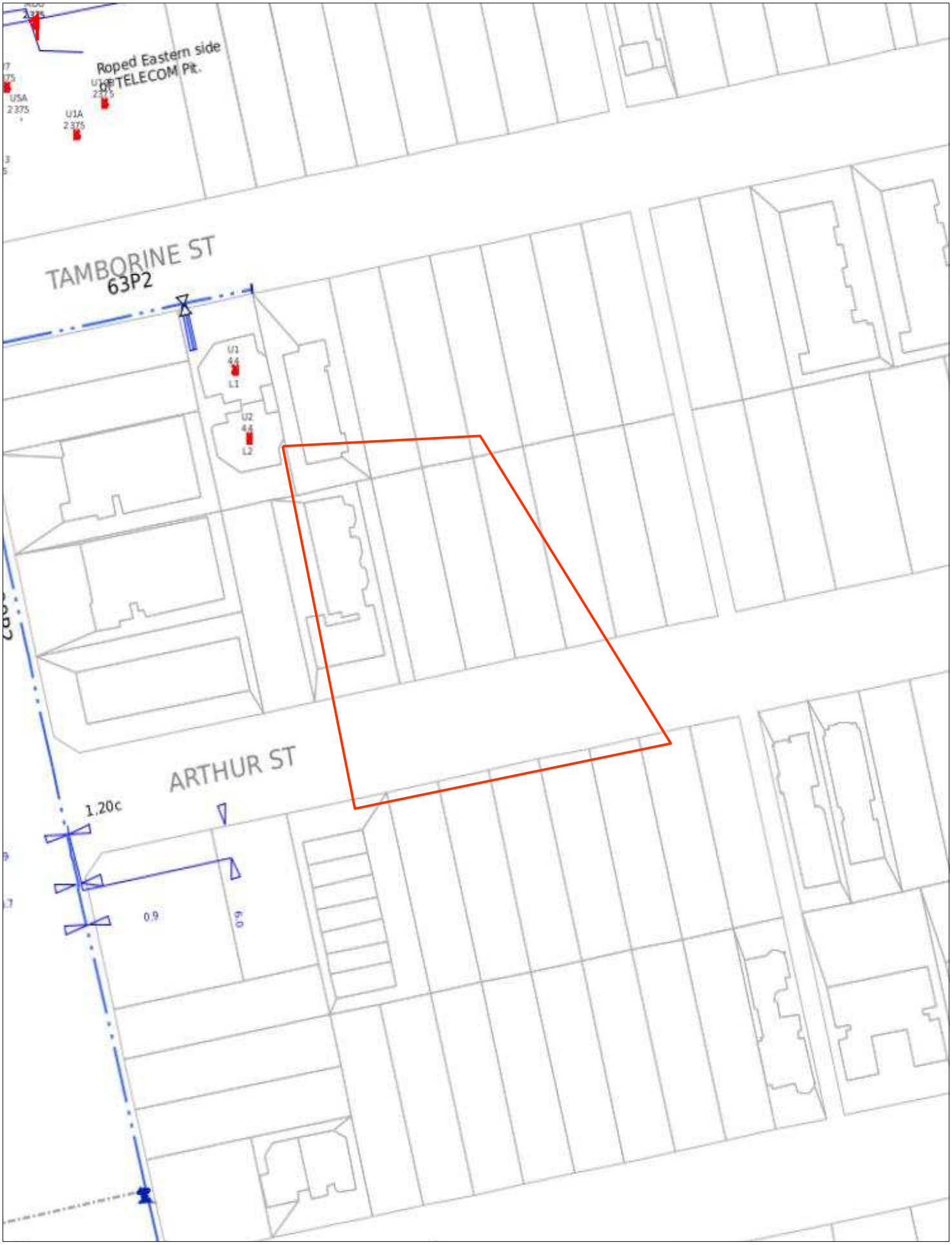
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Map Sources: Esri, Garmin, HERE, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

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Enquiry Area

Map Key Area



Scale 1: 700 map

Map Sources: Esri, Garmin, HERE, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

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Enquiry Area

Map Key Area

Map Symbology

Pipe

- Low pressure
- Medium pressure
- High pressure
- Transmission pressure
- Critical main (behind pipe)
- Proposed (pressure by colour)
- LPG (pressure by colour)
- Abandoned
- Idle/inactive
- Sleeve
- Casing (behind pipe)

Area

- BYDA area of interest

Pipe code and material

C* (for example, C2)	Cast iron
CU	Copper
N2	Nylon
P*	Polyethylene (PE)
P6, P7, P9–P12	Medium density PE
P2, P4, P8	High density PE
S*	Steel
W2	Wrought galv iron
W3	PE coat wrought galv iron

Object

- Valve
- Buried valve
- Regulator
- Gas supplied = yes
- CP rectifier terminal
- CP test station
- CP anode
- CP bond wire
- Syphon
- Trace wire point

Abbreviation

BoK	Back of kerb	FoK	Front of kerb
C	Depth of cover	Galv	Galvanized
CP	Cathodic protection	NTI	Not tied in

Example

Pipe	
40P6 in 80C2	40 mm high pressure medium density poly in an 80 mm cast iron casing
63S8	63 mm medium pressure steel

Pipe code

Pipe diameter in millimetres is shown before pipe code.
40P6 = 40 mm nominal diameter

This map was created in colour and should be printed in colour

Site Watch

Site Watch is where an APA field officer attends your work site to monitor and ensure controls are in place to protect critical gas assets from damage during work.

The following rates apply for this service (1 hour minimum charge):

Item	Rate (excl. gst)
Site Watch - Business Hours	$143.42 per hour
Site Watch - After Hours	$175.06 per hour
Cancellation Fee Fee applies where cancellations received after 12pm (midday) 1 business day prior to the booking	$286.84

- Contact APA - Before You Dig officer for state specific hours of business.

Contacts

Contacts APA Group	
Enquiry	Contact Numbers
General enquiries or feedback regarding this information or gas assets.	APA - Before You Dig Officer Phone: 1800 085 628 Email: BYDA_APA@apa.com.au
Gas Emergencies	Phone: 1800 GAS LEAK (1800 427 532)

Important Information

- Refer to requirements relating to construction, excavation and other work activities in the APA **Guidelines for Works Near Existing Gas Assets** document with this BYDA response.
- BYDA enquiries are valid for 30 days. If your works commence after 30 days from the date of this response a new enquiry is required to validate location information.
- For some BYDA enquiries, you may receive two (2) responses from APA. Please read both responses carefully as they relate to different assets.
- Gas (inlet) services connecting Gas Assets in the street to the gas meter on the property are not marked on the map. South Australia Only - if a meter box is installed on the property, a sketch of the gas service location may be found inside the gas meter box. APA does not guarantee the accuracy or completeness of these sketches.

Disclaimer and legal details

- This information is valid for 30 days from the date of this response.
- This information has been generated by an automated system based on the area highlighted in your BYDA request and has not been independently verified.
- Map location information is provided as AS5488-2022 Quality Level D, as such supplied location information is indicative only.
- Whilst APA has taken reasonable steps to ensure that the information supplied is accurate, the information is provided strictly on the condition that no assurance, representation, warranty or guarantee (express or implied) is given by APA in relation to the information (including without limitation quality, accuracy, reliability, completeness, currency, sustainability, or suitability for any particular purpose) except that the information has been disclosed in good faith.
- Any party who undertakes activities in the vicinity of APA operated assets has a legal duty of care that must be observed. This legal obligation requires all parties to adhere to a standard of reasonable care while performing any acts that could foreseeably harm these assets.

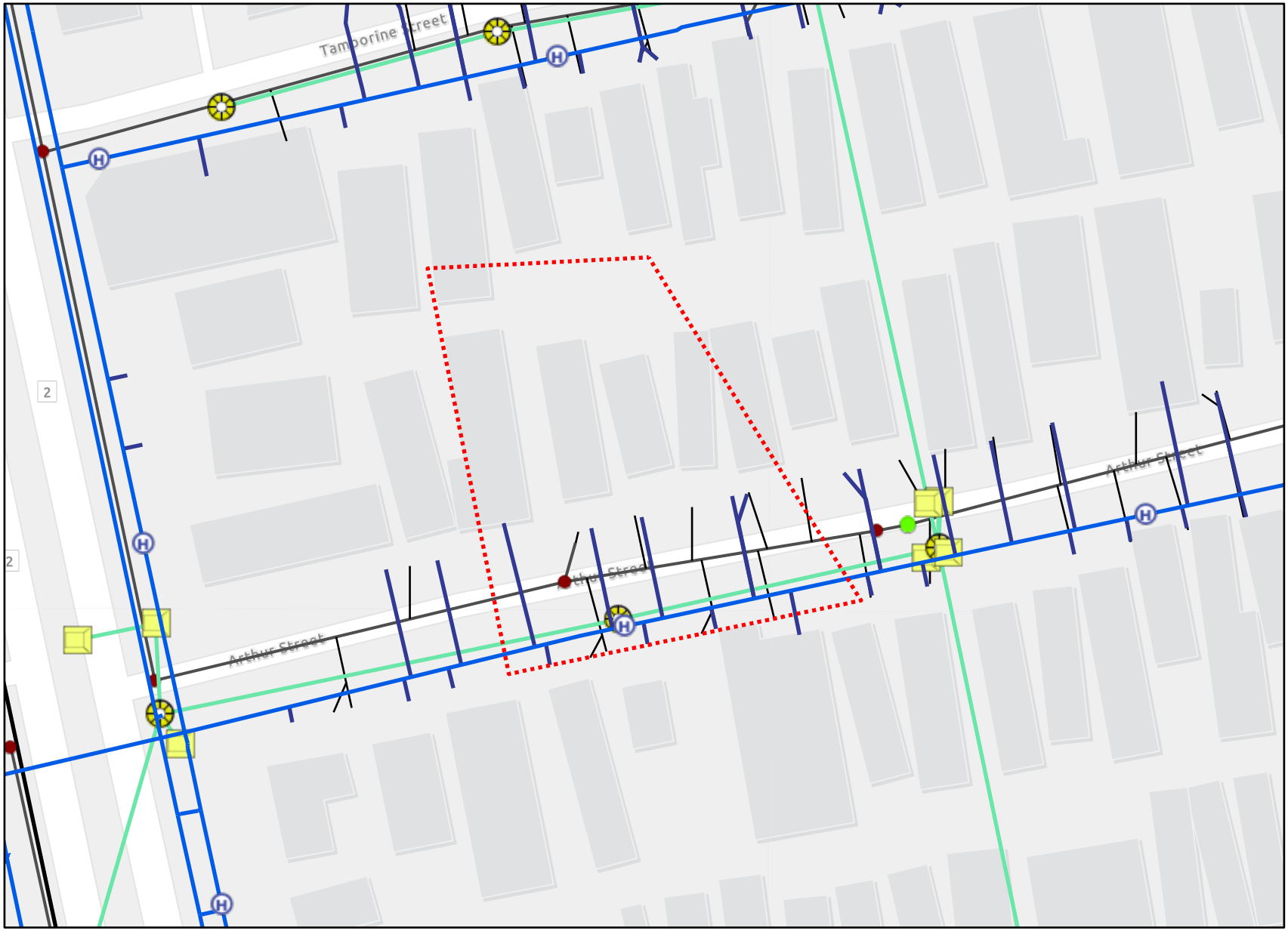

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BEFORE YOU DIG www.byda.com.au



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Scan to provide feedback

ELECTRICITY ENTITY REQUIREMENTS - WORKING NEAR OVERHEAD AND UNDERGROUND ELECTRIC LINES

Part of Energy Queensland

Purpose: This instruction describes Electricity Entity requirements for working or operating plant near any Electricity Entity Overhead or Underground electric lines. Scope: This instruction applies to anyone who may be contemplating working or operating plant near any Electricity Entity Overhead or Underground electric lines.	
Person responsible for ensuring compliance with this Work Practice:	All EQL employees have responsibility to comply with listed controls.
Measures in place to ensure compliance with the Work Practice:	Team Leaders must provide appropriate supervision and / or assurance in addition to formal assurance activities performed by EQL.
Person(s) responsible for reviewing the Work Practice:	Prior to any task listed on this Work Practice being performed, the contents must be understood by all workers exposed to the hazard on site. (i.e. using HazChat).
Work Practice control and guidance to be reviewed:	All controls for this task must be verified, monitored, and maintained by crews for the duration of works.
Key tools and equipment: N/A	
Note: Prior to works commencing the contents of supporting Work Practices must be understood. If at any time the control or procedural guidance in this Work Practice cannot be applied or are not suitable, work must cease, and advice must be sought from your leader or a Technical SME before proceeding. Work Practices may be provided as a means of sharing hazard and control information to EQL contractors. But it is the responsibility of the contractor to provide their own safe system of work (including, consultation, training, instruction, and supervision to reduce risk SFAIRP)	

Table of Contents

1. ABOUT THIS GUIDE

This guide to working near the Electricity Entity network is designed to assist any person working, contemplating work or operating plant near any Electricity Entity overhead or underground electric lines to meet their duties under the Work Health and Safety Act 2011, Electrical Safety Act 2002, Electrical Safety Regulation 2013 and relevant Codes of Practice including Electrical Safety Code of Practice 2020 Working Near Overhead and Underground Electric Lines and help to identify the steps needed to ensure risks are minimised for all who work or are likely to be affected by the work in these situations.

"The Electrical Code of Practice 2020 Working Near Overhead and Under Ground Electric Lines" provides practical advice on ways to manage electrical risk when working near electric lines including the exclusion zones that apply. An electronic copy of this Code of Practice as well as, Electrical Safety Act and Regulation is available at the Queensland Government Electrical Safety Office web site at https://www.worksafe.qld.gov.au/electricalsafety. You should obtain a copy and read this material, to enable you to fully understand your obligations, and prospective means of complying with them.

1.1. Who does the Electrical Safety Code of Practice 2020 - Working Near Overhead and Underground Electric Lines and Electricity Entity Requirements apply to?

A person, worker or Person Conducting a Business or Undertaking (PCBU) at a workplace is required to comply with the requirements of Electrical Safety Regulation 2013 Part 5 Overhead and Underground Electric Lines and Electrical Safety Code of Practice 2020 Working Near Overhead and Underground Electric Lines to ensure that no person, plant or thing comes within an unsafe distance (exclusion zone) of an overhead electric line. Compliance with these regulatory requirements is essential to reduce the risk of electric shock and contact with Electricity Entity electric lines and other assets which can have deadly consequences.

Examples of work activities where risk of person, plant or equipment coming near or into contact with overhead electric lines include but are not limited to:

- Pruning or felling trees or vegetation near overhead electric lines, including the service wire into a building.
- Carrying out building work, scaffolding or demolition adjacent to overhead electric lines.
- Painting fascia, replacing roofing, guttering or external cladding near service line point of entry to a building.
- Operating cranes, tip trucks, cane harvesters, elevated work platforms, fork lifts, grain augers, excavators, irrigators, etc near OH electric lines.
- Erecting or maintaining advertising signs or billboards near overhead electric lines.
- Dam or levee bank construction.

Examples of work activities that could involve risk of damage to underground cables or earthing systems include but are not limited to:

- Digging holes, excavating, sawing, trenching, under boring, sinking bore holes, earthworks or laying cables, pipes, etc or driving implements into the ground (e.g. star pickets, fence posts) near where underground cables or earthing systems may be located.

1.2. Are you working or planning to work near overhead or underground electric lines?

Electrical Safety Regulation Section 68 requires that before carrying out any work at a workplace where there is a risk of any person, plant or thing encroaching the exclusion zone of overhead electric lines, the person, worker or PCBU is required to ensure that the potential hazards are identified, a risk assessment conducted and the necessary control measures implemented to minimise electrical safety risks to ensure the safety of all workers and other persons at the workplace. The Electrical Safety Regulation 2013 and Electrical Safety Code of Practice 2020 - Working Near Overhead and Underground Electric Lines detail the Exclusion Zones that must be maintained.

1.2.1 Work near overhead electric lines

Where a risk assessment has been conducted and control measures implemented in accordance with requirement of Electrical Safety Code of Practice 2020 - Working Near Overhead and Underground Electric Lines and Electricity Entity Requirements (this document) and it has identified that exclusion zones from overhead electric lines cannot be maintained, the person, worker or PCBU is then required to contact Electricity Entity and request written Safety Advice (refer Section 1.3 below).

The person, worker or PCBU shall be required to maintain exclusion zones until such times as the Electricity Entity has provided written Safety Advice.

A person, worker or PCBU would not be required to contact the Electricity Entity and request a written Safety Advice where their risk assessment and implemented control measures ensure that exclusion zones from overhead electric lines will be maintained throughout performance of work to be undertaken at a particular site.

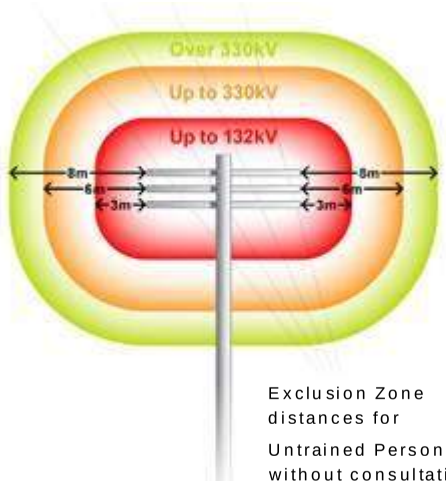
1.2.2 Exclusion Zones

An exclusion zone is a safety envelope around an overhead electric line. No part of a worker, operating plant or vehicle should enter an exclusion zone while the overhead electric line is energised (live).

Exclusion zones keep people, operating plant and vehicles a safe distance from energised overhead lines.

You must keep yourself and anything associated with the work activity out of the exclusion zone (e.g. a safe distance) unless it is not reasonably practicable to do so; and the person conducting a business or undertaking complies with the requirements of Section 68(2) of the Electrical Safety Regulation in relation to:

- conducting a risk assessment.
- implementing control measures
- adhering to any requirements of an Electricity Entity responsible for the line.



Exclusion Zone distances for

Untrained Persons without consultation

Exclusion Zone – Untrained Person (distances in mm)

Nominal phase to phase voltage of electric line	Untrained Person		
	Person	Operating Plant	Operating Vehicles
Insulated LV: Consultation with and verified by AP (Electrical)	No exclusion zone prescribed	1000	300
LV with NO consultation with Electricity Entity	3000	3000	600
LV With consultation with Electricity Entity	1000		
>LV up to 33 kV with NO consultation with Electricity Entity	3000		900
LV up to 33 kV with consultation with Electricity Entity	2000		
>33 kV up to 132 kV	3000		2100
>132 kV up to 220 kV	4500	6000	2900
>220 kV up to 275 kV	5000		

Information extracted from Electrical Safety Regulation 2013 Schedule 2

Exclusion Zone – Instructed Person and Authorised Person (distances in mm)

Nominal phase to phase Voltage of electric line	Instructed Person (IP) & Authorised Person (AP)		
	AP and IP	Operating Plant with Safety Observer or another Safe System of work	Operating of Vehicles
Insulated LV: Consultation with and verified by AP (Electrical)	No exclusion zone prescribed	No exclusion zone prescribed	No exclusion zone prescribed
LV	No exclusion zone prescribed	1000	600
>LV up to 33 kV	700	1200	700
>33 kV up to 50 kV	750	1300	750
>50 kV up to 66 kV	1000	1400	1000
>66 kV up to 110 kV		1800	
>110 up to 132	1200		1200

Information extracted from Electrical Safety Regulation 2013 Schedule 2

1.2.3 Work near underground electrical lines (underground electrical assets)

Before carrying out any earthworks at a location, the person, worker or PCBU is required to ensure that the potential hazards are identified, a risk assessment conducted and the necessary control measures implemented to minimise the risk of damaging identified or unidentified underground electrical assets and to ensure the safety of all workers and other persons at the workplace. The Electrical Safety Regulation 2013 and Electrical Safety Code of Practice 2020 - Working Near Overhead and Underground Electric Lines and Electricity Entity Requirements detail the requirement for work near underground electric lines.

There is no exclusion zone applicable for underground electrical assets – conduits, cables (unless cable is damaged, or conductors or terminations have been exposed) therefore there is no requirement for a written Safety Advice to be requested by a person, worker or PCBU, or issued by an electricity entity for work at a site that only involves identified or unidentified underground electrical assets (e.g. does not involved overhead electric lines or other exposed live parts within the work location).

1.3. Obtaining Safety Advice

To obtain written Safety Advice where identified as being required in Section 1.2.1 above, complete and return (by fax or email) the applicable Safety Advice Request Form which is accessible via the electricity entity website link on page 9:

- Energex Form - Application for Safety Advice – Working near Energex exposed live parts
- Ergon Energy Safety Advice Request Form

On receipt, the Electricity Entity will contact the Applicant to advise date and time to meet at site to provide written Safety Advice. It is advisable to bring to the meeting your copy of the Electrical Safety Code of Practice 2020 Working Near Overhead and Underground Electric Lines (and Before You Dig Australia Plan for location of underground assets where required), as reference to this will be necessary during the meeting. Written Safety Advice and/or other control measures provided by the Electricity Entity may incur a fee.

Failure to adhere to the Electrical Safety Regulation Section 68 requirements and mandatory control measures as documented on written Safety Advice as issued will result in written non-compliance advice being sent to the Electrical Safety Office.

Where this work is required to occur on a regular basis at a workplace, the PCBU may consider arranging to have one or more employees trained and subsequently accredited with the Electricity Entity as Authorised Persons.

1.4. Authorised Person and how to become one?

Under the Electrical Safety Regulation 2013, the exclusion zones for working near or operating plant or vehicles near exposed, low voltage or high voltage electric lines vary depending on whether a person is classed as an “Untrained Person”, “Authorised Person” or “Instructed Person”. An Authorised Person is permitted to carry out work closer to the electric lines than an Untrained Person (refer Electrical Safety Code of Practice 2020 Working Near Overhead and Underground Electric Lines Appendix B Exclusion Zones for Overhead Electric Lines).

To become an Authorised Person, the employer / self-employed person must first satisfy the “person in control” of the electric line, in this case the Electricity Entity, that their Applicants possess the required competencies. They must then apply in writing to Electricity Entity for approval.

Removal or replacement of LV service fuse to permit work on consumers’ mains, installation switchboard, consumer’s terminals or eliminate an exclusion that would exist requires the Electrical Mechanic to hold a current Queensland Electrical Mechanic Licence and perform the work in accordance with their documented safe system of work.

NOTE: It is not permissible to replace a blown LV service fuse(s) after l**oss of supply to consumer’s installation or to alter Electricity Entity** LV aerial services.

1.5. Contacting Electricity Entity for Safety Advice or Authorised Person Enquiries

By phone

- call Electricity Entity on General Enquiries phone number (refer page 3).

By email

- Energex: custserve@energex.com.au or authorisedperson@energex.com.au
- Ergon Energy: safetyadvice@ergon.com.au

Website

- Energex: https://www.energex.com.au/home/safety/working-near-powerlines
- Ergon Energy: https://www.ergon.com.au/network/safety/business-safety/the-outdoor-workplace/working-near-powerlines

2. OVERHEAD ELECTRIC LINES

The following table sets out preparatory work options that may be required to be performed by the Electricity Entity (or electrical contractor where identified as being permitted who is an Authorised Person - Electrical) to assist a person, worker or PCBU in minimising the electrical safety risks of, encroaching within the exclusion zone or contact with electric lines.

Category of work		Description	Costing arrangement
Safety Advice	Base information	Provide Safety Advice	Nil cost to customer
LV Service isolation	1. Isolation carried out by customer's electrical contractor	Isolation of overhead or underground service by removal of the service fuse(s). (Preferred option to isolate supply and eliminate the exclusion zone).	No involvement by the Electricity Entity. May be a cost charged by the customer's electrical contractor.
	2. Isolation carried out by Electricity Entity	Customer requested isolation of overhead or underground service by removal of the service fuse(s); or Customer requested physical disconnection and reconnection of overhead or underground service.	Cost to customer.
Insulation integrity verification	3. Verification of insulation integrity to reduce exclusion zone to no exclusion zone prescribed e.g. no contact permitted	Verification of insulation integrity to classify as insulated service – Insulation integrity can only be verified at the time of inspection – visual inspection is required before confirmation in all cases. When service insulation integrity verified - no exclusion zone prescribed e.g. no contact permitted.	Cost to customer.
Service replacement	4. Open wire service, service fuse(s) at house/building	Replacement of service with new XLPE service cable and service fuse(s) installed at origin (pole end) of service to allow isolation of service. Insulation integrity can be verified for new XLPE services at the time of installation – visual inspection is required before confirmation.	Nil cost to customer for service replacement. Customer responsible for necessary installation, Mains Connection Box and service support bracket upgrade and associated costs if required.
		Service installations where: a. the consumer's mains cannot be insulated and an exclusion zone must be maintained, and b. the service cannot be isolated at the service fuse. Service to be isolated by breaking the service cable connection to the LV mains at the pole. Service fuse(s) to be installed at origin (pole end) of service prior to reconnection.	Nil cost to customer for first disconnection and reconnection. Cost to customer for subsequent requests.

Category of work		Description	Costing arrangement
	5. All other service replacements	Customer requested replacement of existing service with new XLPE service cable to classify as insulated service, in lieu of isolation, to allow work close (no exclusion zone prescribed e.g. no contact permitted). Service fuse(s) to be installed at origin (pole end) of service.	Cost to customer for service replacement. Customer responsible for necessary installation, Mains Connection Box and service support bracket upgrade and associated costs if required.
Tiger Tails	6. Installation of Tiger Tails (for visual indication only – not for providing electrical insulation of LV mains)	Customer requested coverage of LV mains for visual indication only (not permitted on HV mains). The Entity may also fit tiger tails to LV service line for visual indication only.	Cost to customer.
Aerial Markers	7. Installation of aerial marker flags or balls (for visual indication only)	Customer requested temporary or permanent installation of appropriate aerial marker devices on LV or HV mains.	Cost to customer.
Switching	8. Customer requested switching	Customer requested switching to allow customer/contractor to work close (no exclusion zone prescribed e.g. no contact permitted).	Cost to customer.

2.1. Isolation of supply to customer installation to eliminate exclusion zone around LV service line

An Electrical Mechanic (holding current Queensland Licence) working on behalf of an electrical contractor and accredited with the Electricity Entity as an Authorised Person (Electrical) is permitted to remove and replace LV service fuse(s) when isolation of customer LV service line is required to eliminate the exclusion zone around the LV service line, or to work on the customer's mains and/or switchboard. Isolation of the customer's LV service line by an Authorised Person (Electrical) is only permitted at an underground service pillar or service pole by removing a fuse wedge(s) from a service line, in accordance with Electricity Industry practices e.g. from ground level using appropriate insulated tools, PPE and insulating mats. In those situations where the service fuse/circuit breaker is not located at supply end of the LV service, contact the Electricity Entity to arrange for Safety Advice where elimination of exclusion zone around LV service line is required.

Any controls used by the Authorised Person (Electrical) to identify and confirm isolation and ensure supply to the customer's installation is not inadvertently re-energised shall comply with Electrical Safety Regulation 2013 Section 14 and 15 requirements.

NOTE: The Authorised Person (Electrical) will n**ot be permitted to replace a blown LV service fuse(s) after loss of supply to a customer's** installation or to alter the Electricity Entity overhead LV services. The low voltage pole top service fuse shall only be removed by use of an approved, in test, insulated telescopic pole device while standing at ground level and wearing class 00 insulating gloves. At no **time is it permissible for an Authorised Person (Electrical) to climb or work aloft on the Electricity Entity's poles or asse**ts unless approved by the Electricity Entity.

2.2. Operating Plant

It can be extremely difficult for operating plant operators to see overhead lines and to judge distances from them. Contact with overhead lines can pose a risk of grounding live conductors and electrocution.

In many cases the likelihood of damage or injury can be reduced by setting up and operating the machinery well clear of overhead electric lines.

In situations where operating plant is operated by an Authorised Person or Instructed Person without a Safety Observer or another safe system, the exclusion zone requirements (refer Section 1) for an Untrained Person applies (refer Electrical Safety Regulation 2013 Schedule 2 or Electrical Safety Code of Practice 2020 Working Near Overhead and Underground Electric Lines).

For an Authorised or Instructed Person and their Operating Plant to approach overhead electric lines closer than the exclusion zone distances for an Untrained Person, a Safety Observer or another safe system shall be used. Refer to the Electrical Safety Regulation 2013 and the Electrical Safety Code of Practice 2020 - Working Near Overhead and Underground Electric Lines for exclusion zone distances for Authorised and Instructed Persons operating plant with a Safety Observer or another safe system.



Where a Safety Observer is used, the Safety Observer shall:

- Be trained to perform the role.
- Not be required to carry out any other duties at the time, and
- Not be required to observe more than one item of plant operating at a time, and
- Attend all times when the item of plant is operating.

Other control measures for operating plant may include, but are not restricted to:

- Constructing physical barriers or height warning indicators either side of the overhead electric line that are lower than the maximum travel height permissible without encroaching within the exclusion zone of the overhead electric line.
- Applying appropriate signage at least 8 to 10 m either side of overhead electric lines.
- Arrange for visual indicators such as Tiger Tails or aerial markers to fitted to the overhead electric lines – only erected by the Electricity Entity (tiger tails are only permitted on LV mains).
- Ground barriers, where appropriate.
- Informing workers of required work practices.
- Ensuring operators are aware of the height and reach of their machinery in both stowed and working positions.
- Lowering all machinery to the transport position when relocating.
- Providing workers with maps or diagrams showing the location of underground and overhead electric lines, and
- Where possible, directing work away from overhead electric lines not towards them.

2.3. Scaffolding Requirements

The following information provided is for guidance only and shall be read in conjunction with the Electrical Safety Regulation 2013, Electrical Safety Code of Practice 2020 - Working Near Overhead and Underground Electric Lines and AS/NZS 4576:1995: Guidelines for Scaffolding.

Requirements shall be complied with where scaffolding is required to be erected within 4 m of nearby overhead electric lines:

- The scaffolding shall not be erected before contacting and obtaining Safety Advice from the Electricity Entity.
- Erection of scaffolding to comply with requirements of AS/NZS 4576:1995: Guidelines for Scaffolding.

<u>The scaffolding can be either:</u>

- nonconductive material scaffolding; or

- metallic scaffolding with solid nonconductive barriers (with no gaps, holes or cuts) securely fixed to the outside and/or top of the scaffolding to prevent encroachment within exclusion zones or contact with the energised mains.

Where scaffolding is erected within 3 m of nearby overhead electric lines:

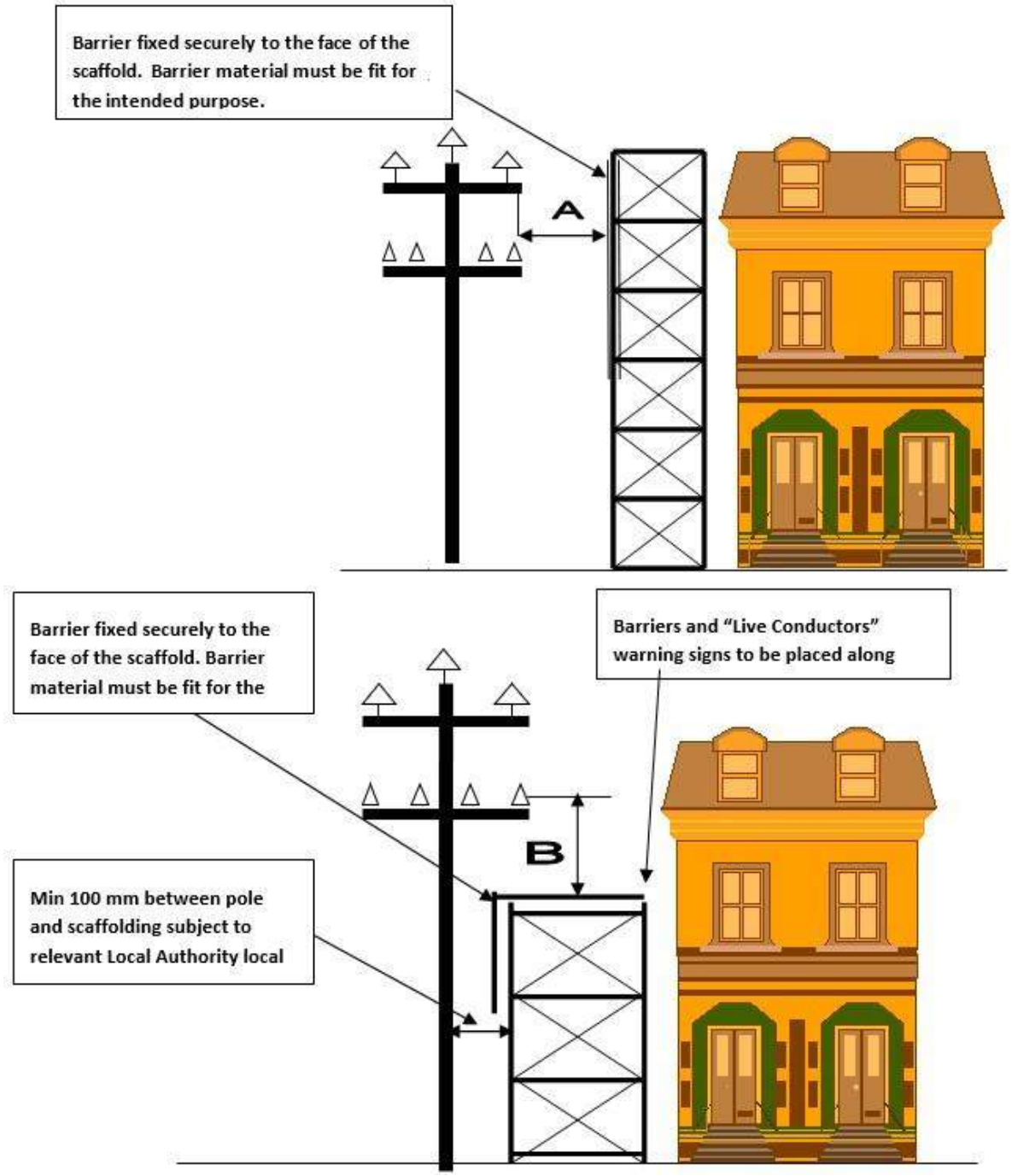
- It shall be fitted with fully enclosed non-conductive solid barriers to prevent encroachment within exclusion zones or contact with the energised mains fully enclosed.
- The person required to erect and/or disassemble scaffolding as well as the required solid barrier affixed to the scaffolding should be an Authorised Person (approved in writing by the Electricity Entity - refer requirements of Section 1.4 of this Reference).
- A Safety Observer shall be used during performance of this work where there is a risk of encroachment within 3 m of nearby energised overhead electric lines for voltages up to 33 kV. Additional requirements may apply for voltage levels above 33 kV, contact the Electricity Entity for consultation.
- Alternatively, consideration should be given to the de-energisation of the nearby electric lines where possible for the duration of this work. Additional requirements may apply for voltage levels above 33 kV, contact the Electricity Entity for consultation.
- Comply with the horizontal and vertical statutory clearances from overhead electric lines as set out in Electrical Safety Regulation 2013 Schedule 4.
- Persons are not permitted to go outside of or climb on top of the solid barrier fixed on the outside and/or top of the scaffolding.

Where an insulated low voltage service line passes through the scaffolding, it should either be de-energised for duration of work or be fully enclosed by non-conductive material (e.g. form ply).

Minimum statutory clearances from nearby overhead electric lines for scaffolding erected with barriers affixed.

Voltage Level	**Horizontal Distance "A"** (in metres)	**Vertical Distance "B"** (in metres)
Low voltage conductors (uninsulated)	1.5m	2.7m
Low voltage conductors (insulated) – these distances can only be applied after the integrity of the insulation has been verified by the Electricity Entity	0.3m	0.6m
Above LV and up to 33 kV (uninsulated)	1.5m	3.0m
Above LV and up to 33 kV (insulated)	Contact Electricity Entity for consultation.	
Above 33 kV (uninsulated)	Additional requirements may apply for voltage levels above 33 kV, contact the Electricity Entity for consultation.	

NOTE: **Dimension's "A" and "B" is between the scaffolding and the clo**sest conductor of the overhead electric line. Dimension B is also taken from the lowest part of the mid span sag adjacent to the scaffolding.


Barrier fixed securely to the face of the scaffold. Barrier material must be fit for the intended purpose.
A
Barrier fixed securely to the face of the scaffold. Barrier material must be fit for the
Barriers and "Live Conductors" warning signs to be placed along
B
Min 100 mm between pole and scaffolding subject to relevant Local Authority local

2.4. High Load transport under Overhead Electric Lines

Any person or company transporting a High Load (load in excess of 4.6 m high) under overhead electric lines must comply with Electrical Safety Code of Practice 2020 - Working Near Overhead and Underground Electric Lines is required to submit a Notification to Transport High Load form to the relevant Electricity Entity of the intended route and details of the high load involved. Before any person or company can transport a high load (load in excess of 4.6 m high), authorisation to travel must be received in writing from the Electricity Entity. Refer details below to contact the Electricity Entity for high load enquiries or to submit Notification to Transport High Load form:

Energex:

- Email: custserve@energex.com.au
- Website: www.energex.com.au
- Phone: Energex Contact Centre on 13 12 53 (8am to 5:30pm, Monday to Friday)

Ergon Energy:

- Email: Highload2@ergon.com.au
- Website: www.ergon.com.au
- Phone: (07) 4932 7566 (8am to 4:30pm, Monday to Friday)

2.5. Additional Details and Fact Sheets on Electricity Entity Requirements

Additional details and Fact Sheets on Electricity Entity requirements for working near overhead electric lines are located on the following internet sites

Energex: https://www.energex.com.au/home/safety/working-near-powerlines

Ergon Energy: https://www.ergon.com.au/network/safety/business-safety/the-outdoor-workplace/working-near-powerlines

3. UNDERGROUND ELECTRICAL ASSETS

3.1. Responsibilities When Working in the Vicinity of Electricity Entity Underground Electrical Assets

Everyone has a legal “Duty of Care” that must be observed when working in the vicinity of underground electrical assets which includes underground cables, conduits and other associated underground equipment. When discharging this “Duty of Care” in relation to Electricity Entity underground electrical assets, the following points must be considered:

1. It is the responsibility of the architect, consulting Engineer, developer, and principal contractor in the project planning stages to design for minimal impact and protection of Electricity Entity underground electrical assets. The Electricity Entity will provide plans on request via BYDA showing the presence of the underground electrical assets to assist at this design stage.
2. It is the constructor’s responsibility to:
   a. Anticipate and request BYDA plans of Electricity Entity underground electrical assets for a particular location at a reasonable time before earthworks begins.
   b. Visually locate Electricity Entity underground electrical assets by use of an electronic cable locator followed by careful non-mechanical excavation (potholing using hydrovac or hand tools) when earthworks activities may damage or interfere with Electricity Entity plant.

c. After completion of steps (a) and (b) above, if there is a risk of the Electricity Entity underground electrical assets being damaged or its structural integrity compromised by your planned earthworks activities, contact the Electricity Entity (General Enquiries phone number – refer page 3) for further advice.

A constructor may include but not limited to designer, project manager, installer, contractor, civil contractor.

3. The alignments and boundaries contained within BYDA plans and maps will sometimes differ from present alignments and boundaries "on the ground". Accordingly, in every case, the constructor should obtain confirmation of the actual position of Electricity Entity cables and pipelines under the roadways by non-mechanical excavation (potholing using hydrovac or hand tools) when earthworks activities may damage or interfere with Electricity Entity underground electrical assets. In no case should the constructor rely on statements of third parties in relation to the position of Electricity Entity underground electrical assets.

3.2. Conditions of Supply of Information

- Plans and details of Electricity Entity underground electrical assets provided by BYDA are only current for 4 weeks from the date of dispatch and should not be referred to after this period, if you go past this time, please re-apply to BYDA as underground services may have been updated.
- The Electricity Entity agrees to provide plans if an Electricity Entity underground electrical assets location request is made to Before You Dig Australia (BYDA) , online at https://www.byda.com.au or the free iPhone Application, only on the basis that at least 2 business day notice is given and the BYDA applicant agrees to the terms of this agreement.



Note that the Electricity Entity only provides information on underground electrical assets it owns. Contact the owner of any privately owned underground electrical assets for details of their assets located at site.

- The Electricity Entity retains copyright of all plans and details provided in connection to your request.
- BYDA plans or other details are provided for the use of the BYDA applicant, its servants, or agents, for the sole purpose of the applicant's responsibilities in relation to the Electricity Entity underground electrical assets and shall not be used for any other purpose.
- BYDA plans are diagrams only and indicate the presence of Electricity Entity underground electrical assets in the general vicinity of the geographical area shown. Exact ground cover and alignments cannot be given with any certainty as such levels can change over time.
- On receipt of BYDA plans and before commencing excavation work or similar activities near Electricity Entity's underground electrical assets, carefully locate this plant first to avoid damage.
- The Electricity Entity, its servants or agents shall not be liable for any loss or damage caused or occasioned by the use of plans and of details so supplied to the BYDA applicant, its servants or agents, and the BYDA applicant agrees to indemnify the Electricity Entity against any claim or demand for any such loss or damage to the BYDA applicant, its servants, or agents or to any third party.
- The constructor is responsible for all damages to the Electricity Entity underground electrical assets when work commences prior to obtaining BYDA plans, or at any time after that for failure to follow agreed instructions contained in this document or any other advice provided by the Electricity Entity.
- By undertaking any work, you acknowledge that the Electricity Entity reserves all rights to recover compensation for loss or damage to the Electricity Entity caused by interference or damage, including consequential loss and damage to its cable network, or other property.
- Be aware that some underground conduits may contain asbestos. Refer to "Code of Practice for the Management and Control of Asbestos in Workplace [NOHSC: 2018 (2005)]" for guidance.

3.3. When Working in the Vicinity of Electricity Entity Underground Electrical Assets, You Must Observe the Following Conditions

3.3.1 Records

The first step before any excavation commences is to obtain BYDA plans of Electricity Entity underground electrical assets in the vicinity of the work. For new work, records should be obtained during the planning and design stage. The records provided by BYDA must be made available to all relevant work groups on site. Where underground electrical asset information is transferred to plans for the proposed work, care must be exercised that important detail is not lost in the process.

3.3.2 Location of underground electrical assets

Examining the records is not sufficient, as reference points may change from the time of installation. Records must also be physically proven when working in close proximity to underground electrical assets. The exact location of underground electrical assets likely to be affected shall be confirmed by use of an electronic cable locator followed by careful non mechanical excavation to the level of concrete slabs or conduits. Non mechanical excavation (potholing using hydrovac or hand tools) must be used in advance of excavators. In any case, where doubt exists with respect to interpretation of cable records, contact the Electricity Entity (General Enquiries phone number - refer page 3) for further advice.

If during excavation, cables or conduits are damaged:

- call Electricity Entity (Emergencies phone number – refer page 3) to report damaged cables or conduits.
- treat cables as if alive, post a person to keep all others clear of the excavation until the Electricity Entity crew attend to make safe.

If unknown cables or conduits (e.g. not shown on issued BYDA plans) are located during excavation:

- call Electricity Entity (Emergencies phone number – refer page 1) to report.
- treat cables as if alive, post a person to keep all others clear of the excavation until the Electricity Entity crew attend to make safe.

If the constructor is unable to locate Electricity Entity underground electrical assets within 2.5 m of nominal plan locations, they should contact the Electricity Entity (General Enquiries phone number - refer page 3) for further advice.

3.3.3 Remote or On-Site Cable Location conducted by Electricity Entity

This service shall only be provided at Electricity Entity's discretion:

- The Electricity Entity may provide this site visit only when underground cables (33 kV or above) are present.
- Due to remote locations where external cable locator or hydro vac service providers are not readily available, Electricity Entity may attend site and assist with cable location (fees may apply for this service).
- The Electricity Entity may provide either remote over the phone or on-site cable location advice to assist in the location of Electricity Entity underground electrical assets, including how to visually locate and protect the plant when excavating.
- Where the Electricity Entity provides on-site cable location advice, any markings provided for the purpose of identifying cable location are for general guidance only, and the constructor is still responsible for non-mechanical excavation (potholing using hydrovac or hand tools) to visually locate Electricity Entity underground electrical assets.
- If the constructor is unable to locate Electricity Entity underground electrical assets within 2.5 m of nominal plan locations, they should contact Electricity Entity (General Enquiries phone number - refer page 3) to request further advice.

3.3.4 Electrical Cables

Electricity Entity cables may have warning covers e.g.:

- Clay paving bricks or tiles marked “Electricity” or similar (also unmarked)
- Concrete or PVC cover slabs
- PVC, asbestos or fibro conduit, fibre reinforced concrete, iron or steel pipe
- Concrete encased PVC or steel pipe
- Thin plastic marker tape
- Large pipes housing multiple ducts
- Multiple duct systems, including earthenware or concrete

NOTE: Some cables are known to be buried without covers.

3.3.5 Separation from Electricity Entity underground electrical assets

If location plans or visual location of Electricity Entity underground electrical assets by non-mechanical excavation (potholing using hydrovac or hand tools) reveals that the location of Electricity Entity underground electrical assets is situated where the developer or constructor plans to work, then contact the Electricity Entity (General Enquiries phone number - refer page 3) for further advice.

The developer or constructor shall ensure that minimum separation distance from Electricity underground electrical assets (refer Minimum Separation Requirements tables below) is complied with when installing, altering or repairing other underground services located in the vicinity.

If the Electricity Entity relocation or protection works are part of the agreed solution, then payment to the Electricity Entity for the cost of this work shall be the responsibility of the principal developer or constructor. The Electricity Entity will provide an estimate for work on receipt of the developer’s or constructor’s order number before work proceeds.

It will be necessary for the developer or constructor to provide the Electricity Entity with a written Work Method Statement for all works in the vicinity of, or involving Electricity Entity underground electrical assets. This Work Method Statement should form part of the tendering documentation and work instruction. All Work Method Statements shall be submitted to the Electricity Entity prior to the commencement of site earthworks.

Underground Services Running Parallel with Electricity Entity Electrical Assets (Minimum Separation required in mm)

Voltage Level	Gas	Communication or TV	Water		Sanitary drainage		Storm Water
			≤DN 200	>DN200	≤DN 200	>DN 200	
LV	300 (Ergon) 250 (Energex)	100	500	*1000	500	1000	500
HV		300					
*Contact your local utility/council to obtain specific separation distances							

Underground Services Crossing Electricity Entity Electrical Assets (Minimum Separation required in mm)					
Voltage Level	Gas	Communication or TV	Water	Sanitary drainage	Storm Water
LV	100	100	300	300	100
HV					

Notes:

- These clearances are each Electricity Entity's minimum requirements, additional separation may be required by the Service Owner. The greater of the separation requirements shall apply.
- Where the above tables does not list a separation requirement for a particular underground service type, the following minimum separation from electricity entity electrical assets shall apply:
  - LV = 100 mm
  - HV = 300 mm
- Compliance with these minimum separation requirements does not guarantee that issues such as Earth Potential Rise (EPR) and Low Frequency Induction (LFI) are managed, where these issues need to be managed, advice will need to be sought from an RPEQ Engineer
- All separation distances are measured from the exterior surface of the conduit / cable not centrelines or inner wall surfaces.

Additional Details and Fact Sheets on Electricity Entity Requirements

Additional details and Fact Sheets on Electricity Entity requirements for working near underground electrical assets are located on the following internet site.

Energex: https://www.energex.com.au/home/safety/working-near-powerlines

Ergon Energy: https://www.ergon.com.au/network/safety/business-safety/the-outdoor-workplace/working-near-powerlines

4. EXCAVATION

4.1. Excavating near Poles and Stay Wires

The following requirements are to be compiled with to minimise the risk of compromising the structural integrity of the Electricity Entity poles and stay foundations when excavation or trenching work is performed nearby that could result in the failure of one or more poles and grounding of supported electric lines.

- Excavation and trenching work undertaken by a person, worker or PCBU in the vicinity of poles and stay foundations shall:
- only be commenced after requirements of Section 3 have been complied with for any underground electrical assets located within the work site.
- upon completion of excavation and site earthworks do not restrict the Electricity Entity vehicle access to pole site for purpose of carrying out maintenance activities.

- comply with exclusion zones as detailed in the Electrical Safety Code of Practice 2020 - Working Near Overhead and Underground Electric Lines.
- not be attempted:
  - within 5 m (horizontal distance) of pole stays where the excavation depth is greater than 250 mm before contacting the Electricity Entity to determine requirements.
  - within 5 m (horizontal distance) of Electricity Entity poles with earth leads or cables running down into the ground before contacting the Electricity Entity to determine requirements.
  - within "Do Not Disturb" zone of pole prior to a certified engineering assessment having been completed by a Registered Professional Engineer Queensland, and then reviewed and approved by the Electricity Entity before proceeding with work. Approval by the Electricity Entity shall not relieve the PCBU of its duties to perform the work in a safe and proper manner and in accordance with all applicable legislation.
  - if the soil is exceedingly wet (saturated) or there is more than minimal wind loading unless additional pole support is provided in accordance with certified engineering assessment and approved by Electricity Entity.
  - when a severe weather event is occurring or expected (e.g. severe weather warning has been issued by Bureau of Meteorology).
- be backfilled as soon as possible (within same day where pole is required to be supported) soil mechanically compacted in layers of 150 mm and all rock and vegetable material excluded from the backfill.
- be backfilled and pole stabilised before removal of additional support required by a certified engineering assessment are permitted to be removed.

The PCBU shall be responsible for arrangement and costs of required certified engineering assessments, approvals by other regulatory bodies (eg councils, Main Roads pipeline owners, telecomm owns) and installation, maintenance, and removal of associated pole support.

Pole support equipment (where required in accordance with certified engineering assessment) shall be:

- only attached and removed by persons approved by the Electricity Entity.
- used to restrain both the pole head and foot to maintain pole stability during nearby excavation work.
- set up and positioned to maximise support effectiveness and minimise impact on traffic, pedestrian, excavation and machinery at site; and maintain exclusion zone from overhead lines. If insufficient clearance exists to maintain exclusion zone to pole support equipment, arrangements may be required for de-energising the electric line.

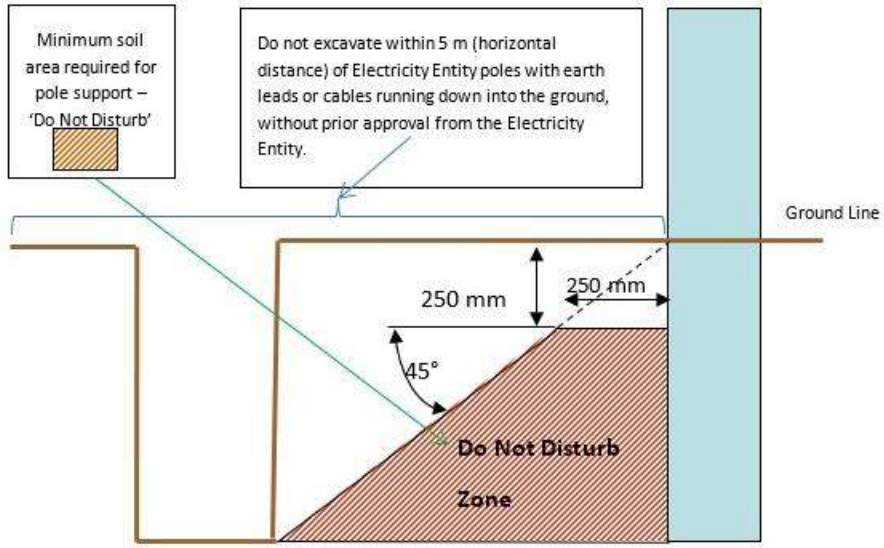


Figure 1 - Do Not Disturb Zone requirements when excavating near poles

Maximum Trench Depth	Minimum Distance from pole without pole support
Not more than 0.25 m (250 mm)	Can trench or hand dig (where cables and leads exist) right up to pole
1.0 m	1.0 m
1.5 m	1.5 m
2.0 m	2.0 m
2.5 m	2.5 m
3.0 m	3.0 m

4.1.1 Certified Engineering Assessment

Where required to be provided by the PCBU, a Certified Engineering Assessment shall:

- Ensure the stability of the Electricity Entity poles and foundations is maintained during and as a result of excavation work completed within the 'Do Not Disturb' zone.
- Include detailed design drawing of pole support method.
- Be completed and certified by a Registered Professional Engineer Queensland.
- Consider and address the following key points as a minimum:
  - Pole loading (vertical and lateral) including line deviation angles, direction of lean (towards or away from resultant loading)
  - Direction of pole lean.
  - Pole inspection (conducted to meet the Electricity Entity's requirements at customer cost)
  - Pole foundation depth
  - Proximity of excavation in relation to pole
  - Soil condition
  - Proposed shoring methods as well as installation and removal process
  - Duration and staging of work
  - Requirement to independently support pole during work
  - Proximity of existing adjacent underground services and excavations
  - Proposed backfilling and reinstatement method
  - Monitoring and engineering/ geotechnical supervision during excavation work progress
  - Other equipment attached to pole (e.g. underground cables, transformer, ACR, ABS.) must be taken into consideration and in some circumstances will prevent the pole being supported.

4.2. Excavating Near Underground Electrical Assets

For all work within 2.5 m of nominal location, the constructor is required to non-mechanical excavation (potholing using hydrovac or hand tools) and expose the underground electrical assets, hence proving its exact location before earthworks can commence.

4.2.1 Excavating Parallel to Underground Electrical Assets

If excavation work is parallel to the Electricity Entity underground electrical cables, then non mechanical excavation (potholing using hydrovac or hand tools) at least every 4 m is required to establish the location of all cables, hence confirming nominal locations before work can commence. If an excavation exceeds the depth of the cables and it is likely that that the covers or bedding material around the cables/pipes will move causing Electricity Entity cables or conduits to be unsupported, contact Electricity Entity (General Enquiries phone number - refer page 3) for further advice.

NOTE: Be aware that cable depths and directions may change suddenly along the route.

4.2.2 Excavating Across Underground Electrical Assets

Refer Minimum Separation Requirements table in Section 3.3.5 of this document for distances that shall be maintained to prevent inadvertent contact with or damage to underground electrical assets. If the width or depth of excavation is such that the Electricity Entity cables will be unsupported, contact Electricity Entity (General Enquiries phone number - refer page 3) for further advice. In no case shall a cable cover be removed without approval. A cable cover may only be replaced under the supervision of an Electricity Entity officer. Protective cover strips when removed must be replaced under Electricity Entity supervision. Under no circumstances shall protective cover strips be omitted to achieve the minimum separation distance required between Electricity Entity cables and other underground services.

4.2.3 Heavy Machinery Operation Over Underground Electrical Assets

Where heavy “crawler” or “vibration” type machinery is operated over the top of cables, a minimum cover of 450 mm to the cable protective cover must be maintained. Alternatively, subject to a Certified Engineering Assessment, use load bearing protection whilst the machinery is in operation.

4.2.4 Directional Boring Near Underground Electrical Assets

When boring parallel to cables, it is essential that trial holes are carefully dug using non mechanical excavation (pot holing using hydrovac or hand tools) at regular intervals to prove the actual location of the conduits/cables before using boring machinery. Where it is required to bore across the line of cables/conduits, the actual location of the cables/conduits shall be proven by non-mechanical excavation (pot holing using hydrovac or hand tools). A trench shall be excavated 1 m from the side of the cables where the auger will approach to ensure a minimum clearance of 500 mm from cables/conduits can be maintained.

4.2.5 Hydro Vac Operation

When operating hydro vac equipment to excavate in vicinity of underground electrical assets (cables/conduits):

- Fitted with:
  - nonconductive (neoprene rubber or equivalent) vacuum (suction) hose.
  - oscillating nozzle on pressure wand with water pressure adjusted to not exceeding 2000 psi.
- Maintain a minimum distance of 200 mm between end of pressure wand and underground electrical assets. DO NOT insert the pressure wand jet directly into subsoil.
- Ensure pressure wand is not directly aimed at underground electrical assets (cables / conduits).

4.3. Blasting

Explosives must not be used within 5 m of cables/conduits, unless an engineering report is provided indicating that no damage will be sustained. Clearances shall be obtained from the Electricity Entity for use of explosives in the vicinity of cables/conduits. Contact Electricity Entity (General Enquiries phone number - refer page 3) for further advice.

The Electricity Entity will accept the level of 25 mm / sec as a peak component particle velocity upper limit as defined in AS 2187.2 Appendix J for blasting operations in the vicinity of these power lines.

Electric line insulators and conductors are particularly susceptible to damage from fly rock and adequate control measure including the use of blast mats shall be used to manage this. Contact Electricity Entity for consultation and application.

5. REPORTING DAMAGE CAUSED TO OVERHEAD OR UNDERGROUND ELECTRIC LINES

Any damage caused to the Electricity Entity overhead electric lines, poles, stays, underground cables, conduits and pipes must be reported no matter how insignificant the damage appears to be. Even very minor damage to cable protective coverings can lead to eventual failure of cables through corrosion of metal sheaths and moisture ingress.

All work in the vicinity of damaged overhead or underground electric lines shall cease and the area be made safe and vacated until clearance to continue earthworks has been obtained from the Electricity Entity. Call Electricity Entity (Emergencies phone number – refer page 3).

6. INFRASTRUCTURE NEAR ELECTRIC LINES

6.1. Easements and Wayleaves

This information, whilst not a legal document, has been developed to assist the community in answering some commonly asked questions about our easements and wayleaves, and briefly outlines what you can do where land is affected by an easement or where consent to installing electrical infrastructure has been given.

6.1.1 What is an Electricity Easement?

An electricity easement is the authority held by the Electricity Entity to use your land near overhead and underground electric lines and substations (electrical assets). Electricity Entity holds this authority for your own safety and to allow employees access to electrical assets at all times. Whilst it will depend on the terms of the particular grant of easement, electrical easements generally give the Electricity Entity the right to access, maintain, repair, rebuild and to restrict development within a defined area.

The easement, which is registered on the property's title, contains a plan showing the dimensions of the easement and its location on the property together with the rights and restrictions over the easement area. The Department of Natural Resources and Mines https://www.resources.qld.gov.au/ or your solicitor will be able to provide this information. Easements may also exist for telephone lines, water and sewage mains and natural gas supply lines.

6.1.2 Why are easements necessary?

Easements are also created to allow the Electricity Entity clear, 24 hour access to the electric lines. It is important to keep the easement clear at all times so regular maintenance, line upgrades, damage or technical faults can be attended to immediately to provide a safe and reliable supply of electricity. Interference with Electricity Entity's rights and electrical equipment may compromise safety of the public and the occupiers of the property. Therefore, it is essential that Electricity Entity's rights are understood and observed.

6.1.3 How do I know if there are easements on my property?

Contact your solicitor or The Department of Natural Resources and Mines to obtain a Title Search that shows all registered easements on the property.

6.1.4 Who owns the land the easement is on?

The ownership of that land encumbered with the easement remains with the property owner.

6.1.5 How does an easement affect what I can do with my property?

An easement controls what you can build, what size trees you can plant and what outdoor activities you can carry out in the easement area.

An easement affects the use of the property by limiting the development that can be undertaken within the easement area. The exact rights granted to an Electricity Entity under an electricity easement will depend on the wording used in the grant of easement. Property owners and occupiers should also be aware that an Electricity Entity has the right of access to land to undertake certain works (including reading meters and disconnecting supply). These rights of access are granted by Queensland legislation not the easement and so may not be registered on the property's title and therefore may not be revealed in a Title Search.

6.1.6 Who is responsible for maintenance of easement area?

You must provide a continuous, unobstructed area along the full length of the easement to allow an Electricity Entity access to electric lines, transformers, underground cables and other equipment at all times. A width of 4.5 m is typically required for the safe passage of vehicles and heavy plant.

You must NOT place obstructions in the easement within 5 m of any electric lines, transformer, power pole, equipment or supporting wire.

Maintenance of the easement area is generally the responsibility of the property owner and/or occupier, however, complying with regulatory and safety requirements associated with Electricity Entity's electrical assets within the easement area is the responsibility of the Electricity Entity.

6.1.7 What type of maintenance work does Electricity Entity undertake on easements?

To enable Electricity Entity to construct, maintain, repair and rebuild electric lines on some properties, access roads and tracks are required on or adjacent to the easement area. As required, Electricity Entity is able to construct access tracks, retain the right of use of these tracks and maintain them to a suitable level to permit access for its vehicles. Where gates are installed within the easement area, an Electricity Entity lock may be required to enable continual access along the easement corridor.

In addition, periodic vegetation management works are also undertaken by Electricity Entity to ensure that a specified minimum clearance between vegetation and the electric lines is maintained.

Where possible, property owners will be contacted prior to easement maintenance and vegetation works commencing.

6.1.8 Where consent (Wayleave) to installing Electricity Entity infrastructure has been given

Much of Electricity Entity's above ground electricity network is constructed without easements. Instead, the consent of the owner of the affected land is obtained and the electrical infrastructure is installed. Historically this consent has been in the form of a document known as a Wayleave.

This consent (or Wayleave) is a document evidencing the agreement from a particular owner, but it is not registered on the title of the land like an easement.

Once consent is obtained from an owner, Queensland legislation (the Electricity Act 1994) says that the consent of all future owners to the electrical infrastructure is not required.

Queensland legislation grants Electricity Entity rights to access, maintain, repair and replace electrical assets installed with consent.

6.2. Contact Electricity Entity when planning construction work near electric lines

When planning and before commencement (regardless of whether or not local council approval is required), it is essential to confirm that the proposed construction work (e.g. building, structure, sign, crane, scaffold) does not breach the minimum statutory clearance distances that must be maintained from nearby Electricity Entity overhead or underground electric lines. Refer Electrical Safety Regulation 2013, Schedule 4 and 5 for information on statutory clearance distances that must be complied with.

It is extremely dangerous and potentially life threatening to allow anything to come in close proximity to the conductors of an electric line.

Where it is necessary for an Electricity Entity to relocate electric lines due to statutory clearance breach caused by construction work performed nearby, the Electricity Entity is entitled to recover costs from the PCBU, property owner or occupier who caused the breach. Refer Electrical Safety Regulation 2013, Section 209 Building or adding to structure near electric lines.

Although it is preferred that the area around Electricity Entity electrical assets (including within an Easement area) is free of development, the following examples provide property owners and occupiers with an indication of what type of development is acceptable and what is not.

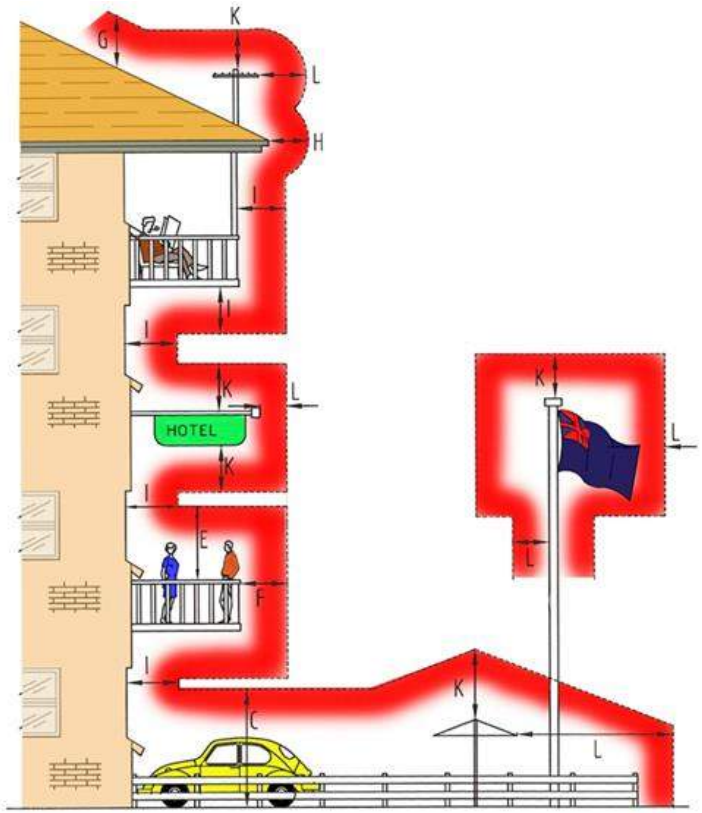
NOTE: Do not assume that your local council approval is sufficient approval for you to proceed with your work. The local council may not check whether or not **your proposed construction work will comply with the Electricity Entity's statutory clearance requirements**

6.3. What clearances must be maintained once construction work is completed?

Electrical Safety Regulation 2013, Schedule 4 - Clearance of overhead electric lines and Schedule 5 – Clearance of low voltage overhead service lines detail the statutory clearances that must be maintained from overhead electric lines for completed buildings and structures. These statutory clearances will need to be taken into consideration during the planning phase of determining the location for a building or structure. The table below sets out the minimum statutory clearances required for voltage levels up to 33 kV. Additional requirements may apply for voltage levels above 33 kV, contact the Electricity Entity for consultation.

Where the Electricity Entity has identified a breach of statutory clearance resulting from erection of a building or structure, the statutory breach will be reportable to the Electrical Safety Office as a Dangerous Electrical Event and any costs incurred in subsequent remedial work to achieve required statutory clearances may be recovered from the person or company who caused the breach of statutory clearance.

CODE	LOCATION	DIRECTION	INSULATED CABLE (ABC) (Note 1)	BARE	MORE THAN 1000 VOLTS BUT NOT MORE THAN 33kV
MINIMUM CLEARANCE FROM ROADS, GROUND, OR BOUNDARIES					
A	Crossing the carriageway, roadway	VERTICALLY	5.5m	5.5m	6.7m
A1	Designated "Over Dimension Routes"	VERTICALLY	7.0m	7.0m	7.5m
B	At other positions, footpath	VERTICALLY	5.5m	5.5m	5.5m
C	Other than roads but trafficable	VERTICALLY	5.5m	5.5m	5.5m
C1	Areas totally inaccessible to traffic or mobile machinery	VERTICALLY	4.5m	4.5m	4.5m
D	Cuttings, embankments, easement boundaries	HORIZONTALLY	1.5m	1.5m	2.1m
X	Real Property Boundaries	HORIZONTALLY	0.0m	0.0m	0.0m
MINIMUM CLEARANCE FROM STRUCTURES AND BUILDINGS					
E F	Unroofed terraces, balconies, sun-decks, paved areas, etc, subject to pedestrian traffic only. A hand rail or wall surrounding such an area and on which a person may stand. (Note)	VERTICALLY AND HORIZONTALLY (Note)	2.7m 1.2m	3.7m 1.5m	4.6m 2.1m
G H	Roofs or similar structures not used for traffic or resort but on which a person may stand. A parapet surrounding such a roof and on which a person may stand. (Note)	VERTICALLY AND HORIZONTALLY (Note)	2.7m 0.9m	3.7m 1.5m	3.7m 2.1m
I	Covered places of traffic or resort such as windows which are capable of being opened, roofed open verandahs and covered balconies.	IN ANY DIRECTION	1.2m	1.5m	2.1m
J	Blank walls, windows which cannot be opened. (Note)	HORIZONTALLY	0.6m	1.5m	1.5m
K L	Other structures not normally accessible to persons. (Note)	VERTICALLY HORIZONTALLY (Note)	0.6m 0.3m	2.7m 1.5m	3.0m 1.5m



NOTE:
The vertical clearance and the horizontal clearance specified shall be maintained.

The following list of examples is not exhaustive, and it may be necessary to contact the Electricity Entity if doubt exists as to what is permitted around electricity assets.

What is PERMITTED around Electricity Entity overhead or underground electric lines	What is NOT PERMITTED around Electricity Entity overhead or underground electric lines
✓ Erection of fences to a maximum height of 2.4 m is generally acceptable, provided they do not affect access to, and work on, the poles, electric lines and/or cables. Trees, shrubs and plants should be located clear of vehicle access. Note: Maximum Growth Height of 3 m. ✓ Clothes hoists and barbecues should be located clear of the vehicle access way. Note: Maximum Height 2.5 m. ✓ Installation of underground utility services, such as low voltage electricity, gas, telephone and water, is generally acceptable, subject to clearances from Electricity Entity poles and supporting structures, and underground electric mains. ✓ Excavating, filling and altering of nearby land may be acceptable but full details need to be provided to the Electricity Entity for assessment. ✓ Vehicles, mobile plant and equipment within the easement area need to maintain the minimum statutory clearances distances from overhead electric lines. Normal farming, grazing and other agricultural activities can be carried out. Take care when ploughing or operating mobile machinery or irrigation equipment near Electricity Entity's equipment. ✓ Parking of vehicles, trucks, trailers, etc. is normally allowed. Note: Maximum Load and Aerial Height of 4 m. Barriers of an approved design (e.g. bollards) may be required to protect poles from vehicle contact damage. Heavy vehicle or operating plant crossings may need a protective concrete cover to ensure underground cables are not damaged.	✗ Build houses, sheds, garages or other large structures. Building of roofed/ unroofed verandahs, swimming pools and pergolas are generally not acceptable. ✗ Flying kites or model aircraft within the easement. ✗ Driving fence posts or stakes into ground within easements where there is underground cabling. ✗ Storing liquids such as petrol, diesel fuel, or any flammable or combustible material that will burn. ✗ Installing lighting poles. ✗ Stockpiling soil or garbage within the easement. ✗ Planting trees in large quantities that could create a fire hazard or that grow in excess of the approved maximum height of 3 m. ✗ Storing or using explosives. ✗ Residing in or occupying any caravan or mobile home within an easement. ✗ Placing obstructions within the vicinity of any Electricity Entity assets (e.g. power pole, overhead electric line, equipment or pole stay) that impede access to or work on these assets.

6.4. What about Electric and Magnetic Fields?

The Electricity Entity operates its electric lines within the current guidelines set by the National Health and Medical Research Council for exposure to 50/60 hertz electric and magnetic fields (EMF) and is mindful of some community concern about such fields and health. Contact the Electricity Entity (General Enquiries phone number - refer page 3). Alternatively, further information can be sourced from:

Energy Networks Association (ENA) brochure - "Electric and Magnetic Fields - What We Know", January 2014

http://www.ena.asn.au/sites/default/files/emf-what-we-know-jan-2014-final_1_1.pdf

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) brochure - "Electricity and Health", May 2011

http://www.arpansa.gov.au/RadiationProtection/Factsheets/is_electricity.cfm

DEFINITIONS	
Term	Definition
Applicant	A person contacting or applying to the Electricity Entity for a Safety Advice.
Authorised Person	For work near an electrical line, means a person who has enough technical knowledge and experience to do work that involves being near to the electrical line; and has been approved by the person in control of the electrical line (Electricity Entity) to do work near to the electrical line.
Authorised Person (Electrical)	An Electrical Mechanic or Electrical Linesperson (holding current Queensland Licence) working on behalf of an electrical contractor and accredited with the Electricity Entity who is permitted to remove and replace LV service fuse(s) when isolation of customer LV service line is required to eliminate the exclusion zone around the LV service line, or to work on the customer's mains and / or switchboard.
Earthworks	Any digging, penetration or disturbance of ground including but not limited to post hole digging, excavating, trenching, directional boring, bore hole sinking, driving pickets/posts into ground, cut and fill, dam or levee bank construction, blasting.
Electricity Entity	Where Electricity Entity appears throughout this document, it relates to either Energex or Ergon Energy area of responsibility. Refer to respective contact details below.
Instructed Person	For an electrical line, means a person who is acting under the supervision of an Authorised Person for the electrical line.
Safety Advice	A written notice identifying the known electrical hazards at a specific site and advising the control measures required to be implemented by Responsible Person (person responsible for worksite) to reduce the likelihood of harm to person, plant or vehicle at site.
Safety Observer	A safety observer or "spotter", for the operation of operating plant, means a person who: (a) observes the operating plant; and (b) advises the operator of the operating plant if it is likely that the operating plant will come within an exclusion zone for the operating plant for an overhead electric line. This is a person who has undergone specific training and is competent to perform the role in observing, warning and communicating effectively with the operator of the operating plant.
Untrained Person	For an electrical line, means a person who is not an Authorised Person or an Instructed Person for the electrical line.

TRAINING
Staff must be current in all Statutory Training relevant for the task.

SAFETY / ENVIRONMENTAL CONTROLS

Follow the Safety Policy, procedures and practices set out for Energy Queensland and subsidiary companies.

Personnel are responsible for understanding all the risks and ensuring their individual actions do not endanger the health and safety of themselves or others.



FATAL HAZARDS CRITICAL CONTROLS FOR THE TASK



REFERENCES

Supporting Documents

Electrical Safety Regulation 2013: Part 5 - Overhead and Underground Electric Lines

Electrical Safety Code of Practice 2020 - Working Near Overhead and Underground Electric Lines

Work Health and Safety Act 2011

Work Health and Safety Regulation 2011

Energex documents:

- Application for Safety Advice – Working near Energex exposed live parts
- Important Notice – Working near Energex Power Lines Including Overhead Services
- Safety Advice on working near Energex exposed live parts

Ergon Energy documents:

- Safety Advice Request Form
- Safety Advice on Working around Electrical Parts Form
- Important Notice Regarding Safety Advice QRG

Copies of the relevant Acts, Regulation and Codes of Practice and any other relevant legislation can be found on the Queensland Government web site - https://www.worksafe.qld.gov.au/

REFERENCES

Disclaimer

This document refers to various standards, guidelines, calculations, legal requirements, technical details and other information and is not an exhaustive list of all safety matters that need to be considered.

Over time, changes in industry standards and legislative requirements, as well as technological advances and other factors relevant to the information contained in this document, may affect the accuracy of the information contained in this document. Whilst care is taken in the preparation of this material, Energex and Ergon Energy do not guarantee the accuracy and completeness of the information. Accordingly, caution should be exercised in relation to the use of the information in this document.

To the extent permitted by law, Energex and Ergon Energy will not be responsible for any loss, damage or costs incurred as a result of any errors, omissions or misrepresentations in relation to the material in this document or for any possible actions ensuing from information contained in the document.

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Responsibilities – (When Working in the Vicinity of Energex Assets)

Extreme care must be taken during non-mechanical or mechanical excavation as damage to Energex Assets can lead to injury or death of workers or members of the public. Assets include underground cables, conduits and other associated underground Asset used for controlling, generating, supplying, transforming or transmitting electricity.

In accordance with the Electrical Safety Act 2002, a Person Conducting a Business or Undertaking (**PCBU**) must ensure the person's business or undertaking is conducted in a way that is electrically safe. This includes:

a) ensuring that all Assets used in the conduct of the person's business or undertaking are electrically safe;

b) if the person's business or undertaking includes the performance of electrical work, ensuring the electrical safety of all persons and property likely to be affected by the electrical work; and

c) if the person's business or undertaking includes the performance of work, whether or not electrical work, involving contact with, or being near to, exposed parts, ensuring persons performing the work are electrically safe.

In addition, a PCBU at a workplace must ensure, so far as is reasonably practicable, that no person, Asset or thing at the workplace comes within an unsafe distance of an underground electric line.

Workers and other persons must also take reasonable care for their own and other person's electrical safety. This includes complying, so far as is reasonably able, with any reasonable instructions given by Energex to ensure compliance with the Electrical Safety Act 2002

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The following matters must be considered when working near Energex Assets:

The PCBU must ensure, so far as is reasonably practicable, that no person, Asset or thing at the workplace comes within an unsafe distance of an underground electric line (see section 68 of the Electrical Safety Regulation 2013)

1. It is the responsibility of the architect, consulting engineer, developer and head contractor in the project planning stages to design for minimal impact and protection of Energex Assets.
2. It is the constructor's responsibility to:
   a) Anticipate and request plans of Energex Assets for a location at a reasonable time before construction begins.
   b) Visually locate Energex Assets by hand or vacuum excavation where construction activities may damage or interfere with Energex Assets.
   c) notify Energex if the information provided is found to be not accurate or Assets are found on site that are not recorded on the Energex BYDA plans.
   d) Read and understand all the information and disclaimers provided.

   Note: A constructor may include but not limited to a PCBU, Designer, Project Manager, Installer, Contractor, Electrician, Builder, Engineer or a Civil Contractor

3. Comply with applicable work health and safety and electrical safety codes of practice including but not limited to:
   a) Working near Assets – Electrical safety codes of practice 2020
   b) Managing electrical risk in the workplace – Managing Electrical Risks in the workplace Code of Practice 2021
   c) Excavation work – Code of practice 2021

IMPORTANT NOTES:

- As the alignment and boundaries of roadways with other properties (and roads within roadways) frequently change, the alignments and boundaries contained within Energex plans and maps will frequently differ from present alignments and boundaries "on the ground". Accordingly, in every case where it appears that alignments and boundaries have shifted, or new roadways have been added, the constructor should obtain confirmation of the actual position of Energex cables and pipelines under the roadways. In no case should the constructor rely on statements of third parties in relation to the position of Energex cables and pipelines. It is the applicant's responsibility to accurately locate all services as part of the design and/or prior to excavation.
- Energex does not provide information on private underground installations, including consumers' mains that may run from Energex mains onto private property. Assets located on private property are the responsibility of the owner for identification and location.
- Energex plans are circuit diagrams or pipe indication diagrams only and indicate the presence of Asset in the general vicinity of the geographical area shown. Exact ground cover and alignments cannot be given with any certainty; as such levels can change over time.
- All underground conduits are presumed to contain asbestos. Refer to the:
  - Electrical safety codes of practice 2020
  - Model Code of Practice: How to manage and control asbestos in the workplace | Safe Work Australia
  - How to manage and control asbestos in the workplace code of practice 2021 (Workplace Health and Safety Queensland (WHSQ)
  - How to safely remove asbestos code of practice 2021 (WHSQ)
- Plans provided by Energex are not guaranteed to show the presence of above ground Assets.
- In addition to underground cables marked on attached plan there could be underground substation, underground earth conductors, Multiple Earthed Neutral(MEN) conductors, Single Wire Earth Return(SWER), substation Earth Conductors, ABS Earth Mats or Consumer Mains in the vicinity or private underground cables (inc. consumers' mains that may run from Energex mains onto private property) in the vicinity of the nominated work area(s) that are not marked on the plans.
- Being aware of Your obligations including but not limited to [ss 304, 305] Excavation work— underground essential services information under the Work Health and Safety Regulation 2011 , Chapter 6 Construction work, Part 6.3 Duties of person conducting business or undertaking. This includes but is not limited to taking reasonable steps to obtain the current information & providing this information to persons engaged to carry out the excavation work. For further information please refer to: - http://www.legislation.qld.gov.au/LEGISLTN/SLS/2011/11SL240.pdf
- Energex plans are designed to be printed in colour and as an A3 Landscape orientation.

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Conditions – (When Working in the Vicinity of Energex Assets)

Records:
The first step before any excavation commences is to obtain records of Energex Assets in the vicinity of the work. For new work, records should be obtained during the planning and design stage. The records provided by Energex must be made available to all construction groups on site. Where Asset information is transferred to plans for the proposed work, care must be exercised to ensure that important detail is not lost in the process.

Plans and or details provided by Energex are current for four weeks from the date of dispatch and should be disposed of by shredding or any other secure disposal method after use. A new BYDA enquiry must be made for proposed works/activities to be undertaken outside of the four-week period.

Energex retains copyright of all plans and details provided in connection with Your request.

Energex plans or other details are provided for the use of the applicant, its servants, or agents, and shall not be used for any unauthorised purpose.

On receipt of BYDA plans and before commencing excavation work or similar activities near Energex's Assets check to see that it relates to the area You have requested and carefully locate this Asset first to avoid damage. If You are unclear about any information contained in the plan, You must contact Energex on the General Enquiries number listed below for further advice.

Energex, its servants or agents shall not be liable for any loss or damage caused or occasioned by the use of plans and or details so supplied to the applicant, its servants and agents, and the applicant agrees to indemnify Energex against any claim or demand for any such loss or damage.

The contractor is responsible for all Asset damages when works commence prior to obtaining Energex plans, or failure to follow agreed instructions, or failure to demonstrate all reasonable measures were taken to prevent the damage once plans were received from Energex.

Energex reserves all rights to recover compensation for loss or damage caused by interference or damage, including consequential loss and damages to its Assets, or other property.

NOTE: Where Your proposed work location contains Energex 33kV or greater Underground cables please access the Energex BYDA website for more information.

Location of Assets:
Examining the records is not sufficient, as reference points may change from the time of installation. Records must also be physically proven when working in close proximity to them. The exact location of Assets likely to be affected shall be confirmed by use of an electronic cable and pipe locater followed by **careful hand or vacuum excavation to the level of cable protection cover strips or conduits.** When conducting locations, please be aware that **no** unauthorised access is permitted to Energex Assets– including Pits, Low Voltage Disconnection Boxes, Low Voltage Pillars or High Voltage Link Boxes.

Hand or vacuum excavation must be used in advance of excavators. In any case, where any doubt exists with respect to interpretation of cable records, You must contact Energex on the General Enquires number listed below for further advice.

If the constructor is unable to locate Energex underground Assets within 5 metres of nominal plan locations, they must contact the Energex General Enquires number listed below for further advice.

If unknown cables or conduits (i.e. not shown on issued BYDA plans) are located during excavation:
1. Call the ELECTRICITY EMERGENCIES number listed below
2. Treat Assets as if alive, post a person to keep all others clear of the excavation until Energex crew attend to make safe.
3. All work in the vicinity of damaged Asset must cease and the area must be vacated until a clearance to continue work has been obtained from an Energex officer.

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Asset Installation Methods:
Energex Assets are installed with a variety of protection devices including:

1. Clay paving bricks or tiles marked “Electricity” or similar (also unmarked)
2. Concrete or PVC cover slabs
3. PVC, A/C or fibro conduit, fibre reinforced concrete, iron or steel pipe
4. Concrete encased PVC or steel pipe
5. Thin plastic marker tape
6. Large pipes housing multiple ducts
7. Multiple duct systems, including earthenware or concrete 2, 4, and 6-way ducts and shamrocks

Note: Some Assets are known to be buried without covers and may change depth or alignment along the route.

Excavating Near Assets:
For all work within 2.5 m of nominal location, the constructor is required to hand or vacuum excavate (pothole) and expose the Assett, hence proving its exact location before work can commence.

Cable protection cover strips shall not be disturbed. Excavation below these cover strips, or into the surrounding backfill material is not permitted.

Excavating Parallel to Assets:
If construction work is parallel to Energex cables, then hand or vacuum excavation (potholing) at least every 4m is required to establish the location of all cables, hence confirming nominal locations before work can commence. *Generally, there is no restriction to excavations parallel to Energex cables to a depth not exceeding that of the cable.* ***Note: Cable depths & alignment may change suddenly****.*

Separation from Assets:
Any service(s) must be located at the minimum separation as per the tables below:

Table 1. Minimum Separation Requirements for Underground Services Running Parallel with Energex Assets

(Minimum Separation required in mm)							
Voltage Level	**Gas**	**Communication or TV**	**Water**		**Sanitary drainage**		**Storm Water**
			≤DN 200	**>DN200**	**≤DN 200**	**>DN 200**	
LV	250	100	500	*1000	500	1000	500
HV		300					
*Contact Energex/council to obtain specific separation distances							

Table 2. Minimum Separation Requirements for Underground Services Crossing Energex Assets

(Minimum Separation required in mm)					
Voltage Level	**Gas**	**Communication or TV**	**Water**	**Sanitary drainage**	**Storm Water**
LV & HV	100	100	300	300	100

Where the above table does not list a separation requirement for a particular underground service then 300mm shall be used.

Excavating Across Assets:
The standard clearance between services shall be maintained as set down in Table 2 above. If the width or depth of the excavation is such that the Asset will be exposed or unsupported, then Energex shall be contacted to determine whether the Assets should be taken out of service, or whether they need to be protected or supported. In no case shall an Asset cover be removed without approval. An Asset cover may only be removed under the supervision of an Energex authorised representative. Protective cover strips when removed must be replaced under Energex supervision. Under no circumstances shall they be omitted to allow separation between Energex Assets and other services.

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Heavy Machinery Operation Over Assets:
Where heavy "Crawler" or "Vibration" type machinery is operated over the top of Assets, a minimum cover of 450 mm to the cable protective cover mains must be maintained using load bearing protection whilst the machinery is in operation. For sensitive cables (i.e. 33 and 110kV fluid and gas filled cables), there may be additional constraints placed on vibration and settlement by Energex.

Directional Boring Near Assets:
When boring parallel to Assets, it is essential that trial holes are carefully hand or vacuum excavated at regular intervals to prove the actual location of the Asset before using boring machinery. Where it is required to bore across the line of Assets, the actual location of the Asset shall first be proven by hand or vacuum excavation. A trench shall be excavated 1m from the side of the Asset where the auger will approach to ensure a minimum clearance of 500mm above and below all LV, 11kV, 33kV & 110/132kV Asset shall be maintained.

Explosives:
Explosives must not be used within 10 metres of Assets, unless an engineering report is provided indicating that no damage will be sustained. Clearances should be obtained from Energex's Planning Engineer for use of explosives in the vicinity of Energex cables.

Damage Reporting:
All damage to Assets must be reported no matter how insignificant the damage appears to be. Even very minor damage to Asset protective coverings can lead to eventual failure of Assets through corrosion of metal sheaths and moisture ingress.

If any Damaged Asset is found:
1. Call the ELECTRICITY EMERGENCIES number listed below
2. Treat Assets as if alive, post a person to keep all others clear of the excavation until Energex crew attend to make safe.
3. All work in the vicinity of damaged Asset must cease and the area must be vacated until a clearance to continue work has been obtained from an Energex officer.

Solutions and Assistance:
If Asset location plans or visual location of Asset by hand or vacuum excavation reveals that the location of Energex Asset is situated wholly or partly where the developer or constructor plans to work, then Energex shall be contacted to assist with Your development of possible engineering solutions.

If Energex relocation or protection works are part of the agreed solution, then payment to Energex for the cost of this work shall be the responsibility of the, PCBU, principal developer or constructor. Energex will provide an estimated quotation for work on receipt of the PCBU's, developer's or constructor's order number before work proceeds.

It will be necessary for the developer or constructor to provide Energex with a written Safe Work Method Statement for all works in the vicinity of or involving Energex Assets. This Safe Work Method Statement should form part of the tendering documentation and work instruction. Refer Interactive Tool on Safe Work Australia site: Interactive SWMS guidance tool - Overview (safeworkaustralia.gov.au)

Vacuum Excavations (Hydro Vac)

When operating hydro vac equipment to excavate in vicinity of Assets fitted with:

- Nonconductive (neoprene rubber or equivalent) vacuum (suction) hose
- Oscillating nozzle on pressure wand with water pressure adjusted to not exceeding 2000 Pound force per Square Inch(PSI).

Maintain a minimum distance of 200mm between end of pressure wand and underground electrical Assets. DO NOT insert the pressure wand jet directly into subsoil.

Ensure pressure wand is not directly aimed at underground electrical Assets (cables/conduits).

Safety Notices (Underground Work)

It is recommended that You obtain a written Safety Advice from Energex when working close to Energex Assets. For Safety Advice please contact custserve@energex.com.au

Further information on Working Safely around Energex Assets: Working near powerlines | Energex

Thank You for Your interest in maintaining a safe and secure Electricity Distribution network. Energex welcomes Your feedback on this document via email to byda@energyq.com.au.

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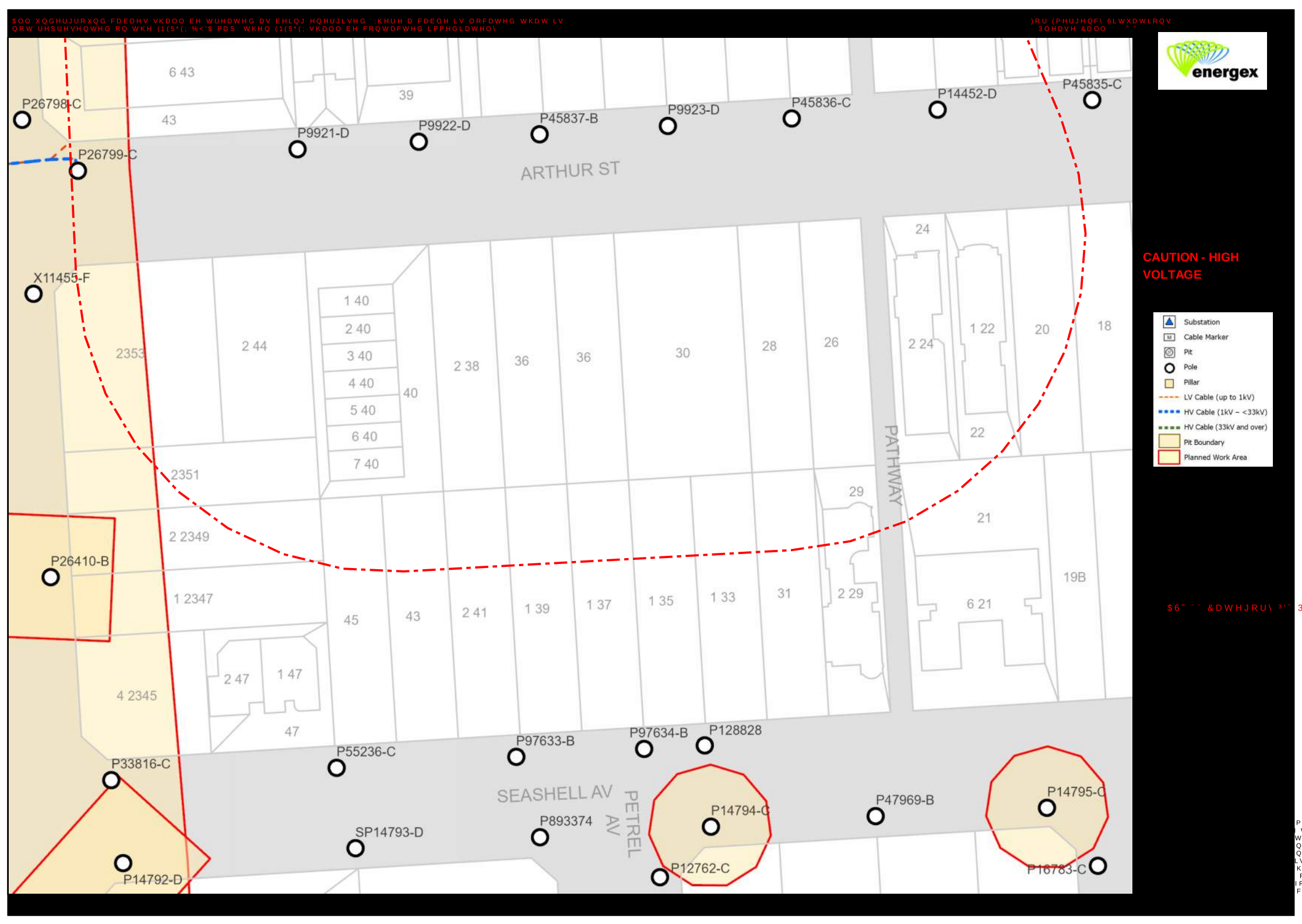
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OVERVIEW

CAUTION - HIGH VOLTAGE

- Substation
- Cable Marker
- Pit
- Pole
- Pillar
- LV Cable (up to 1kV)
- HV Cable (1kV – <33kV)
- HV Cable (33kV and over)
- Pit Boundary
- Planned Work Area


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CAUTION - HIGH VOLTAGE
Substation
Cable Marker
Pit
Pole
Pillar
LV Cable (up to 1kV)
HV Cable (1kV – <33kV)
HV Cable (33kV and over)
Pit Boundary
Planned Work Area
TAMBORINE ST
PATHWAY
P13849-E
P12065-C
P13801-E
P12056-D
SP237-N
P12064-D
P13803-D
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2371
2371
7 2367
2367
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energex
CAUTION - HIGH VOLTAGE
Substation
Cable Marker
Pit
Pole
Pillar
LV Cable (up to 1kV)
HV Cable (1kV – <33kV)
HV Cable (33kV and over)
Pit Boundary
Planned Work Area
ARTHUR ST
SEASHELL AV
PETREL AV
PATHWAY
P26798-C
P26799-C
X11455-F
P26410-B
P33816-C
P14792-D
SP14793-D
P55236-C
P9921-D
P9922-D
P45837-B
P9923-D
P45836-C
P14452-D
P45835-C
P97633-B
P97634-B
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Working near nbn™ cables

nbn has partnered with Dial Before You Dig to give you a single point of contact to get information about **nbn** underground services owned by **nbn** and other utility/service providers in your area including communications, electricity, gas and other services. Contact with underground power cables and gas services can result in serious injury to the worker, and damage and costly repairs. You must familiarise yourself with all of the Referral Conditions (meaning the referral conditions referred to in the DBYD Notice provided by **nbn**).

Practice safe work habits

Once the DBYD plans are reviewed, the Five P's of Excavation should be adopted in conjunction with your safe work practices (which must be compliant with the relevant state Electrical Safety Act and Safe Work Australia "Excavation Work Code of Practice", as a minimum) to ensure the risk of any contact with underground **nbn** assets are minimised.

Plan: Plan your job by ensuring the plans received are current and apply to the work to be performed. Also check for any visual cues that may indicate the presence of services not covered in the DBYD plans.

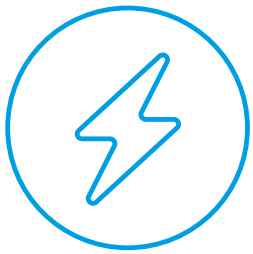
Prepare: Prepare for your job by engaging a DBYD Certified Plant Locator to help interpret plans and identify on-site assets. Contact **nbn** should you require further assistance.

Pothole: Non-destructive potholing (i.e. hand digging or hydro excavation) should be used to positively locate **nbn** underground assets with minimal risk of contact and service damage.

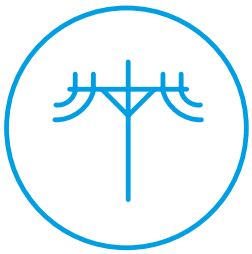
Protect: Protecting and supporting the exposed **nbn** underground asset is the responsibility of the worker. Exclusion zones for **nbn** assets are clearly stated in the plan and appropriate controls must be implemented to ensure that encroachment into the exclusion zone by machinery or activities with the potential to damage the asset is prevented.

Proceed: Proceed only when the appropriate planning, preparation, potholing and protective measures are in place.

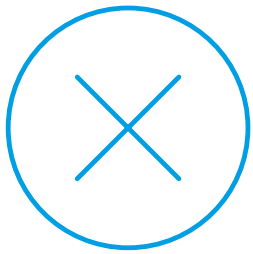
Working near **nbn**™ cables



Identify all electrical hazards, assess the risks and establish control measures.



When using excavators and other machinery, also check the location of overhead power lines.



Workers and equipment must maintain safety exclusion zones around power lines.

Once all work is completed, the excavation should be re-instated with the same type of excavated material unless specified by **nbn**. Please note:

- Construction Partners of **nbn** may require additional controls to be in place when performing excavation activities.
- The information contained within this pamphlet must be used in conjunction with other material supplied as part of this request for information to adequately control the risk of potential asset damage.

Contact

All **nbn**™ network facility damages must be reported online here.
For enquiries related to your DBYD request please call 1800 626 329.

Disclaimer

This brochure is a guide only. It does not address all the matters you need to consider when working near our cables. You must familiarise yourself with other material provided (including the Referral Conditions) and make your own inquiries as appropriate.

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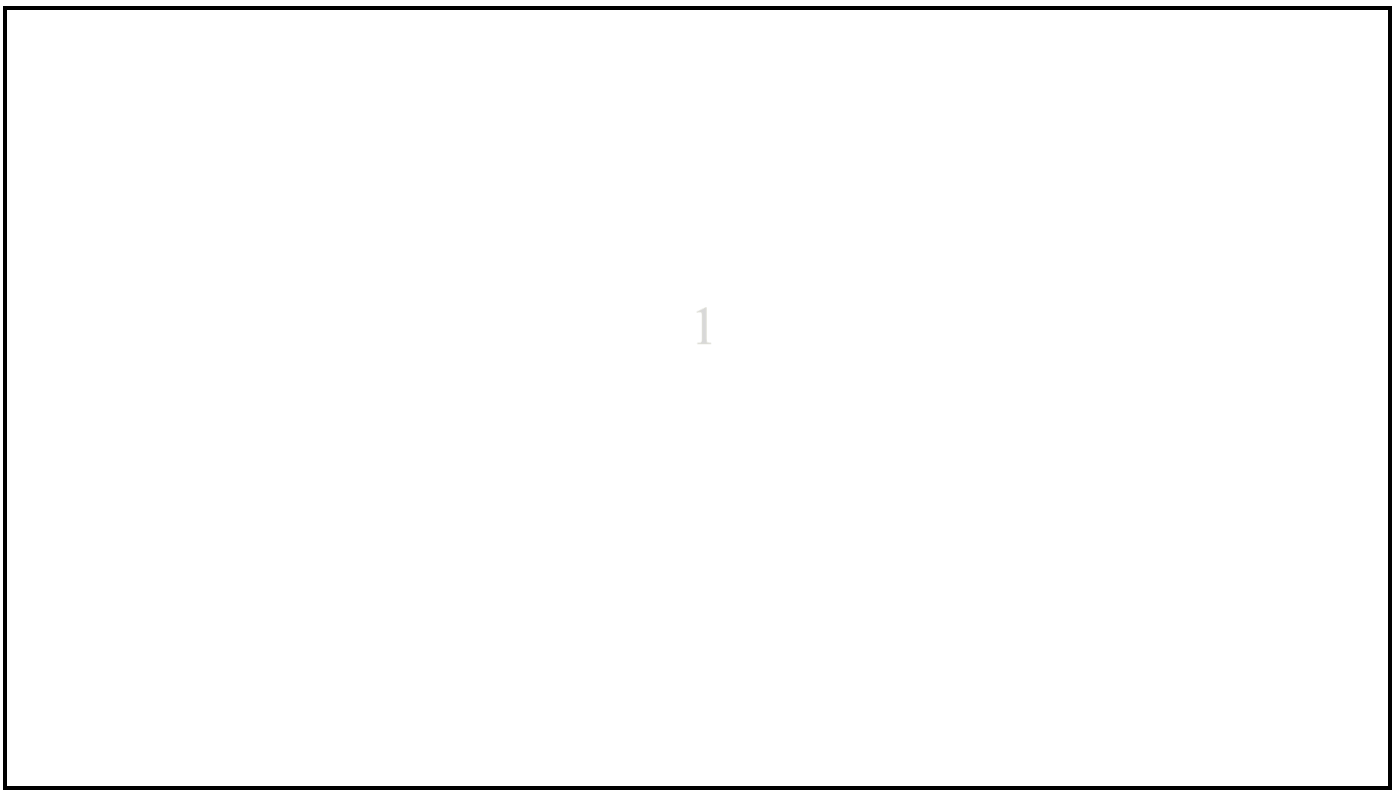
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Phone:	Not Supplied
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Email:	jesse@pinnacleeng.com.au

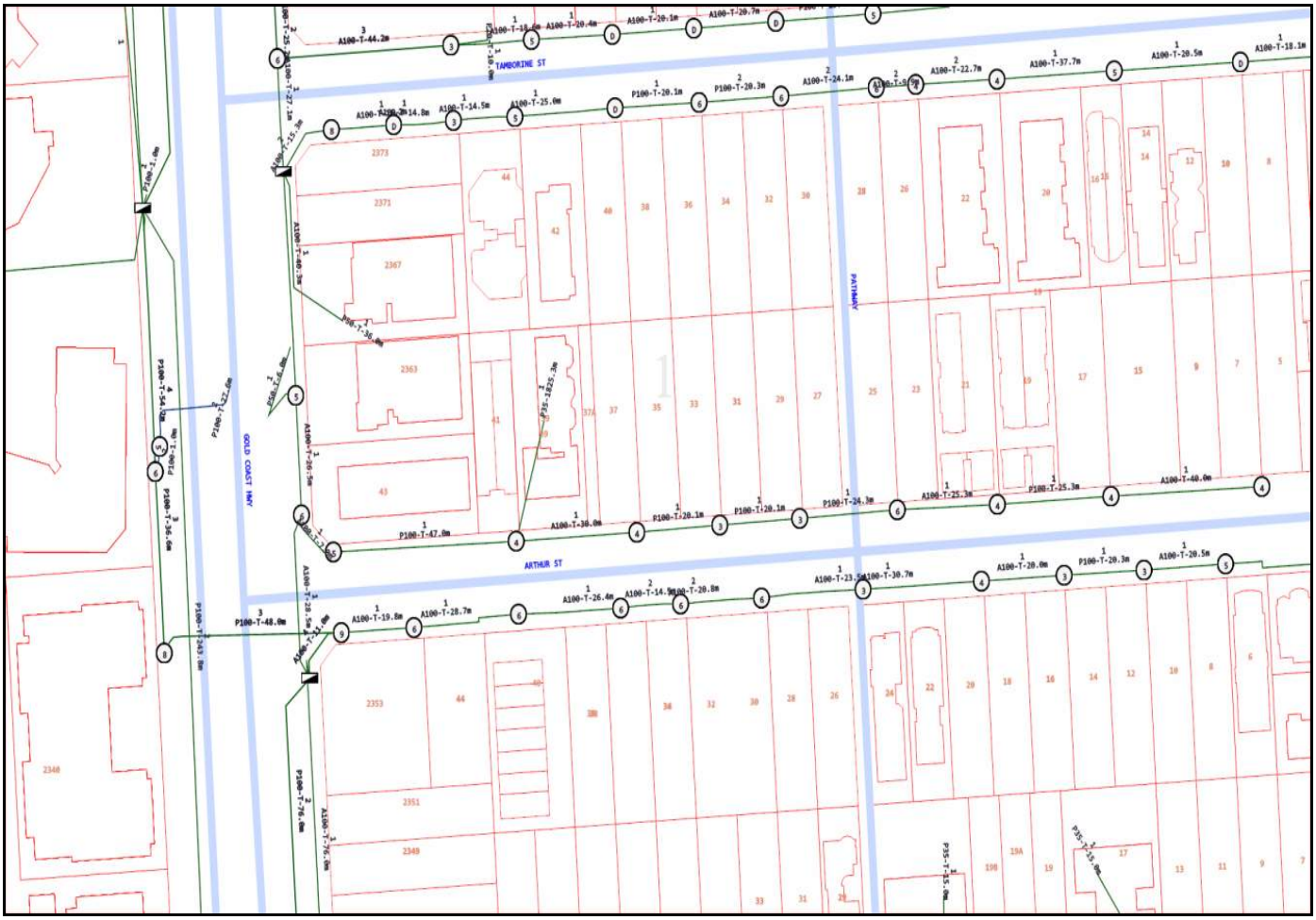
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Issue Date:	19/12/2024
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Indicative Plans are tiled below to demonstrate how to layout and read nbn asset plans



LEGEND

34	Parcel and the location
5	Pit with size "5"
2E	Power Pit with size "2E". Valid PIT Size: e.g. 2E, 5E, 6E, 8E, 9E, E, null.
	Manhole
	Pillar
2 PO – T- 25.0m P40 – 20.0m 5 9	Cable count of trench is 2. One "Other size" PVC conduit (PO) owned by Telstra (-T-), between pits of sizes, "5" and "9" are 25.0m apart. One 40mm PVC conduit (P40) owned by NBN, between pits of sizes, "5" and "9" are 20.0m apart.
2 10.0m 5 9	2 Direct buried cables between pits of sizes ,"5" and "9" are 10.0m apart.
5 9	Trench containing any INSERVICE/CONSTRUCTED (Copper/RF/Fibre) cables.
5 9	Trench containing only DESIGNED/PLANNED (Copper/RF/Fibre/Power) cables.
5 9	Trench containing any INSERVICE/CONSTRUCTED (Power) cables.
BROADWAY ST	Road and the street name "Broadway ST"
Scale	0 20 40 60 Meters 1:2000 1 cm equals 20 m



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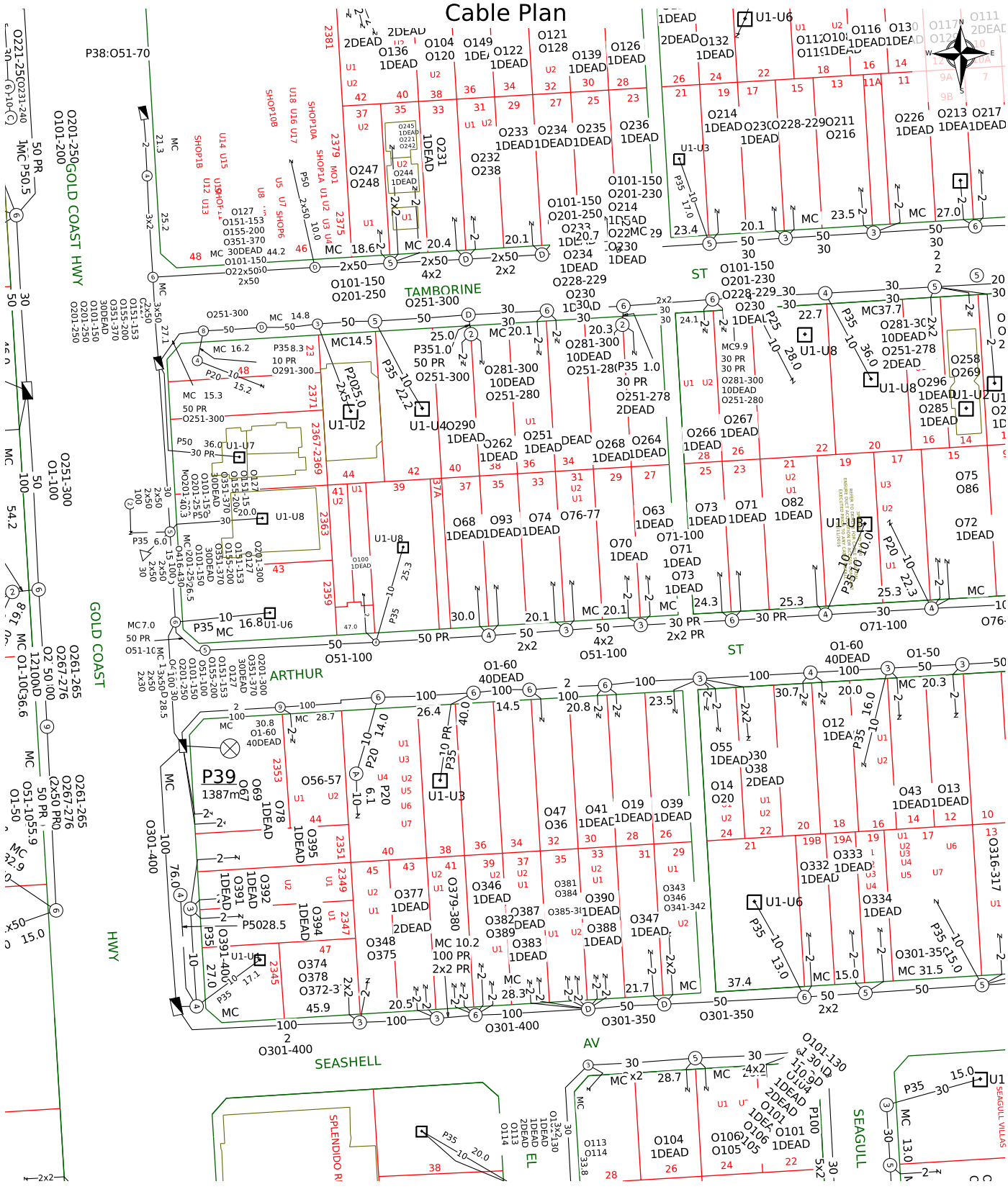
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Cable Plan



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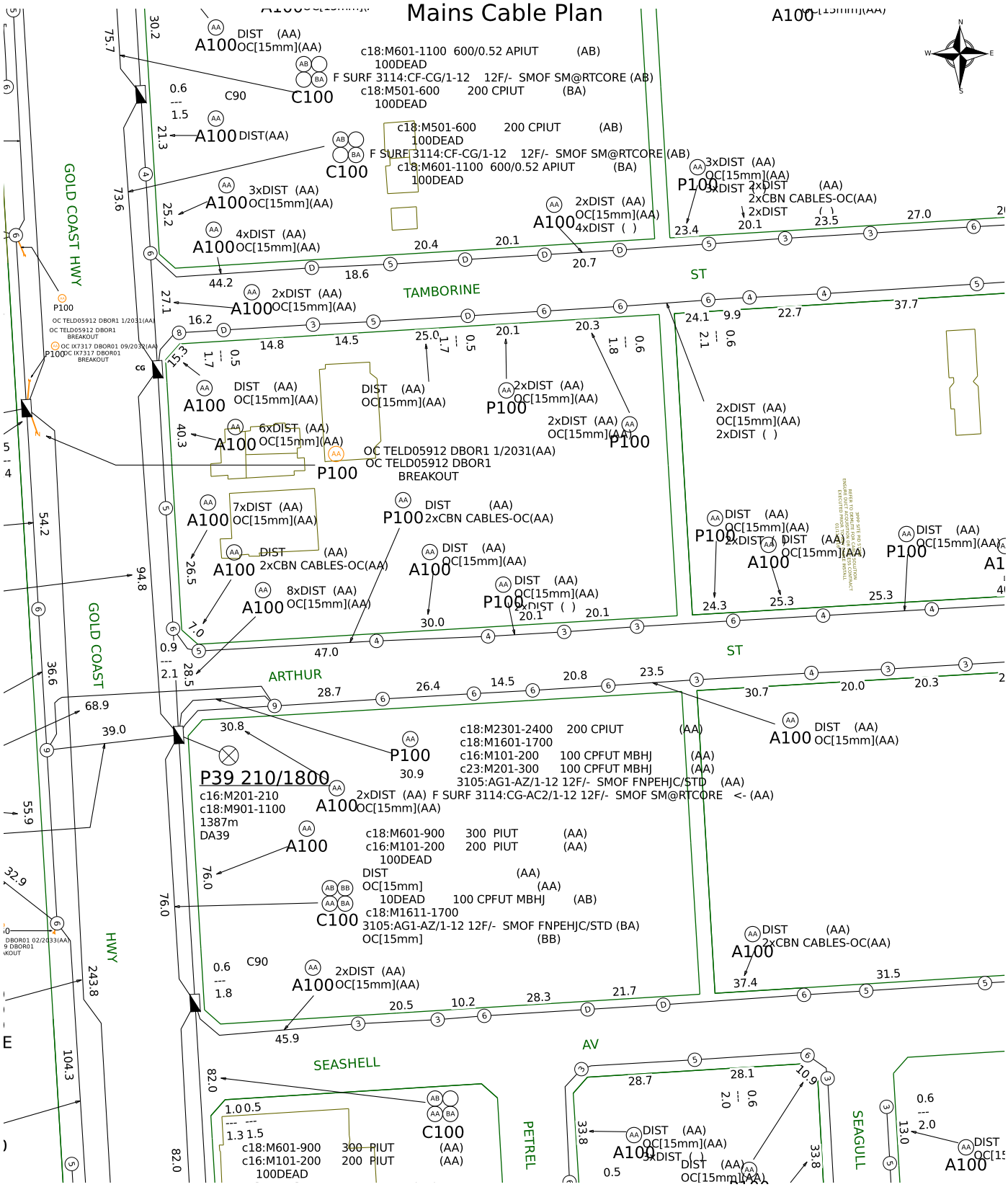
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Mains Cable Plan



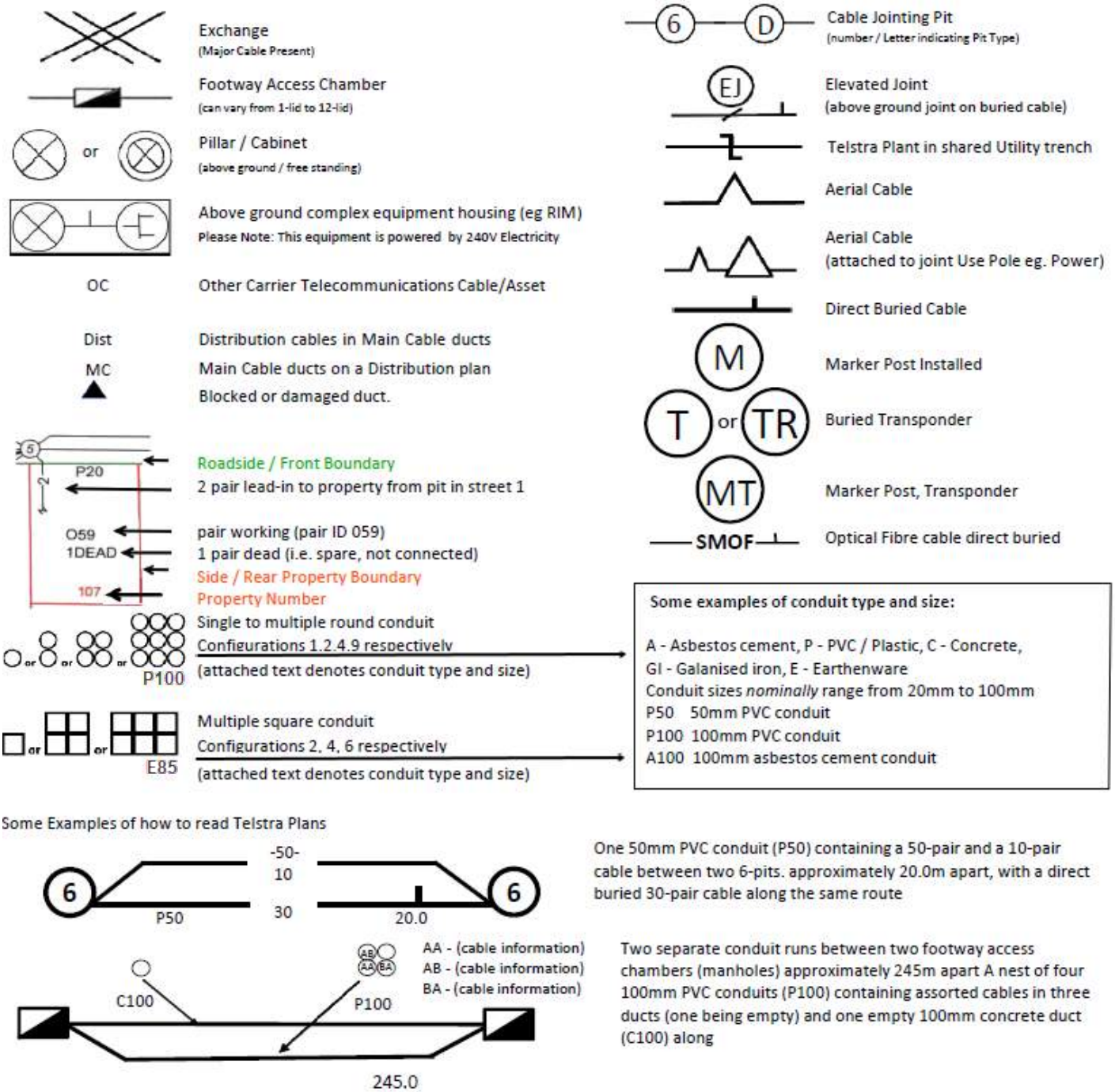
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LEGEND



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- 600mm Heavy Vehicle Traffic (over 3 tonnes) not to be driven across Telstra ducts or plant.
- 1.0mJackhammers/Pneumatic Breakers
- 2.0m Boring Equipment (in-line, horizontal and vertical)

For more info contact a CERTLOC Certified Locating Organisation (CLO) or Telstra Location Intelligence Team 1800 653 935

Appendix E

CoGC Mapping


Tamborine Street
Gold Coast Highway
Gold Coast Highway
Gold Coast Highway
Gold Coast Highway
Arthur Street
Arthur Street
Flood Depth
0 cm - 30 cm
30 cm - 60 cm
60 cm - 1.2 m
1.2 m - 1.5 m
1.5 m - 2.0 m
Over 2.0 m

Appendix F

CoGC Codes


PINNACLE
ENGINEERING GROUP
PINNACLE ENGINEERING GROUP
ABN: 80 608 431 625
Level 1, 19 Short Street, Southport QLD 4215
(PO Box 517, Paradise Point QLD 4216)
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Section 4 - SPECIALIST REPORTS

Stormwater Management Plan
Prepared by Pinnacle Engineering Group



PINNACLE ENGINEERING GROUP

SITE BASED STORMWATER MANAGEMENT PLAN

PROPOSED MULTI-UNIT RESIDENTIAL DEVELOPMENT

37 Arthur Street, Mermaid Beach QLD

CUECORP™ PROPERTY GROUP

APRIL 2025

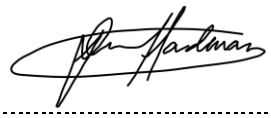
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Pinnacle Engineering Group
ABN: 80 608 431 625
P.O. Box 517 Paradise Point QLD 4216

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In accordance with the requirements of the *Queensland Professional Engineers Act 2002*, this document was prepared under the supervision of, reviewed and approved by the following experienced Registered Professional Engineer of Queensland (RPEQ).



Jesse Hardman (RPEQ No. 27335)

Pinnacle Engineering Group
P.O. Box 517
Paradise Point, QLD 4216

PH: +61 433 266 457
E: michael@pinnacleeng.com.au

www.pinnacleeng.com.au

Document control

Rev	Date issued	Review	Approved	Approved on	Revision type
01	31-January-2025	A. Cresswell	B. Popa	31-January-2025	Issued for comment
02	1-April-2025	A. Cresswell	J. Hardman	1-April-2025	Issued for approval

Distribution of copies

Revision	Quantity	Distribution
01	1.pdf	Cuecorp Property Group
02	1.pdf	Cuecorp Property Group

Printed:	01 April 2025
Last saved:	01/04/2025 10:00
File name:	P:\Projects\PEG1310_37 Arthur Street, Mermaid Beach\03 Reports\02 SBSMP\250401_PEG1310_37 Arthur Street, Mermaid Beach_SMP_R002.docx
Author:	Jesse Hardman
Project manager:	Michael Binger
Name of organisation:	Pinnacle Engineering Group
Name of project:	37 Arthur Street, Mermaid Beach QLD
Name of document:	250401_PEG1310_37 Arthur Street, Mermaid Beach_SMP_R002.docx
Document version:	REV 02
Project number:	PEG1310

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1 Introduction

Pinnacle Engineering Group (Pinnacle) was engaged by Cuecorp Property Group to prepare a site based stormwater management plan (SBSMP) and undertake the associated investigations as supporting documentation for the proposed multi-unit residential complex located at 37 Arthur Street, Mermaid Beach QLD within the local authority of the City of Gold Coast (CoGC).

1.1 Scope of Investigation

This report addresses the proposed stormwater management strategy for the aforementioned development, including but not limited to the following elements:

- Pre and post development flows for various Average Exceedance Probably (AEP) / Average Recurrence Interval (ARI) design storm events;
- Nomination of the Lawful Point of Discharge for the site;
- Details of the stormwater quantity management strategy;
- Details of the stormwater quality management strategy and proposed treatment train;
- Details of maintenance and monitoring requirements for proposed treatment train; and
- Details of the proposed sediment and erosion control plan.

1.2 Site Description

1.2.1 Site Location

Street Address	-	37 Arthur Street, Mermaid Beach QLD 4218
RP Description	-	Lot 1 on RP85529 and Lot 23 on RP41194
Site Area	-	0.0527 Hectares
Current Zoning	-	Medium Density Residential
Proposed Use	-	Multi-Unit Residential Development
Local Authority	-	CoGC

Refer to Figure 1.1 for the site location.

1.2.2 Existing Site Conditions and Topography

The subject site is currently occupied a single storey residential dwelling located centrally within the site, a carport within the south-west corner of the site, and a swimming pool within the northwest corner of the site. The balance of the site is comprised of paved surfaces and landscaped areas.

The highest elevation of the subject site of RL6.11m AHD is reached adjacent to the existing building slab while the lowest elevation of approximately RL5.62m AHD is reached within the southwest corner of the site, adjacent to the front property boundary.

Refer to Figure 1.2 for the existing aerial view of the subject site. The topographic survey of the site is included in Appendix B.

1.2.3 Proposed Development

The proposed development will deliver a multi-unit residential building comprised of 6 units, basement level carparking and associated infrastructure across the site. The subject site will have direct access to the Arthur Street road reserve to the south via a new heavy-duty vehicular crossover.

Architectural drawings of the proposed development are included within in Appendix A.

1.2.4 Existing Drainage Network

Currently, the stormwater runoff from the existing dwelling discharges to the Arthur Street kerb and channel via multiple kerb adaptor outlets. The balance of the site discharges via overland flow to the road reserve.

The existing stormwater network downstream of the site comprises of a pit and pipe system. The nearest Council gully pit is located within the Gold Coast Highway road reserve to the west of the subject site. An existing 1200mm x 1200mm manhole is located within the southern verge of Arthur Street, with the pipe downstream on the manhole being a 1050mm reinforced concrete pipe (RCP). This stormwater network ultimately drains to the west, discharging into the nearby canals.

1.2.5 External Catchments

A review of the site topography and a site inspection have confirmed that no external catchments discharge through the subject site.

1.2.6 Flood Assessment

A search of Council's records and online interactive mapping system has confirmed that the subject site is located outside of the mapped flood affected area.

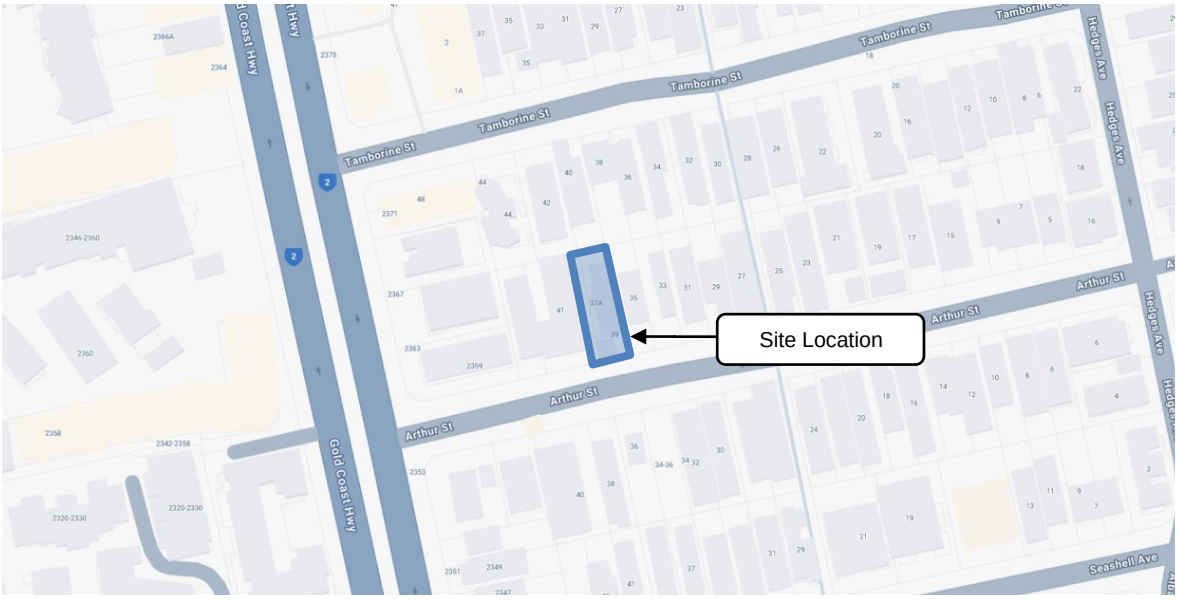


Figure 1.1: Map View (Source: Google Maps)



Figure 1.2: Aerial View (Source: www.nearmap.com.au)

2 Stormwater Quantity Assessment

2.1 Hydrologic Objectives

The hydrologic objectives for the subject site were set in accordance with the requirements of the Queensland Urban Drainage Manual (QUDM) and the CoGC City Plan: Planning Scheme Policies, SC6.12: Land Development Guidelines. These objectives include but are not limited to the following:

- The proposed development shall ensure that all stormwater drainage is directed to the Lawful Point of Discharge in accordance with QUDM;
- Minor System Design for 10% AEP (Q_{10}) storm event;
- Major System Design for 1% AEP (Q_{100}) storm event;
- No adverse impact on adjoining or downstream properties; and
- No increase in post-development stormwater discharge, up to and including the 1% AEP (Q_{100}) storm event.

2.2 Lawful Point of Discharge

The Lawful Point of Discharge for the subject site is taken as the existing kerb and channel / stormwater network located within the Arthur Street road reserve fronting the subject site.

2.3 Stormwater Quantity Assessment

The analysis of the stormwater runoff from the subject site was undertaken using the non-linear software package XP-Rafts.

2.3.1 Site Specific Rainfall Data

The design rainfall Intensity Frequency Duration (IFD) data for the storm events up to and including the 1% AEP (Q100) storm event was derived based on the CoGC City Plan: Planning Scheme Policies, SC6.12: Land Development Guidelines.

The rainfall temporal patterns utilised by the XP-Rafts analysis were derived in accordance with Australian Rainfall and Runoff (AR&R), 2016 edition, and were accessed from www.data.arr-software.org in June 2024 (28.1028 S, 153.4624 E).

The design IFD data for the catchment is summarised in Table 2.1 below.

Table 2.1 IFD Data for Palm Beach, QLD (mm/hr) (28.1028 S, 153.4624 E) (Source: BOM)

Annual Exceedance Probability (AEP)							
Duration	**63.20% (Q_1)**	**39.35% (Q_2)**	**18.13% (Q_5)**	**10% (Q_{10})**	**5% (Q_{20})**	**2% (Q_{50})**	**1% (Q_{100})**
1 min	168	210	262	302	347	405	450
2 min	143	179	224	261	302	365	416
3 min	133	167	209	244	282	338	383
4 min	126	158	198	230	265	316	355
5 min	120	150	188	218	251	296	332
10 min	97.1	122	151	174	200	232	256
15 min	82.1	103	128	147	168	194	214
20 min	71.6	89.6	111	128	146	170	187
25 min	63.8	79.8	99.1	114	131	152	168
30 min	57.7	72.2	89.8	104	119	139	154
45 min	45.6	57.1	71.3	82.7	95.3	112	126
1 hour	38.2	47.9	60.2	70.1	81.2	96.7	109
1.5 hour	29.6	37.2	47.3	55.5	64.8	78.1	88.9
2 hour	24.7	31.1	39.8	47.1	55.3	67.2	77
3 hour	19.1	24.2	31.4	37.4	44.4	54.5	62.8
4.5 hour	14.9	18.9	24.9	29.9	35.8	44.2	51.1
6 hour	12.5	16.0	21.2	25.6	30.7	38.0	44.0
9 hour	9.87	12.6	16.9	20.5	24.7	30.6	35.3
12 hour	8.36	10.7	14.5	17.5	21.1	26.0	30.0
18 hour	6.63	8.54	11.5	14.0	16.7	20.5	23.5

2.3.2 XP-Rafts Modelling Inputs

The rainfall loss parameters for each sub-catchment were applied using an initial and continuing rainfall loss model. The design rainfall loss parameters input into the XP-Rafts model are based on the guideline values recommended by the AR&R, and other reputable industry standards.

The rainfall loss parameters adopted for this XP-Rafts model are as tabulated below.

Table 2.2: Adopted XP-Rafts Rainfall Loss Parameters

Storm Event	Pervious Areas		Impervious Areas	
AEP (%)	Initial Loss (mm)	Continuing Loss (mm)	Initial Loss (mm)	Continuing Loss (mm)
39.35-18.13	15	2.5	1	0
10-5	10	2.5	1	0
2-1	2.5	2.5	0	0

2.3.3 XP-Rafts Model Validation

The validation of the XP-Rafts model was undertaken through the comparison of the XP-Rafts generated stormwater discharge rates to the pre-development Rational Method calculations included within Appendix D.

The Rational Method adopted a C10 coefficient of runoff of 0.84 for the pre-development Catchment A, in accordance with Table 4.5.3 of QUDM. As detailed in Table 2.3 below, the stormwater discharge rates calculated using the Rational Method are generally comparable to the stormwater discharge rates calculated using the XP-Rafts model. We can therefore reasonably adopt the stormwater discharge rates generated from the XP-Rafts model.

2.3.4 Critical Duration Analysis

Design storm durations ranging from 10-minutes to 720-minutes were simulated by the XP-Rafts model analysis in order to determine the design stormwater discharge for the subject site.

2.3.5 Existing Discharge Locations

As outlined in the previous sections of this report the majority of the subject site generally discharges over the southwest property boundary via overland flow into an existing private field inlet pit. The roofwater from the existing dwelling discharges to the Gold Coast Highway existing barrier kerb and channel fronting the site via kerb adaptor.

2.4 Hydrologic Analysis

2.4.1 Pre-development Scenario

The results obtained from the XP-Rafts model generally show that the critical storm duration throughout the local catchment analysed for all AEP storm events is generally the 10-minute storm event.

A fraction impervious area of 0.73 was calculated for the pre-development site from the topographic survey included within Appendix B.

The pre-development catchment discharges for the 39.35% AEP, 18.13% AEP, 10% AEP, 5% AEP, 2% AEP and 1% AEP storm events are detailed in Table 2.3 below.

Table 2.3: Pre-development Catchment Details and Discharges

Catch.	Area (ha)	Imp. Area (ha) (Slope)	Perv. Area (ha) (Slope)	XP-Rafts Results AEP						Rat. Method
				39.35% AEP (m^3/s)	18.13% AEP (m^3/s)	10% AEP (m^3/s)	5% AEP (m^3/s)	2% AEP (m^3/s)	1% AEP (m^3/s)	1% AEP (m^3/s)
A	**0.0527**	**0.0384 (2.0%)**	**0.0143 (1.0%)**	**0.018**	**0.024**	**0.027**	**0.031**	**0.040**	**0.045**	**0.049**
Critical Storm Duration				**20mins**	**20mins**	**25mins**	**25mins**	**15mins**	**15mins**	**-**

2.4.2 **Post-development Scenario – Unmitigated**

The proposed redevelopment of the subject site will deliver a multi-unit residential development and associated landscaped areas, driveways and infrastructure. The site will have direct driveway access to Arthur Street via a new vehicular crossover.

A fraction impervious of 0.93 was calculated for the subject site post-development scenario from the architectural drawings provided. For the purposes of this analysis the post-development catchment was further split into sub-catchments being the roof, driveway and ground areas. Upon review of the architectural design we can conclude that the current development proposal reflects an ultimate development scenario of the subject site.

A copy of the architectural drawings is included in Appendix A. The post-development catchment plan is included in Appendix C.

The impervious areas were modelled using the second sub-catchment option within XP-Rafts. The total impervious area for each sub-catchment is tabulated below. The results of the XP-Rafts post-development analysis show that the critical storm duration throughout the catchment for all AEP storm events is generally the 10-minute storm events.

Table 2.4 summarises the unmitigated peak flow rates for the post-development catchment.

Table 2.4: Post-development Catchment Details and Discharges (Unmitigated)

Catchment	Total Area (ha)	Imp. Area (ha) (Slope)	Perv. Area (ha) (Slope)	XP-Rafts Results					
				39.35% AEP (m^3/s)	18.13% AEP (m^3/s)	10% AEP (m^3/s)	5% AEP (m^3/s)	2% AEP (m^3/s)	1% AEP (m^3/s)
A1 – Roof	0.0380	0.0380 (0.5%)	0.0000	0.017	0.021	0.025	0.026	0.032	0.037
A2 – Road	0.0012	0.0012 (1.0%)	0.0000	0.001	0.001	0.001	0.001	0.001	0.001
A3 – Ground	0.0135	0.0101 (0.5%)	0.0034 (0.5%)	0.004	0.006	0.007	0.008	0.010	0.010
A Total	**0.0527**	**0.0493**	**0.0034**	**0.022**	**0.028**	**0.033**	**0.035**	**0.043**	**0.047**
Critical Storm Duration				**10mins**	**15mins**	**10mins**	**10mins**	**10mins**	**10mins**

A comparison of the XP-Rafts results at the Lawful Point of Discharge in Tables 2.3 and 2.4 generally indicates an increase in peak development discharges for the 39.35% AEP, 18.13% AEP, 10% AEP, 5% AEP, 2% AEP and 1% AEP storm events post-development when compared to the pre-development scenario. This increase in discharge is attributed to the increased impervious area observed during the post-development scenario when compared to the pre-development scenario. Table 2.5 below details the comparison between the pre-development and post-development peak discharges for the site.

Table 2.5: Pre-development and Post-development Scenario Comparison (Unmitigated)

Storm Event AEP	Catchment A Total (Discharge to Arthur Street)		Difference	
	Pre (m^3/s)	Post (m^3/s)	(m^3/s)	(%)
39.35% AEP	0.018	0.022	+0.004	+22.22%
18.13% AEP	0.024	0.028	+0.004	+16.67%
10% AEP	0.027	0.033	+0.006	+22.22%
5% AEP	0.031	0.035	+0.004	+12.90%
2% AEP	0.040	0.043	+0.003	+7.50%
1% AEP	0.045	0.047	+0.005	+4.44%

2.5 Post Development Stormwater Mitigation Strategy

The following strategy is proposed to mitigate the post-development stormwater discharge to the site's pre-development discharge rates.

- Attenuation of post-development storm discharge from subject site through the use of a dual-use detention tank located beneath the proposed driveway;
- Discharge the minor 10% AEP storm discharges to the Lawful Points of Discharge via a piped stormwater network;
- Discharge the major (up to 1% AEP) storm discharges to the Lawful Points of Discharge via piped stormwater networks and overland flow;
- Direct all stormwater runoff from the subject site to the proposed dual-use detention tank via an internal stormwater reticulation network and overland flow prior to discharge to the Lawful Point of Discharge; and
- Generally, maintain the existing drainage regimes and drainage discharge locations.

2.5.1 Detention Tank Design

Table 2.6 below details the proposed dual-use detention tank characteristics with Table 2.7 detailing the tank storage/height relationships adopted for the XP-rafts analysis. The documented peak outflows and stage heights were subject to a statistical analysis and disregard any outliers.

Table 2.6: Detention Tank Characteristics

Design Parameter	Details					
Tank Outlets	Low-flow Outlet = 2 x Ø90mm orifice outlet at base of tank, discharging to existing Arthur Street stormwater network via Ø375mm RCP High-flow Outlet = 0.5m wide x 0.1m high weir outlet at 0.82m above base of tank, discharging to existing Arthur Street stormwater network via Ø375mm RCP					
Tank Geometry	Base Area = 10.0m^2 total Storage Height = 1.0m Storage Volume = 10.0m^3 (Total)					
Modelling Summary	AEP (%)	Peak Outflow (m^3/s)	Stage	AEP (%)	Peak Outflow (m^3/s)	Stage
	39.35	0.016	0.322m	5	0.023	0.638m
	18.13	0.019	0.455m	2	0.037	0.872m
	10	0.021	0.563m	1	0.045	0.898m

Table 2.7: Tank Height/Storage Relationship

Stage (m)	Tank Storage (m^3)	Stage (m)	Tank Storage (m^3)
0	0.00	0.6	6.0
0.1	1.0	0.7	7.0
0.2	2.0	0.8	8.0
0.3	3.0	0.9	9.0
0.4	4.0	1.0	10.0
0.5	5.0	-	-

Table 2.8: Pre-development and Post-development Scenario Comparison

Storm Event AEP	Catchment A Total (Discharge to Arthur Street)		Difference	
	Pre (m^3/s)	Post (m^3/s)	(m^3/s)	(%)
39.35% AEP	0.018	0.016	-0.002	-11.11%
18.13% AEP	0.024	0.019	-0.005	-20.83%
10% AEP	0.027	0.021	-0.006	-22.22%
5% AEP	0.031	0.023	-0.008	-25.81%
2% AEP	0.040	0.037	-0.003	-7.50%
1% AEP	0.045	0.045	0.000	0.00%

As documented in Table 2.8 above, all AEP storm event result in a reduction in development flows from the subject site, ranging from $0.002m^3/s$ to $0.014m^3/s$. As such, we can conclude that the results presented demonstrate that the proposed dual-use detention tank successfully attenuates the post-development site discharge to pre-development rates.

3 Stormwater Quality Assessment

3.1 Water Quality Objectives

This water quality analysis for the subject site was undertaken in accordance with the requirements of the CoGC City Plan, Healthy Waterways WSUD Technical Design Guidelines for South East Queensland – Version 1 and the Queensland State Planning Policy, July 2017.

The pollutant types and the associated Load Reduction Objectives (LRO) that will be evaluated are as follows:

Table 3.1: LRO Summary

Pollutant Types	Site Water Quality Objective
Total Suspended Solids (TSS)	80% reduction
Total Phosphorous (TP)	60% reduction
Total Nitrogen (TN)	45% reduction
Gross Pollutants (GP)	90% reduction

3.2 Proposed Treatment Strategy

In order to meet the above water quality objectives, a treatment train has been proposed for the site which comprises of a number of individually designed proprietary Atlan Stormwater treatment devices that collectively contribute to the achievement of whole site water quality objectives.

3.3 Proposed Treatment Measures

In order to meet the above water quality objectives, a treatment train has been proposed for the site which comprises of a number of individually designed proprietary Atlan Stormwater treatment devices that collectively contribute to the achievement of whole site water quality objectives.

3.3.1 Atlan Stormwater Water Quality Treatment Products

The Atlan Stormwater devices effectively act as a gross pollutant trap, and is typically located within inlet pits or immediately preceding an inflow pipe into a rainwater or detention tank receiving surface runoff. The system uses a mesh and grated system to capture ‘large’ pollutants prior to further nutrient and fine particle treatment.

The Atlan Filter Cartridge system is a passive, flow-through stormwater filtration system which consists of a number of filter cartridges containing a variety of filter media. The system works based on the incoming hydraulic grade forcing water up and into the cartridge system which traps and slowly releases the runoff, containing pollutants within the filter. Clean water is then discharged out of the system and into downstream infrastructure.

Figure 3.1 below illustrates a typical Atlan Stormwater treatment train configuration. Additional information on Atlan Stormwater treatment devices is included in Appendix H.

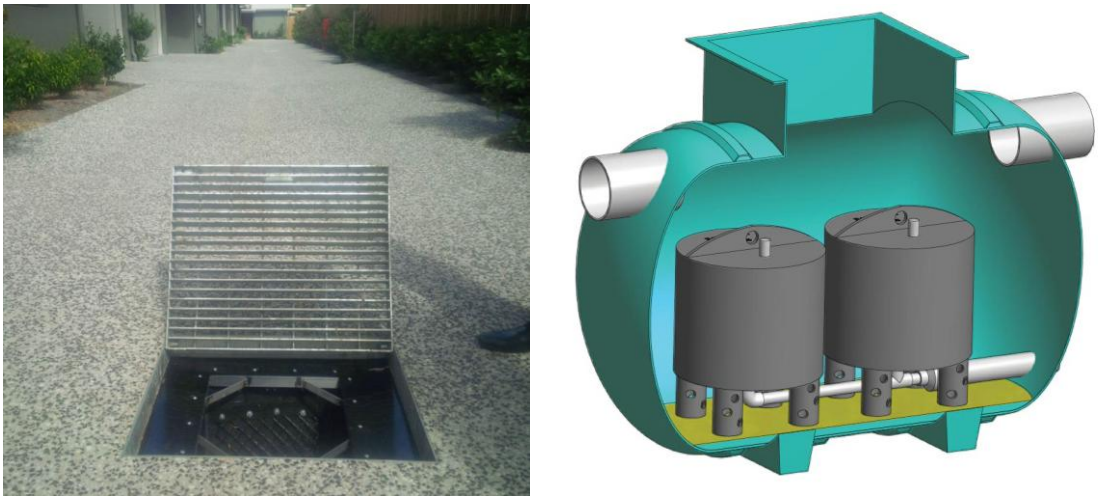


Figure 3.1: Typical Atlan Stormwater Treatment Train Configuration (Source: Atlan Stormwater)

3.4 MUSIC Modelling

The proposed treatment train is detailed in Appendix F with additional details of the modelling procedure described in the following sections.

3.4.1 Meteorological Data

The meteorological data inputs utilised by MUSIC to simulate catchment hydrology processes includes rainfall data (at intervals relevant to the time step being modelled) and average areal potential evapotranspiration (measured in millimetres per day).

The meteorological data adopted for this model was the Hinze Dam station 1371 (6-minute time step 1976-1985) as outlined in the Healthy Waterways MUSIC Modelling Guidelines for South East Queensland.

3.4.2 MUSIC Source Nodes

The MUSIC source node properties for a split catchment were obtained from the Healthy Waterways MUSIC Modelling Guidelines for Southeast Queensland and are as follows.

Table 3.2: Pollutant Export Parameter for Split Catchment (Log^{10} Values)

Land Use		Mean EMC (mg/L)					
		TSS		TP		TN	
Urban Residential		Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow
Roof	Mean	1.30	0.00	-0.89	0.00	0.26	0.00
	Std. Deviation	0.39	0.00	0.31	0.00	0.23	0.00
Roads	Mean	2.43	1.00	-0.30	-0.97	0.26	0.20
	Std. Deviation	0.39	0.34	0.31	0.31	0.23	0.20
Ground	Mean	2.18	1.00	-0.47	-0.97	0.26	0.20
	Std. Deviation	0.39	0.34	0.31	0.31	0.23	0.20

3.5 Performance Assessment

The site was modelled as a number of urban residential source nodes. The MUSIC model parameters were adopted in accordance with the Healthy Waterways MUSIC Modelling Guidelines for Southeast Queensland and are outlined within Table 3.3 below.

Table 3.3: Adopted MUSIC Model Source Node Parameters

Parameter	Value
Source Data	
Rainfall data and modelling period	Central Gold Coast (Hinze Dam) 1371
Modelling period	1976 – 1985
Model time step	6 Minute
Soil properties (Rainfall runoff parameter)	Urban Residential (Healthy Waterways MUSIC Modelling Guidelines for Southeast Queensland)
Site Data	
Catchment A – Urban Residential	A1 – 0.0380 Ha – Roof (100% Impervious) A2 – 0.0012 Ha – Road/Driveway (100% Impervious) A3 – 0.0135 Ha – Landscaping/Ground (75% Impervious)

Table 3.4: Adopted MUSIC Model Treatment Node Parameters

Parameter	Value	
Treatment Devices		
Catchment A – Atlan Vault / AtlanFilter / Stormsack	AtlanVault High flow bypass = 100m^3/s Storage surface area = 2.0m^2 Extended detention depth = 0.55m Low flow pipe diameter = 44mm AtlanStormsack Low flow bypass = 0.000m^3/s High flow bypass = 0.005m^3/s Required Number = 2 (1 per inlet)	AtlanFilter Cartridge Type = 660mm SF.15-EMC-M Required number = 2 High flow bypass = 0.003m^3/s

3.5.1 MUSIC Analysis Results

Table 3.5 summarises the load analysis and reduction achieved by MUSIC using the WSUD strategy outlined above. As detailed within Table 3.5 below, the LRO of 80% for TSS, 60% for TP, 45% for TN and 90% for GP as described in Section 3.1 have been achieved for the post-development scenario.

Table 3.5: MUSIC Pollutant Load Assessment

System	Parameter	Sources	Residual Load	Reduction (%)
Receiving node	Total Suspended Solids (kg/yr)	51.4	7.73	85.0
	Total Phosphorous (kg/yr)	0.15	0.0375	75.0
	Total Nitrogen (kg/yr)	1.32	0.566	57.0
	Gross Pollutants (kg/yr)	14.9	0	100

4 Monitoring and Maintenance Strategy

4.1 Monitoring of Proprietary Treatment Devices

A monitoring program will be established for the stormwater treatment devices as required by Atlan Stormwater.

Atlan Stormwater will be responsible for all monitoring activities associated with the operation of the treatment train which will be undertaken under a maintenance agreement between Atlan Stormwater and the Developer.

4.2 Maintenance of Proprietary Treatment Devices

The ongoing performance of the Atlan Stormwater treatment devices will be dependent on the regular maintenance conducted.

The maintenance program will be as required by Atlan Stormwater and will be undertaken as part of maintenance agreement between Atlan Stormwater and the Developer.

5 Erosion and Sediment Control Strategy

The objective of erosion and sediment management on construction sites is to minimise soil erosion and control silt and/or sediment discharge from the sites through the use of suitable control devices during the four primary phases of the project lifecycle being:

1. Pre-construction/Establishment Phase;
2. Bulk Earthworks/Change to Ground Level Phase;
3. Construction Phase; and
4. Post-development/Operational Phase.

Sections 5.2 and 5.3 below outline the typical and industry best practice erosion and sediment control measures that will be implemented throughout the life cycle of this project.

5.1 Development Lifecycle Erosion and Sediment Management

5.1.1 Pre-construction/Establishment Phase

Prior to the commencement of construction, during the site establishment phase of the works, the following sediment and erosion control measures will be implemented in order to minimise site disturbance and ensure that water quality is maintained.

- Silt/Sediment fences will be installed around the proposed bulk earthworks site (along the toe of the batter alignment) and any environmentally sensitive areas; and
- A construction vehicle entry/exit shakedown area will be installed and will comprise of a vibratory cattle grid or gravel/rock pad in accordance with the IEAust Guidelines.

5.1.2 Bulk Earthworks/Change to Ground Level Phase

Excavation during the bulk earthworks/change to ground level phase of the project will be staged in a manner that runoff will generally be directed towards sediment and erosion controls established during the pre-construction phase.

As applicable, sediment basins will be constructed within proposed park/open space areas generally in the location of the proposed bio-retention basins to ensure that all sediment runoff is intercepted and treated prior to discharging from site.

5.1.3 Construction Phase

During the construction phase of the project, the following erosion and sediment controls will be implemented to ensure water quality is maintained.

- Sediment fences will be erected at the base of all batters and stockpiles to prevent sediment transportation offsite;
- All sediment and erosion control structures will be maintained and inspected regularly as well as after each storm event to ensure the ongoing integrity is maintained. No structure is to accumulate sediment above 40% of its capacity; and
- Regular monitoring of water quality will be undertaken to determine the effectiveness of the sediment and erosion control measures. Testing may be required and shall be provided to the Local Authority on request.

5.1.4 Post-development/Operational Phase

Following the completion of the construction phase of the project and the development reaching 'Practical Completion' and/or 'On-maintenance', a monitoring program will be established for the stormwater treatment devices outlined previously within this report, where applicable. The monitoring program will ensure the ongoing integrity and effectiveness of these stormwater treatment devices following the completion of the construction phase of the project.

5.2 Dust Suppression and Erosion Control Measures

The time of disturbance onsite will be kept to a minimum by ensuring that the civil works are undertaken directly following the earthworks phase. Consideration to staging of the works shall be given in order to minimise the area of exposed earthworks at any given time.

Erosion control and dust suppression measures shall be applied to the exposed areas of the site as deemed necessary by the site supervisor in order to prevent the emission of dust from the site.

A number of erosion control measures are available inclusive of but not limited to the following:

- Water spraying (by water truck);
- Dust suppressants;
- Surface stabilisation; and
- Covering of exposed areas.

5.3 Sediment Control Measures

With reference to the IEAust Guidelines and Current Industry Best Practice, there are three (3) fundamental sediment control principles that have been identified for use during construction:

- Construction Vehicle Shakedown and/or Entry/Exit;
- Sediment Fences; and
- Sediment Barriers.

5.3.1 Construction Vehicle Shakedown and/or Entry/Exit

A dedicated construction vehicle shakedown will be installed at the site's entry/exit point for road and construction vehicles. This construction vehicle shakedown area will be established to facilitate the removal of soil, mud, dust and debris from the tyres of vehicles prior to leaving the construction site. The construction shakedown will comprise of a gravel/rock pad designed or a vibratory grid system constructed and maintained in accordance with the IEAust Guidelines. The advantages of the vibratory grid system include ease of movement and ability to reuse for several years at different construction sites.

5.3.2 Sediment Fences

Sediment fencing will be established at the bottom of slopes on any exposed earthworks batters where there is an established risk of contaminated water discharging from the site prior to clearing and earthworks commencing. Sediment fencing may be required at regular spacing down the disturbed slope to limit scour and rutting caused by channelising of stormwater discharge. Sediment fences will be used to protect any temporary stockpile sites as required. Sediment collected from sediment barriers will be regularly removed and either taken offsite as part of the earthworks phase or stockpiled for use during revegetation works.

5.3.3 Sediment Barriers

Sediment barriers will be constructed around all stormwater drainage gully pits and field inlets where contaminated water may enter the existing and proposed stormwater network. The provision of these sediment barriers will facilitate the settlement of sediments prior to entering the downstream stormwater drainage network. Sediment barriers will generally comprise of gravel wrapped in geotextile 'sausage', sediment fences around field inlets or similar approved products.

5.4 Monitoring and Maintenance

The site supervisor will be responsible for the following regular monitoring and maintenance activities during the various phases of the development:

1. Inspection of downstream stormwater network as well as sediment and erosion controls will be conducted at the end of each construction day and after each rainfall event greater than 25mm.
2. If any established complaints by neighbouring property owners and/or local authority or evidence of water quality deterioration is reported downstream of the works site, the following actions are to be taken immediately:

    a. locate source of stormwater quality deterioration.
    b. construct temporary erosion and sediment controls to prevent the continuing short-term stormwater quality deterioration.
    c. repair existing erosion and sediment controls, modify construction procedures or construct additional controls to prevent further deterioration.

6 Conclusions and Recommendations

This report outlines the stormwater management strategy developed to manage potential impacts due to the proposed multi-unit residential development located at 37 Arthur Street, Mermaid Beach.

Following the above investigation, the stormwater management strategy outlined below was adopted for the subject site:

- Attenuation of post-development storm discharge from subject site through the use of a dual-use detention tank located beneath the proposed driveway;
- Discharge the minor 10% AEP storm discharges to the Lawful Points of Discharge via a piped stormwater network;
- Discharge the major (up to 1% AEP) storm discharges to the Lawful Points of Discharge via piped stormwater networks and overland flow;
- Direct all stormwater runoff from the subject site to the proposed dual-use detention tank via an internal stormwater reticulation network and overland flow prior to discharge to the Lawful Point of Discharge;
- Best practice stormwater quality management techniques will be implemented to achieve water quality objectives by directing stormwater runoff from the site to the proposed private bio-retention basin for treatment prior to discharging from the site; and
- Implementation of typical erosion and sediment control devices during the four (4) primary phases of the proposed development.

Following the conclusion of this investigation we can infer that the development site, with the implementation of the stormwater management strategy outlined within this report, will result in a 'no worsening' effect of the current stormwater discharge conditions upstream or downstream of the subject site.

7 Reference Documentation

City of Gold Coast Planning Scheme Policies (CoGC City Plan Version 11, 2024)

Institution of Engineers, Australia (2016) "Australian Rainfall and Runoff – A Guide to Flood Estimation"

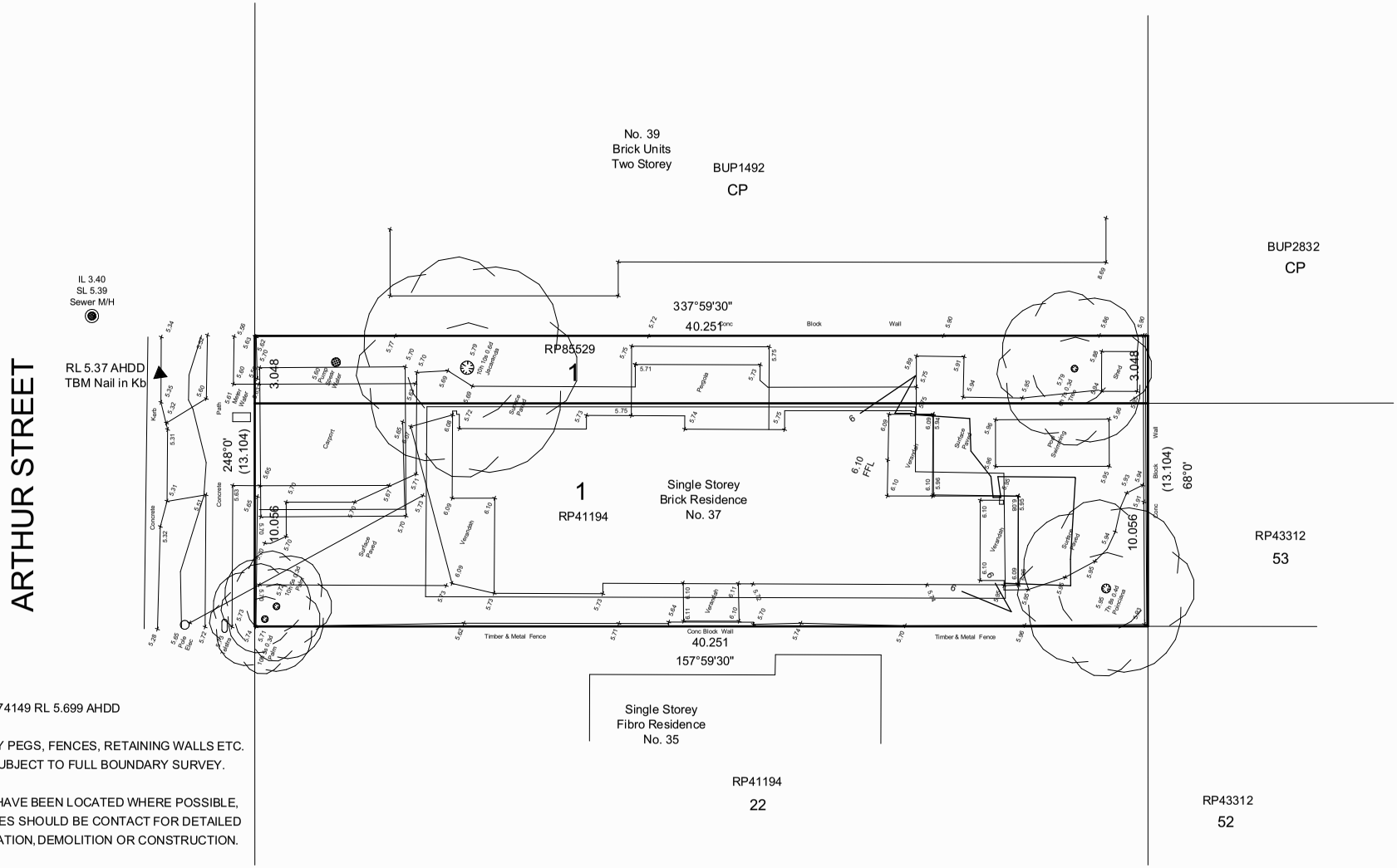
Institute of Public Works Engineers Australia (Queensland Division) (2016) “Queensland Urban Drainage Design Manual (QUDM)”, Fourth Edition

The State of Queensland: Department of State Development, Infrastructure and Planning, July 2017. State Planning Policy

Water by Design (2018) “Modelling Guidelines” – Consultation Draft, November 2018

Appendix A

Proposed Development Plans



NOTES

DATUM - AHD DERIVED FROM PM74149 RL 5.699 AHDD

SHOWN LOCATION OF BOUNDARY PEGS, FENCES, RETAINING WALLS ETC. ARE DIAGRAMMATIC ONLY AND SUBJECT TO FULL BOUNDARY SURVEY.

ALL SERVICES SHOWN HEREON HAVE BEEN LOCATED WHERE POSSIBLE, HOWEVER RELEVANT AUTHORITIES SHOULD BE CONTACT FOR DETAILED LOCATION PRIOR TO ANY EXCAVATION, DEMOLITION OR CONSTRUCTION.

BOYD & MOORE PTY LTD
ACN 109 294 260
SURVEYORS

24 GALAPAGOS WAY,
PACIFIC PINES QLD 4211

Correspondence to:
PO BOX 3060
NERANG MDC QLD 4211

Ph/Fax: (07) 55804205

Email: boydsurv@bigpond.net.au

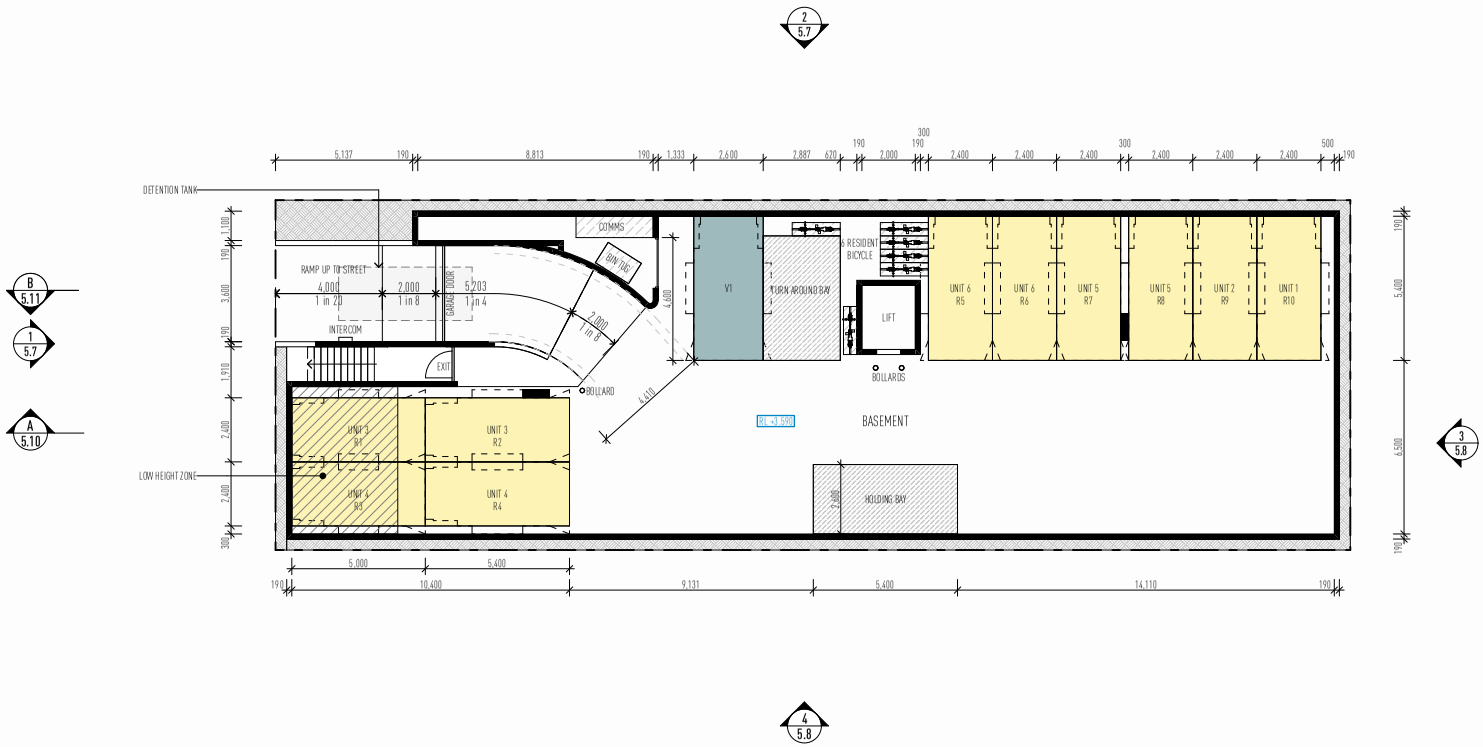
DETAIL SURVEY OVER LOT 23 ON RP41194 & LOT 1 ON RP85529

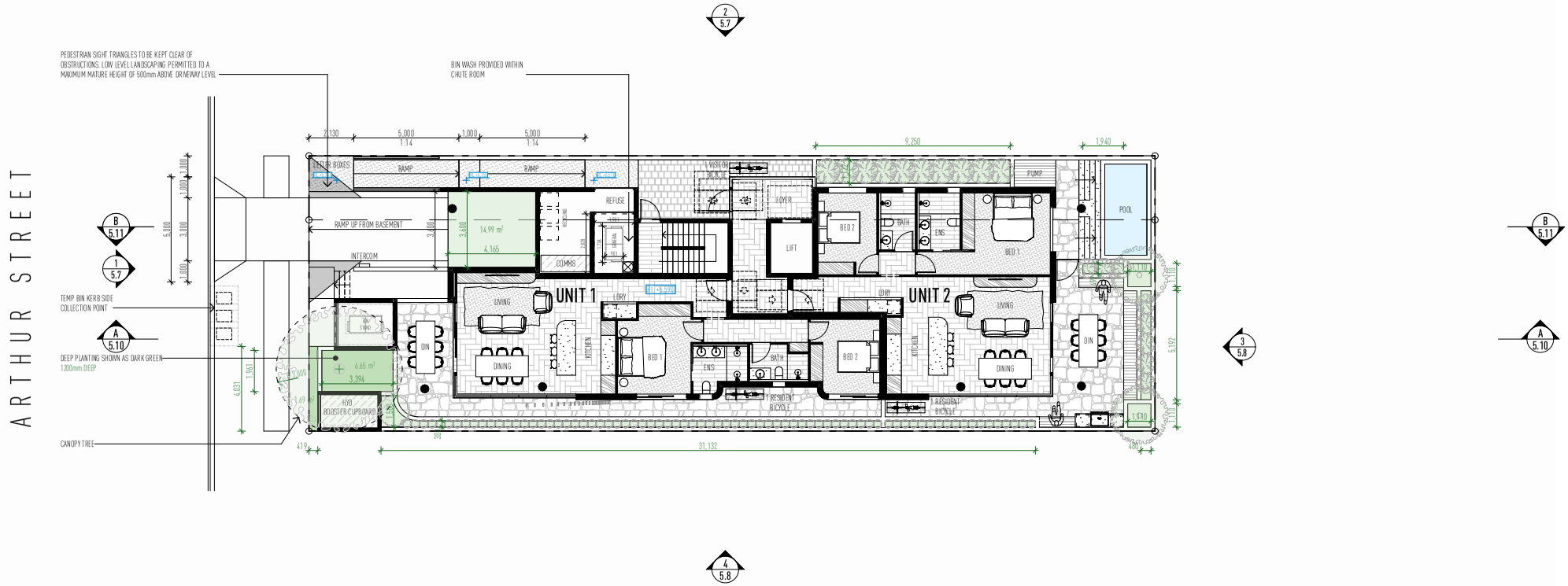
37 ARTHUR STREET,
MERMAID BEACH

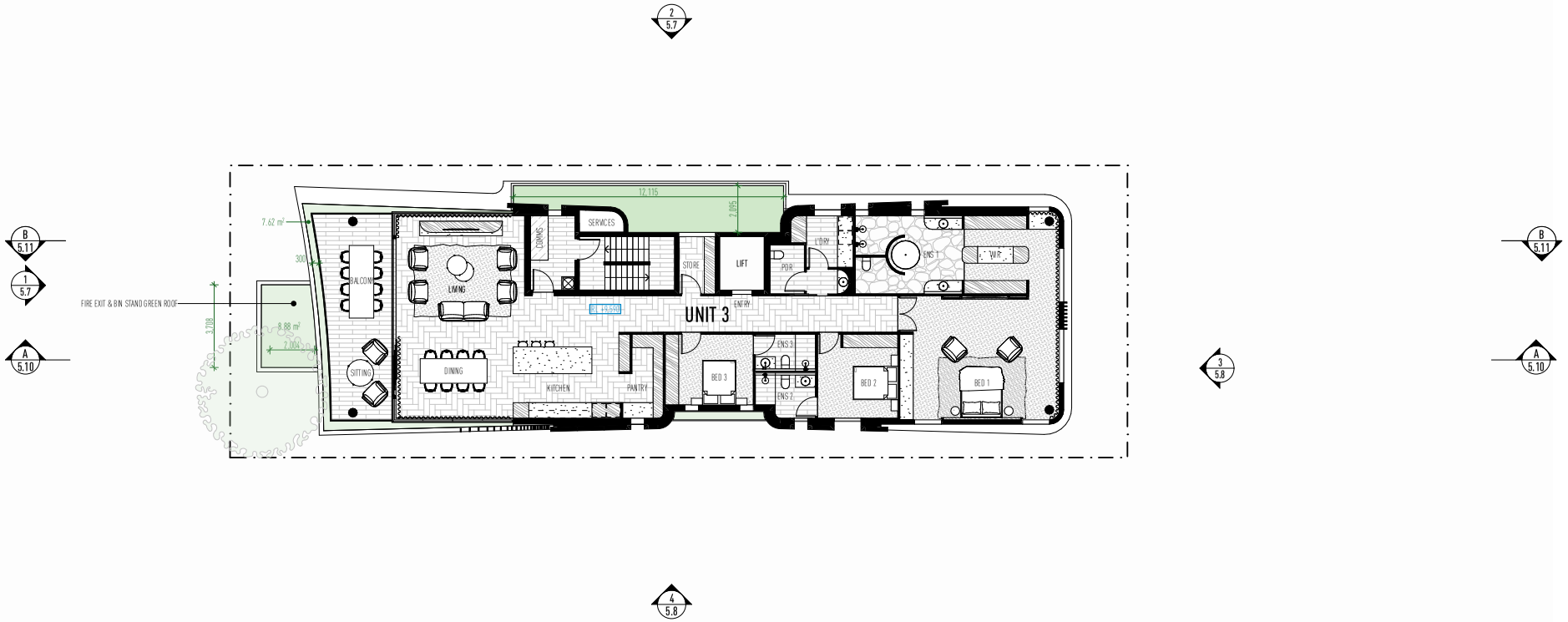
PARISH : GILSTON COUNTY : WARD

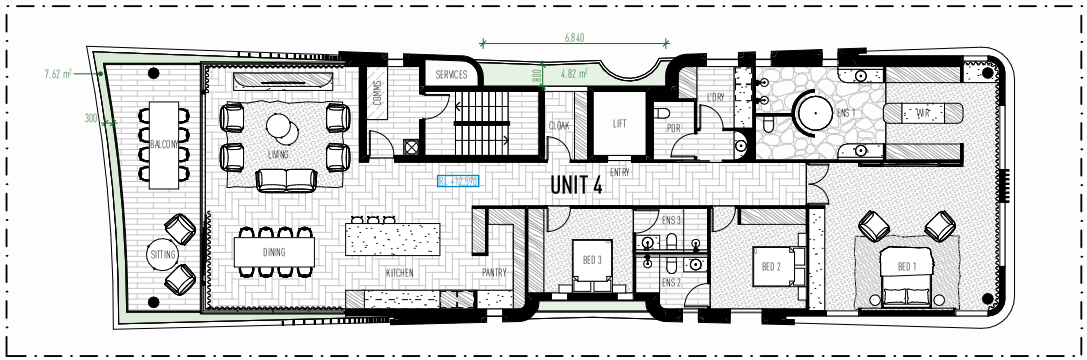
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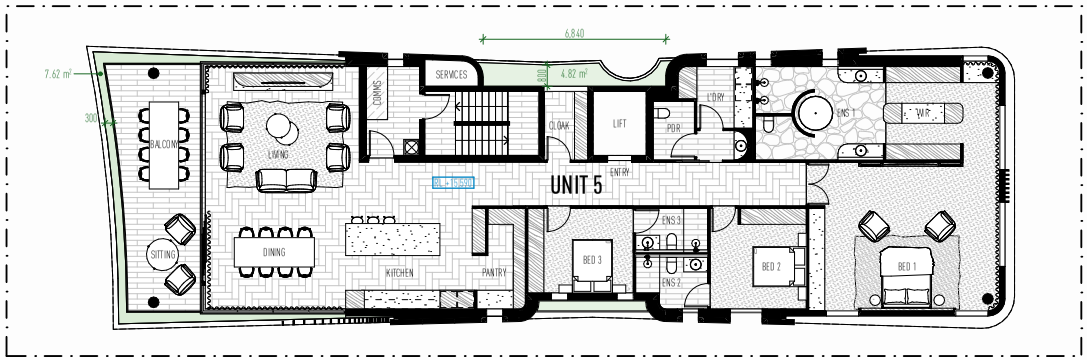
Floor Plan - Basement Level



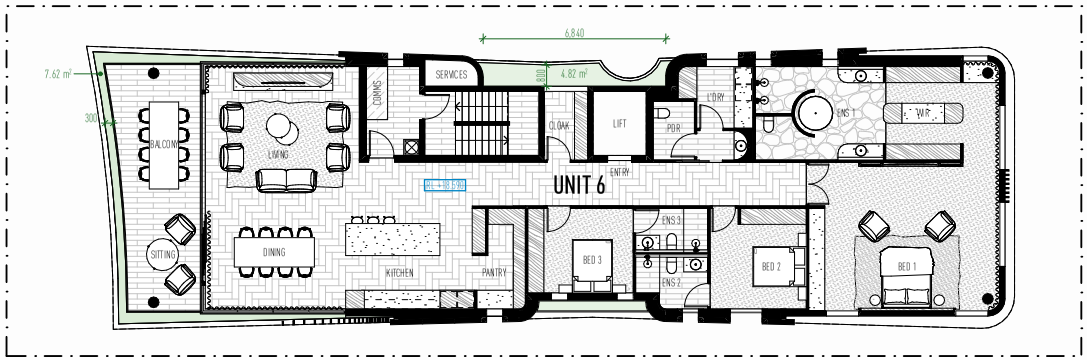

ARTHUR STREET
PEDESTRIAN SIGHT TRIANGLES TO BE KEPT CLEAR OF OBSTRUCTIONS. LOW LEVEL LANDSCAPING PERMITTED TO A MAXIMUM MATURE HEIGHT OF 500mm ABOVE DRIVEWAY LEVEL
BIN WASH PROVIDED WITHIN CHUTE ROOM
TEMP BIN KERB SIDE COLLECTION POINT
DEEP PLANTING SHOWN AS DARK GREEN 1200mm DEEP
CANOPY TREE
LETTER BOXES
RAMP
RAMP UP FROM BASEMENT
INTERCOM
REFUSE
COMMS
VISITOR
LOBBY
LIFT
POOL
PUMP
UNIT 1
UNIT 2
LIVING
DINING
KITCHEN
LDRY
BED 1
BED 2
ENS
BATH
RESIDENT BICYCLE
HYD BOOSTER CUPBOARD
31,132
2
5.7
B
5.11
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5.8
4
5.8

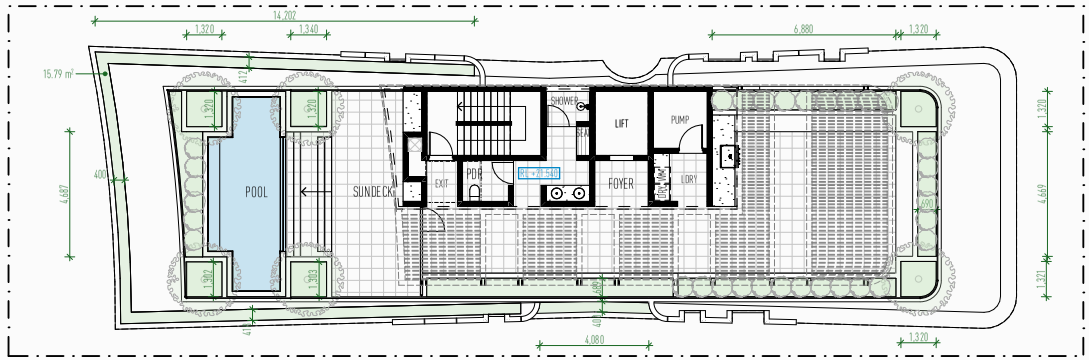

2
5.7
B
5.11
1
5.7
A
5.10
FIRE EXIT & BIN STAND GREEN ROOF
7.62 m²
3000
8.88 m²
2.004
3.708
BALCONY
LIVING
SITTING
DINING
KITCHEN
PANTRY
CURTAINS
SERVICES
12.115
2.095
STORE
LIFT
PDR
ENTRY
UNIT 3
LOBBY
ENS 1
WIR
BED 1
ENS 2
ENS 3
BED 2
BED 3
3
5.8
4
5.8
B
5.11
A
5.10

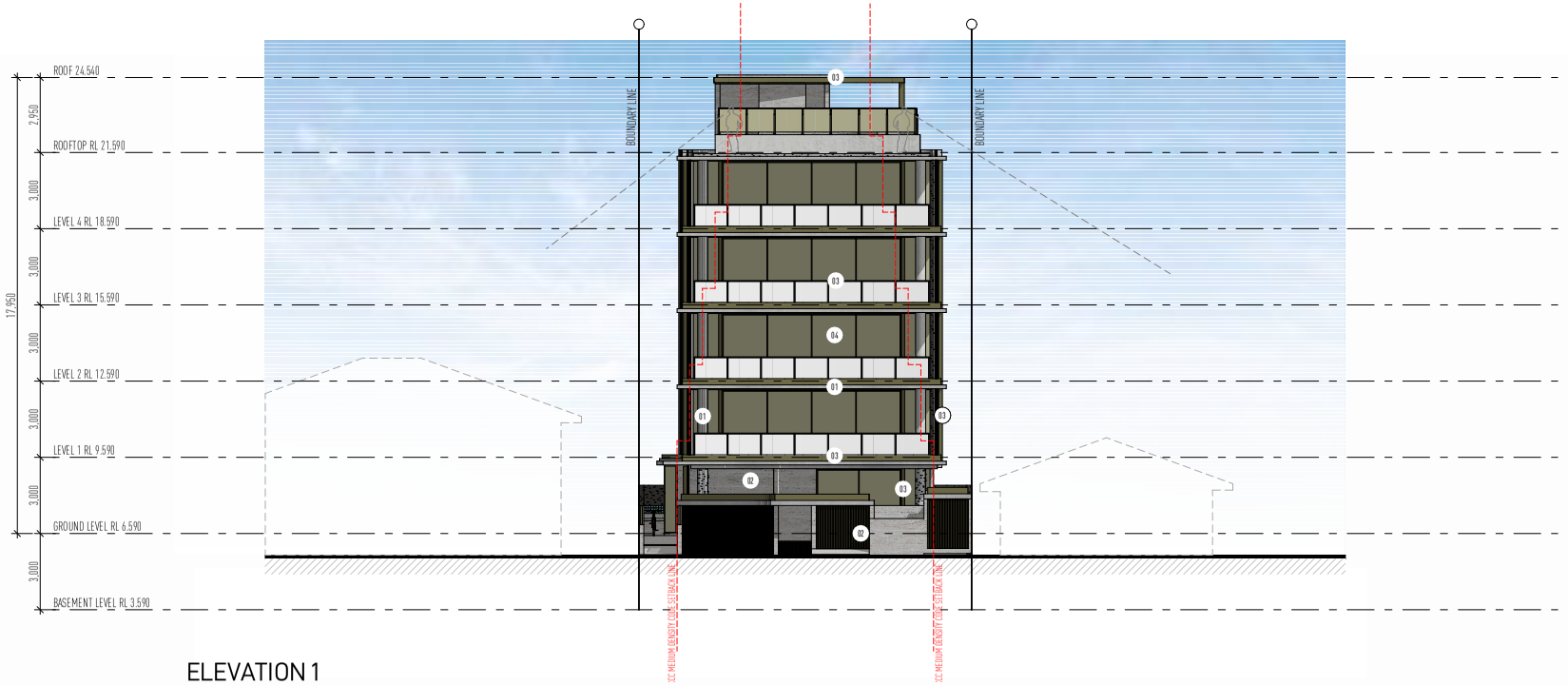

6.840
7.62 m²
300
BAL.CONST
LIVING
CURTAINS
SERVICES
4.82 m²
CL.OAK
LIFT
PDR
LDRY
ENS 1
WIR
UNIT 4
ENTRY
SITTING
DINING
KITCHEN
PANTRY
BED 3
ENS 3
ENS 2
BED 2
BED 1
2
5.7
4
5.8
B
5.11
1
5.7
A
5.10
3
5.8


6,840
7.62 m²
4.82 m²
300
BAL.CONY
LIVING
CORNS
SERVICES
CL.OAK
LIFT
PDR
L'DRY
ENS 1
WIR
ENTRY
UNIT 5
SITTING
DINING
KITCHEN
PANTRY
BED 3
ENS 3
ENS 2
BED 2
BED 1
2
5.7
B
5.11
1
5.7
A
5.10
3
5.8
4
5.8

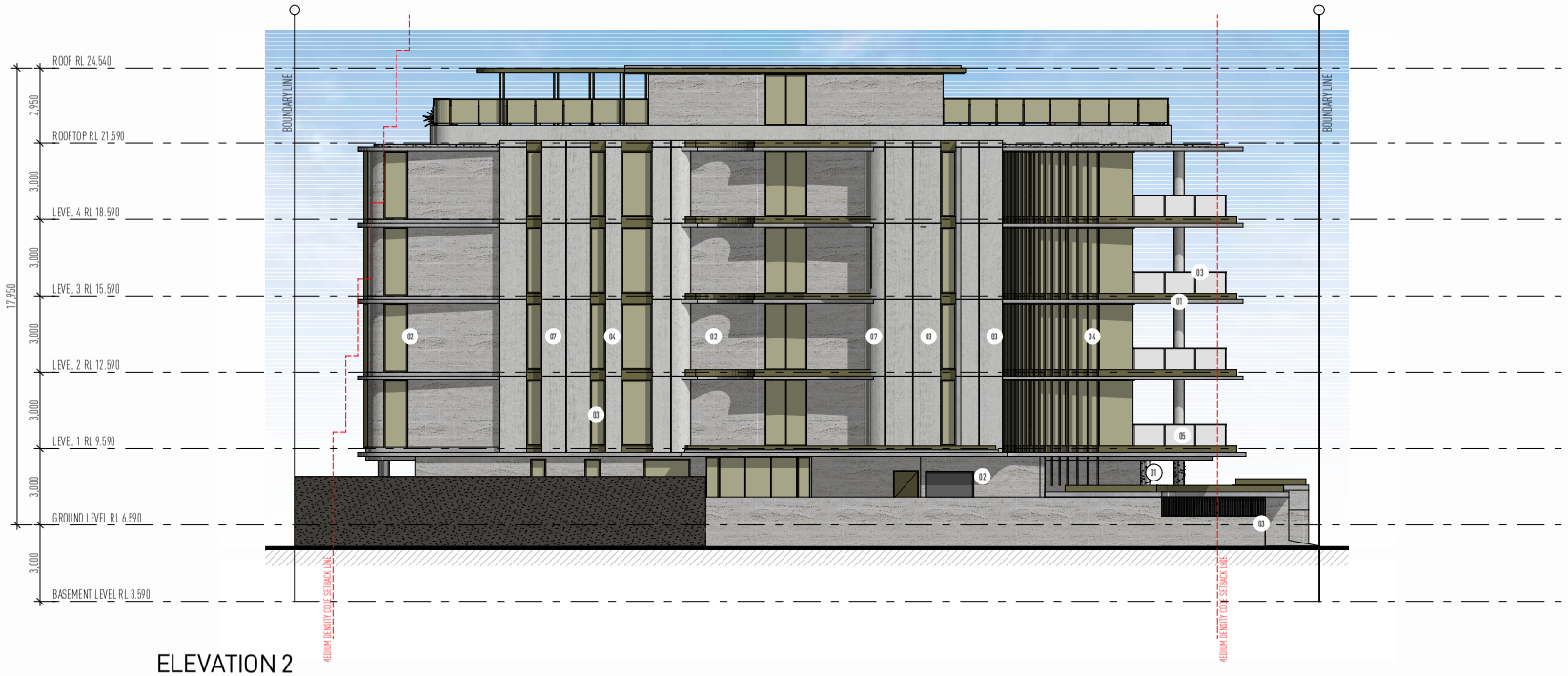
Floor Plan - Level 4




14,200
1,320
1,340
6,880
1,320
15.79 m²
POOL
SUNDECK
EXIT
PDR
SHOWER
STAIR
LIFT
PUMP
FOYER
LDRY
4,687
4,669
4,080
1,320
B 5.11
1 5.7
A 5.10
2 5.7
3 5.8
4 5.8



ELEVATION 1

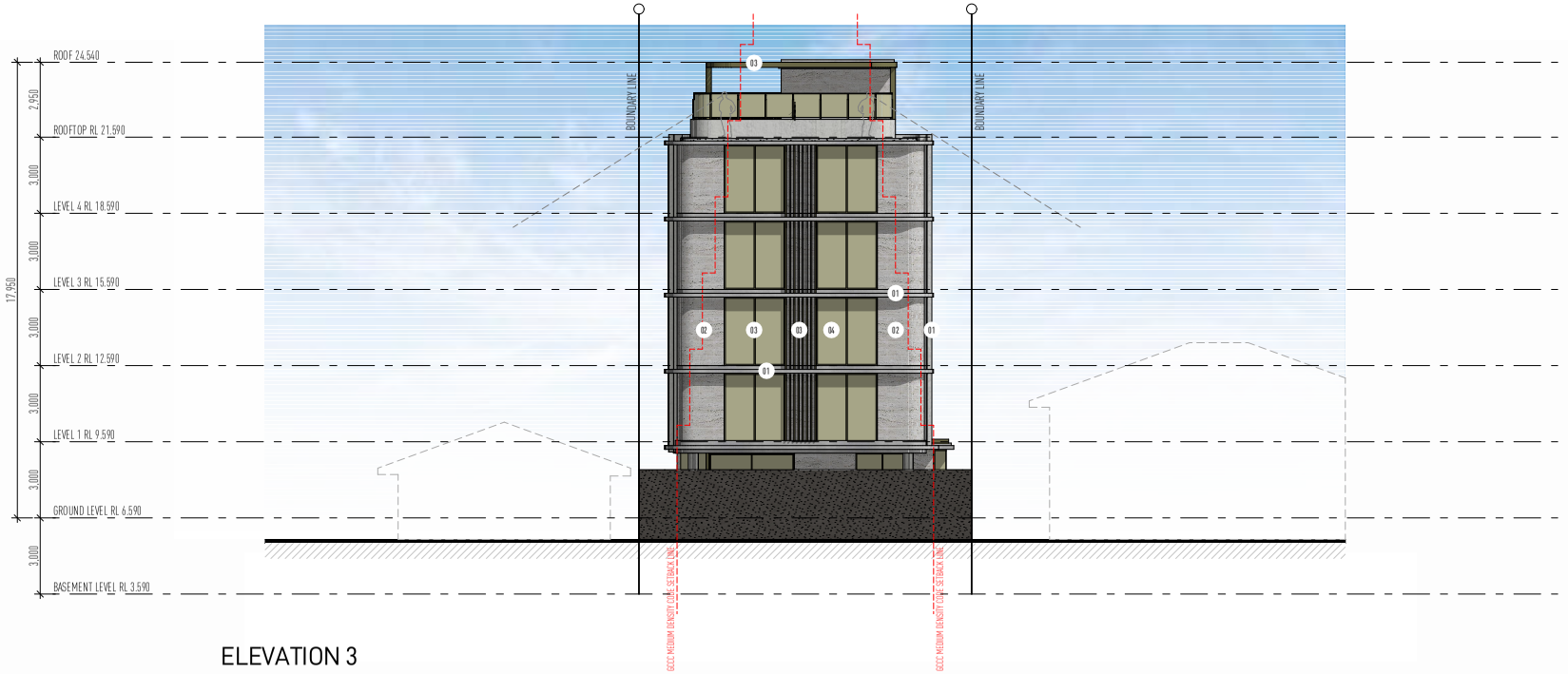


ELEVATION 2

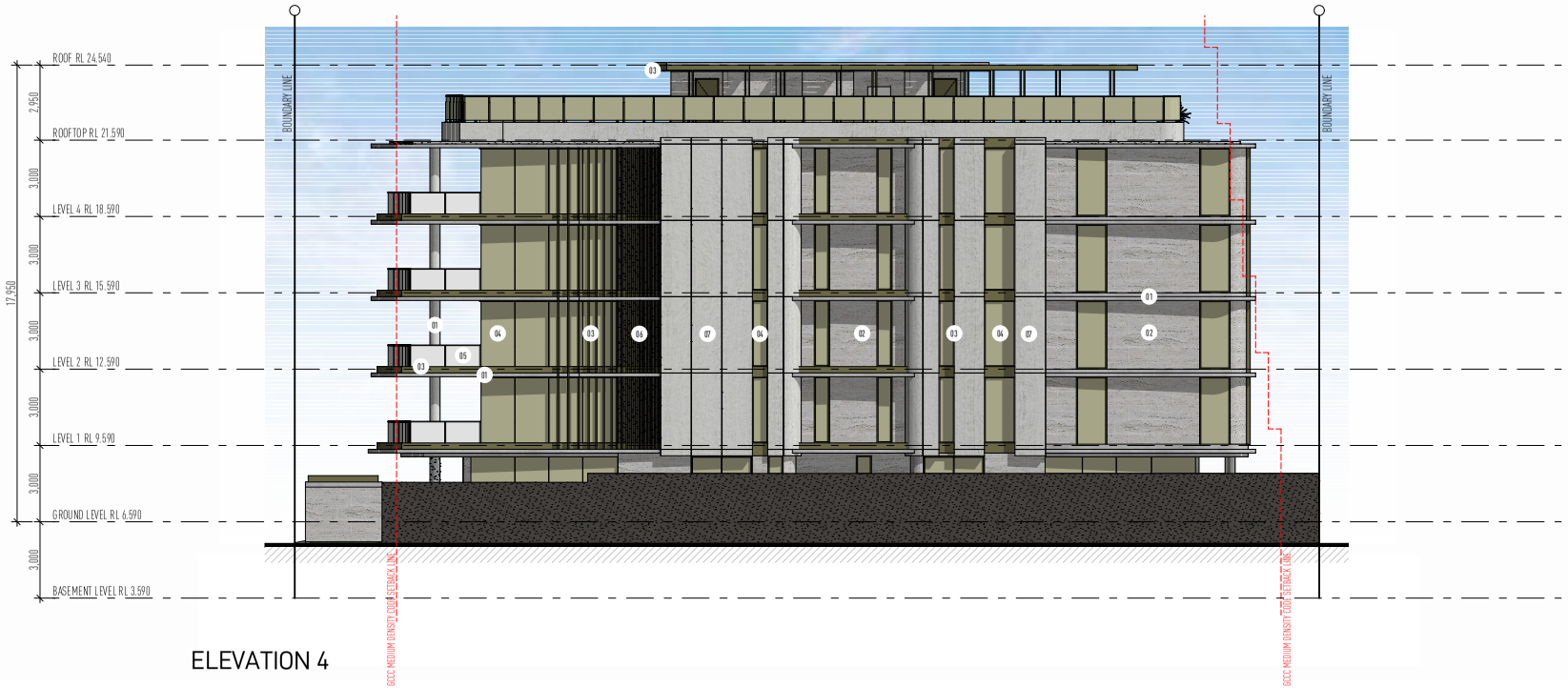
LEGEND

01. CONCRETE, OFF-FORM, CLASS 1
02. STONE, TRAVERTINE, 'WHITE'
03. WINDOW & DOOR FRAMES, BATTEN SCREENS, BALUSTRADE TOP RAIL, OUTSIDE EDGE PLANTERS. POWDER COATED 'NATURAL BRONZE'
04. GLASS, TINTED, 'BRONZE'
05. GLASS BALUSTRADE 'CLEAR'
06. RENDER, SLECT TEXTURE FINISH, DULUX 'KADE'S CABIN'
07. RENDER, SELECT TEXTURE FINISH, 'WHITE'

Elevations 3 & 4



ELEVATION 3

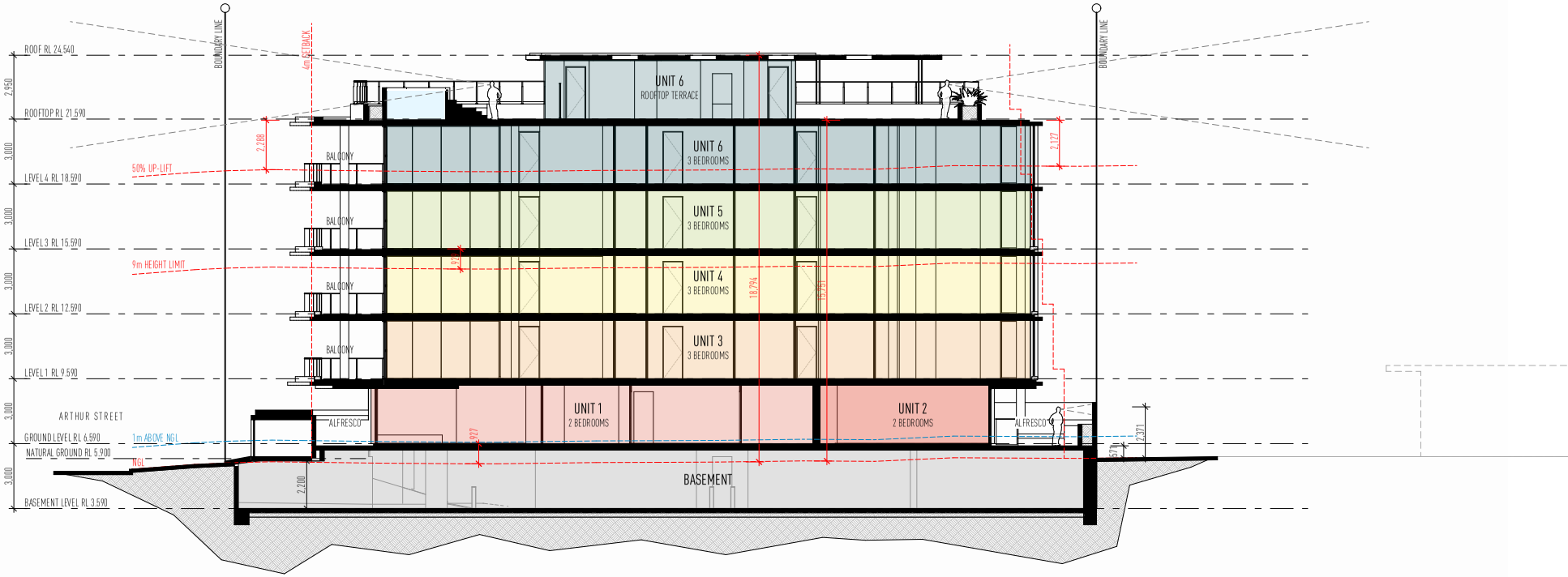


ELEVATION 4

LEGEND

01. CONCRETE, OFF-FORM, CLASS 1
02. STONE, TRAVERTINE, 'WHITE'
03. WINDOW & DOOR FRAMES, BATTEN SCREENS, BALUSTRADE TOP RAIL, OUTSIDE EDGE PLANTERS. POWDER COATED 'NATURAL BRONZE'
04. GLASS, TINTED, 'BRONZE'
05. GLASS BALUSTRADE 'CLEAR'
06. RENDER, SLECT TEXTURE FINISH, DULUX 'KADE'S CABIN'
07. RENDER, SELECT TEXTURE FINISH, 'WHITE'

Section A

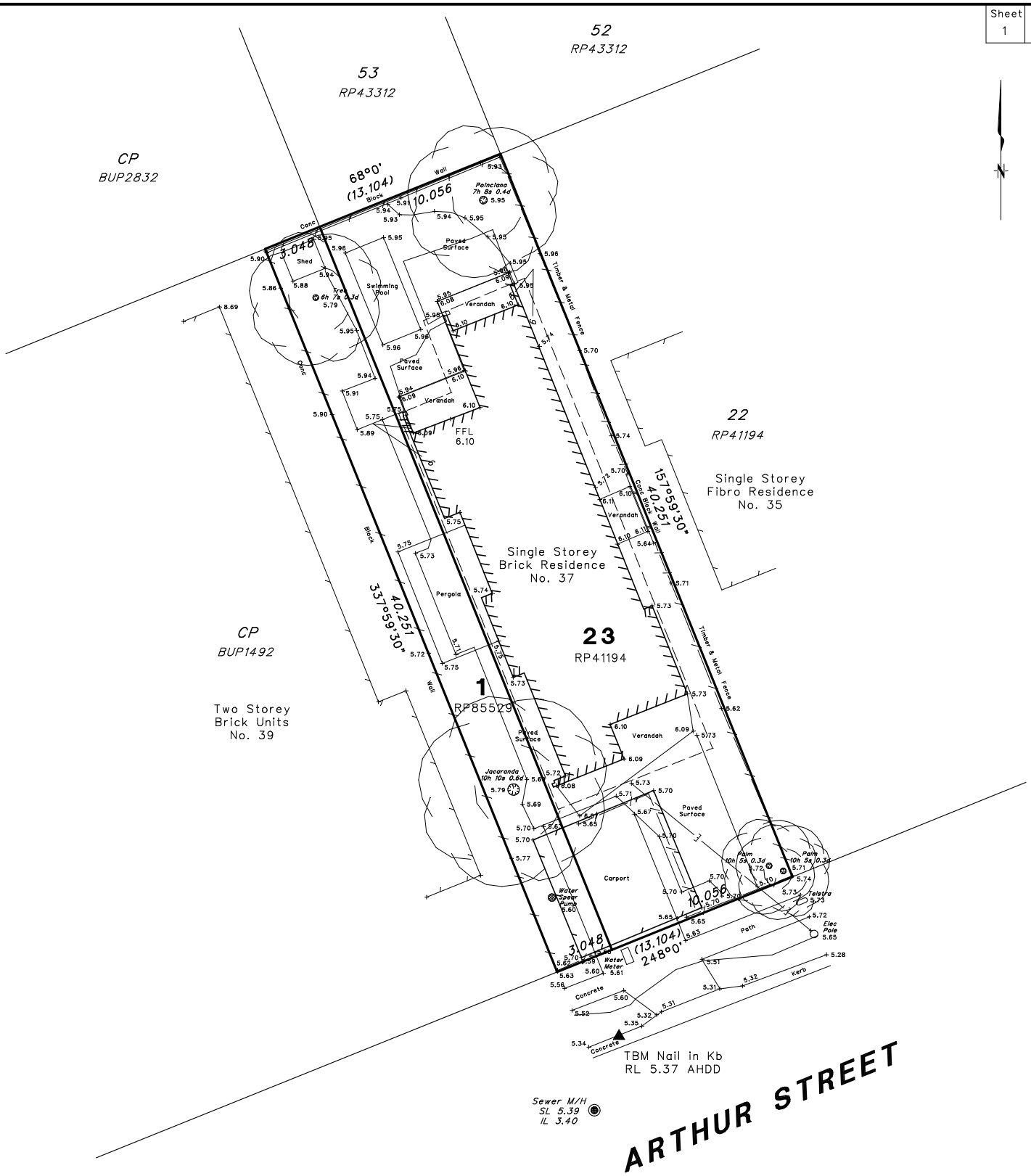

ROOF RL 24.540
ROOFTOP RL 21.590
LEVEL 4 RL 18.590
LEVEL 3 RL 15.590
LEVEL 2 RL 12.590
LEVEL 1 RL 9.590
GROUND LEVEL RL 6.590
NATURAL GROUND RL 5.900
BASEMENT LEVEL RL 3.590
2,950
3,000
3,000
3,000
3,000
3,000
3,000
BOUNDARY LINE
4m SETBACK
50% UP-LIFT
9m HEIGHT LIMIT
1m ABOVE NGL
NGL
ARTHUR STREET
UNIT 6
ROOFTOP TERRACE
UNIT 6
3 BEDROOMS
UNIT 5
3 BEDROOMS
UNIT 4
3 BEDROOMS
UNIT 3
3 BEDROOMS
UNIT 1
2 BEDROOMS
UNIT 2
2 BEDROOMS
BALCONY
BALCONY
BALCONY
BALCONY
ALFRESCO
ALFRESCO
BASEMENT
2,288
2,122
18,794
16,951
2,927
2,100
2,371
570

Section B


ROOF RL 24.540
ROOFTOP RL 21.590
LEVEL 4 RL 18.590
LEVEL 3 RL 15.590
LEVEL 2 RL 12.590
LEVEL 1 RL 9.590
GROUND LEVEL RL 6.590
BASEMENT LEVEL RL 3.590
2,950
3,000
3,000
3,000
3,000
3,000
3,000
BOUNDARY LINE
BOUNDARY LINE
50% UP-LIFT
9m HEIGHT LIMIT
1m ABOVE NGL
NGL
2,159
2,590
18,930
4m SETBACK
2,323
880
UNIT 6
ROOFTOP TERRACE
UNIT 6
ROOFTOP TERRACE
POOL
UNIT 6
3 BEDROOMS
UNIT 5
3 BEDROOMS
UNIT 4
3 BEDROOMS
UNIT 3
3 BEDROOMS
UNIT 2
2 BEDROOMS
UNIT 6
3 BEDROOMS
UNIT 5
3 BEDROOMS
UNIT 4
3 BEDROOMS
UNIT 3
3 BEDROOMS
BALCONY
BALCONY
BALCONY
BALCONY
POOL
BASEMENT
BASEMENT
DETENTION TANK
ARTHUR STREET
5,310

Appendix B

Topographic Survey



NOTES

DATUM - AHD DERIVED FROM PM74149 RL 5.699 AHDD

SHOWN LOCATION OF BOUNDARY PEGS, FENCES, RETAINING WALLS ETC. ARE DIAGRAMMATIC ONLY AND SUBJECT TO FULL BOUNDARY SURVEY.

ALL SERVICES SHOWN HEREON HAVE BEEN LOCATED WHERE POSSIBLE, HOWEVER RELEVANT AUTHORITIES SHOULD BE CONTACT FOR DETAILED LOCATION PRIOR TO ANY EXCAVATION, DEMOLITION OR CONSTRUCTION.

Michael Boyd
Director/Licensed Surveyor

0 50mm 100mm 150mm

BOYD & MOORE PTY LTD
ACN 109 294 260
SURVEYORS

24 GALAPAGOS WAY, PACIFIC PINES QLD 4211
Correspondence to: PO BOX 3060 NERANG MDC QLD 4211
Ph/Fax: (07) 55804205
Email: boydsurv@bigpond.net.au

DETAIL SURVEY OVER LOT 23 ON RP41194 & LOT 1 ON RP85529

37 ARTHUR STREET, MERMAID BEACH

PARISH : GILSTON COUNTY : WARD

Scale:	1 : 200
Sheet Size :	A3
Date:	15/12/2008
Drawn:	MJB
REF :	638-1-A3

Appendix C

Stormwater Catchment Plans

LEGEND

- EXISTING TELSTRA CABLE
- EXISTING SEWERAGE RETICULATION
- EXISTING WATER RETICULATION
- EXISTING STORMWATER PIPE
- EXISTING OVERHEAD ELECTRICAL
- SEWER RETICULATION FLOW DIRECTION
- EXISTING BOUNDARY
- EXISTING NOMINAL KERB LINE
- INDICATIVE WORKS AREA
- EXISTING SURFACE CONTOURS (0.5m)
- EXISTING FEATURE TO BE DEMOLISHED
- ROOF / BUILDING HARDSTAND AREA
- CONCRETE DRIVEWAY / PAVED AREA
- PERVIOUS AREA
- OVERLAND FLOW DIRECTION
- CATCHMENT BOUNDARY
- CATCHMENT LABEL (A)

CATCHMENT TABLE (PRE)

CATCHMENT AREA - A	0.0527 ha

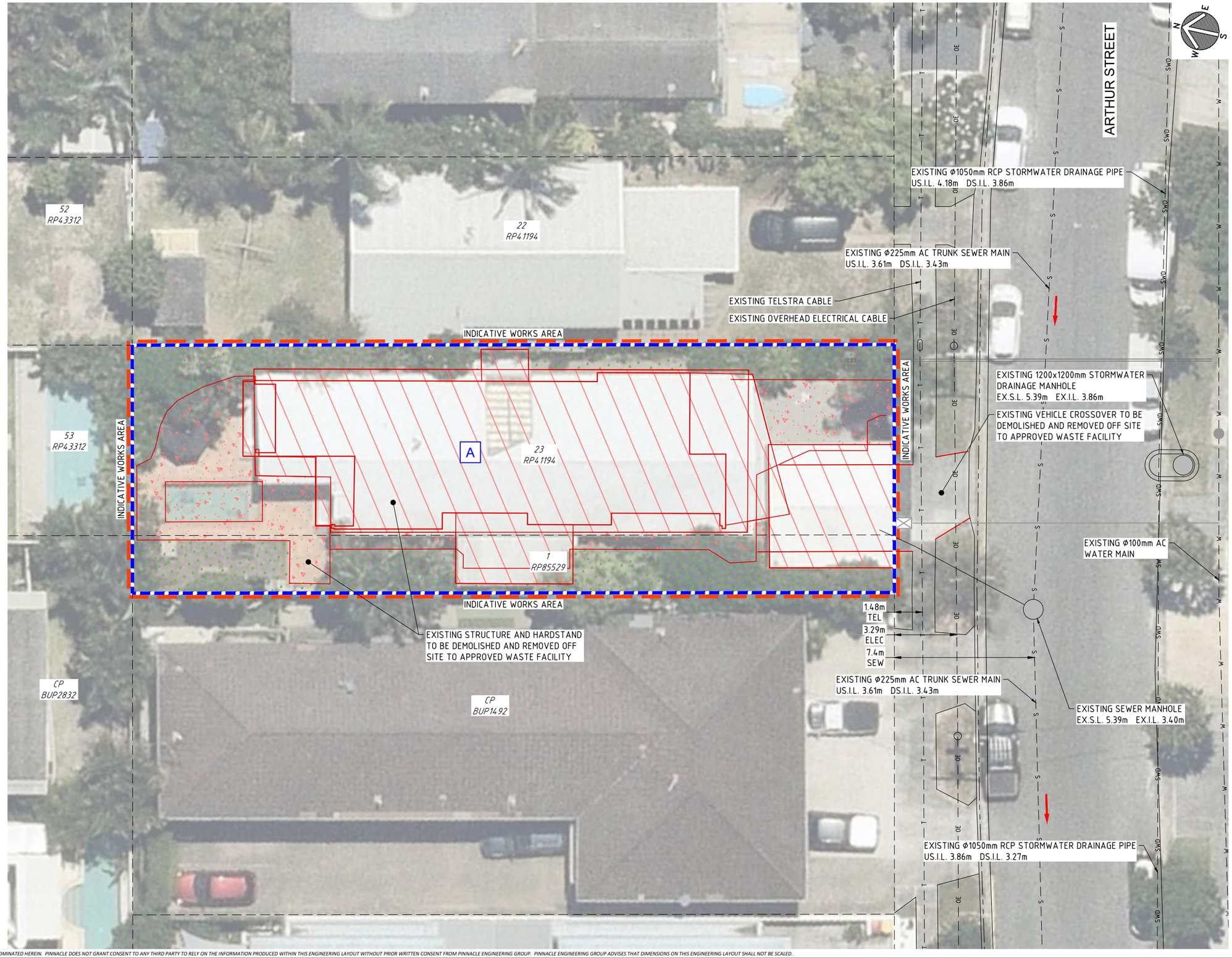
CATCHMENT DATA	A
BUILDING / ROOF AREA	0.0283 ha
HARDSTAND / DRIVEWAY	0.0101 ha
GARDEN / PERVIOUS AREA	0.0140 ha
TOTAL IMPERVIOUS AREA	0.0384 ha
TOTAL PERVIOUS AREA	0.0143 ha

NOTES

1. THE LOCATION OF THE EXISTING SERVICES HAS BEEN PLOTTED FROM SURVEY AND RECORDS AND IS TO BE CONFIRMED PRIOR TO CONSTRUCTION.
2. HISTORICAL AERIAL PHOTOGRAPHY HAS BEEN USED TO VALIDATE SURVEY DATA AND ESTABLISH PRE-DEVELOPMENT CATCHMENTS.

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PINNACLE ENGINEERING GROUP
LEVEL 1 19 SHORT STREET, SOUTHPORT QLD 4215
(PO BOX 517, PARADISE POINT QLD 4216)
WWW.PINNACLEENG.COM.AU

REV	DESCRIPTION	DRAWN	DATE
A	ORIGINAL ISSUE	J.H.	31.01.2025
B	ISSUED FOR APPROVAL	J.H.	01.04.2025

TASK	BY	INITIAL	DATE
REVIEW	M. BINGER		01.04.2025
DESIGN	J. HARDMAN		01.04.2025
DRAWN	J. HARDMAN		01.04.2025

SCALE 1 0 1 2 3 4 5 1:100

(SCALE ABOVE DENOTES ORIGINAL SHEET SIZE - A1)

CLIENT: CUECORP PROPERTY GROUP PTY LTD

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT
37 ARTHUR STREET
MERMAID WATERS QLD 4218
(LOT 23 ON RP41194 & LOT 1 ON RP85529)

DRAWING TITLE: PRE DEVELOPMENT CATCHMENT LAYOUT

STATUS: PRELIMINARY
(NOT TO BE USED FOR CONSTRUCTION)

APPROVED RPEQ No

DRAWING NUMBER: PEG1310-DA-SK01

REVISION: B

PEG1310-DA-SK01 PRE DEVELOPMENT CATCHMENT LAYOUT.dwg 01.04.2025 Lutfi Ali (8.30) x 1.00 Inches | None Jones-Hutchins

LEGEND

- EXISTING TELSTRA CABLE
- EXISTING SEWERAGE RETICULATION
- EXISTING WATER RETICULATION
- EXISTING STORMWATER PIPE
- EXISTING OVERHEAD ELECTRICAL
- EXISTING BOUNDARY
- EXISTING NOMINAL KERB LINE
- INDICATIVE WORKS AREA
- ROOF / BUILDING HARDSTAND AREA
- CONCRETE DRIVEWAY / PAVED AREA
- PERVIOUS AREA
- OVERLAND FLOW DIRECTION
- CATCHMENT BOUNDARY
- A1 CATCHMENT LABEL

CATCHMENT TABLE (POST)

CATCHMENT AREA - A1 (ROOF/BUILDING)	0.0380 ha
CATCHMENT AREA - A2 (DRIVEWAY/SLAB)	0.0012 ha
CATCHMENT AREA - A3 (GROUND/LANDSCAPING)	0.0135 ha

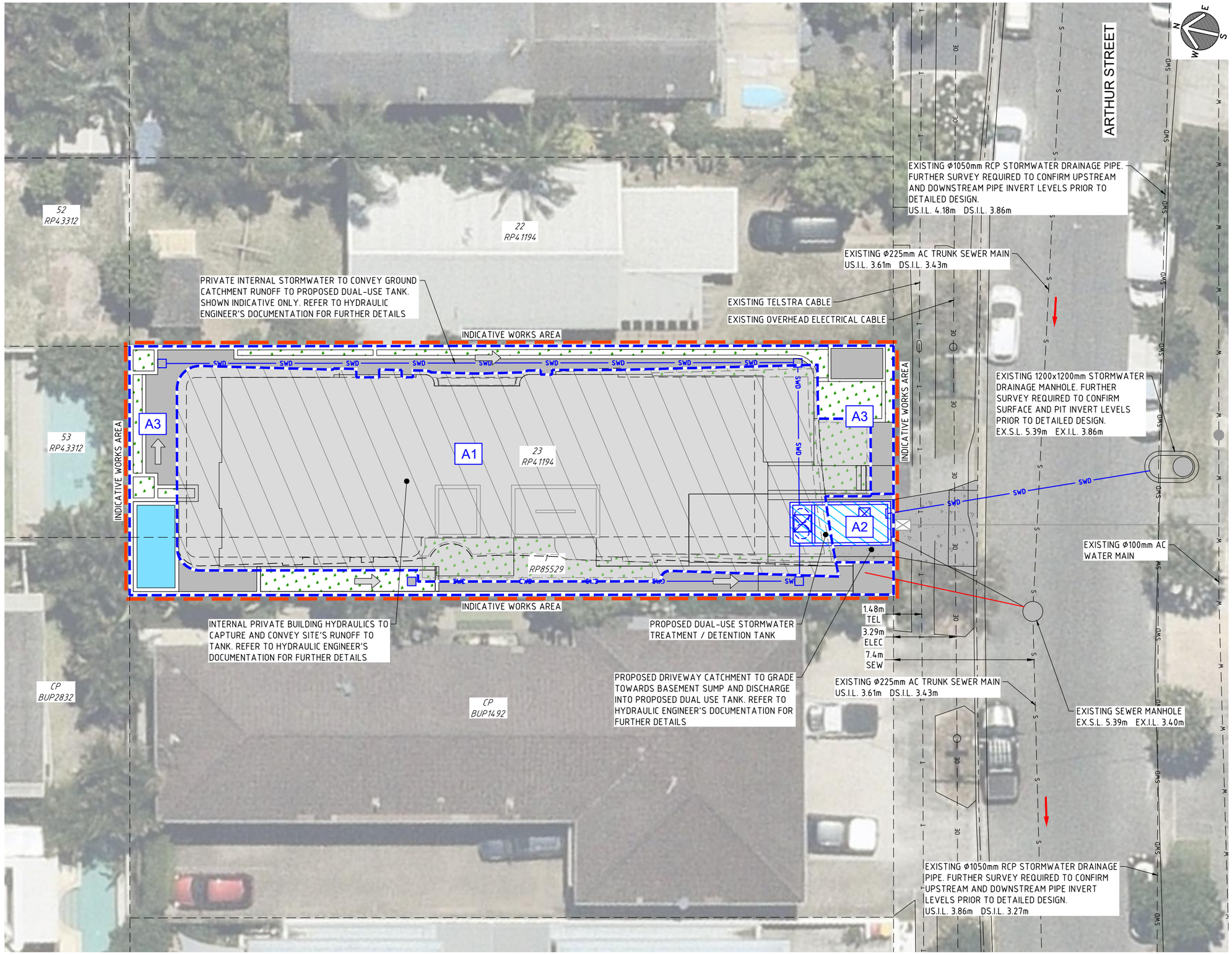
CATCHMENT DATA	A1	A2	A3
ROOF / BUILDING AREA	0.0380 ha	N/A	N/A
DRIVEWAY / ROAD	N/A	0.0012 ha	N/A
GROUND / GARDEN	N/A	N/A	0.0135 ha
TOTAL IMPERVIOUS AREA	0.0380 ha	0.0012 ha	0.0101 ha
TOTAL PERVIOUS AREA	N/A	N/A	0.0034 ha

NOTES

1. THE LOCATION OF THE EXISTING SERVICES HAS BEEN PLOTTED FROM SURVEY AND RECORDS AND IS TO BE CONFIRMED PRIOR TO CONSTRUCTION.
2. THE DETAILED DESIGN OF THE DISCHARGE PIPE WORK IS THE SUBJECT OF THE SEPARATE PLUMBING AND DRAINAGE APPLICATION.

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LEVEL 1 19 SHORT STREET, SOUTHPORT QLD 4215
(PO BOX 517, PARADISE POINT QLD 4216)
WWW.PINNACLEENG.COM.AU

REV	DESCRIPTION	DRAWN	DATE
A	ORIGINAL ISSUE	J.H.	31.01.2025
B	ISSUED FOR APPROVAL	J.H.	01.04.2025

TASK	BY	INITIAL	DATE
REVIEW	M. BINGER		01.04.2025
DESIGN	J. HARDMAN		01.04.2025
DRAWN	J. HARDMAN		01.04.2025

SCALE 1 0 1 2 3 4 5 1:100

(SCALE ABOVE DENOTES ORIGINAL SHEET SIZE - A1)

CLIENT: CUECORP PROPERTY GROUP PTY LTD

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT
37 ARTHUR STREET
MERMAID WATERS QLD 4218
(LOT 23 ON RP41194 & LOT 1 ON RP85529)

DRAWING TITLE: POST DEVELOPMENT CATCHMENT LAYOUT

STATUS: PRELIMINARY (NOT TO BE USED FOR CONSTRUCTION)

APPROVED RPEQ No

DRAWING NUMBER: PEG1310-DA-SK02

REVISION: B

PEG1310-DA-SK02 POST DEVELOPMENT CATCHMENT LAYOUT.dwg 01.04.2025 Jeffrey @ A3 x 1:1.00 Printed, Plotted or Scaled

Appendix D

Rational Method Calculations

RATIONAL METHOD CALCULATIONS

Project:	PEG01310_37 Arthur Street, Mermaid Beach
Date:	31-Jan-25
Designed:	J. Hardman
Comments:	Catchment A - Pre-development

PARAMETERS	VALUE		
Catchment Name	A		
Catchment Size	0.0527	ha	
C10 Coefficient of Runoff	0.84		QUDM T4.5.3 1I10 = 70.1, 73% Imp.

Total Time of Concentration — QUDM

Total time of Conentration **(tc)** — **5.0 mins**

Rational Method for Peak Catchment flow — Q = 0.00278 x C x I x A

ARI	Rainfall Intensity (mm/h)	Rainfall Depth (mm)	Fy	Coefficient of Runoff	Discharge (m^3/s)
3 month					0.006
1	120.00	10.00	0.80	0.67	0.012
2	150.00	12.50	0.85	0.71	0.016
5	188.00	15.67	0.95	0.80	0.022
10	218.00	18.17	1.00	0.84	0.027
20	251.00	20.92	1.05	0.88	0.032
50	296.00	24.67	1.15	0.97	0.042
100	332.00	27.67	1.20	1.01	0.049

Appendix E

Stormwater Management Layout

LEGEND

- EXISTING TELSTRA CABLE
- EXISTING SEWERAGE RETICULATION
- EXISTING WATER RETICULATION
- EXISTING STORMWATER PIPE
- EXISTING OVERHEAD ELECTRICAL
- EXISTING BOUNDARY
- EXISTING NOMINAL KERB LINE
- INDICATIVE WORKS AREA
- ROOF / BUILDING HARDSTAND AREA
- CONCRETE DRIVEWAY / PAVED AREA
- PERVIOUS AREA
- OVERLAND FLOW DIRECTION
- CATCHMENT BOUNDARY
- A1 CATCHMENT LABEL

CATCHMENT TABLE (POST)

CATCHMENT AREA - A1 (ROOF/BUILDING)	0.0380 ha
CATCHMENT AREA - A2 (DRIVEWAY/SLAB)	0.0012 ha
CATCHMENT AREA - A3 (GROUND/LANDSCAPING)	0.0135 ha

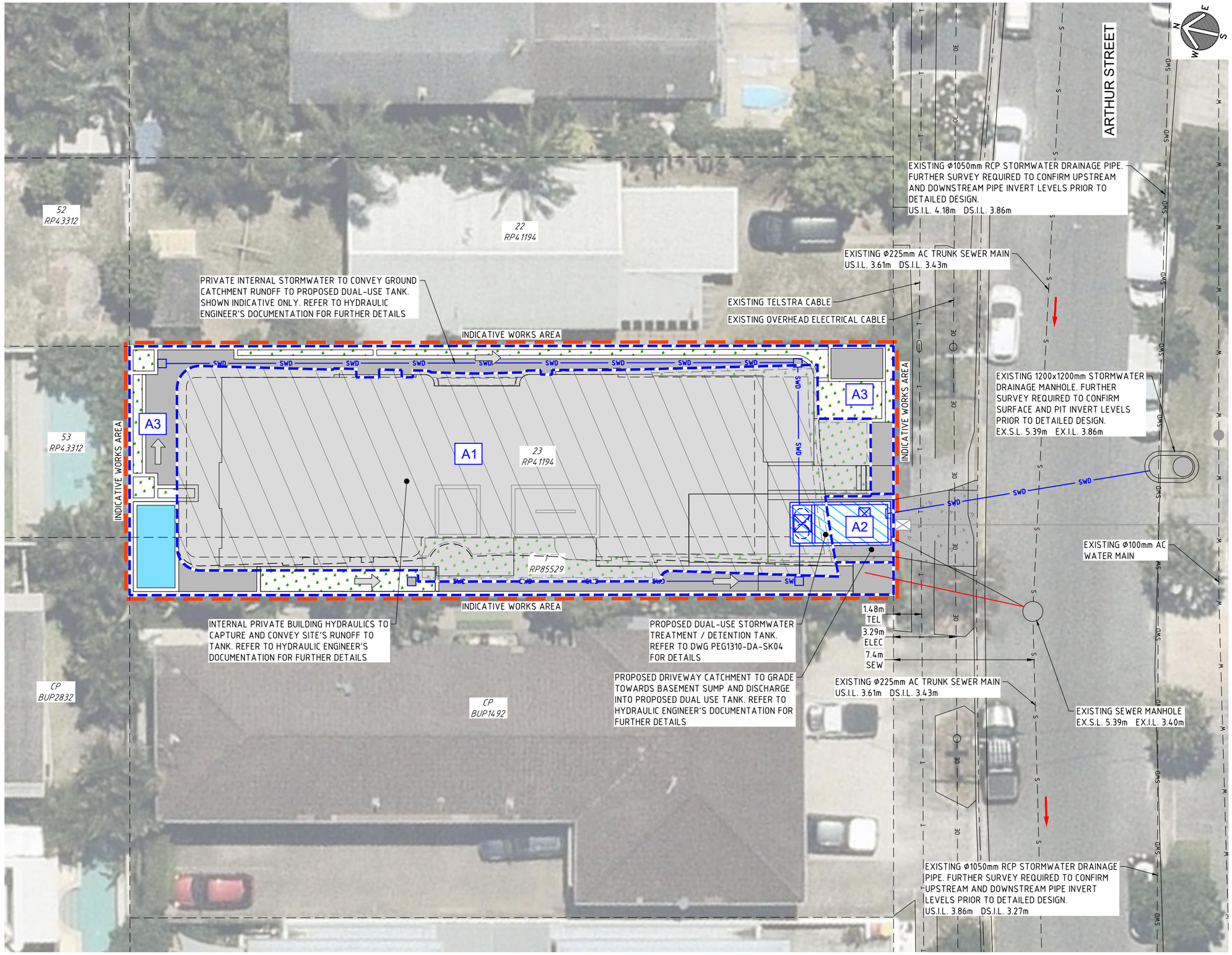
CATCHMENT DATA	A1	A2	A3
ROOF / BUILDING AREA	0.0380 ha	N/A	N/A
DRIVEWAY / ROAD	N/A	0.0012 ha	N/A
GROUND / GARDEN	N/A	N/A	0.0135 ha
TOTAL IMPERVIOUS AREA	0.0380 ha	0.0012 ha	0.0101 ha
TOTAL PERVIOUS AREA	N/A	N/A	0.0034 ha

NOTES

1. THE LOCATION OF THE EXISTING SERVICES HAS BEEN PLOTTED FROM SURVEY AND RECORDS AND IS TO BE CONFIRMED PRIOR TO CONSTRUCTION.
2. THE DETAILED DESIGN OF THE DISCHARGE PIPE WORK IS THE SUBJECT OF THE SEPARATE PLUMBING AND DRAINAGE APPLICATION.

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LEVEL 1 19 SHORT STREET, SOUTHPORT QLD 4215
(PO BOX 517, PARADISE POINT QLD 4216)
WWW.PINNACLEENG.COM.AU

REV	DESCRIPTION	DRAWN	DATE
A	ORIGINAL ISSUE	J.H.	31.01.2025
B	ISSUED FOR APPROVAL	J.H.	01.04.2025

TASK	BY	INITIAL	DATE
REVIEW	M. BINGER		01.04.2025
DESIGN	J. HARDMAN		01.04.2025
DRAWN	J. HARDMAN		01.04.2025

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

(SCALE ABOVE DENOTES ORIGINAL SHEET SIZE - A1)

CLIENT: CUECORP PROPERTY GROUP PTY LTD

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT
37 ARTHUR STREET
MERMAID WATERS QLD 4218
(LOT 23 ON RP41194 & LOT 1 ON RP85529)

DRAWING TITLE: STORMWATER MANAGEMENT LAYOUT

STATUS: PRELIMINARY (NOT TO BE USED FOR CONSTRUCTION)

APPROVED RPEQ No

DRAWING NUMBER: PEG1310-DA-SK03

REVISION: B

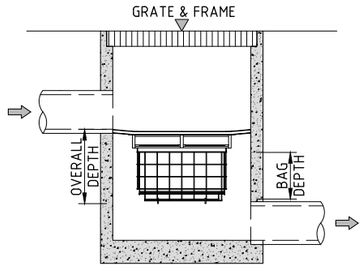
PEG1310-DA-SK03 STORMWATER MANAGEMENT LAYOUT | Aug 01 Oct 2025 | Letter (8.50 x 11.00 Inches) | None | Jesse Hardman

DETENTION TANK DETAILS

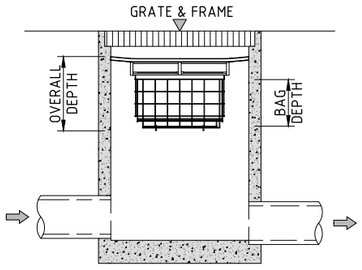
PARAMETERS	TANK
TANK OUTLETS	
LOW FLOW OUTLET	= 2 x Ø90mm ORIFICE OUTLET (DISCHARGE TO EXISTING ARTHUR STREET STORMWATER NETWORK)
LOW FLOW OUTLET LEVEL	= AT BASE OF TANK
HIGH FLOW OUTLET	= 0.1m HIGH x 0.5m WIDE INTERNAL HIGHFLOW WEIR (DISCHARGE TO EXISTING ARTHUR STREET STORMWATER NETWORK)
HIGH FLOW OUTLET LEVEL	= 0.82m ABOVE EXTENDED DETENTION
TANK GEOMETRY	
STORAGE AREA	= 10m^2 MIN.
STORAGE HEIGHT	= 1.0m
STORAGE VOLUME	= 10.0m^3
TANK MODELLING SUMMARY	
10% AEP PEAK OUTFLOW	= 0.021m^3/s
10% AEP PEAK STAGE	= 0.563m ABOVE BASE OF TANK
1% AEP PEAK OUTFLOW	= 0.045m^3/s
1% AEP PEAK STAGE	= 0.898m ABOVE BASE OF TANK

TREATMENT TANK DETAILS

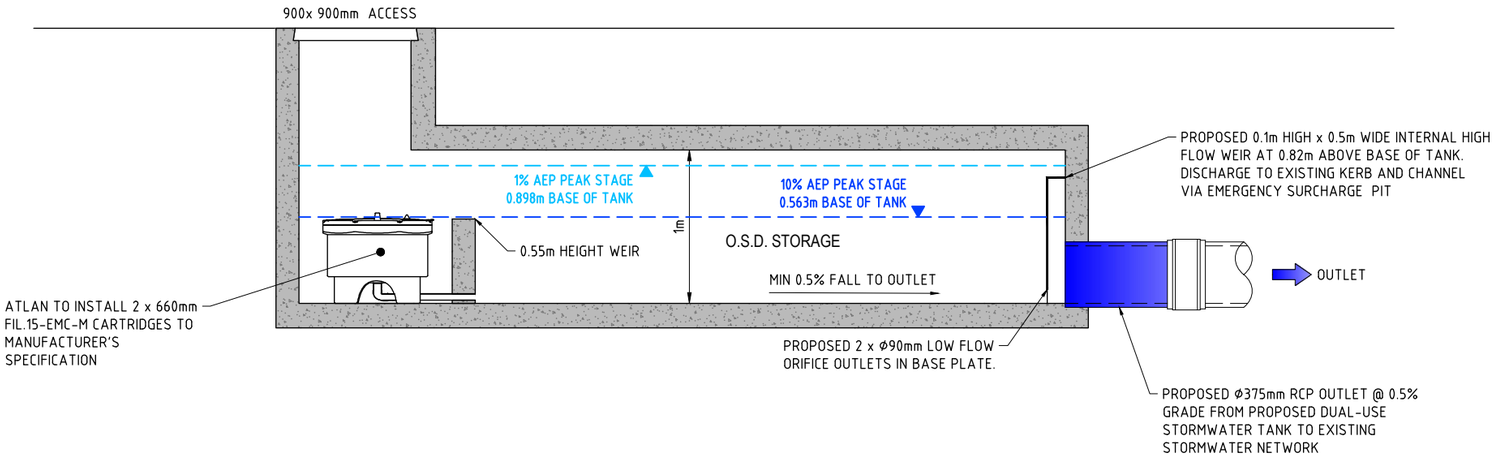
PARAMETERS	TANK (SITE TOTAL)
ATLAN VAULT	
HIGH FLOW BYPASS	= 100m^3/s
STORAGE SURFACE AREA	= 2.0m^2
EXTENDED DETENTION DEPTH	= 0.55m
EQUIVALENT PIPE DIA.	= 44mm
ATLAN FILTER CARTRIDGE	
TYPE	= 660mm FIL.15-EMC-M
REQUIRED NUMBER	= 2
HIGH FLOW BYPASS	= 0.003m^3/s
ATLAN STORMSACK	
REQUIRED NUMBER	= 2
LOW FLOW BYPASS	= 0.000m^3/s
HIGH FLOW BYPASS	= 0.005m^3/s

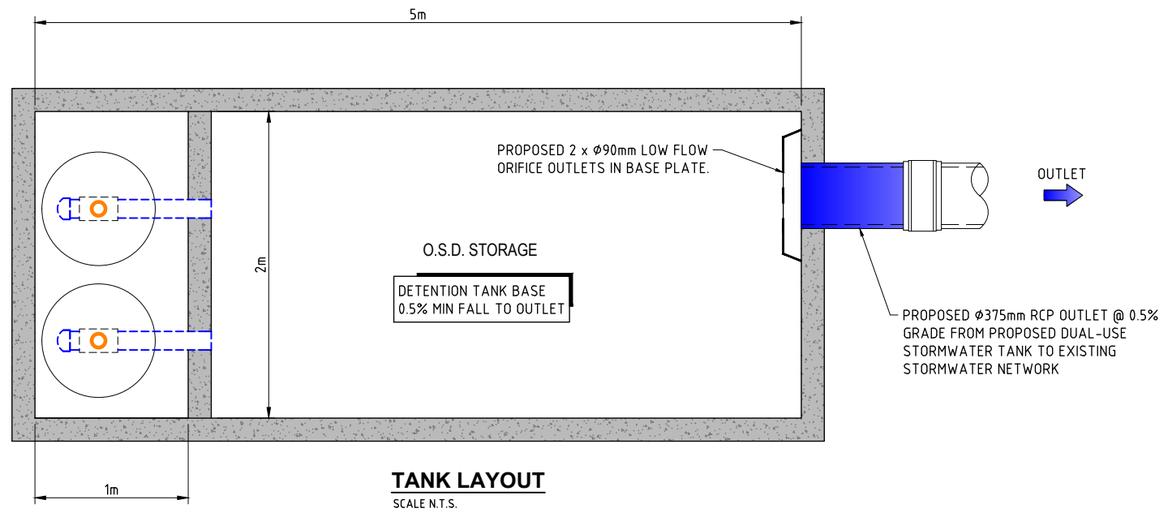


TYPICAL DETAIL
GROSS POLLUTANT DEVICE PIPE FLOW CONFIGURATION
SCALE N.T.S.

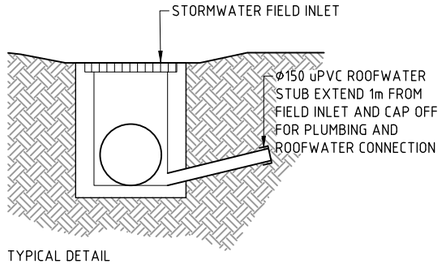


TYPICAL DETAIL
GROSS POLLUTANT DEVICE SURFACE FLOW CONFIGURATION
SCALE N.T.S.





TANK LAYOUT
SCALE N.T.S.



TYPICAL DETAIL
ROOFWATER DRAINAGE CONNECTION

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(PO BOX 517, PARADISE POINT QLD 4216)
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REV	DESCRIPTION	DRAWN	DATE
A	ORIGINAL ISSUE	J.H.	31.01.2025
B	ISSUED FOR APPROVAL	J.H.	01.04.2025

TASK	BY	INITIAL	DATE
REVIEW	M. BINGER		01.04.2025
DESIGN	J. HARDMAN		01.04.2025
DRAWN	J. HARDMAN		01.04.2025

SCALE: AS SHOWN
(SCALE ABOVE DENOTES ORIGINAL SHEET SIZE - A1)

CLIENT: CUECORP PROPERTY GROUP PTY LTD

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT
37 ARTHUR STREET
MERMAID WATERS QLD 4218
(LOT 23 ON RP41194 & LOT 1 ON RP85529)

DRAWING TITLE: STORMWATER MANAGEMENT DETAILS

STATUS: PRELIMINARY
(NOT TO BE USED FOR CONSTRUCTION)

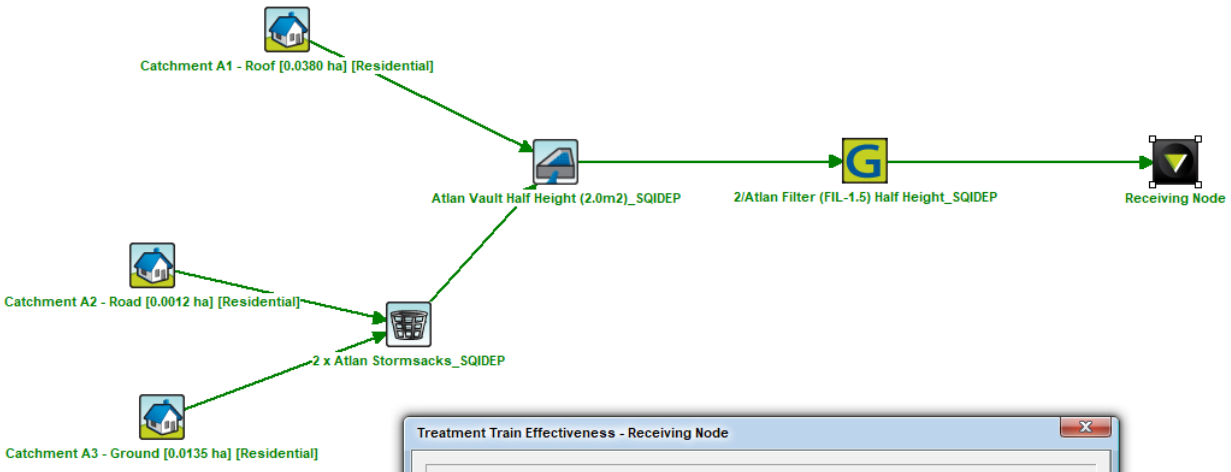
APPROVED
RPEQ No

DRAWING NUMBER: PEG1310-DA-SK04
REVISION: B

PEG1310-DA-SK04 STORMWATER MANAGEMENT DETAILS.dwg 01.04.2025 Jared Wiese Jensen Hardman

Appendix F

MUSIC Model



Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.636	0.636	0
Total Suspended Solids (kg/yr)	51.4	7.73	85
Total Phosphorus (kg/yr)	0.15	0.0375	75
Total Nitrogen (kg/yr)	1.32	0.566	57
Gross Pollutants (kg/yr)	14.9	0	100

Appendix G

CoGC Mapping


Tamborine Street
Gold Coast Highway
Gold Coast Highway
Gold Coast Highway
Gold Coast Highway
Arthur Street
Arthur Street
Flood Depth
0 cm - 30 cm
30 cm - 60 cm
60 cm - 1.2 m
1.2 m - 1.5 m
1.5 m - 2.0 m
Over 2.0 m

Appendix H

Atlan Stormwater Information

STORMWATER AUSTRALIA

Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

VERIFICATION CERTIFICATE

Applicant Information

Company Name	ATLAN Stormwater
Company Address	130 Sandstone Place Parkinson, QLD 4115
Website	www.atlan.com.au
Contact Email	sales@atlan.com.au

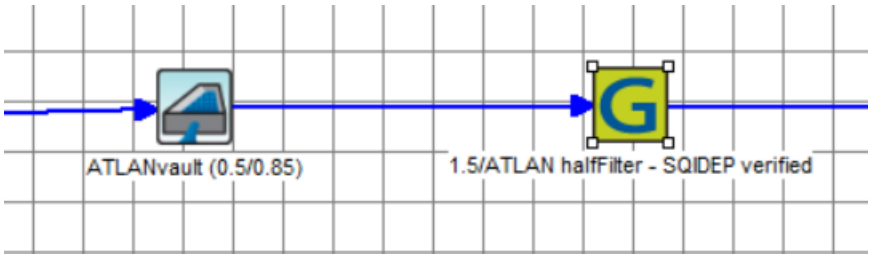
Verified Technology

Product Title	**ATLANFilter – Half Height**
SQIDEP Pathway	Body of Evidence Evaluation Pathway (Local Field Trial Supplement)
Reviewed Documents	The following documents form the basis of this independent evaluation: • SPEL Body of Evidence application submission (Prepared by Drapper Environmental Consultants) • SQIDEP Body of Evidence Submission, Half Height Cartridge supplementary report, Sippy Downs Drive, (Drapper Environmental Consultants, 2 June 2022); • ALS Chain of Custody, Certificates of Analysis, and Quality Control Reports (2020); • Statutory Declaration by Drapper Environmental Consultants, 8 April 2022; • Sippy Downs Drive Filter Hydrographs (1 April 2020 – 3 February 2022); • SQIDEP Supplementary Information, Field Monitoring of a SPEL Half Height Filter at Sippy Downs Drive (Drapper Environmental Consultants, 30 May 2023); • Laboratory Chain of Custody forms, Quality Control reports, QC Compliance Reviews & Certificates of Analysis • SQIDEP Independent Evaluators Joint Report, SPELFilter (full height) (DesignFlow and AECOM, 5 December 2022); • SQIDEP Independent Evaluators Joint Report, SPEL Half Height Filter (DesignFlow and AECOM, July 2023).

Technology Information

Applicant's Verified Performance Claims	Total Suspended Solids (TSS) Total Phosphorus (TP) Total Nitrogen (TN) Gross Pollutants	85 % 74 % 59 % 0 %
Test Stormwater Runoff	The presented runoff pollutant test results complied with the SQIDEP typical stormwater pollutant concentrations for urban environments. The device has therefore been tested within the pollutant loading ranges specified by SQIDEP v1.3 for typical urban environments (Urban Roads, Residential, Industrial, Commercial).	
Test Catchment Type	Urban Road	

Maintenance Performed during monitoring	Without pre-treatment, the filter vault for the Half-height SPELFilters was maintained every six months via vacuum eduction. Filter cartridges were not replaced.

Verified method to model in MUSIC	Modelling a Half-height ATLANFilter in MUSIC is as follows;  1. Use a detention basin node to represent the vault • with modified 'K' values with K=1 • use size of 0.5m^2 per cartridge and 0.5m extended detention depth • adopt a nominal detention time of 0.1 hours (plus or minus 10%). 2. Use a generic node with: • a high flow bypass of 1.5 L/s per cartridge • pollutant reductions of 85% for TSS • pollutant reductions of 74% for TP • pollutant reductions of 59% for TN. When entering the data into MUSIC the detention basin surface area and high flow bypass rate of the generic node is factored up depending on the number of filter cartridges proposed. All other values listed above remain the same (note: the *Notional Detention Time* is adjusted by changing the *Low Flow Pipe Diameter*). Input Properties should reflect those shown below:

Pollutant	Influent range	Effluent Range	Reduction
Total Suspended Solids (TSS)	1000	150	85%
Total Phosphorous (TP)	5	1.3	74%
Total Nitrogen (TN)	50	20.5	59%

Conditions	The limitations of the acceptance of these claims include: • As with the majority of treatment devices, designers should consider the need for pre-treatment on a case-by-case basis with regard to ensuring the longevity of the Filters. Pre-treatment with a gross pollutant trap, or similar, is recommended. • The life expectancy of the media should be regularly monitored and replaced in accordance with the Manufacturer's Technical Guidelines/Maintenance Manual.

Independent Reviewers

Evaluator	Evaluator
Dr Robin Allison	Dr Ricky Kwan
DesignFlow	AECOM

Issue of Verification Certificate

Acceptance by SQIDEP Governance Panel	August 2023
Acceptance by Stormwater Australia Board of Directors	September 2023
Verification Issued	October 2023
Stormwater Australia Verification Certificate Number Reference	SA-2023/07b-VC

Verified under SQIDEP Version 1.3

Body of Evidence Evaluation Pathway

Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

VERIFICATION CERTIFICATE

Applicant Information

Applicant Name	**Atlan Stormwater**
Applicant Address	130 Sandstone Place, Parkinson, QLD 4115
Website	www.atlan.com.au
Contact Email	Andy.hornbuckle@atlan.com.au

Verified Technology

Product Title	**Atlan Stormsack**
SQIDEP Pathway	**Field Evaluation via reviewed QAPP**
Reviewed Documents	The following documents form the basis of this independent evaluation: 1. Stormsack detailed performance report (Stormsack DPR) (Issue 2) Dapper, D., Waldron, S., & Nyakas, L. (2024). SQIDEP Detailed Performance Report – Stormsack (Issue 2), Drapper Environmental Consultants, Crestmead, Queensland, Australia 2. Hydraulic Performance (Treatable Flowrate) Lab Testing report (Issue 1), 5 July 2024 Dapper, D., Nyakas, L. (2024). Hydraulic Performance (Treatable Flowrate) Lab Testing report (Issue 1), Drapper Environmental Consultants, Crestmead, Queensland, Australia 3. ATLAN Stormsack Device Lab Testing Report (Issue 3), 5 July 2024 Dapper, D.; Nyakas, L. ATLAN Stormsack Device Lab Testing Report (Issue 3); Drapper Environmental Consultants: Crestmead, Queensland, Australia, 2024. 4. StormSack Performance Assessment, Report Number: MHL2325, Manly Hydraulics Laboratory, November 2014.

Technology Information

Applicant's Verified Performance Claims (ER)

Parameter	
Total suspended solids	**45%**
Total phosphorus	**47%**
Total nitrogen	**25%**
Total petroleum hydrocarbons	**Not claimed**
Gross pollutants	**100 %**

IEP's comments: Nil.
IEP's recommendations: All performance claims are considered compliant up to the treatment flow rate for the applicable device. Verified flow rates are included in the table below:

Size of Stormsack (Pit dimensions) (mm)	TFR for MUSIC modelling – high flow bypass in litres per second
450 x 450	10
600 x 600	25
600 x 900	32
900 x 900	39
1200 x 900	50
1200 x 1200	65

Test Stormwater Runoff

21 compliant stormwater events. Water chemistry was compliant with Table 1 in SQIDEP v1.3. Minimum number of aliquots collected, and samples were representative.

Test Catchment

- The field testing for the ATLAN Stormsack (200) was carried out at Griffith University, Carpark H, Parkland Campus, Griffith Way, Southport, QLD, 4215.
- The catchment area draining to the device was reported to be 1,181 m^2 directly connected to the Stormsack. The catchment was reported to be 66% impervious with the remainder including a eucalyptus forested area which drains to the Stormsack.

Maintenance Performed during monitoring

The Stormsack should be cleaned/maintained when accumulated pollutants reach the trigger level of 150mm depth in the bag, or 50% capacity by volume.

The monitored Stormsack was maintained twice during the SQIDEP monitoring program due to construction loads received from earthworks undertaken in the upstream catchment. Regular inspection of the Stormsack is recommended, as per the manufacturer's O&M manual.

Verified method:

The Reviewers have verified that the method undertaken complies with the intent and specifics of SQIDEP v1.3.

A more detailed Independent Evaluatores Report is available to get an understanding of what was checked and how the claim was verified.

Conditions/Notes

MUSIC modelling shall be carried out as follows:

A generic node is to be used in MUSIC with a high flow bypass set to the applicable TFR (see table below) for the size of the Atlan Stormsack proposed and with inlet and outlet concentrations as follows:

Pollutant	**Inlet concentration**	**Outlet Concentration**
TSS	100	55
TP	100	53
TN	10	7.5

Size of Stormsack (Pit dimensions) (mm)	TFR for MUSIC modelling – high flow bypass in litres per second
450 x 450	10
600 x 600	25
600 x 900	32
900 x 900	39
1200 x 900	50
1200 x 1200	65

Independent Reviewers

Evaluator Name	Evaluator Signature
Mark Liebman	
Baden Myers	

Issue of Verification Certificate

Acceptance by SQIDEP Governance Panel	
Acceptance by Stormwater Australia Board of Directors	
Verification Issued	25/09/2024
Stormwater Australia Verification Certificate Number Reference	SA-2024/12-VC

Verified under SQIDEP Version 1.3

Body of Evidence Pathway


PINNACLE
ENGINEERING GROUP
PINNACLE ENGINEERING GROUP
ABN: 80 608 431 625
Level 1, 19 Short Street, Southport QLD 4215
(PO Box 517, Paradise Point QLD 4216)
www.pinnacleeng.com.au