



FOUNDATION
EARTH
SCIENCES

REMEDIATION ACTION PLAN

Property Address

19-23 Rosalind Street, Cammeray NSW

Prepared for

Perifa Rosalind Development Pty Ltd

Date



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ABBREVIATIONS

AIP	<i>Australian Institute of Petroleum Ltd</i>	QA/QC	<i>Quality Assurance, Quality Control</i>
ANZECC	<i>Australian and New Zealand Environment and Conservation Council</i>	RAC	<i>Remediation Acceptance Criteria</i>
AST	<i>Aboveground Storage Tank</i>	RAP	<i>Remediation Action Plan</i>
BGL	<i>Below Ground Level</i>	RPD	<i>Relative Percentage Difference</i>
BTEX	<i>Benzene, Toluene, Ethyl benzene and Xylene</i>	SAC	<i>Site Assessment Criteria</i>
COC	<i>Chain of Custody</i>	SVC	<i>Site Validation Criteria</i>
DA	<i>Development Approval</i>	SWL	<i>Standing Water Level</i>
DP	<i>Deposited Plan</i>	TCLP	<i>Toxicity Characteristics Leaching Procedure</i>
DQOs	<i>Data Quality Objectives</i>	TPH	<i>Total Petroleum Hydrocarbons</i>
EPA	<i>Environment Protection Authority</i>	UCL	<i>Upper Confidence Limit</i>
ESA	<i>Environmental Site Assessment</i>	UST	<i>Underground Storage Tank</i>
HIL	<i>Health-Based Soil Investigation Level</i>	VHC	<i>Volatile Halogenated Compounds</i>
LGA	<i>Local Government Area</i>	VOC	<i>Volatile Organic Compounds</i>
NEHF	<i>National Environmental Health Forum</i>	DPI	<i>Department of Primary Industries</i>
NEPC	<i>National Environmental Protection Council</i>		
NHMRC	<i>National Health and Medical Research Council</i>		
OCP	<i>Organochlorine Pesticides</i>		
OPP	<i>Organophosphate Pesticides</i>		
PAH	<i>Polycyclic Aromatic Hydrocarbon</i>		
PCB	<i>Polychlorinated Biphenyl</i>		
PID	<i>Photo Ionisation Detector</i>		
PQL	<i>Practical Quantitation Limit</i>		



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1.0 EXECUTIVE SUMMARY

Foundation Earth Sciences (FES) was appointed by Perifa Rosalind Development Pty Ltd to prepare a Remediation Action Plan (RAP) for the property located at 19-23 Rosalind Street, Cammeray NSW (“the site”).

The FES DSI dated October 2025 indicated a RAP is required for the site due to the following reasons:

- Borehole BH1 – contain asbestos impacted fill to a depth of 0.4m BGL. The delineation of the impacted fill is proposed to be completed as part of the remediation works.
- The RAP also requires the additional investigation to be completed post demolition of site structures to assess beneath the former building footprints and further define the extent of the required soil remediation works.

The adopted remedial strategy is the removal of contaminated material to a licensed landfill. The remediation of the site is to take place in the following stages:

- Stage One – Site Preparation.
- Stage Two – Site Walkover.
- Stage Three – Additional Investigation & Delineation Works (Post Demolition).
- Stage Four – Classification, removal, and validation of impacted areas.
- Stage Five – Validation of basement floor and landscape area.
- Stage Six – Asbestos Clearance.
- Stage Seven – Validation Report Preparation.



Therefore, it is considered that the site will be *suitable* for the proposed development, subject to the implementation of the remediation and validation works in accordance with this RAP.

2.0 INTRODUCTION

Foundation Earth Sciences (FES) was appointed by Perifa Rosalind Development Pty Ltd to prepare a Remediation Action Plan (RAP) for the property located at 19-23 Rosalind Street, Cammeray NSW (“the site”).

This RAP has been prepared to be part of the Development Application (DA) for this site. Work and reporting were conducted in general accordance with the FES proposal, FES environmental protocols and with reference to relevant environmental regulatory criteria including the guidelines issued or endorsed by the NSW EPA.

3.0 OBJECTIVES, SCOPE & DEVIATIONS

3.1 Objectives

The primary objective of this RAP is to inform and guide site remediation and validation through the following:

- Summary of the current contamination status of the site.
- Providing a description of the remediation strategy(s) that will effectively manage the environmental concerns identified, in a manner that protects both human health and the environment.



- Provide a preliminary sampling and analytical quality plan to be used for site validation.
- Comply with DA Conditions for Development.

3.2 Scope

The scope is outlined below:

- Establish remediation goals and criteria.
- Evaluation of remedial technologies and selection of appropriate remedial strategy(s)
- Facilitate guidance on approvals, licences, contractor WHS Plan & any other site management plans required for the remedial works.
- Provide an outline of the additional investigations (if required) to be carried out to address the recommendations identified in the previous investigation.
- Develop sampling, analysis and quality plan for additional works, remedial works and proposed validation.
- The area of impact is within borehole BH1 (0.3-0.4m) and is within the fill soil profile.
- Waste Classification.

3.3 Deviation from this RAP

It is recommended that an experienced and qualified Environmental Engineer / Scientist be appointed to the project to enable:

- Coordination and implementation of the staged approach to the proposed remediation / validation works.
- Any proposed deviations from the works specified in this RAP are documented



and approved as required under NSW EPA "*Consultants Reporting on Contaminated Land*" dated 2020.

- The format of this report closely follows that recommended in the NSW EPA "*Consultants Reporting on Contaminated Land*" dated 2020.

Completion of remedial works without adequate supervision from a qualified Environmental Engineer / Scientist could leave to project delays and extra costs due to additional requirements imposed by a third party, to confirm the environmental status of site. Any waste material removed from site without sufficient characterisation and/or waste classification may lead to regulatory actions.



4.0 SITE IDENTIFICATION, SITE HISTORY, ENVIRONMENTAL SETTINGS AND BACKGROUND INFORMATION

4.1 Site identification and zoning

Table 1: Site Identification

Site Identifier	Site Details	
Site Location	19-23 Rosaline Street, Cammeray NSW	
Lot/DP	SP4657 SP5218 SP16181	
Site Coordinates #	NE Corner: Latitude: -33.824862, Longitude: 151.208379	
Parish	Willoughby	
County	Cumberland	
Site Area #	Approximately 4,093m ²	
Local Government Area (LGA)	The North Sydney Council	
Zoning##	R4 – High Density Residential	
Surrounding Land Uses	<i>North</i>	Rosalind St, then Residential and Warringah Fwy
	<i>South</i>	Residential, then Ernest St, Residential and School
	<i>East</i>	Residential then Miller St, Residential and School
	<i>West</i>	Residential, then West St and Residential

Notes: # Six Maps



4.2 Site description

The following observations were made during the DSI works:

- The site appeared to be occupied by three separate residential lots. Each property has a residential apartment building on it, with a sealed driveway along the eastern boundary connecting the properties, carparking spaces under the dwellings and landscaped areas.

4.3 Proposed Development

The proposed development includes demolishing current site features and construction of a five (5) level residential apartment building for senior housing, with a basement carpark, communal open spaces and landscaped areas.

Refer to **Appendix B** – Proposed Development Plans.



4.4 Site Conditions and Surrounding Environmental

Table 2: Environmental Settings

Site Information	Descriptions
Sensitive Receivers	<p>The nearest sensitive human receptors are the current and future users of the site, construction workers during the site redevelopment and the public. The nearest watercourse is Willoughby Creek, located approximately 741m north-east of the site.</p>
Soil Landscape <i>Review of NSW Soil and Land Information website ESPADE.</i>	<p>The Soil Landscape Map viewed on NSW ESPADE indicates that the site is in Gymea & Blacktown landscape areas.</p> <p>Gymea – undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief 20-80m, slopes 10-25%. Rock outcrop <25%. Broad convex crests, moderately inclined sideslopes with wide benches, localised rock outcrop on low broken scarps. Extensively cleared open-forest (dry sclerophyll forest) and eucalypt woodland.</p> <p>Blacktown – gently undulating rises on Wianamatta Group shale and Hawkesbury shale. Local relief to 30m, slopes is usually <5%. Broad rounded crests and ridges with gently inclined slopes. Cleared eucalypt woodland and tall open forest (wet sclerophyll forests).</p>
Topography	<p>Gymea – undulating to rolling low hills with local relief 20-80m and slopes of 10-25%. Sideslopes with narrow to wide outcropping sandstone rock benches (10-100m), often forming broken scarps of <5m.</p> <p>Blacktown – gently undulating rises on Wianamatta Shale with local relief 10-30m and slopes generally <5% but up to 10%. Crests and ridges are broad (200-600m) and rounded with convex upper slopes grading into concave lower slopes. Rock outcrop is absent.</p>
Geological Profile	<p>The Geological Map of Sydney (Geological Series Sheet 9130, Scale</p>



	1:100,000, 1983), published by the Department of Mineral Resources indicates the residual soils within the site to be underlain by Triassic Age Shale of the Wianamatta Group, comprising black to dark grey shale and laminite.					
Presence of Acid Sulphate Soils	A review of the “eSPADE” map indicated that the site is in an area of “No Known Occurrence” of acid sulphate soils.					
Localised Hydrogeology	Number	Location from Site	Depth (m BGL)	SWL (m BGL)	Use	Water Bearing Zones
	GW023150	1.225km E	1.80	-	Domestic, Recreational	1.20-1.20
	GW105224	1.195km NW	132.40	35.00	Domestic	29.00-35.00, 98.00-100.00
Nearest Surface Water Body	The nearest watercourse is Willoughby Creek, located approximately 741m north-east of the site.					
Local Meteorology (Bureau of Meteorology BOM website)	The monthly rainfall of the local surrounding area is represented by the data collected from the BOM rainfall gauge located in Sydney (Observatory Hill), which is approximately 3.3km from Cammeray. The records indicate that the highest rainfall recorded for the month of September was 178.6mm (date of fieldwork).					
Nearest Active Service Station and Dry Cleaner (Google Maps Search)	Service station is 482m north of the site. Dry Cleaners is 382m north of the site.					



4.5 Previous environmental investigations

Three (3) previous investigations for the property are summarised at the time writing this report:

- Foundation Earth Sciences (2025), “Preliminary Site Investigation” for 19-23 Rosalind Street, Cammeray NSW, project reference: E3403, dated October 2025.
- Foundation Earth Sciences (2025), “Preliminary Acid Sulphate Soil Assessment” for 19-23 Rosalind Street, Cammeray NSW, project reference: E3403-4, dated October 2025.
- Foundation Earth Sciences (2025), “Detailed Site Investigation” for 19-23 Rosalind Street, Cammeray NSW, reference: E3403-2, dated: October 2026.

4.5.1 FES PSI (October 2025)

Foundation Earth Sciences was appointed by Perifa to undertake a Preliminary Site Investigation (PSI) for the property situated at 19-23 Rosalind Street, Cammeray NSW.

Founded on the investigation, including the proposed land use, previous site history, underground service plans, land title information & site inspection, the potential for significant soil and/or groundwater impact is considered a low to moderate risk. In applying the NEPM 2013 Schedule B2 “Guideline on Site Characterisation”; there is a sufficient evidence, uncertainty and/or suspicion of contamination, therefore further investigation is recommended. A hazardous materials assessment is recommended to be completed prior to the demolition of the site.

The following data gaps were identified:



- The soil and groundwater quality at the site have not been investigated.

Based on the results of this investigation, it is considered that the risk to human health and the environment associated with any potential soil contamination at the site are low to moderate in the context of the proposed use of the site. The site ***can be made suitable*** for the proposed development, subject to the following recommendations:

- Preparation of a Detailed Site Investigation (Phase 2 Environmental Site Assessment) by a suitably qualified Environmental Consultant.
- Any soil requiring removal from the site, as part of future site works, should be classified in accordance with the “Waste Classification Guidelines, Part 1: Classifying Waste” NSW EPA (2014).

4.5.2 FES PASSA (October 2025)

Foundation Earth Sciences was appointed by Perifa to prepare a Preliminary Acid Sulphate Assessment for the property located at 19-23 Rosalind Street, Cammeray NSW. The assessment of acid sulphate material can be quite complex and can have a lot of interferences associated with the test methods and soil matrix. The following points outline the evidence to support the site is ***NOT*** impacted to the maximum depth of sampling:

- Analysis using the pH_f showed the soil indicators to be absence for AASS.
- Analysis using the pH_{fox} field test protocol showed the soil indicators to be unlikely for AASS / PASS due to PH values.
- Analysis using the Chromium reducible suite indicated that organic sulphur was detected but no inorganic sulphur sources were present above the relevant action criteria.



- The site is located at an elevation of approximately 88-90m AHD according to Google Earth. Acid Sulphate Soils occur in soil horizons less than 5m AHD.

Therefore, it has been determined that the site is **NOT impacted by Acid Sulphate Soils** within the borehole locations ***BH2, BH4, BH6 & BH10*** to a maximum depth of analysis. Therefore, an Acid Sulphate Soil Management plan (ASSMP) is not required for the site as it is not impacted with AASS / PASS to the maximum depth of analysis.

4.5.3 FES DSI (October 2025)

Foundation Earth Sciences (FES) was appointed by Perifa to undertake a Detailed Site Investigation for the property situated at 19-23 Rosalind Street, Cammeray NSW (“the site”).

The soil data concluded the following:

- The soil laboratory results were below the adopted detection limits and/or the relevant guideline criteria, apart from BH1 where asbestos was detected within the soil material.
- Therefore, upon review of the decision area dataset results, the null hypothesis for the investigation was accepted due to the asbestos contamination present on the site.

The following lines of evidence support the low to moderate risk groundwater conclusions in relation to site suitability:

- *Whether sources have been removed* – no immediate sources of contamination were identified on the site or within the surrounding areas. Therefore, the risk of groundwater contamination is considered low.



However, further investigation may be required if future structures or sources are identified.

- *Contaminant sources unrelated to the site* – there is no information on the groundwater quality, however the land use on the site and the surrounding areas is predominately residential. There is unlikely then to be any risk of soil and/or groundwater contamination.
- *Quantity of contaminants and its mobility characteristics* – during the investigation, minor elevated heavy metals of Chromium, Copper, Nickel & Zinc were identified in GW6, as well as Nickel & Zinc in GW1 and GW2. It is considered that these could be related to regional contamination and/or background levels. The bedrock below the site was also determined to be Sandstone, therefore minimising the movement groundwater within the site and surrounding areas (which is reflected by the similar exceedances of heavy metal contamination within the site).
- The site is not located in a catchment with contains the water quality objectives of drinking water (i.e., beneficial use) and therefore drinking water guidelines were not applied.

It is concluded then that the heavy metal exceedances within the site are of limited concern in relation to the GIL. As part of the remediation works and post demolition of the existing site structure's additional locations are recommended to be completed targeting the former building footprints.

Based on the historical review, environmental information, proposed development and laboratory results of the investigation, the site can be made **suitable** for the proposed development, subject to the following:



- It is considered that the site would be deemed suitable for the proposed development subject to the implementation of a Remediation Action Plan (RAP) to manage the abovementioned environmental concerns and data gaps.
- Any soil requiring removal from the site, as part of future site works, should be classified in accordance with the “Waste Classification Guidelines, Part 1: Classifying Waste” NSW EPA (2014).

4.6 Site History

The site history as listed in the DSI is outlined below:

Land Titles

- SP4657 (19 Rosalind St) titles revealed the property was privately owned during the mid-1800s and from 1911 to 1961. At this time, ownership was transferred to commercial entities. By 1975, a Strata Plan had been established and has remained to the present time.
- SP5218 (21 Rosalind St) land titles revealed private ownership during the mid-1800s and from 1911 to 1969. At this time, a commercial entity owned the site until an unknown time. From 1995 to the present time, a Strata Plan was utilised.
- SP16181 (23 Rosalind St) land titles revealed private ownership during the mid-1800s and from 1912 to 1920. From this time until 1981, the property was owned by a number of commercial entities. From 1981 to the present, a Strata Plan has been utilised.



Aerials

Prior to 1943, the site appeared to be subdivided into two residential properties, each with a residential dwelling along the northern boundary and storage structures, including some extending along the eastern boundary. The western portion of the site appeared to be dominated by vacant land. By 1955, structures along the southern boundary appeared to be removed. By the mid-1960s, the previous site features had been cleared and divided into three separate lots. On each lot, a residential apartment building appeared to be developed with carparking areas below and landscaped areas. From this time to the present, no major changes were observed.

The surrounding areas prior to 1943 appeared to be dominated by residential properties, with a cemetery being noted to the north-west as well as some vacant portions of land to the east. By 1955, some residential properties to the south appeared to be redeveloped, and vacant properties to the east were developed into residential lots as well as a recreational area (Bowling Club). In the mid-1960s, several properties to the north, south and east of the site appeared to be cleared. At this time, a carparking area (in association with the Bowling Club) and new residential apartment buildings to the west were constructed. By 1985, the cleared properties to the north had been redeveloped into the Warringah Freeway. Residential apartment buildings appeared to be constructed in the cleared portions of land in the north, south and east of the site. At this time, the cemetery also appeared to be redeveloped into a recreational area (park). No major changes were observed from this time until 2005 where more residential apartment buildings appeared to be constructed in the north and east, as well as some townhouses. By 2013, the carparking area to the east also appeared to be redeveloped into residential apartments. No other major changes were noted from this time to the present.



NSW EPA Records

- The NSW EPA contaminated land database, POEO Register, List of Notified Sites and PFAS Preliminary Screening indicate subject site is not listed.



5.0 CONCEPTUAL SITE MODEL - CURRENT

5.1 Conceptual Site Model Components

5.1.1 Potential Contaminated Media

Table 3: Potential Contaminated Media

Known and potential contamination source	Associated Contaminants
<i>Fill Material</i>	There is known contamination to be present in the fill soil material to depth of 0.4m BGL (subject to the proposed delineation works). Contaminants of concern include Asbestos.
<i>Groundwater</i>	Given the site history, sampling to date and surrounding land uses groundwater is considered a low potentially contaminated media.
<i>Soil Vapour</i>	Given the site history, sampling to date and surrounding land uses soil vapour is considered a low potentially contaminated media.



5.2 Area of Concern

Table 4: Area of Concern

Known and potential contamination source	Associated Contaminants
<i>Historical Site Uses (Residential, Vacant)</i>	Heavy Metals, TRH, BTEX, PAH, OCP, PCB & Asbestos
<i>Surrounding Land Use (Residential, Recreational, School)</i>	Heavy Metals, TRH, BTEX, PAH, OCP, PCB & Asbestos
<i>Potential Pesticides Use</i>	OCP, OPP
<i>Imported Fill / Land Filling Materials</i>	Heavy Metals, TRH, BTEX, PAH, OCP, PCB & Asbestos
<i>Car parking Areas</i>	TRH, BTEX, PAH
<i>Building degradation/ Demolition</i>	Heavy Metals and Asbestos

5.3 Chemicals of Concern

Soils

The following chemicals of concern were identified in the FES DSI and are outlined as follows:

- Boreholes BH1 – contains Asbestos impacted fill soils to a depth of 0.4m BGL.

The delineation of the impacted fill is proposed to be completed as part of the remediation works. Refer to section 8.2.



5.4 Sources

Soil

The most likely source of the contaminants of concern is the quality of the fill soil located on the site.

5.5 Pathways (Transport of COC)

Potential exposure pathways include:

- Dermal.
- Ingestion; and
- Inhalation.

The potential for ingestion of soil is considered a potential exposure pathway during site development works as construction workers would be exposed to soil.

Based on the soil and groundwater sampling to date there is a LOW potential for vapour to be present in the underlying profile within the site. Minimal vapour intrusion risk was encountered in the groundwater well sampled during the DSI.

5.6 Receptors

Human:

The site groundwater is not currently used for or planned to be used for drinking water as town water is provided by Sydney Water.

Ecological

The ecological receptors would be surface water and benthic organisms in the Willoughby Creek.



Potential receptors of environmental impact present within the site which will be required to be addressed with respect to the suitability of the site for the proposed use include:

- Excavation/construction/maintenance workers conducting activities at the site, who may potentially be exposed to COPCs through direct contact with impacted soils, Vapour Intrusion and/or groundwater present within excavations and/or inhalation of dusts/fibres associated with impacted soils.
- Future occupants/users of the site may potentially be exposed to COPCs through direct contact with impacted soils and/or ingestion of impacted soils and/or inhalation of dusts/fibres associated with impacted soils and/or exposure to vapour; and/or
- Offsite sensitive receptors of groundwater.
- Flora species to be established on vegetated areas of the site.
- Willoughby Creek.

5.7 Potential for Migration

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid/liquid and mobility characteristics).
- The extent of the contaminants (isolated or widespread).
- The location of the contaminants (surface soils or at depth); and
- The site topography, geology, hydrology and hydrogeology.



The potential contaminants identified as part of the site history review & site inspection are present in solid (e.g. impacted fill, asbestos), liquid (e.g. dissolved in water) and gaseous/ vapour forms.

The proposed development once constructed will potentially create some unsealed ground surfaces and therefore, there is a risk for migration of contaminants via wind-blown dust.

Likewise, rainfall infiltration at the site is expected due to the potential unsealed surfaces across the site.

The removal of the contaminated soil will reduce the risk for any ongoing / future migration of soil contaminants. Based on the historical uses, previous reports and sampling to date, the site has a low potential for possible migration of contaminants in liquid (on-off site migration).

5.8 Preferential Pathways

For this assessment, preferential pathways have been identified as natural and/or man-made pathways that result in the preferential migration of COPCs as either liquids or gases.

Man-made preferential pathways are present throughout the site, generally associated with fill materials and services present beneath existing ground surface. Fill materials and service lines are anticipated to have a higher permeability than the underlying natural soil and/or bedrock.



5.9 Frequency of Exposure

As the potential for ingestion of soil is considered a potential exposure pathway during site development works as construction workers would be exposed to soil. The frequency of exposure will be occurring from removal of the existing hard standing surfaces until construction of the new surfaces across the proposed development area.

5.10 Offsite Contamination

Impacted soil contamination could migrate off site during site development works with surface water run-off.

5.11 Data Gap Identification

The following data gaps remain:

- Vertical and lateral extent of impacted fill needs further delineation at BH1.
- An additional investigation is required to be completed post demolition of the existing building structures. The investigation is required to address the following.
 - Assess the soil beneath the existing building footprint.
 - The additional investigation is proposed to be completed as part of the remediation works once the building has been demolished.



6.0 REMEDIATION CRITERIA

6.1 Soil

6.1.1 Health Investigation Levels (HIL)

To assess the contamination status of soils at a site, the NSW EPA refers to the document entitled National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) (Amendment 2013).


The site will be assessed against the NEPM exposure scenario 'Residential B' Health Investigation Levels of the above-mentioned guidelines and specifically refers to the following:

HIL 'B' Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.

The soil regulatory guidelines are presented in the table below.



Table 5: Health Investigation Levels (HIL) Criteria for Soil Contaminants

 FOUNDATION EARTH SCIENCES	Residential B	Reference
Heavy Metals		
Arsenic	500	NEPM 2013 - Table 1(A)1 HILs
Beryllium	90	NEPM 2013 - Table 1(A)1 HILs
Boron	40000	NEPM 2013 - Table 1(A)1 HILs
Cadmium	150	NEPM 2013 - Table 1(A)1 HILs
Chromium (VI)	500	NEPM 2013 - Table 1(A)1 HILs
Cobalt	600	NEPM 2013 - Table 1(A)1 HILs
Copper	30000	NEPM 2013 - Table 1(A)1 HILs
Lead	1200	NEPM 2013 - Table 1(A)1 HILs
Manganese	14000	NEPM 2013 - Table 1(A)1 HILs
Mercury (Inorganic)	120	NEPM 2013 - Table 1(A)1 HILs
Methyl Mercury	30	NEPM 2013 - Table 1(A)1 HILs
Nickel	1200	NEPM 2013 - Table 1(A)1 HILs
Selenium	1400	NEPM 2013 - Table 1(A)1 HILs
Zinc	60000	NEPM 2013 - Table 1(A)1 HILs
Cyanide (Free)	300	NEPM 2013 - Table 1(A)1 HILs
Polycyclic Aromatic Hydrocarbons (PAHs)		
Carcinogenic PAHs (as Bap TEQ)	4	NEPM 2013 - Table 1(A)1 HILs
Total PAHs	400	NEPM 2013 - Table 1(A)1 HILs
Organochlorine Pesticides		
DDT + DDE + DDD	600	NEPM 2013 - Table 1(A)1 HILs
Aldrin + Dieldrin	10	NEPM 2013 - Table 1(A)1 HILs
Chlordane	90	NEPM 2013 - Table 1(A)1 HILs
Endosulfan	400	NEPM 2013 - Table 1(A)1 HILs
Heptachlor	10	NEPM 2013 - Table 1(A)1 HILs
HCB	15	NEPM 2013 - Table 1(A)1 HILs
Phenols		
Phenols	45000	NEPM 2013 - Table 1(A)1 HILs
Pentachlorophenol	130	NEPM 2013 - Table 1(A)1 HILs
Cresols	4700	NEPM 2013 - Table 1(A)1 HILs
Polychlorinated Biphenyls (PCBs)		
PCBs	1	NEPM 2013 - Table 1(A)1 HILs
Other Pesticides		
Atrazine	470	NEPM 2013 - Table 1(A)1 HILs
Chlorpyrifos	340	NEPM 2013 - Table 1(A)1 HILs
Bifenthrin	840	NEPM 2013 - Table 1(A)1 HILs
Herbicides		
2,4,5-T	900	NEPM 2013 - Table 1(A)1 HILs
2,4-D	1600	NEPM 2013 - Table 1(A)1 HILs
MCPA	900	NEPM 2013 - Table 1(A)1 HILs
MCPB	900	NEPM 2013 - Table 1(A)1 HILs
Mecoprop	900	NEPM 2013 - Table 1(A)1 HILs
Picloram	6600	NEPM 2013 - Table 1(A)1 HILs
Other Organics		
PDBe (Br1-Br9)	2	NEPM 2013 - Table 1(A)1 HILs


Note – All values are in mg/kg



6.2 Health Screening Levels (HSLs) – HSL A & B

For selection of the health screening criteria an assessment of the in-situ soil profile should be undertaken. The soil criteria indicate that the upper soil profile is more consistent with **CLAY & SAND**.

Table 6: Health Screening Levels (HSL) Criteria

	HSL A & HSL B	HSL A & HSL B	HSL A & HSL B	HSL A & HSL B	Soil Saturation Concentration (C _{sat})	Reference
	0m to <1m	1m to <2m	2m to <4m	4m+		
SAND						
Toluene	160	220	310	540	560	NEPM 2013 - Table 1(A) 3 HSLs
Ethylbenzene	55	NL	NL	NL	64	NEPM 2013 - Table 1(A) 3 HSLs
Xylenes	40	60	95	170	300	NEPM 2013 - Table 1(A) 3 HSLs
Naphthalene	3	NL	NL	NL	9	NEPM 2013 - Table 1(A) 3 HSLs
Benzene	0.5	0.5	0.5	0.5	360	NEPM 2013 - Table 1(A) 3 HSLs
F1	45	70	110	200	950	NEPM 2013 - Table 1(A) 3 HSLs
F2	110	240	440	NL	560	NEPM 2013 - Table 1(A) 3 HSLs
SILT						
Toluene	480	NL	NL	NL	640	NEPM 2013 - Table 1(A) 3 HSLs
Ethylbenzene	NL	NL	NL	NL	69	NEPM 2013 - Table 1(A) 3 HSLs
Xylenes	110	310	NL	NL	330	NEPM 2013 - Table 1(A) 3 HSLs
Naphthalene	5	NL	NL	NL	10	NEPM 2013 - Table 1(A) 3 HSLs
Benzene	0.7	1	2	3	440	NEPM 2013 - Table 1(A) 3 HSLs
F1	50	90	150	290	910	NEPM 2013 - Table 1(A) 3 HSLs
F2	280	NL	NL	NL	570	NEPM 2013 - Table 1(A) 3 HSLs
CLAY						
Toluene	480	NL	NL	NL	630	NEPM 2013 - Table 1(A) 3 HSLs
Ethylbenzene	NL	NL	NL	NL	68	NEPM 2013 - Table 1(A) 3 HSLs
Xylenes	110	310	NL	NL	330	NEPM 2013 - Table 1(A) 3 HSLs
Naphthalene	5	NL	NL	NL	10	NEPM 2013 - Table 1(A) 3 HSLs
Benzene	0.7	1	2	3	430	NEPM 2013 - Table 1(A) 3 HSLs
F1	50	90	150	290	850	NEPM 2013 - Table 1(A) 3 HSLs
F2	280	NL	NL	NL	560	NEPM 2013 - Table 1(A) 3 HSLs


Note - All values are in mg/kg



Ecological Investigation Levels (EILs) -

Any validation samples in the future will be assessed against the site derived EILs. A copy of the site derived EILs is provided below.

Table 7: Site Derived EIL Criteria

	EIL Analytes (mg/kg)							
	ARSENIC	CHROMIUM (VI) ^a	COPPER	LEAD	NICKEL	ZINC	NAPHTHALENE	DDT
Site Derived Ecological Investigation Levels (EILs)								
FES DSI Fill BH6 (0.1-0.2m)	100	410	260	1,200	360	1,100	170	180
FES DSI Natural BH6 (0.5-0.6m)	100	410	60	1,100	30	140	170	180

Notes: a Chromium VI has been used in lieu of Chromium III


Ecological Screening Levels (ESLs) -

Ecological screening levels (ESLs) are presented based on a review of Canadian guidance for petroleum hydrocarbons in soil and application of the Australian methodology (Schedule B5b) to derive Tier 1 ESLs for BTEX, benzo(a)pyrene and F1 and F2 (Warne 2010a, 2010b).

The Canadian Council of the Ministers of the Environment (CCME) has adopted risk-based TPH standards for human health and ecological aspects for various land uses in the *Canada-wide standard for petroleum hydrocarbons (PHC) in soil* (CCME 2008) (CWS PHC). The standards established soil values including ecologically based criteria for sites affected by TPH contamination for coarse- and fine-grained soil types.



Table 8: (EIL) and (ESL) Criteria

 FOUNDATION EARTH SCIENCES	Contaminant Age/Soil Texture	National parks and areas of high conservation value	Urban residential and open public spaces	Commercial and industrial	Reference
Ecological Investigation Levels (EILs)					
Heavy Metals					
Arsenic	Fresh	20	50	80	NEPM 2013 - Table 1(B) 1-5 EILs
	Aged	40	100	160	
Chromium (III)	Fresh	Site Specific Calculation Required			NEPM 2013 - Table 1(B) 1-5 EILs
	Aged				
Copper	Fresh	Site Specific Calculation Required			NEPM 2013 - Table 1(B) 1-5 EILs
	Aged				
Lead	Fresh	110	270	440	NEPM 2013 - Table 1(B) 1-5 EILs
	Aged	470	1100	1800	
Nickel	Fresh	Site Specific Calculation Required			NEPM 2013 - Table 1(B) 1-5 EILs
	Aged				
Zinc	Fresh	Site Specific Calculation Required			NEPM 2013 - Table 1(B) 1-5 EILs
	Aged				
Polycyclic Aromatic Hydrocarbons (PAHs)					
Naphthalene	Fresh	10	170	370	NEPM 2013 - Table 1(B) 1-5 EILs
	Aged	10	170	370	
Organochlorine Pesticides					
Ecological Screening Levels (ESLs) and Management Limits					
F1 (C ₆ -C ₁₀)	Coarse	125*	180*	215*	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine				
F1 (C ₆ -C ₁₀) (Management Limits)	Coarse	-	700	700	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		800	800	
F2 (>C ₁₀ -C ₁₆)	Coarse	25*	120*	170*	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine				
F2 (>C ₁₀ -C ₁₆) (Management Limits)	Coarse	-	1000	1000	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		1000	1000	
F3 (>C ₁₆ -C ₃₄)	Coarse	-	300	1700	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		1300	2500	
F3 (>C ₁₆ -C ₃₄) (Management Limits)	Coarse	-	2500	3500	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		3500	5000	
F4 (>C ₃₄ -C ₄₀)	Coarse	-	2800	3300	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		5600	6600	
F4 (>C ₃₄ -C ₄₀) (Management Limits)	Coarse	-	10000	10000	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		10000	10000	
Benzene	Coarse	10	50	75	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	10	65	95	
Toluene	Coarse	10	85	135	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	65	105	135	
Ethylbenzene	Coarse	1.5	70	165	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	40	125	185	
Xylenes	Coarse	10	105	180	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	1.6	45	95	
Benzo(a)pyrene	Coarse	0.7	0.7	0.7	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	0.7	0.7	0.7	

Notes

- 1 Urban residential/public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
- 2 Aged values are applicable to arsenic contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
- 3 Insufficient data was available to calculate aged values for DDT and naphthalene, consequently the values for fresh contamination should be used.
- 4 Insufficient data was available to calculate ACLs for As, DDT and naphthalene. The EIL should be taken directly from Table 1B(5).
- 5 ESLs are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability.
- 6 * indicates that insufficient data was available to derive a value.
- 7 To obtain F1, subtract the sum of BTEX concentrations from C₆-C₁₀ fraction and subtract naphthalene from >C₁₀-C₁₆ to obtain F2.
- 8 Management limits are applied after consideration of relevant ESLs and HSLs
- 9 Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

The Urban Residential and Open Public Spaces guidelines are the adopted criteria for EIL and ESL.



6.3 Asbestos – Residential A, FA & AF + All forms

Health screening for asbestos in soil, which are based on scenario-specific likely exposure levels, are adopted from the WA DoH guidelines and are referred in Table 7 in Schedule B1. The following health screening levels for asbestos can be seen below:

Table 9: Health Screening Levels for Asbestos

Form of Asbestos	Health Screening Levels (w/w)			
	Residential A	Residential B	Recreational C	Commercial/Industrial D
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA and AF (Friable Asbestos)	0.001%			
All forms of asbestos	No visible asbestos for surface soil			

6.4 Export of waste

Any additional soil material requiring offsite disposal will be analysed against the NSW EPA refers to the NSW EPA (2014) *“Waste Classification Guidelines, Part 1: Classifying Waste”*.

6.5 Aesthetic Considerations

Schedule B1 in NEPC (2013) requires the consideration of aesthetic issues arising from soils and groundwater within the site. The following assessment criteria were adopted when considering aesthetics:



- no persistently malodourous soils or extracted groundwater.
- no persistent hydrocarbon sheen on surface water.
- no staining or discolouration in soils, taking into consideration the natural state of the soil; and
- no large or frequently occurring anthropogenic materials present (to the extent practicable).



7.0 REMEDIATION STRATEGY

7.1 General

All works undertaken during the remediation program must be monitored by a suitably qualified person experienced in the assessment and remediation of contaminated sites. The RAP must be adhered to by all personnel and sub-contractors involved in the remediation program.

7.2 NSW EPA preferred hierarchy of options for site remediation

The NSW EPA has a preferred hierarchy of options for site remediation and/or management which is outlined below:

- If practicable, on-site treatment of the contamination so that it is destroyed and the associated risk is reduced to an acceptable level; and
- Off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level.

If the above is not practicable:

- Consolidation and isolation of the soil on-site by containment with a properly designed barrier; and
- Removal of contaminated material to an approved facility followed, if necessary, by replacement with appropriate materials; or
- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse effect, implementation of an appropriate management strategy.



7.3 Remediation option review

7.3.1 Available remediation / management technologies

There is a range of different remediation technologies that are available for remediation of contaminated sites. Some of these technologies are proven while others have not been successfully implemented, particularly in Australia and / or there is limited local expertise for implementation.

A review of the available soil remediation methods and technologies indicated that the following strategies may be applicable to the remediation of fill material contaminated at concentrations exceeding health-based threshold concentrations:

- Excavation and off-site disposal of contaminated soil to landfill.
- Bioremediation.
- Thermal treatment.
- Cap and contain.

7.3.2 Excavation and off-site disposal

This method involves the excavation of contaminated materials and disposal of the materials off-site to a landfill licensed by the NSW EPA. Excavated soils must be classified before disposal to an appropriate landfill. Depending on the levels of contamination, soil may require pre-treatment (to reduce contaminant levels or immobilise contaminants) prior to off-site disposal to the licensed landfill.



7.3.3 Treatment

There is a range of soil treatment technologies available depending on the type of contaminant including in-situ and ex-situ remediation methods. Most commonly, for contamination, the technologies adopted are ex-situ, requiring excavation of the contaminated material. In-situ remediation technologies generally require a longer timeframe for completion than ex-situ technologies. Most of the treatment technologies that require excavation of the contaminated material could be undertaken on or off-site, subject to obtaining licences. Some possible treatment methods for heavy metals include soil washing and stabilisation of soil.

7.3.4 Managing risks by preventing any direct exposure pathway between contaminated soil and site users (through capping)

On-site capping is used to isolate areas in the subsurface from the surrounding uncontaminated environment. A physical barrier such as a layer of clean soil, synthetic material liners, asphalt and concrete layers may be installed to cap the contaminated material. A cap is typically used where it is required to remove exposure to the contaminated soils and where the contaminated soils are not mobile or there is no contact with groundwater and / or groundwater is not contaminated.

A site management plan is required with any cap and contain strategy. The site management plan identifies the party responsible for adhering to the plan and includes commitments for ongoing monitoring and maintenance of the cap as well as control of future excavations, which must be minimised or if required, the appropriate occupational health and safety procedures are adopted and permits acquired before work is carried out. Any SMP will require public notification and need to have a mechanism for legal enforcement.



7.4 Rationale for selection of remedial strategy

Usual considerations in selecting and implementing a remediation strategy for a site include:

- **Proven technology:** the remediation method should have a proven track record of success/failure.
- **Reliability:** this is a measure of the degree of certainty that the remediation method will succeed in meeting the site remediation goals in the short and long term.
- **Regulatory approvals:** the remediation method needs to be endorsed by the relevant regulatory authorities. The difficulty in obtaining regulatory approvals will be largely dependent upon the nature of the remediation method proposed.
- **Cost:** provides an indication as to the likely costs involved in implementing each type of remediation method.
- **Implementation time:** provides an indication as to the likely time frame involved in implementing each type of remediation strategy.
- **Land use restrictions:** if contaminated material is left on-site, the regulatory authority may place restrictions on the land use and/or require notification of the contamination on the property title.
- **Ongoing liabilities (maintenance and monitoring requirements):** a remediation strategy that does not involve the complete removal of all contaminants from the site will necessitate some form of ongoing maintenance and/or monitoring to ensure the longer-term integrity of the remediation strategy adopted.



- **Future liability:** any remediation strategy that does not involve the complete removal of all contaminants from the site will result in future liability for the contamination.
- **Local contractor experience:** the success and cost effectiveness of any remediation method will be at least partially dependent upon the experience local contractors have in undertaking the type of remediation works proposed.
- **On-site space requirements:** some remediation techniques (e.g. land farming) require relatively large amounts of space to spread soil and will only be feasible if sufficient land is available.
- **Disruptions to site structures and activities:** remediation of the site is likely to create some disturbance, both to the existing site operations and structures, as well as to underground services which may pass through the remediation area (e.g. any work involving excavation of the contaminated soil mass will involve the removal of any structures located atop the excavation zone).
- **Human health risks during remediation:** the remediation workers, site users and the general public may be exposed to hazards posed by contamination during the remediation (e.g. significant levels of vapours may be released when disturbing soil contaminated with volatile organic compounds); and
- **Availability of appropriate disposal sites (for remediation techniques involving excavation and off-site disposal):** landfill disposal of contaminated soil will only be feasible if a landfill licensed to accept the contaminated soils excavated from the site is available at a reasonable distance from the site.



The table below presents an evaluation of the various options for general remediation projects in Australia based on the above. The table also includes a number of limitations and risks associated with each method.

Table 10A: Remediation options

Technical Characteristics	Option 1 Excavation – Off-Site Disposal	Option 2 Bioremediation	Option 3 Thermal Treatment	Option 4 Cap and Contain
Cost	Low- Medium	Medium	High	Low
Technical feasibility	Possible for a range of contaminants including those encountered at the site during the investigations (PAH)	Not possible for heavy metal contaminated material (COPC at this site is PAH – therefore possible)	Not possible for heavy metal contaminated material (COPC at this site is PAH – therefore possible)	Possible for a wide range of contaminants including those encountered at the site (PAH)
Human Health Risks	Relatively low – excavation and direct offsite disposal will minimise personal contact	Variable – relatively low risk associated with in-situ bioremediation but greater with ex-situ, as soil needs to be excavated	Significant – excavation and handling of contaminated materials will create a volatile contaminant release hazard	Relatively low – only minimal soil disturbance involved



Technical Characteristics	Option 1 Excavation – Off-Site Disposal	Option 2 Bioremediation	Option 3 Thermal Treatment	Option 4 Cap and Contain
Reliability	Excellent – system ensures the removal of all contaminated materials	Variable – in-situ bioremediation presents only a low potential to adequately remediate all organic species. Ex-situ is more reliable, due to the more complete mixing of organisms, nutrients and oxygen with the contamination	Moderate – thermal processes have been successfully implemented on most organic contaminant species	Moderate – some potential may exist for contaminant breakthrough if containment wall not properly keyed into bedrock. Care also needs to be taken to prevent preferential gas venting.
Regulatory Approval	Satisfactory – Compliance with Regulatory Authorities. Licensed landfills available for day cover	Satisfactory – on-site treatment is generally the EPA’s preferred strategy for site remediation	May be difficult. May require an EIS	Generally satisfactory – whilst on-site containment is not the EPA’s preferred option, it is often accepted as a feasible option



Technical Characteristics	Option 1 Excavation – Off-Site Disposal	Option 2 Bioremediation	Option 3 Thermal Treatment	Option 4 Cap and Contain
Disruption to Site Structures and Activities	Significant – all existing site structures need to be demolished or relocated to allow excavation of contaminated soils	Variable – disturbance relatively minor for in-situ bioremediation, but ex-situ would require existing structures to be demolished or relocated	Significant – all existing site structures need to be demolished or relocated to allow excavation of contaminated soils	Moderate – some disruption likely to proposed underground services
Ongoing Liabilities	Minimal – all heavily contaminated materials removed	Variable – need for ongoing monitoring will be largely dependent upon the success of bioremediation in destroying contaminants	Variable – need for ongoing monitoring will be largely dependent upon the success of thermal desorption in destroying contaminants	Moderate to high – capping system need to be maintained, and ongoing monitoring necessary to ensure the integrity of the cap and cut-off wall
Contractor Experience	Good – relatively simple strategy involving only basic technologies	Very Limited – technology is still developing, and only a limited amount of trials undertaken in Australia	Very Limited – technology is still developing, and only a limited amount of trials undertaken in Australia	Moderate – contractors available with experience in the implementation of cap and contain systems



Technical Characteristics	Option 1 Excavation – Off-Site Disposal	Option 2 Bioremediation	Option 3 Thermal Treatment	Option 4 Cap and Contain
Availability of Disposal Sites	Good – landfills available to accept solid waste	Not Applicable	Not Applicable	Not Applicable (assuming all materials excavated to form the cut-off wall are retained on-site)
Implementation Time Frame	Short	Long	Short to Moderate	Short to Moderate

7.5 Preferred remediation strategy

For this site, on- and off-site treatment of contaminants, which are the most preferred remedial strategies of the NSW EPA, were ruled out for the following reasons:

- Materials have to be removed from site so if land farming took place, materials would ultimately be removed; and
- The costs of reuse and treatment for more sensitive sites would be substantially higher than off-site disposal to landfill.

The next most preferred strategy of on-site containment was ruled out for the following reasons:

- The site requires a reduction of soils as excavation is required within the site.

The next most preferred remedial option strategy is removal of contaminated material to a licensed landfill and is the selected strategy for the following reasons:

- The costs of off-site disposal to landfill are considerably less than treatment costs.



- The method fits in with the proposed development.

Relative benefits of the “excavate and dispose” strategy are as follows:

- The costs associated with the ‘excavate and dispose’ remediation method is low to medium.
- The ‘excavate and dispose’ remediation method is a proven technology for the type of contaminants identified at the site, likely to be approved by the regulatory bodies.
- The ‘excavate and dispose’ remediation method is dependent upon the cost and availability of suitable landfill disposal sites. These are readily available and cost-effective.
- After completion of the remediation works by the ‘excavate and dispose’ remediation method, the site would continue to be suitable for the proposed use, and there would be no ongoing liabilities, and very limited (if any) ongoing maintenance / monitoring required.
- As part of the site development, a net reduction of soils is required thus fitting into this remediation strategy; and
- The timeframe for implementation of the ‘excavate and dispose’ remediation method is relatively short compared to other possible remediation methods.



7.6 Excavation Risk – Offsite Disposal

Prior to commencement of any excavation works, the remediation contractor should refer to the **engineering report to limit any undermining risks to the adjacent properties**. An assessment by a suitable qualified contractor / engineering is required to identify a suitable excavation method prior to start of excavation works to ensure integrity of adjacent structures remain.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate licence, consent and/ or approvals to dispose of the waste materials according to the assigned waste classification, and with the appropriate approvals obtained from the EPA, if required. **Details of all soils removed from the site (including VENM) shall be documented by the Contractor with source location, volume/tonnage, waste classification, disposal date, disposal destination, copies of weighbridge slips, landfill receipts/disposal docket, tip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and/or the NSW EPA Accredited Site Auditor.**

Material tracking needs to include information on source location, volume /tonnage, waste classification, disposal date, disposal destination, disposal docket, including waste locate consignment number of any asbestos soil waste disposed, transporters details (including EPL No) and a tally of estimated versus actual volume disposed.



8.0 REMEDIATION WORKS

8.1 Remediation Goal & Objectives

The remediation goal is to render the site suitable for the proposed development upon completion of the remediation and validation works. This would be achieved by remediating and completing:

- Boreholes BH1 – contains Asbestos impacted fill to a depth of 0.4m BGL. The delineation of the impacted fill is proposed to be completed as part of the remediation works.
- The RAP also requires the additional investigation to be completed post demolition of site structures to assess beneath the former building footprints and further define the extent of the required soil remediation works.

The delineation of the impacted fill soil (BH1) is proposed to be completed as part of the remediation works. Refer to section 8.2.

8.2 Remediation program

Assuming appropriate permits have been granted, the remediation of the site is to take place in the following stages:

Stage One - Site Preparation

- Notice should be given to council at least 30 days prior to the commencement of remediation works. The site developer needs to prepare and implement a Construction Environmental Management Plan (CEMP) and site Work Health and Safety Plan prior to any site works.



- An Asbestos Management Plan (AMP) is to be prepared by the validation consultant (or the remediation contractor, if agreed to by the relevant parties involved) to document the asbestos-related management requirements for the remediation. The AMP is to be implemented by the remediation contractor (and their nominated subcontractors where relevant) throughout the remediation.

Stage Two - Site Walkover

- Post demolition of structures and removal of hardstand pavements, an appraisal of the prevailing site conditions is to be performed by a suitable qualified environmental scientist / engineer.
- The purpose of the site walkover is to observe any signs / evidence of potential contamination including fibro cement fragments, ACM, heavy staining, odours, presence of waste.
- Unexpected finds protocol will be implemented if signs / evidence of contamination is encountered.

Stage Three - Additional Investigation & Delineation Works (Post demolition)

Licensed Asbestos Assessor to complete asbestos clearance on any impacted areas including appropriate handling and disposal of asbestos in accordance with the relevant legislation as outlined in Sections 17.6.

Asbestos Air monitoring should be set up to monitor the excavation works being undertaken. Asbestos monitoring canisters should be set up each day and removed and sent to a NATA Accredited Laboratory for analysis.

Soil Delineation – BH1

- Works to occur prior to offsite removal of soil.



- Boreholes BH1 will be delineated laterally and vertically comprising of four (4) step out locations around each location. Initially the step out locations will be located North, South, East & West approximately 1-2m from the existing location and samples collected in both fill and natural profiles.
 - One test pit to be excavated within the original hotspot to delineate the vertical extent of contamination.
 - One fill sample from each test pit. If the fill is greater than 1m deep, additional fill samples to be analysed and collected in each soil horizon.
 - Soil samples will be analysed in a NATA-accredited laboratory under Chain of Custody. Laboratory analysis for Asbestos %w/w.
- Delineation locations to be test pitted to allowed sufficient soil collection for asbestos analysis of the collected samples.
- Note if the step out location is impacted, further step out sampling will be required and delineation sampling will cover the entire fill profile.

Soil – Additional Locations

- Works to occur prior to offsite removal of soil.
- An additional ten (10) locations are proposed to be investigated to target the former building footprints.
 - One fill sample from each test pit. If the fill is greater than 1m deep, additional fill samples to be analysed and collected in each soil horizon.
 - Soil samples will be analysed in a NATA-accredited laboratory under Chain of Custody. Laboratory analysis for HM, TRH, BTEXN, PAH, OCP, PCB & Asbestos %w/w.
- Locations to be test pitted to allowed sufficient soil collection for asbestos analysis of the collected samples if required.



This RAP is based on current information and may need to be updated once the data gap investigation / additional investigation is finalised.

Stage Four - Classification, Removal, and Validation of Impacted Areas

Refer to Section 11.1 for validation sampling frequency and listed of analytes to be tested.

Impacted Area 1 – BH1

- BH1 - contains Asbestos impacted fill soil materials to a depth of 0.4m BGL. The fill profile extends to 1.8m BGL. The material is to be classified in accordance with the NSW EPA Waste Classification Guidelines and can be disposed of at EPA licenced landfill facility that can accept the waste. The area to be excavated will be based on the delineation sampling. However, an estimated amount is 4m x 4m x 2m deep = 32m³.
- The area will be validated to ensure the successful removal of contaminated fill soils. Chasing up of contaminants may be required during this stage of works if levels are found over site criteria.
- The current maximum depth of impacted fill of 1.8m BGL may be amended based on results of the delineation sampling and this will be included in the Remediation Validation report.
- Licensed Asbestos Assessor to complete asbestos clearance on any impacted areas including appropriate handling and disposal of asbestos in accordance with the relevant legislation as outlined in Sections 17.6.
- Asbestos Air monitoring should be set up to monitor the excavation works being undertaken. Asbestos monitoring canisters should be set up each day and removed and sent to a NATA Accredited Laboratory for analysis.



Waste classified for offsite disposal should be loaded onto EPA licensed waste vehicles for transport to designated landfill. Waste classification ex-situ at rate of 1 per 25m³ up to 250m³ for waste classification purposes. Minimum of 3 samples per stockpile. Stockpiles greater than 250m³ up to 2500m³, sampling frequency is minimum of 10 samples plus 95%UCL. Stockpiles greater than 2500m³ will have sampling frequency of 1 sample per 250m³.

- Collection of QA/QC
- Analysis includes HM, TRH, BTEXN, PAH, OCP, PCBs and Asbestos
- TCLP Analysis of heavy metals and benzo(a)pyrene is required to facilitate waste classification and offsite disposal.

Stockpile Footprint Validation

Validation of stockpile footprints to occur	1 floor sample per 25m ² 1 inter-laboratory duplicate 1 intra-laboratory duplicate Spikes / blanks	HM, TRH, BTEX, PAH, OC, PCB and Asbestos
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Stage Five – Validation of basement floor and landscape areas

The floors of the basement floor and landscape areas will be sampled by taking twenty (26) floor samples plus QA/QC samples to validate the areas.

Stage Six – Asbestos Clearance

Following the completion of the remediation and validation, an accredited Asbestos Assessor / Occupational Hygienist should undertake & provide an Asbestos Clearance Certificate.



Stage Seven - Validation Report Preparation

- Remediation will occur by managing soil for offsite disposal to landfill for contaminated soils.
- A validation report will be prepared to present the remediation works undertaken and confirm that the objectives of the remediation works have been attained.

The extent of the remediation works would be extended whether any USTs, associated infrastructure &/or any further contaminated material via unexpected finds are identified during remediation works.

8.3 Extent of remediation works required

As described above the preferred remediation strategy for the site is excavation and off-site disposal of the fill materials. If contaminated material is found during the remediation works, these materials will be chased up and removed.

8.4 Regulatory requirements such as licenses and approvals

Approval from a licensed disposal facility will be required prior to removal of any contaminated material from the site.

8.5 Disposal of excavated contaminated material

The contaminated fill or soil excavated from the site will be disposed of at a licensed landfill facility. If disposal of contaminated liquids is required, this will be undertaken by



a licensed contractor. The weighbridge and truck dockets will be retained by the contractor and made available to the principal's environmental representative.

Details of all soils removed from the site (including VENM) shall be documented by the Contractor with source location, volume/tonnage, waste classification, disposal date, disposal destination, copies of weighbridge slips, landfill receipts/disposal docket, tip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and/or the NSW EPA Accredited Site Auditor.

Material tracking needs to include information on source location, volume /tonnage, waste classification, disposal date, disposal destination, disposal docket, including waste locate consignment number of any asbestos soil waste disposed, transporters details (including EPL No) and a tally of estimated versus actual volume disposed.

8.6 Contingencies during Remedial Works

8.6.1 Contaminated Soils

Follow the unexpected finds protocol as detailed in Section 16.2 & Appendix A. Works to be suspended until the environmental project manager can further assess impacted soils / materials.

8.6.2 Contaminated Groundwater

During remediation works if any other form of contamination is noticed during excavation works, such as buried drums, waste pits, unexpected USTs etc, a review of groundwater conditions will be required.



8.6.3 Primary Source Removal

During demolition works the removal of any infrastructure involved with the source of the potential contaminated groundwater will be completed.

8.6.4 Contamination Identified near Heritage Items or Significant Trees

Stop work. Review contaminant concentrations and risks to heritage items / flora. Assess human health and environmental risks if contamination remains in place. Review natural attenuation options.

8.6.5 Contamination Identified near underground services

Stop work, inform the principal environmental consultant and relevant site auditor. Review contaminant concentrations and assess human health and environmental risks if contamination remains in place. Possible longer term environmental management plan to be considered.

8.6.6 Contamination Identified near neighbouring structure

Stop work, inform the principal environmental consultant and relevant site auditor. Review contaminant concentrations and assess human health and environmental risks if contamination remains in place. Engage suitably qualified engineer to assess the structural risk. Possible longer term environmental management plan to be considered.



9.0 VALIDATION PLAN (DATA QUALITY OBJECTIVES)

The DQOs have been developed for the validation assessment using Appendix IV of the Site Auditor Guidelines. These require 7 steps. The steps being:

- a. State the problem.
- b. Identify the decisions.
- c. Identify inputs to decision.
- d. Define the study boundaries.
- e. Develop a decision rule.
- f. Specify limits on decision errors.
- g. Optimise the design for obtaining data.

The following table outlines each of these steps and the approaches taken for this investigation.

Table 11: DQOs for the Validation Assessment

DQO's	Considerations
1	State the problem – assemble an effective planning team, describe the problem and examine the resources for investigating the problem
1.1	Write a summary of the contamination problem. During the FES DSI – BH1 is above the adopted site criteria “HSL B” for Asbestos. A regular shaped area of land of approximately 4,093m ² in area requires validation to determine the land use suitability or the appropriate waste classification
1.2	Identify members of the planning team. Landowner/developer, planning consultant and site contamination assessment consultant.
1.3	Develop/refine the conceptual site model (CSM), including a summary Contaminants –Asbestos at BH1. Sources – buried building and demolition wastes



	of the exposure scenarios.	<p>Receptors – site maintenance workers and trespassers, as the site is fenced and secured. If developed, site workers (surface and sub-surface), residents and visitors (adults and children).</p> <p>Pathways – dermal contact, inhalation of dust and ingestion have been identified as the pathways of concern. Further assessment of groundwater and/or soil gas will be considered based on the findings of this investigation.</p>
1.4	Specify the available resources and constraints, such as relevant deadlines for the study, budget, availability of personnel and schedule.	<p>The site contamination assessment consultant has the available capacity to conduct the investigation using appropriate subcontractors (drill rig and laboratory). While the developer seeks close out of the issue within the next three months, there are no practical constraints, as the land is identified as high-value and sufficient budget is available.</p> <p>Additional investigations, or remediation will be conducted as required.</p>
2	Identify the goals of the study – identify the principal study question(s) and potential alternative actions (with implications) and combine these to make statements of the decision problem.	
2.1	Identify the principal study question(s).	<p>Is the material suitable for a residential land use based on contaminant levels and aesthetic concerns?</p> <p>If not, what disposal options are available, i.e. what is the waste classification?</p>
2.2	Identify the alternative outcomes or actions that could result from resolution of the principal study question(s).	<p>The alternative outcomes will be:</p> <ul style="list-style-type: none"> • The material is suitable for residential land use (HIL-B), or • The material is not suitable for the proposed land use and needs to be partially or fully removed from the site to allow for development.
2.3	For decision problems, combine the	If the contamination status of the material is acceptable, the



	principal study questions and the alternative actions into decision statements.	material can remain on-site. If the contamination status of the material is unacceptable, consider the remediation hierarchy.
3	Identify information inputs – identify the information needed to formulate and investigate the problem and confirm that appropriate sampling and analytical methods are available.	
3.1	Identify the information that will be required to resolve the decision statements/estimation, including existing information and new environmental data, and identify the sources for each item of information required.	Soil data to be collected as part of the validation assessment, including field samples and analytical samples. A previous FES DSI in October 2025 indicated remediation works are required at BH1.
3.2	Identify the information needed to establish the action level.	Investigation criteria will be sourced from: <ul style="list-style-type: none"> • NEPM 2013, Schedule B1, HILs for residential with minimal access to soil; and • NSW EPA 2014c, Waste Classification Guidelines
3.3	Confirm that appropriate sampling and analytical methods exist to provide the necessary data.	Sampling and analytical methods will be consistent with existing guidance, including NEPM 2013, B2 and B3. Analytical laboratories will be NATA accredited and/or subject to proficiency testing and use analytical methods based on NEPM, USEPA and APHA methods.
4	Define the boundaries of the study – define the target population and the spatial and temporal boundaries associated with the population; examine any practical constraints to collecting data, and factors that affect the selection of the unit that defines the scale of sampling and the scale of decision making or estimation.	
4.1	Define the target population of interest and its relevant spatial	The impacted area is within BH1 and prior to delineation works the proposed area to remove is 4m x 4m x 2.0m deep



	boundaries.	=32m3
4.2	Define what constitutes a sampling unit.	<p>Sampling units will consist of:</p> <ul style="list-style-type: none"> Field samples of appropriately described and logged samples which are field screened. Analytical samples of the laboratory-specified sample jar quantity.
4.3	Specify temporal boundaries and other practical constraints associated with sample/data collection.	To achieve the three-month schedule for problem resolution, the field investigation should start within two weeks of the investigation plan (SAQP and commercial) being accepted. There are no site access restrictions for personnel once they are inducted, and the project is approved. The decision area is open with a light grass covering only and directly accessible without obstructions.
4.4	Specify the smallest unit on which decisions or estimates will be made.	The decision is to be based on the complete decision area. However, following data analysis, some form of segregation may be considered, i.e. some of the decision area may be suitable for HIL-B and some may require offsite disposal.
5	Develop the analytic (statistical) approach – develop a logical ‘if..., then... or...’ statement that defines the conditions that would cause the decision maker to choose among alternative actions.	
5.1	Specify the statistical parameter that characterises the population of interest, such as mean, median, maximum, 95% upper confidence limit (UCL) of the arithmetic mean or proportion.	<p>The 95% UCL of the arithmetic mean will be the key statistical parameter. The data evaluation will include:</p> <ul style="list-style-type: none"> The 95% UCL arithmetic mean to be \leq criterion. No individual sample to exceed 250% of the criterion. The sample standard deviation to be $\leq 50\%$ criterion. <p>Additional considerations will include aesthetic requirements, including no odours or staining, no waste</p>



		materials and no monolithic deposits as per NEPM 2013, B2.
5.2	Specify the action level for the decision.	<p>To determine if the material is suitable for the HIL-B land use, analytical action levels are to be based on the NEPM HILs (2013, B1).</p> <p>If the material is not suitable for the HIL-B land use, the material will be classified in accordance with EPA 2014c for offsite disposal.</p> <p>Samples will be held at the laboratory for additional analyses, including leachate analysis following TCLP extraction, if required.</p>
5.3	Confirm that measurement detection will allow reliable comparisons with the action level.	<p>Samples will be submitted to NATA-accredited laboratories.</p> <p>The laboratories' analytical LORs are suitably below the adopted criteria. Note: to achieve an acceptable limit of reporting for asbestos fines and fibrous asbestos, the method may not be NATA-accredited but undertaken using in-house methods for quantification.</p>
5.4	Combine the outputs from the previous DQOs steps and develop an 'if..., then..., else...' theoretical decision rule based on the chosen action level.	<p>If the statical parameters (or aesthetics) of the sampling data exceed the applicable action levels, then offsite disposal of the fill material will be required, otherwise, if the statistical (and aesthetic) parameters are below the applicable action levels, then the fill material will be determined to be suitable for a HIL-B land use.</p>
6	Specify performance or acceptance criteria – specify probability limits for false rejection and false acceptance decision errors.	
6.1	Specify the decision rule as a statistical hypothesis test.	<p>The null hypothesis is that the material is contaminated and exceeds the adopted criteria. The alternative hypothesis is that the material is not contaminated above the adopted criteria.</p>
6.2	Examine consequences of making	Possible decision errors include:



	<p>incorrect decisions from the test.</p>	<ul style="list-style-type: none"> • The material being accepted as suitable for a HIL-B land use when it is not, thereby potentially risking human health or environmental impacts. • Unnecessary disposal of the material offsite, imposing needless financial and resource burdens on the development project and resulting in an inappropriate waste classification.
<p>6.3</p>	<p>Place acceptable limits on the likelihood of making decision errors, including acceptable alpha (α) and beta (β) risk levels.</p>	<p>Stated hypotheses:</p> <ul style="list-style-type: none"> • Null hypothesis (H0): the 95% UCL, and other requirements, are > the action level. • Alternate hypothesis (HA): the 95% UCL, and other requirements, are \leq the action level. Potential outcomes include Type I and Type II errors: <ul style="list-style-type: none"> ○ Type I error of determining the material is acceptable for the proposed HIL-B land use when it is not (wrongly rejects true H0). ○ Type II error of determining the material is unacceptable for the proposed HIL-B land use when it is acceptable (wrongly accepts false H0). For performance criteria, the acceptable limits on the likelihood of making decision errors to be applied are: <ul style="list-style-type: none"> ▪ Alpha risk (Type I error) of $\alpha = 0.05$ ▪ Beta risk (Type II error) of $\beta = 0.2$ <p>The above acceptance criteria are required.</p>
<p>7 Optimise the design for obtaining data – identify a resource-effective sampling and analysis design for generating data that is expected to satisfy the DQOs.</p>		
<p>7.1</p>	<p>Document the final sampling and analysis design, along with a</p>	<p><u>Soil Delineation Landscape area</u></p> <p>Boreholes BH1 will be delineated laterally and vertically comprising of four (4) step out locations around each location.</p>



	<p>discussion of the key assumptions underlying this design.</p>	<p>Initially the step out locations will be located North, South, East & West approximately 1-2m from the existing location and samples collected in fill profiles.</p> <p><u>Additional Locations</u></p> <p>An additional ten locations are proposed to be investigated to target the former building footprints.</p> <p><u>Validation Site Surfaces</u></p> <p>To allow statistical inference, a probabilistic strategy is to be adopted. As the proposed development is based on retail and residential use within an area of 4,093m², 13 is minimum however we will be using 26 for double density – asbestos, so the density equates to one sample location per 157m². Using a stratified sampling using a medium density systematic sampling strategy.</p> <p>Boreholes are proposed to be drilled at each location to the underlying natural material as identified by the remnant A-horizon, at a approx. depth of 0-1m. One validation sample is proposed to be collected at each sample location at the surface (a depth of 0.0-0.3m</p> <p>Based on the size of the decision area, this sampling design results in:</p> <ul style="list-style-type: none"> • One sample location per 157m²
7.2	<p>Detail how the design should be implemented, together with contingency plans for unexpected events.</p>	<p>The field methods for sample collection, handling, and analysis (at analytical laboratories) are described in the project-level standard operating procedures (SOPs). Contingencies include collecting additional samples from</p>



		material that is significantly difference from the reworked natural material, and conducting additional analyses where field indicators (staining, odours, field screening results) suggest other contaminants.
7.3	Determine the quality assurance and quality control (QA/QC) procedures that are to be performed to detect and correct problems to ensure defensible results.	The required field QA, and the field and laboratory QC, are described in the project-level SOPs. These include both the data quality indicators (DQIs) and the associated measurement quality objectives (MQOs).
7.4	Document the operational details and theoretical assumptions of the selected design in the SAQP.	Theoretical assumptions include: <ul style="list-style-type: none"> • Surficial impacts from overland flow from the adjacent facility and burial of wastes are the modes of contamination expected. • The material is homogenous. • The remnant A-horizon will be readily discernible from buried grass and organic soil.



10.0 VALIDATION SAQP & METHODOLOGY

Remediation of the impacted area will be considered validated following the achievement of the two validation objectives.

- Validation of the remedial excavations will continue to the extent of the impacts and resulting samples are within the adopted criteria.
- In the event of backfilling, validation of the imported fill materials used is required to confirm the suitability for the intended land use.

10.1 Soil Validation Methodology

Soil sampling and handling is outlined in the table below:

Table 12: Sampling and Handling

Action	Outline
Sample collection	Soil validation sampling will be collected directly from exposed surface of excavation, or from the material scraped from the excavator bucket. Data shall be recorded in accordance with COC requirements
Sampling, handling, transport and tracking	<ol style="list-style-type: none">1.Validation soil samples to be transferred directly into appropriately labelled clean laboratory supplied containers.2.Validation soil samples to be transferred into chilled eskies for sample preservation.3.All equipment used in the sampling program was decontaminated prior to use and between samples to prevent cross contamination. Decontamination of equipment involved the following procedures:<ul style="list-style-type: none">-Cleaning equipment in potable water to remove gross



	<p>contamination.</p> <p>-Cleaning in a solution of Decon 90.</p> <p>-Rinsing in clean demineralised water then wiping with clean lint free cloths.</p> <p>5.A Chain of Custody to be completed and forwarded to the laboratory to ensure sample tracking.</p>
Sampling Frequency	<p><u>Validation sampling</u></p> <p>Refer to table 13</p> <p><u>Stockpile sampling:</u></p> <p>Small Volumes (<250m³)- 1 sample every 25m³</p> <p>Large Volumes (>250 <2500 m³) minimum of 10 samples with 95%UCL</p> <p>>2500m³ minimum sampling rate should be 1 per 250m³</p>
Laboratory Quality Assurance and Quality Control	<p>The contracted laboratory to conduct in-house QA/QC procedures involving by not limiting to:</p> <p>Blanks, spike recoveries, laboratory duplicates & analysis.</p>
Assessment of DQOs	<p>Provide analysis of the QA/QC samples and procedures & provide assessment of the overall data quality.</p>

10.2 Soil Validation Reporting

All fieldwork, chemical analysis, discussions, conclusions and recommendations will be provided in the final validation report for the site. The validation report will be prepared in accordance with the *NSW EPA, Consultants Reporting on Contaminated Land, 2020* and *NSW DEC (2017) Guidelines for the NSW Site Auditor Scheme* and will confirm the site is suitable for the proposed development. Waste tracking documentation and disposal details will be provided in the validation report.



11.0 VALIDATION WORKS

11.1 Objectives

The objective of the validation program is to ensure that at completion of the remediation works, the site is suitable for continued use and the proposed redevelopment.

Table 13: Soil Validation Sampling Program

Item	Sampling Frequency	Analytes
Impacted Area 1 – BH1	Excavation Floor <ul style="list-style-type: none"> 1 sample every 25m² Excavation wall <ul style="list-style-type: none"> 1 sample every 5m (from each distinct horizon / material type) 1/20 inter-laboratory duplicates 1/20 intra-laboratory duplicates Spikes / blanks Per location	Asbestos %w/w
Validation basement floor and any landscape areas	26 floor samples 1 inter-laboratory duplicate 1 intra-laboratory duplicate Spikes / blanks	HM, TRH, BTEX, PAH, OCP, PCB and Asbestos %w/w
Validation stockpile footprints	1 floor sample per 25m ² 1 inter-laboratory duplicate 1 intra-laboratory duplicate	HM, TRH, BTEX, PAH, OC, PCB and Asbestos



	Spikes / blanks	
Backfill Material (if required)	<p>Certified VENM or 1 sample per 25m³</p> <p>Certified ENM as per NSW EPA Resource Recovery Order 2014</p>	<p>HM, TPH, BTEX, PAH, OCP, PCB, Phenol, Cyanide & Asbestos.</p> <p>Additional COPC may need to be included in the testing suite depending on the source site.</p> <p>HM, TPH, BTEX, PAH, EC, PH & Foreign Materials & Asbestos</p>
Unexpected Finds	<p>Excavation Floor</p> <p>1 sample every 25m²</p> <p>Excavation Wall</p> <p>1 sample every 5m (from each distinct horizon / material type)</p>	<p>Dependent on the location, type and characteristic of the unexpected find.</p>



11.2 Waste classification of the fill

During excavation works a suitable qualified environmental consultant / hygienist should be present to confirm no unexpected finds arise during the removal works. If unexpected find arises, then refer to section 16.2 for procedures.

Any excavated fill will be temporarily stockpiled (prior to disposal) on a heavy-duty plastic sheet or a sealed surface such as concrete and covered with an impermeable plastic sheet to prevent rain infiltration.

- Asbestos transporters and facilities receiving asbestos waste in NSW weighing more than 100 kilograms or consisting of more than 10m² of asbestos sheeting in one load must track and report this waste to NSW EPA using WasteLocate.
- Tracking of asbestos waste is to be done via the NSW EPA's online system known as WasteLocate.
- Refer to Section 13.12 for more details.

A preliminary soil classification is listed below on the sampling completed during the FES DSI in October 2025.

- Soil fill material located within the borehole locations BH2 to BH3, BH5 to BH13 are classified as **General Solid Waste (non-putrescible)**.
- Soil fill material located within the borehole locations BH4 is classified as **Restricted Solid Waste**.
- Soil fill material located within the borehole location BH1 is classified as **Restricted Solid Waste and Special Waste (Asbestos)**.



- A TCLP leachate analysis is recommended to further characterise the initial waste classification at the time of removal.
- Additional soil sampling is recommended to be completed to further characterise the preliminary waste classification at the time of bulk removal works.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate licence, consent and/ or approvals to dispose of the waste materials according to the assigned waste classification, and with the appropriate approvals obtained from the EPA, if required. **Details of all soils removed from the site (including VENM) shall be documented by the Contractor with copies of weighbridge slips, landfill receipts, tip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and/or the NSW EPA Accredited Site Auditor.**

For material handling and tracking the following is required to be considered:

Waste Classification

- Material source and description of material.
- Sampling density, pattern and COPCs.
- Results summary, including appropriate table with comparison to acceptance criteria.

For Offsite Disposal

- Source location.
- Estimate volume (based on excavation size).
- Transporter details and licence.



- Reconciliation of actual disposal volume and the estimated volume of disposal (based on excavation size).

Actual volume of Disposal

- The waste classification document,
- Final destination and the POEO licence.
- Reconciliation of waste dockets with actual disposal volume.

For Imported Material

- Source site.
- Volume of imported material.
- Placement location.
- Transporter.
- VENM certificate or certificate applicable for NSW EPA exemptions (e.g ENM/ROO certificate).

11.3 Validation of Impacted Borehole BH1

Following removal of soils from location BH1, photographic records of the floor and wall of the excavation will be taken for reference in the Validation Report. Soil validation samples will be collected as per Table 13. Where contaminant concentrations in validation samples exceed the site remediation criteria, further excavation must be carried out, until new validation samples return concentrations below the site validation criteria.

11.4 Validation of basement floor and landscape area

General site validation samples are proposed to be collected from the site surfaces and landscape areas. Sampling is to follow a systematic pattern and be analysed for the



contaminants of concern identified at these locations, including heavy metals, TRH, BTEX, PAH, OCP, PCB & Asbestos %w/w. The soil samples will be collected from between 0-150 mm depth from freshly excavated surfaces.

Samples will be recovered from approx. twenty-six (26) locations. Where contaminant concentrations in validation samples exceed the site remediation criteria, further excavation must be carried out, until new validation samples return concentrations below the site validation criteria.

11.5 Validation Results

If validation criteria exceedances are encountered, statistical analysis will be applied to the dataset. The 95% UCL of the mean concentrations of the COPC will be calculated, the standard deviation is required to be less than 50% of the adopted criteria and no single concentration exceeded the criteria by more than 250%.

11.6 Validation of areas where fill has been temporarily stockpiled

The excavated contaminated fill will be temporarily stockpiled on a plastic sheet and covered with an impermeable plastic sheet to prevent rain infiltration. In order to confirm that cross-contamination of the soil underneath has not occurred during stockpiling; testing of the soil's underneath stockpiles will be required after disposal of the stockpile off-site (where necessary).



11.7 Validation of imported fill

If importation of fill is required, it must be ***certified VENM or ENM*** material. Certified VENM must be tested in accordance with the requirements of the NSW EPA waste classification guidelines (including testing for asbestos). Certified ENM material is also acceptable and will be tested in accordance with the NSW EPA Resource Recovery Order 2014 for ENM. VENM and/or ENM will also be visually assessed for fibro sheeting and samples analysed for asbestos if detected.

11.8 Duration of remediation and validation works

Based on the proposed scope of the remediation and validation works, it is expected that the works should be completed within approximately four to eight weeks following receipt of the regulatory approvals. This timeframe does not include reporting which should be completed approximately three to five weeks after completion of the remediation and validation works.

11.9 Validation Reporting

The following information will be included in the final validation report to order to render the site suitable for the proposed and development and/or satisfy any NSW EPA Site Audit condition:

- Summarise the contamination assessments carried out, and the remediation recommendations provided in previous reports.
- Describe the remediation works carried out on-site and subsequent validation.
- Classify soils within the site for suitable disposal.
- Representative soil sampling and testing to validate site areas.



- Assessment of laboratory analytical results, based on currently accepted and applicable guidelines.
- Assessment of field and laboratory quality assurance (QA) and quality control (QC).
- Assessment of the resultant suitability of the site for the proposed development.
- The preparation of a validation report.
- Provide a statement on the resultant contamination status of the site and suitability for the proposed development.



12.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The quality assurance/quality control (QA/QC) program aims at ensuring that the data collected is sufficiently accurate, precise and reproducible to be used for the purpose of the validation report. QA/QC should be in accordance with the NEMP 2013 and with the Australian Standard AS4482.1-2005.

12.1 General QA/QC

The frequency required for each field quality assurance / quality control (QA/QC) sample is presented in the table below.

Table 14: QA/QC Frequencies

	Intra Lab	Inter Lab	Rinsate	Spikes	Blanks
Sampling Frequency	1 in 20	1 in 20	1/day	1/day	1/day

During the contamination assessment the integrity of data collected is considered vital. With the assessment of the site, a number of measures were taken to ensure the quality of the data. These are as follows:

12.2 Sample Containers

Soil samples to be collected remediation work are to be placed immediately into laboratory prepared glass jars with Teflon lid inserts. Standard identification labels are



to be used for each individual container and labelled according to depth, date, sampling team and media collected.

12.3 Decontamination

All equipment used in the proposed sampling program are to be decontaminated prior to use and between samples to prevent cross contamination. Decontamination of equipment involved the following procedures:

- Cleaning equipment in potable water to remove gross contamination.
- Cleaning in a solution of Decon 90.
- Rinsing in clean demineralised water then wiping with clean lint free cloths.

FES adopts a sampling gradient of lowest to highest potential contamination to minimise the impact of cross contamination. This gradient is determined from the historical review and the on-site inspection that was carried out prior to sampling.

12.4 Sample Tracking, Identification and Holding Times

All samples are to be forwarded to NATA Accredited laboratories under recognised chain of custodies with clear identification outlining the date, location, sampler and sample ID. All samples are required to comply with the laboratories respective holding times. The sample tracking system is considered adequate for the purposes of sample collection.



12.5 Sample Transport

All samples are to be packed into an esky with ice from the time of collection. A trip blank and trip spike are collected where appropriate. Samples were kept below 4°C at all times, soil samples submitted for asbestos analysis are not required to be kept below 4°C.

12.6 Data Quality Indicators

The pre-determined data quality indicators for the validation program are discussed below in relation to precision, accuracy, representativeness, comparability and completeness and are summarised in the table below:

Table 15: Data Quality Indicator for the proposed Validation Program

Data Quality Indicator	Frequency	DQI Indicator
Completeness		
Data from critical samples is considered valid	All samples	All samples
Satisfactory frequency / result for QC samples	All samples	95%
Field documentation completed	All samples	All samples
Boreholes logs & COCs completed and holding times complied with.	All samples	All samples
Comparability		
Standard operating procedures	All samples	All samples



Data Quality Indicator	Frequency	DQI Indicator
used		
Consistent field conditions, sampling staff and laboratory analysis	All samples	All samples
Same analytical methods used	All samples	All samples
Limit of reporting appropriate and consistent	All samples	All samples
Representativeness		
Sampling appropriate for media and analytes	All samples	All samples
Samples adequately preserved	All samples	All samples
Precision		
SOPs appropriate and complied with in relation to field duplicates	All samples	All samples
RPDs of the field duplicates within control limits	1/20 samples	<50% RPD
RPDs of the laboratory duplicates within control limits	All samples	All samples
Accuracy		
SOPs appropriate and complied with in relation to field blanks	All samples	All samples
Rinsate Blanks, trip blanks & laboratory blanks free of	Laboratory blanks (LB) = 1 per batch	LB = <LOR RB= <LOR



Data Quality Indicator	Frequency	DQI Indicator
contaminants	Rinsate Blanks (RB) = 1 / day Trip Blank (TB)= 1/day	TB= <LOR
Surrogate spikes within control limits	All organic analytes	70-130%
Laboratory control spikes within control limits	Yes	Yes
Matrix Spike recoveries within control limits	1 /20 samples	70-130%
Trip spike recoveries within control limits	1/day	>70%



13.0 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

A site-specific Construction Environmental Management Plan (CEMP) should be prepared for the construction phase for the proposed development. The CEMP should set out the requirements for environmental management during the works including:

- Management structure and responsibilities.
- Approval and licensing requirements.
- Environmental induction and training.
- Emergency contacts.
- Environmental incident response.
- Implementation of the plan.
- Community consultation process consistent with council requirements; and
- Monitoring required during the works and the process for review of the CEMP, if required.
- Unexpected Finds Protocol.



14.0 SITE MANAGEMENT PLAN

Adherence to the SMP will be monitored by an on-site Environmental Scientist who will be present during all critical remediation / validations works. The Site Management Plan (SMP) for the remediation will address:

- Site access.
- Working hours.
- Stormwater and soil management.
- Traffic management.
- Noise, dust and odour control; and
- Work health and safety.
- Unexpected Finds Protocol

Each of the issues to be addressed in the site management plan is briefly discussed in the following sections.

14.1 General

The remediation and validation works must be undertaken in accordance with applicable statutory requirements. The site manager/foreman of the remediation contractor should have a thorough understanding of the contents of the RAP, corresponding Site Management Plan (SMP), Work Health & Safety Plan (WHS) and should ensure that each employee or sub-contractor is familiarised with the requirements of these plans.



The remediation and validation works will be undertaken under the monitoring of the principal's environmental representative, who will be represented on-site by a field environmental scientist.

14.2 Site access

The contractor will ensure that adequate barriers have been placed around the site to prevent access of unauthorised personnel to areas where contaminated material is exposed. The contractor will also place adequate warning signs around the site.

14.3 Working hours

The working hours for the remediation / validation works will be stipulated by the DA consent.

14.4 Demolition (including Asbestos Management)

Demolition works are to be completed in accordance with SafeWork NSW Standards and Codes of Practice. Any asbestos identified within the building materials should be managed in accordance with the SafeWork NSW Codes of Practice and Australian Standards.

14.5 Surface water and soil management

The contractor will put in place adequate stormwater runoff, run-on and sediment control measures for the remedial works. These requirements are outlined in Schedule B (9) of the (*site contamination*) NEPM (2013).



These include stockpiling excavated soil in a manner that will prevent contamination from being transported off-site by stormwater, and include the following measures:

- Divert stormwater runoff outside the site so that it does not flow through the site.
- Control drainage on the site by intercepting and redirecting runoff in a controlled manner.
- Stormwater collected at the site in trenches and sumps should be appropriately managed; and
- Silt stop fences should be erected at locations where stormwater may flow outside the site.

The presence of sediment in surface water or runoff must be minimised by the use of sediment controls such as diversion drains, hay bales and silt fencing.

Soils that require stockpiling must be managed in such a manner that these materials remain well contained and easily identifiable and that the effects of wind and rain have minimal impact on their integrity. Subsequently, if adverse weather conditions are anticipated, or if the stockpile is to remain on-site for an extended period, stockpiles must be protected and covered. Stockpile records must be maintained to track the re-use of soils at the site (if any).

Any plant or equipment that comes into contact with soils must be inspected prior to leaving the site and cleaned as necessary.



14.6 Groundwater management

If groundwater is encountered during excavation works, the groundwater is to be directed to and collected in trenches and sumps. No discharge of groundwater will occur without approval of appropriate regulatory bodies.

14.7 Traffic management

The management of the material leaving the site will be under the monitoring of the principal's environmental representative, who will record the details of these materials.

Vehicular movement is to be conducted in accordance with Council requirements. The contractor will install a vehicle wheel washing or shaking facility and will manage all vehicles as indicated by the principal's environmental representative (FES) to minimise tracking of any materials onto public roads. The wheels of the vehicles will be washed and brushed prior to leaving the site. Loads leaving the site should be maintained moist and must be covered to prevent materials from the site being spilled or left on public or private roadway or adjacent areas. Particular care should be taken if UST or any unexpected material has been encountered and are to be removed from the site.

14.8 Noise Control

The contractor should keep noise levels to a minimum, and levels should not exceed limits indicated in AS 2436 1981. Noise levels must also comply with Council and NSW EPA requirements. It is expected that the equipment to be used in the remediation works will not generate noise levels above these requirements.



14.9 Dust control

Works must comply with the requirements listed in Schedule B (9) of the NEPM (2013), Council and the NSW EPA. The generation of dust should be kept to a minimum. Stockpiled contaminated material should be bunded and covered. Water sprays may be used to minimise dust. Water used for this purpose should not be allowed to flow off-site through the stormwater system, sewer, or any other way.

14.10 Odour control

The level of odours generated during remedial activities must be monitored and local Council and NSW EPA requirements must be complied with. Due to the nature of contamination, odours may be encountered. It is noted however that it is expected only small volumes of fill will be excavated at one time and this should minimise the generation of significant odours.

Should odorous compounds be encountered, the remediation contractor should take measures to mitigate them and to prevent their migration outside the site boundaries. This may involve placing the odorous materials as soon as possible in a bunded area, covered with plastic membrane, and spraying with an odour suppressant approved by the environmental consultant.

14.11 Work Health and Safety Plan

As personnel on-site may be exposed to potentially toxic or hazardous compounds, the Contractor will prepare a site-specific Work Health and Safety Plan (WHS) prior to commencement of remediation and validation work in accordance with relevant



legislation. The WHS will identify hazards, assess the risks posed by the hazards and recommend measures to control the hazards. This should include detailed descriptions of vehicle decontamination, protective clothing, equipment and appropriate safety controls that will be adopted during remediation and validation works carried out at the site.

If odours are detected at areas around the site PID measurements will be collected by the on-site Environmental Scientist. If PID readings >30 ppm is recorded breathing masks should be worn by workers in the vicinity of the odour and >300 ppm odour suppressants as well as controlled excavations should be applied.

Personnel working on the site are required to read, understand and apply the requirements of the WHS. All staff working on the site must be inducted by an authorised induction trainer and must sign the relevant induction form.

14.12 Waste / Soil Management Plan (Importation, stockpiles, tracking & disposal)

14.12.1 Imported Soil

Importation of any soil, rock or aggregate is required to meet the following requirements:

- They must be legally able to be imported onto the site in accordance with the Protection of the Environment Operations (Waste) Regulation 2014 and any required consent approvals.
- The soils must meet the remediation criteria for the site (refer to Section 4).
- The soils must be classified as Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM) or other materials legally able to be imported



onto the site based on a Resource Recovery Exemptions. Where available VENM should be imported in preference to ENM. Soils must be assessed in accordance with the EPA requirements.

- Asbestos analysis to be included in suite of analysis for soil classified as VENM and ENM to be imported to the site.
- Prior to importation appropriate documentation needs to be provided to, and approved by, the Environmental Consultant and the materials must be inspected at the source site to confirm that there are no signs of contamination.
- The material must be inspected during importation by the Contractor, and any materials not meeting the description given in the provided documentation or displaying signs of contamination will be rejected.

14.12.2 Stockpiles

Stockpiles should be managed to minimise the risk of dust generation, erosion and leaching. The measures required to achieve this should include:

- Restrict the height of stockpiles to reduce dust generation.
- Construct erosion, sediment and runoff control measures.
- Cover stockpiles of contaminated soils to be left on site for more than 24 hours, or if windy conditions are expected.
- Manage the potential for leaching



14.12.3 Waste Tracking

All transport of waste and disposal of materials must be conducted in accordance with the requirements of the POEO Act. All licences and approvals required for disposal of the material will be obtained prior to removal of the materials from the site.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate licence, consent and/ or approvals to dispose of the waste materials according to the assigned waste classification, and with the appropriate approvals obtained from the EPA, if required. Details of all soils removed from the site (**including VENM**) shall be documented by the Contractor with copies of weighbridge slips, tip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and the contractor.

A site log shall be maintained by the Contractor to track disposed loads against on-site origin. Transport of spoil shall be via a clearly delineated, pre-defined haul route. The proposed waste transport route will be notified to the local Council and truck dispatch shall be logged and recorded by the Contractor for each load leaving the site. A record of the truck dispatch will be provided to the contractor.

Details of all soils removed from the site (including VENM) shall be documented by the Contractor with source location, volume/tonnage, waste classification, disposal date, disposal destination, copies of weighbridge slips, landfill receipts/disposal docket, tip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and/or the NSW EPA Accredited Site Auditor.

Material tracking needs to include information on source location, volume /tonnage, waste classification, disposal date, disposal destination, disposal docket, including waste



locate consignment number of any asbestos soil waste disposed, transporters details (including EPL No) and a tally of estimated versus actual volume disposed.

For material handling and tracking the following is required to be considered:

Waste Classification

- Material source and description of material.
- Sampling density, pattern and COPCs.
- Results summary, including appropriate table with comparison to acceptance criteria.

For Offsite Disposal

- Source location.
- Estimate volume (based on excavation size).
- Transporter details and licence.
- Reconciliation of actual disposal volume and the estimated volume of disposal (based on excavation size).

Actual volume of Disposal

- The waste classification document,
- Final destination and the POEO licence.
- Reconciliation of waste dockets with actual disposal volume.

For Imported Material

- Source site.
- Volume of imported material.
- Placement location.
- Transporter.



- VENM certificate or certificate applicable for NSW EPA exemptions (e.g ENM/ROO certificate).

14.13 Special Waste (Asbestos Waste)

All transport of waste and disposal of materials must be conducted in accordance with the requirements of the POEO Act. All licences and approvals required for disposal of the material will be obtained prior to removal of the materials from the site.

Asbestos transporters and facilities receiving asbestos waste in NSW weighing more than 100 kilograms or consisting of more than 10m² of asbestos sheeting in one load must track and report this waste to NSW EPA using WasteLocate.

Tracking of asbestos waste is to be done via the NSW EPA's online system known as WasteLocate.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate licence, consent and/ or approvals to dispose of the waste materials according to the assigned waste classification, and with the appropriate approvals obtained from the EPA, if required. Details of all soils removed from the site shall be documented by the Contractor with copies of weighbridge slips, tip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and the contractor.

A site log shall be maintained by the Contractor to track disposed loads against on-site origin. Transport of spoil shall be via a clearly delineated, pre-defined haul route. The proposed waste transport route will be notified to the local Council and truck dispatch



shall be logged and recorded by the Contractor for each load leaving the site. A record of the truck dispatch will be provided to the contractor.

14.14 Waste Disposal

All off-site disposal of wastes, where appropriate, will be undertaken in accordance with the POEO Act.

Any soil and rock to be removed from the site will be classified in accordance with either:

- The NSW EPA Waste Classification Guidelines 2014; or
- A General or Specific Exemption under the Protection of the Environment Operations (Waste) Regulation 2014.

No soils should leave the site without a formal waste classification.

All materials excavated and removed from the site shall be disposed in accordance with the POEO Act to a facility/site legally able to accept the material. Copies of all necessary approvals from the receiving site shall be given to the contractor prior to any contaminated material being removed from the site.

A record of the disposal of materials will be maintained. Copies of all consignment notes for the transport, receipt, landfill receipts and disposal of all materials (**including VENM**) will be maintained as part of the site log and made available to the Environmental Consultant for inspection and reporting purposes upon request.



Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate licence, consent and/ or approvals to dispose of the waste materials according to the assigned waste classification, and with the appropriate approvals obtained from the EPA, if required. **Details of all soils removed from the site (including VENM) shall be documented by the Contractor with copies of weighbridge slips, landfill receipts, tip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and the NSW EPA Accredited Site Auditor.**

14.15 Community Engagement

Community engagement should be consistent with council requirements in relation to the development application conditions. The client as listed in Section 16.1 is responsible for implementing community consultation and complaint handling.

14.16 Unexpected Finds Protocol

The sampling strategy for each “unexpected find” shall be designed by a suitably qualified environmental consultant. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, at concentrations which pose an unacceptable risk to human health or the environment.

Refer to Section 16.2 for more details on Unexpected Finds Protocol.



15.0 OPERATIONAL CONTROLS

15.1 Fire and explosion hazard

Explosive atmospheres may be present where any petroleum products or other potentially flammable or explosive substance is encountered / used, including machinery. Therefore, the contractor will put into place measures to prevent fires and explosions, which include:

- pumping and degassing of tanks prior to removal:
- preventing access to the site by unauthorised persons.
- forbidding smoking or using naked flame at the site.
- cutting of concrete to be carried out under a blanket of water in proximity to any underground storage tanks.
- approved fire extinguishers to be maintained in proximity to excavations.
- ensuring that no free product or fuel used for refuelling equipment enters a confined space or drainage/sewer system; and
- using only certified flameproof equipment in proximity to locations where free petroleum fuel is present or is expected to be present.

15.2 Public complaints registry

Given the nature of the remediation and validation works, it is considered that community consultation should be consistent with council requirements in relation to the development application conditions.



15.3 Duties of the on-site environmental scientist

The duties of the on-site environmental scientist include:

- ensure adherence to the Remediation Action Plan, the Work Health and Safety Plan and other plans applicable to the site.
- monitor the excavation of contaminated material undertaken at the site.
- ensure environmental compliance of contractors.
- monitoring with a PID the areas adjacent to open excavated pits at least three times throughout the day, and at additional times if strong or unusual odours or if unusual substances are encountered during the excavations part of the remediation works.
- inspection of the integrity of the sediment controls placed around the site.
- inspection at approximately two hourly intervals of the roadway in the vicinity of the site used by the vehicles leaving the site to ensure that no significant amounts of materials have been tracked off-site by vehicles.
- immediately report actual or potential non-compliances to the principal's environmental representative who will report those to appropriate regulatory bodies.
- note weather conditions, approximate temperature, direction and velocity of the wind, and rainfall at the commencement of work, at about midday and at the end of the day.
- collect samples for validation or other purposes as required by the principal's environmental representative.
- maintain a site diary which will record the following information:
 - date
 - weather conditions
 - presence of odours at the site and at the site boundaries



- PID measurements
- details of materials excavated during the remediation works, and details of actions taken if unexpected materials are encountered
- details of accidents, near misses or incidents, which may have resulted in injury, and the actions taken to prevent their recurrence
- details of environmental issues, which may result in environmental incidents and measures taken to correct them
- details of visitors to the site or other matters relating to environmental or health issues

15.4 Unexpected occurrences

If during remediation works, significant odours and/or evidence of gross contamination not previously detected are encountered, or any other significant unexpected occurrence, site works should cease in that area, at least temporarily, and immediate action taken to abate the odours or prevent / manage cross-contamination occurring. If required, the administering authority will be notified in writing within two working days of significant unexpected occurrence and informed of the remediation actions implemented.

15.5 Non-compliances

If the on-site environmental scientist suspects that some works carried out at the site do not comply with the requirements of the RAP, the WHS or other plans applicable to the site, this should be reported immediately to the principal's environmental representative. If the principal's environmental representative cannot be contacted or if immediate action is required, the on-site environmental scientist has authority to stop



the work or request appropriate action to be taken. This is particularly the case under the following circumstances:

- injury to person due to exposure to materials excavated from the site.
- spillage of materials at the site or on areas adjacent to the site; and
- other events that the environmental scientist believes could give rise to unacceptable risk to human health or to adverse impact to the site or to areas adjacent to the site.



16.0 CONTINGENCY MANAGEMENT

The conditions that may be encountered when excavating is uncertain. As unknown and variable subsurface conditions impose a degree of uncertainty for the project a set of anticipated conditions has been assumed in developing the excavation plan. However, because field conditions vary, flexibility has been built into the excavation plan to adapt to differing conditions.

Table 16: Contingency Management

Anticipated Problem	Corrective Action by Contractor
Asbestos cement sheeting, lagging, pipping etc.	Stop excavations if there is the potential for people to inhale airborne asbestos fibres. Contact FES immediately to assess whether the material is asbestos. Cover the area with plastic and suppress dust by wetting down if needed. Place a warning sign at the entrance to the site where asbestos removal or site remediation is taking place. Adhere to WHS regulations and follow the unexpected finds protocol outlined in 16.2 & Appendix A.
Discovery of USTs	Stop excavations, contact FES immediately. Follow the unexpected finds protocol and UST finds protocol outlined in section 16.2 & 16.3 & Appendix A.
Chemical spill / exposure	Stop work, refer to Occupational Health, Safety and Rehabilitation Plan and immediately contact FES.
Excessive rain	Maintain access roads, cover high-traffic areas with gravel; or cover working areas/stockpiles with plastic during off-shifts; or shut down operations until runoff is more manageable. Inspect & maintain sediment control pond & filter fences.
Unmanageable mud in excavation zone	Improve drainage collection system; add geotextile/gravel in problem areas; or strip off mud/slurry materials; or excavate from the top of the fill.



Excessive drainage	Minimise active/contaminated work area; or improve diversion clean run-on; or maintain sufficient on-site wastewater storage capacity; or mobilise additional storage and/or treatment systems as needed.
Excessive dust	Use water sprays or biodegradable dust sprays or cease dust-generating activity until better dust control can be achieved or apply interim capping systems.
Sediment pond water for discharge – analytical results exceed site response levels	Perform in-situ treatment, e.g. flocculants dosing, until response levels are met. Alternatively arrange off-site disposal by a licensed Contractor.
Excessively wet materials	Stockpile and dewater on-site; or add absorbents.
Equipment failures	Maintain spare equipment or parts; or maintain alternate rental options; or shut down affected operations until repairs are made.
Release of fuel/oil from machinery	Remove source, use absorbent booms to remove oil and make any repairs as required.
Silt fence fails	Stop work and repair fence to specifications.
Excessive noise	Identify source and review noise attenuation equipment and as necessary provide silencers on noisy equipment.



<p>Excessive odours / vapours</p>	<p>If excessive organic odours / vapours are generated, stop works and monitor for volatiles at the site boundaries using PID and upgrade PPE if necessary.</p> <p>Implement control measures including respirators for on-site workers, wetting down excavated material, use of odour and volatile suppressing agents to eliminate or reduce odours as required and/or cover odorous material if practicable.</p> <p>FES notes that no nuisance odours shall be detected at any site boundary as part of the remedial works. If odours/vapours are detected then it is recommended, as part of the CEMP & community consultation procedure, that the project manager, client and remediation contractor:</p> <ol style="list-style-type: none"> 1. Notify the owners / occupiers of the adjoining premises in writing regarding the potential odour issues. Include contact details for any concerns in relation to the odour emissions during remediation. 2. Temporarily pause site works to allow excessive odour to subside whilst implementing the control measures. 3. Record logs for volatile emissions and odours.
<p>Excavation extends below water table into natural materials which are assessed and confirmed to comprise potential acid sulphate soils (PASS).</p>	<p>Implement Acid Sulphate Soils management plan. This will include on-site treatment of the soils in the excavation area. Treatment would likely involve lime addition at a rate to be calculated using methods specified in the ASS Manual (1998).</p>
<p>Unearthing drummed material</p>	<p>Isolate and contact Superintendent. Arrange temporary storage in a secure part of the remediation site (to be nominated).</p>
<p>Identification of cultural or building heritage items</p>	<p>Stop work and notify project manager. Follow the unexpected finds protocol as detailed in section 16.2 & Appendix A.</p>



Complaint Management	Notify client, project managers, and environmental consultant following complaint. Report complaint as per internal procedures, implement control measures to address complaint and notify complainant of the results of the remedial actions.
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In addition to the above listed contingencies, the following steps may need to be undertaken should non-spadeable sludge's or buried drums be discovered during the remediation works:

- upgrade of personal protective equipment (PPE), for workers within the active work zone, in accordance with the site Occupational Health, Safety and Rehabilitation Plan.
- segregation and bunding of discovered material.
- use of odour suppressants (where appropriate).
- cover the discovered material with plastic sheeting.
- appropriate sampling and analysis to assess potential contaminants; and
- appropriate off-site disposal of the materials following receipt of analytical results and any associated regulatory approvals required.



16.1 Contact Persons

Table 17: Contact Persons

Responsible Party	Details
Principal Environmental Representative	Foundation Earth Sciences PO Box 4405, East Gosford NSW 2250 Benjamin Buckley 0466 385 221
Project Manager and Client	Perifa Rosalind Development Pty Ltd Lachlan Miles

16.2 Unexpected Finds Protocol

The sampling strategy for each “unexpected find” shall be designed by a suitably qualified environmental consultant. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, at concentrations which pose an unacceptable risk to human health or the environment.

The sampling frequency of the identified substance / materials shall meet the following minimum requirements:

- Excavation Floor
 - 1 sample every 25m²
 - Samples should be analysed for the chemicals of concern.
- Excavation Wall
 - 1 sample every 5m (from each distinct horizon / material type)
 - Samples should be analysed for the chemicals of concern.

All additional works should be documented by the use of field notes, site photographs, site plans and reporting.



Refer to **Appendix A** for a copy of the Unexpected Finds Protocol.

16.3 USTs

Any unexpected USTs found within the site should be removed in accordance with SafeWork NSW & UPSS Regulation 2014 requirements, and AS4897-2008: The design, installation and operation of underground petroleum storage systems. In the event of conflict between the guidance documents, the latter shall prevail. Due to the volatile nature of petroleum storage tanks, it is recommended that the USTs be excavated and disposed of by an experienced contractor and with an environmental representative present.

Following the removal of any USTs and associated visibly stained or odorous soils, in samples should be collected from the walls and floor of the tank-pits/hotspots and submitted to a NATA accredited laboratory for analysis. The targeted analytes should be, but not be limited to, heavy metals, TPH, BTEX & PAH.

The minimum sampling protocols to be used for unexpected UST areas include:

- 3 samples per backfill UST sands per UST pit.
- 1 sample per tank line.
- 1 sample per vent pipe area.
- 1 sample per spill box (currently not present but may be found).
- 2 base samples and 8 walls (2 samples per wall face) of each tank pit



16.4 Groundwater Contingency

If groundwater contamination is observed during the remediation process, it is recommended to assess the potential impact on the proposed development.

Refer to Sections 8.2, 11.6 & Table 18 for further contingency management.

17.0 REGULATORY APPROVALS AND LICENSES

17.1 SEPP (Resilience and Hazards) 2021

Chapter Four of the SEPP Resilience and Hazards 2021 refers to the planning approach to the remediation of contaminated land. The SEPP defines the regulations for Category 1 and Category 2 remediation works. The remedial works to be undertaken at the site constitute Category 2 works (as defined in SEPP). Appropriate permissions for remediation should be obtained prior to commencement.

17.2 State Protection of the Environmental Operations (UPSS) Regulation 2014

UPSS Regulation requires if a storage system is decommissioned, a report for the storage system must be served on the relevant authority within 60 days of decommissioning or remediation is completed. The report must be prepared by a duly qualified person in accordance with EPA guidelines and must describe the processes used to decommission the storage system and assess contamination at the storage site.



17.3 NSW WHS Regulation 2017

The Work Health and Safety Regulation 2017 (WHS Regulation) is a legal document that outlines the requirements for work health and safety in New South Wales, Australia. It is designed to protect the health, safety, and welfare of all workers and the health and safety of other people who may be affected by the work.

The WHS Regulation applies to all workplaces in New South Wales, including businesses, organizations, and individuals who employ workers or engage contractors. It covers a wide range of topics, including hazard identification, risk assessment, risk control, and the management of incidents and emergencies.

The WHS Regulation is part of a broader framework of Australia's work health and safety laws, including the Work Health and Safety Act 2011 (WHS Act) and other state and territory regulations. Together, these laws form the basis for work health and safety in Australia.

17.4 Duty to Report

Under Section 60 of the Contaminated Land Management Act 1997, the owner of the land is required to notify contamination in circumstances as indicated in the NSW EPA (2015) *Guidelines on Duty to Report Contamination under the Contaminated Land Management Act 1997*.

Sites that are significantly impacted by soil, groundwater and ground gases are likely to require notification to the NSW EPA under section 60 of the CLM Act. A decision process for use by site owners or responsible persons considering reporting contamination under section 60 is provided in Appendix 1 (Figure 1) of the guidelines.



No notification to NSW EPA is recommended based on the sampling and investigation to date.

17.5 Development Consent and Control Plans

All works should be in accordance with the local Council Development Control Plans and any development consent issued by the local Council for the development.

17.6 Asbestos Removal Regulations / Work Health Safety Regulations

17.6.1 General

The removal and disposal of asbestos will be managed in accordance with the Work Health and Safety Act (2011) and Work Health and Safety Regulation (2011), "How to Safely Remove Asbestos: Code of Practice (WorkCover 2012), the, SafeWork NSW Guidelines and the NSW EPA Waste Classification Guidelines.

Health screening for asbestos in soil, which are based on scenario-specific likely exposure levels, are adopted from the WA DoH guidelines and are referred in Table 7 in Schedule B1.

The WHS Regulations require a person conducting a business or undertaking who commissions the removal of asbestos at the workplace must also ensure asbestos removal work is carried out only by a licensed asbestos removalist who is appropriately licensed to carry out the work, unless specified in the WHS Regulations that a licence is not required.



If asbestos is non-friable, is more than 10m² and has been determined that it should be removed, it must be removed by a licensed asbestos removalist as soon as reasonably practicable. Where it is not reasonably practicable to remove it, control measures must be put in place to eliminate any exposure, so far as is reasonably practicable, or to minimise exposure so far as is reasonably practicable, but always ensuring the exposure standard is not exceeded.

Class A License can remove any amount or quantity of asbestos or ACM, including:

- any amount of friable asbestos or ACM
- any amount of ACD
- any amount of non-friable asbestos or ACM

Class B Licence can remove:

- any amount of non-friable asbestos or ACM
 - Note: A Class B licence is required for removal of more than 10 m² of non-friable asbestos or ACM but the licence holder can also remove up to 10 m² of non-friable asbestos or ACM)
- ACD associated with the removal of non-friable asbestos or ACM
 - Note: A Class B licence is required for removal of ACD associated with the removal of more than 10 m² of non-friable asbestos or ACM, but the licence holder can also remove ACD associated with removal of up to 10m² of non-friable asbestos or ACM



17.6.2 Notification of Asbestos Removal Works

WorkCover must be notified five days before licensed asbestos removal work is commenced.

Asbestos removalists licensed in NSW can lodge the notification electronically using WorkCover's Asbestos and demolition online notification system or complete the form.

Interstate asbestos removalists who hold an asbestos removal licence issued under another Work Health and Safety Regulation must lodge the notification by completing the notification form.

17.6.3 Notification of Respirable Asbestos Fibre Levels at more than 0.02 fibres / ml

WorkCover must be notified within 5 days when the respirable asbestos fibre levels exceed 0.02 fibres/ml in the removal area.

NSW licensed asbestos removalists and interstate asbestos removalists who hold an asbestos removal licence issued under a work health and safety regulation must lodge the notification by completing the notification form.

17.6.4 Notification of the Emergency Demolition of a Structure or plant involving Asbestos

Notification of the demolition or refurbishment of a structure or plant is required for the following:



- that was constructed or installed before 31 December 2003.
- is located in either a workplace or a residential premise where an emergency has occurred.
- the structure or plant must be demolished; and
- asbestos is fixed or installed in the structure or plant before the emergency has occurred.

Demolition or refurbishment does not include minor or routine maintenance work or other minor work.

An emergency is defined if:

- a structure or plant is structurally unsound
- collapse of the structure or plant is imminent.

The person with management or control of the workplace or, if in residential premises, the licensed asbestos removalist must notify WorkCover by completing the notification form.

Interstate asbestos removalists who hold an asbestos removal licence issued under another work health and safety regulation must also notify WorkCover if the work is located in NSW.

Completed notification forms can be lodged by:

- contact (02) 8260 5885
- email to adu@safework.nsw.gov.au



- delivery to 92-100 Donnison Street, Gosford 2250 or any Safework office

Asbestos notifications are free and the asbestos and demolition hotline number is (02) 8260 5885.

17.7 Protection of the Environment Operations (Waste) Regulations 2005

The regulations make requirements relating to non-licensed waste activities and waste transporting.

Section 42 of the Regulation stipulates special transportation, re-use or recycling requirements relating to asbestos waste and must be complied with regardless of whether the activity is licensed.

The requirements for the transportation of asbestos waste include:

- bonded asbestos material must be securely packaged at all times,
- friable asbestos material must be kept in a sealed container,
- asbestos-contaminated soils must be wetted down,
- all asbestos waste must be transported in a covered, leak-proof vehicle.

The requirements relating to the off-site disposal of asbestos waste are as follows:

- asbestos waste in any form must be disposed of only at a landfill site that may lawfully receive the waste,
- when asbestos waste is delivered to a landfill site, the occupier of the landfill site must be informed by the person delivering the waste that the waste contains asbestos,



- when unloading and disposing of asbestos waste at a landfill site, the waste must be unloaded and disposed of in such a manner as to prevent the generation of dust or the stirring up of dust,
- asbestos waste disposed of at a landfill site must be covered with virgin excavated natural material or other material as approved in the facility's environment protection licence.

Section 48 of the Regulation requires that wastes are stored in an environmentally safe manner. It also stipulates that vehicles used to transport waste must be covered when loaded.

17.8 Other licences required

Transporters of contaminated waste are required to be licensed to transport contaminated waste to licensed landfills. Landfills are required to be licensed for the category of waste they are scheduled to receive.

Waste classification documentation and waste dockets from the receiving landfill should be kept on file for site validation purposes.

If water is discharged as part of any dewatering activities, the relevant discharge consents must be obtained.

The appointed site contractor should prepare appropriate Construction Environmental Management Plans CEMP, work health safety plans & other plans required by the Council DA and DCPs. Where asbestos removal is required, the contractor must be appropriately licensed to carry out the designated works.



18.0 CONCLUSION

The site appeared to be occupied by three separate residential lots. Each property has a residential apartment building on it, with a sealed driveway along the eastern boundary connecting the properties, carparking spaces under the dwellings and landscaped areas. The proposed development includes demolishing current site features and construction of a five (5) level residential apartment building for senior housing, with a basement carpark, communal open spaces and landscaped areas.

The remediation goal is to render the site suitable for the proposed development upon completion of the remediation and validation works. This would be achieved by remediating and actioning the:

- Borehole BH1 – contain Asbestos impacted fill to a depth of 0.4m BGL. The delineation of the impacted fill is proposed to be completed as part of the remediation works.
- The RAP also requires the additional investigation to be completed post demolition of site structures to assess beneath the former building footprints and further define the extent of the required soil remediation works.

Therefore, it is considered that the site will be made **suitable** for the proposed development, subject to the implementation of the remediation and validation works in accordance with this RAP. No recommendations for further works are proposed pending successful implementation of the RAP.



The following assumptions have been utilised in concluding the site will be considered **suitable**:

- Removal of the soil material from the impacted area BH1 and dispose of appropriately.
- Collection of validation samples from the impacted area BH1.
- Complete the delineation and additional sampling works.
- Contaminant concentrations in the validation samples are shown be below the adopted site validation criteria.
- Data collected and generated during the project is considered appropriate to allow decisions to be made with confidence. Specific limits for the project have been applied in accordance with the appropriate guidance documents from the NSW EPA, NEPM 2013, appropriate indicators of data quality (DQIs used to assess quality assurance / quality control) and standard operating FES procedures for field sampling and handling.



19.0 REFERENCES

- National Environmental Protection Council (NEPC) (1999) – *National Environmental Protection (Assessment of Site Contamination) Measure. Amendment 2013*
- National Health and Medical Research Council (NHMRC) & National Resource Management Ministerial Council (NRMMC) “National Water Quality Management Strategy, Australian Drinking Water Guidelines” (2011)
- NSW EPA (2014) “*Technical Note: Investigation of Service Station Sites*”.
- NSW EPA (2020), “Consultants Reporting on Contaminated Land”. NSW Environment Protection Authority, Parramatta
- NSW DEC “Guidelines for the NSW Site Auditor Scheme” (2017, 3rd edition). NSW Environment Protection Authority, Sydney.
- NSW EPA (2014) – “Waste Classification Guidelines, Part 1: Classifying Waste”.
- NSW EPA (2015) “Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997”.
- NSW EPA “Sampling Design Guidelines” (1995). NSW Environment Protection Authority, Sydney.



20.0 LIMITATIONS

Whilst to the best of our knowledge, information contained in this report is accurate at the date of issue, although subsurface conditions, including groundwater levels and contaminant concentrations, can change in a limited time. This should be borne in mind if the report is used after a protracted delay.

There is always some disparity in subsurface conditions across a site that cannot be fully defined by investigation. Hence it is unlikely that measurements and values obtained from sampling and testing during environmental works carried out at a site will characterise the extremes of conditions that exist within the site.

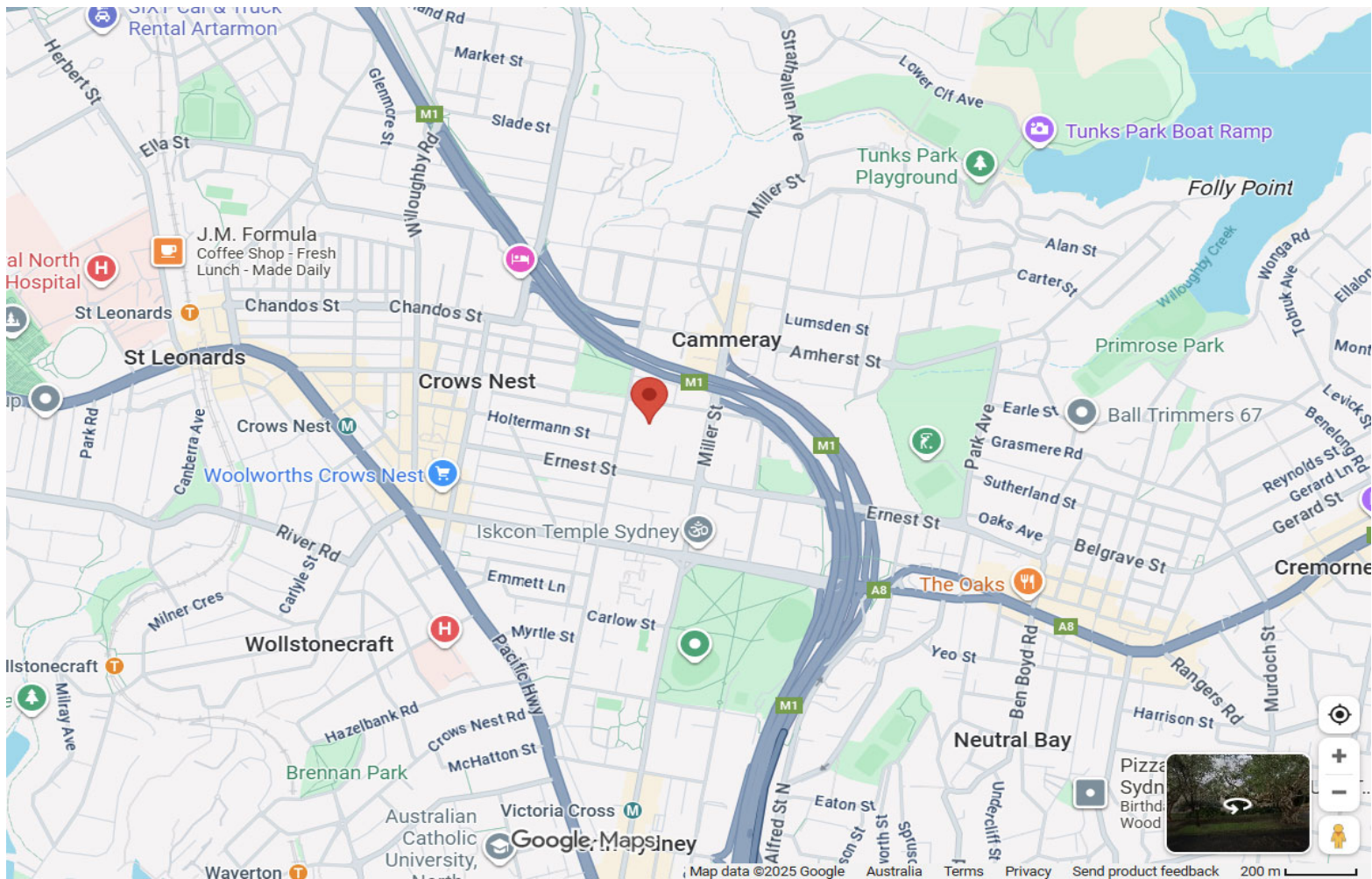
There is no investigation that is thorough enough to preclude the presence of material that presently or in the future, may be considered hazardous at the site. Since regulatory criteria are constantly changing, concentrations of contaminants presently considered low may, in the future, fall under different regulatory standards that require remediation.

Opinions are judgements, which are based on our understanding and interpretation of current regulatory standards, and should not be construed as legal opinions.



FIGURE 1: SITE LOCALITY







Key Site Location	 	DRAWN MT	Site Locality
		Figure 1	Perifa
		E3403-5	19-23 Rosalind Street, Cammeray NSW

FIGURE 2: SITE FEATURES, BOREHOLES & IMPACTED LOCATIONS





Site Features

- a - Residential Apartment
- b - Landscaped Areas
- c - Driveway / Carparking Area

Soil Exceedance

Groundwater Exceedance



Impacted Location BH1



Building Footprint



	Chromium	Copper	Nickel	Zinc
GW6	6	7	13	55

BH1 Asbestos Detected

BH1 / GW1	Nickel	Zinc
GW1	10	22

GW3	Nickel	Zinc
	9	23

Key

Site Boundary & Location
 FES DSI Soil BHs 2025
 FES DSI Soil & GW BHs 2025



DRAWN
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 Figure
 2
 E3403-5

Site Features, Borehole Locations and Impacted Locations

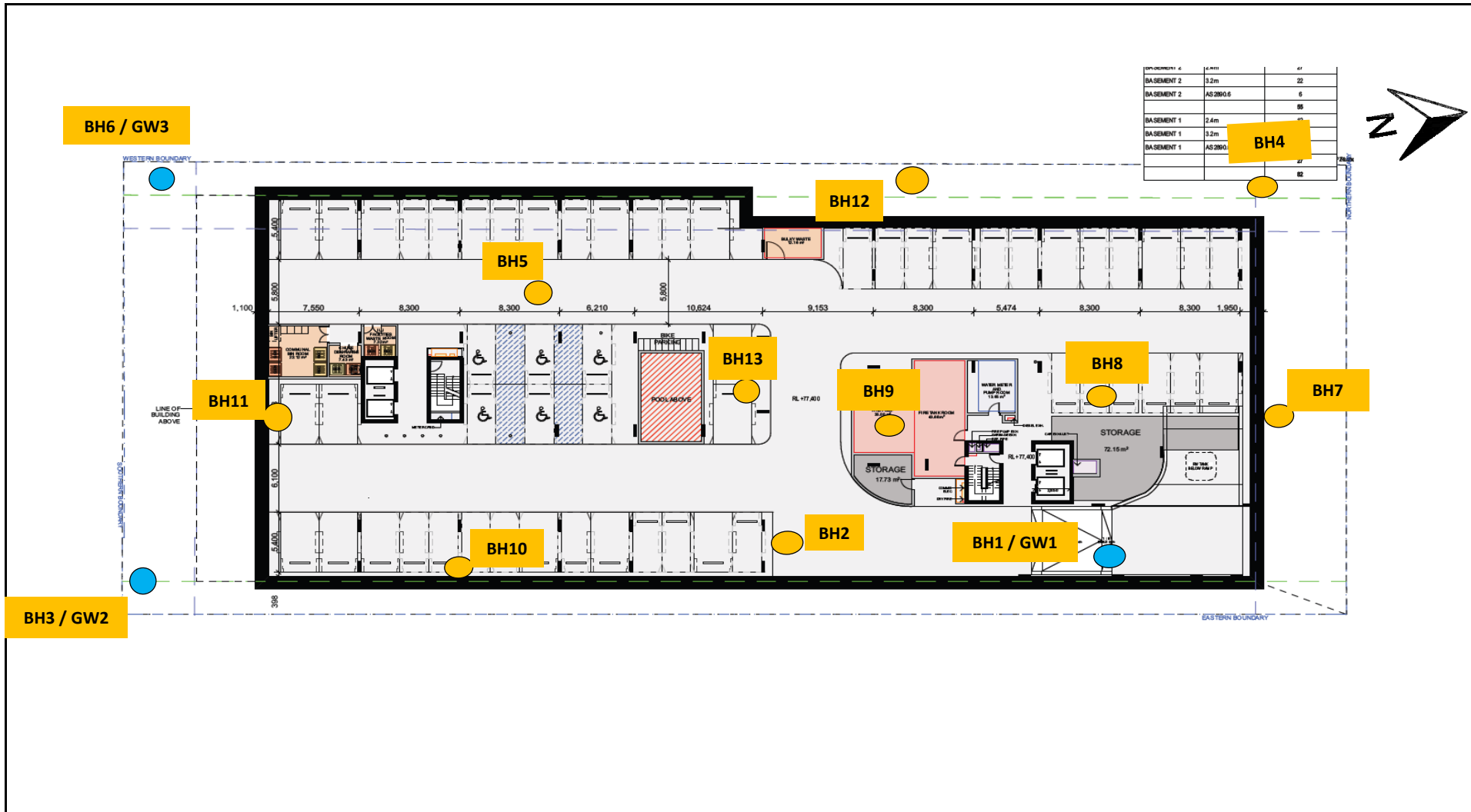
Perifa Rosalind Developments Pty Ltd

19-23 Rosalind Street, Cammeray NSW

FIGURE 3: BOREHOLE LOCATIONS OVER BASEMENT 2



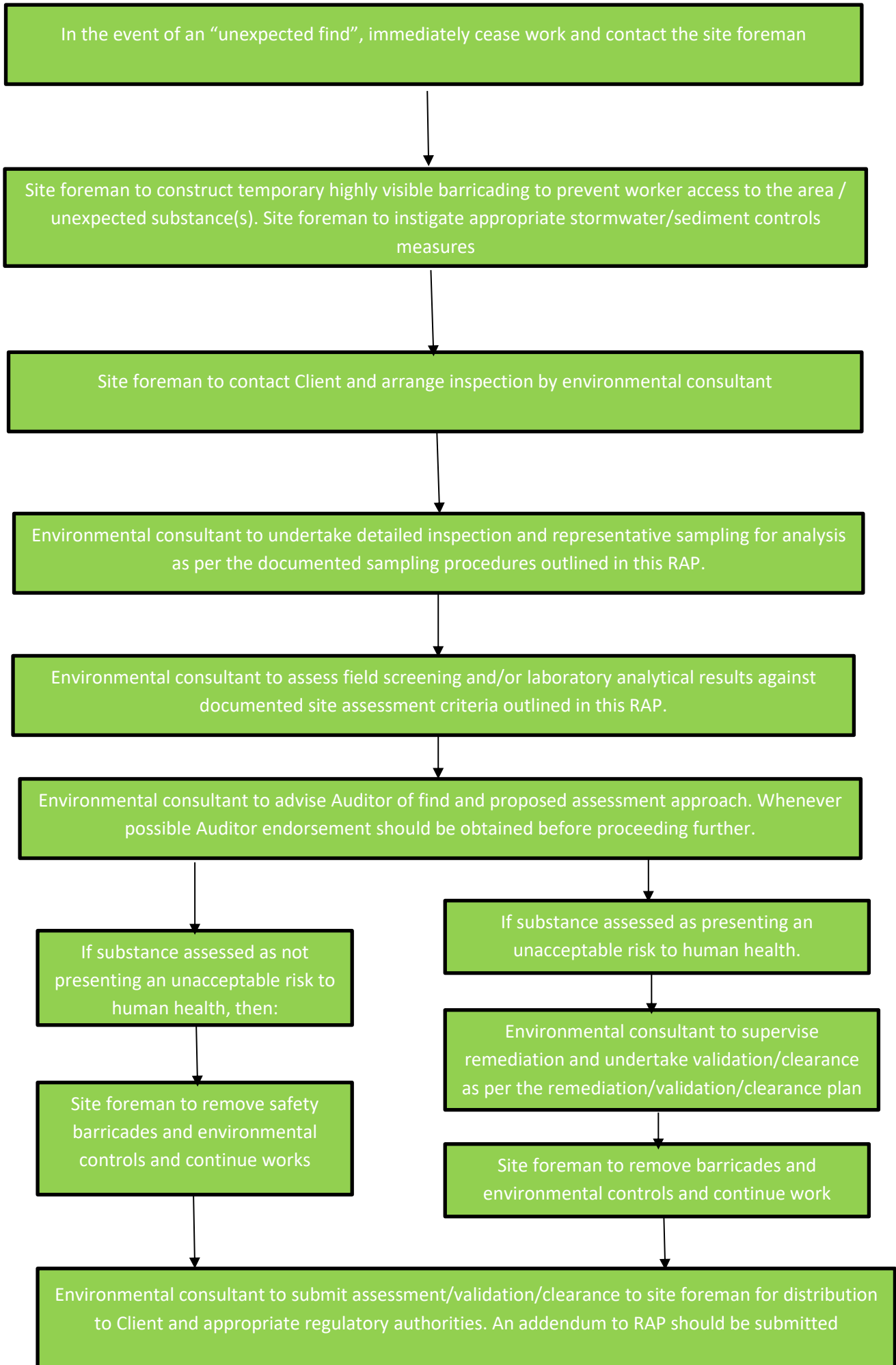
DEPTH (m)	CLASSIFICATION	NO. OF TESTS
0.0 - 0.5	AS 2880.6	6
0.5 - 1.0	AS 2880.6	6
1.0 - 1.5	AS 2880.6	6
1.5 - 2.0	AS 2880.6	6
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Key Site Boundary & Location FES DSI Soil BHs 2025 FES DSI Soil & GW BHs 2025		DRAWN MT	Borehole Locations over Basement 2
		Figure 3	Perifa Rosalind Development Pty Ltd
		E3403-5	19-23 Rosalind Street, Cammeray NSW

APPENDIX A: UNEXPECTED FINDS PROTOCOL





APPENDIX B: PROPOSED DEVELOPMENT PLANS



19 - 23 ROSALIND ST, CAMMERAY

DEVELOPMENT APPLICATION

Page No.	Title	REV
DA-000	COVER PAGE	A
DA-001	SURVEY 1/2	A
DA-002	SURVEY 2/2	A
DA-003	SITE PLAN	A
DA-004	SITE ANALYSIS	A
DA-005	EXISTING PLAN	A
DA-006	DEMOLITION PLAN	A
DA-100	BASEMENT 2 - PROPOSED PLAN	A
DA-101	LOWER GROUND - PROPOSED PLAN	A
DA-102	GROUND - PROPOSED PLAN	A
DA-103	LEVEL 1 - PROPOSED PLAN	A
DA-104	LEVEL 2 - PROPOSED PLAN	A
DA-105	LEVEL 3 - PROPOSED PLAN	A
DA-106	LEVEL 4 - PROPOSED PLAN	A
DA-107	LEVEL 5 - PROPOSED PLAN	A
DA-108	ROOF - PROPOSED PLAN	A
DA-200	ELEVATIONS	A
DA-201	ELEVATIONS	A
DA-202	ELEVATIONS	A
DA-300	SECTIONS	A
DA-301	SECTIONS	A
DA-302	SECTIONS	A
DA-303	SECTIONS	A
DA-400	SHADOW DIAGRAMS 1/2	A
DA-401	SHADOW DIAGRAMS 2/2	A
DA-500	GFA AREA SCHEDULES & PLANS	A
DA-501	UNIT MIX	A
DA-502	COMPLIANCE DIAGRAMS	A
DA-503	ADG - CROSS VENTILATION	A
DA-504	ADG - SOLAR	A
DA-505	HEIGHT PLANE DIAGRAM	A
DA-600	STREET VIEW 1	A
DA-601	STREET VIEW 2	A
DA-602	STREET VIEW 3	A
DA-603	COURTYARD VIEW 1	A



AERIAL VIEW

ARCHITECT

CHROFI

3/1 THE CORSO MANLY NSW 2095 AUSTRALIA
 T +61 2 8096 8500 E info@chrofi.com
 CHOI ROYHA FIGHERA PLACON 144 714 885 A/F CHOI ROYHA FIGHERA UNIT TRUST T/A CHROFI ABN 22 365
 257 187 NOMINATED ARCHITECT TAI ROYHA 6566 STEVEN FIGHERA 6609
 THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT CONTRACTS, SPECIFICATION,
 REPORT AND DRAWINGS. DO NOT SCALE DRAWINGS. DIMENSIONS GOVERN. VERIFY ALL DIMENSIONS ON
 SITE BEFORE CONSTRUCTION. COPYRIGHT OF THIS DRAWING IS VESTED IN CHROFI.

A 15/1/2026 Issue for DA

PROJECT

19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
	A3 GA



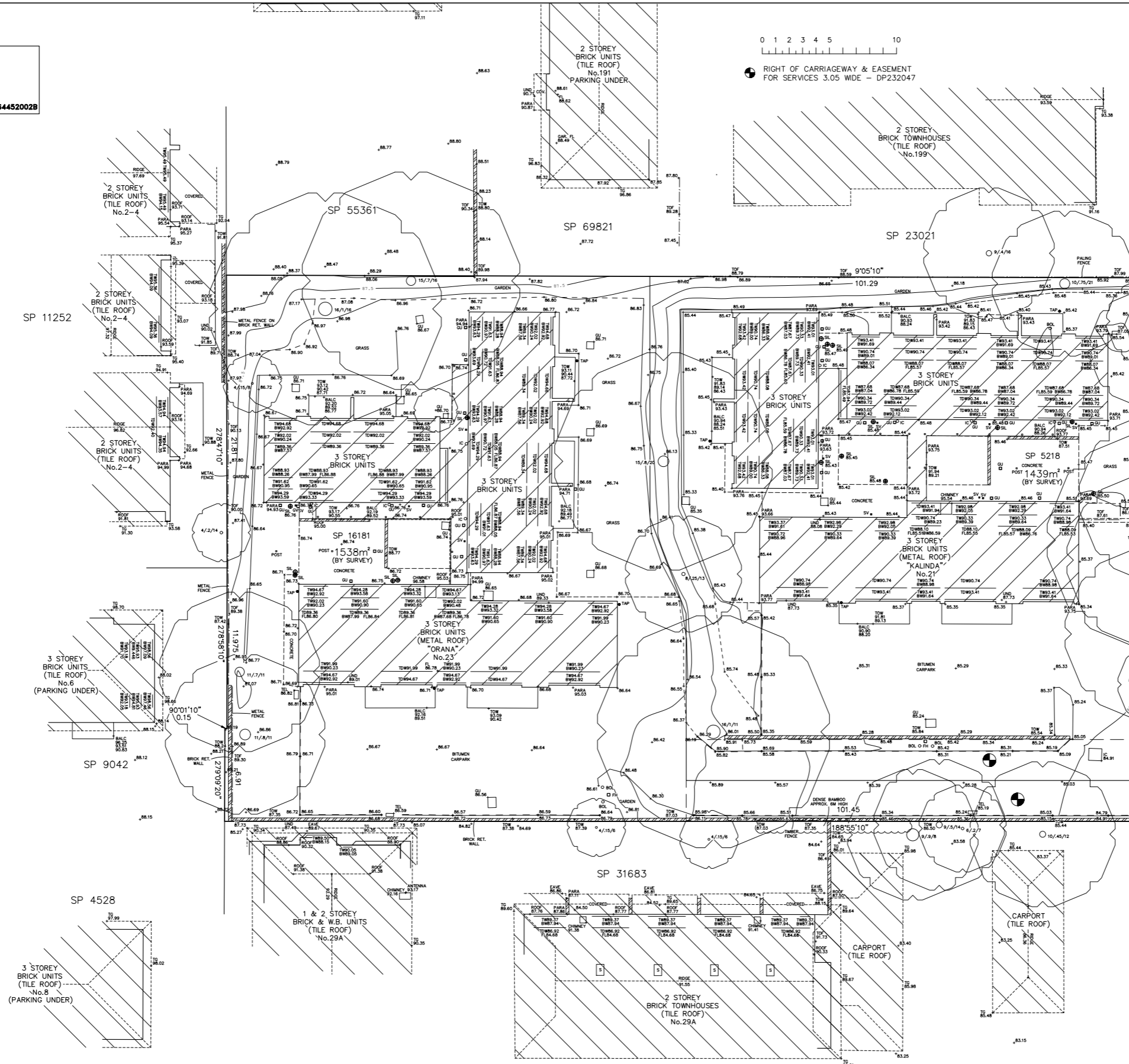
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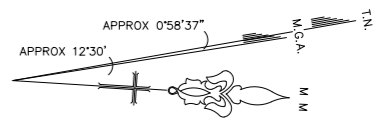
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RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 3.05 WIDE - DP232047



LEGEND

	Building		BALC Balcony Height
	Walls		BS Bus Stop
	Kerb Bottom		BW Bottom of Window
	Concrete edge		C/Box Control Box
	Kerb top		CHIM Chimney Height
	Barrier		ER Earth Rod
	Fence		E/Box Elec. Control Box
	Overhead Powerline		FH Fire Hydrant
	Manholes		FLL First Floor Level
	Survey Station & Name		FL Ground Floor Level
	Bench Mark		GM Gas Meter
	Sapling		GV Gas Valve
	Tree, 12/0.5/10 (Spread/Trunk/Height)		HT Height
	Area Of Undergrowth		IC Inspection Cover
	Gate		LFL Lower Floor Level
	Inspection chamber		MH Manhole
	Cover level		PARA Parapet Height
	Invert level		PP Power Pole
	Pipe invert (diameter)		SFL Second Floor Level
	Gully		SIL Sewer Inspection Lid
	Back Gully		SP Sign Post
	Beam		SV Stop Valve
	Walls		SVP Sewer Vent Pipe
	Door		TDW Top of Door/Window
	Window		TEL Telecommunications
			TG Top of Gutter
			TL Traffic Light
			TOF Top of Fence
			TOW Top of Wall
			UW Understore Height
			WM Water Meter
			W-B Wall to Boundary
			B Beam Height
			CH Ceiling Height
			CI Window Cill Height
			FL Floor Level
			Hd Window Head Height
			HT Height
			TD Door Height

NOTES:

1. ALL DIMENSIONS AND LEVELS SHOULD BE CHECKED ON SITE PRIOR TO DESIGN AND CONSTRUCTION.
2. THIS INFORMATION ON THIS SURVEY IS TO BE USED FOR DA PURPOSES ONLY.
3. IF THERE IS ANY POINT OR FEATURE (FLOOR LEVEL, WALL POSITION, ROOF OR RIDGE HEIGHT ETC) CRITICAL TO THE PREPARATION OF DESIGN PLANS OR CONSTRUCTION, THAT POINT OR FEATURE SHOULD BE MADE KNOWN TO US SO ITS ACCURACY CAN BE CONFIRMED PRIOR TO THE COMPLETION OF DESIGN PLANS OF COMMENCEMENT OF CONSTRUCTION.
4. SOME STRUCTURES AND FEATURES ARE APPROXIMATE ONLY IF USED FOR DESIGN CONFIRMATION OF ACCURACY SHOULD BE CONFIRMED.
5. FENCES ARE APPROXIMATE ONLY UNLESS SPECIFICALLY DIMENSIONED TO BOUNDARY.
6. SURVEY MARKS MUST BE PLACED PRIOR TO CONSTRUCTION OR ERECTION OF FENCES.
7. TREE INFORMATION HAS BEEN SURVEYED FROM GROUND LEVEL AND THEREFORE SHOULD BE TREATED AS APPROXIMATE ONLY. THE EXENT OF THE CANOPY IS APPROXIMATE AND DIAGRAMMATIC ONLY.
8. STAIR RISES, STEPS AND LANDINGS HAVE NOT BEEN INDIVIDUALLY LOCATED AND ARE DIAGRAMMATIC ONLY.
9. THE RECORDS OF THE SERVICE PROVIDERS HAVE NOT BEEN INVESTIGATED, ONLY THOSE SERVICES THAT ARE VISIBLE AND ACCESSIBLE AT THE DATE OF SURVEY HAVE BEEN SHOWN.
10. SERVICES SHOWN ARE INDICATIVE ONLY. OTHER SERVICES MAY EXIST THAT ARE NOT SHOWN. THEREFORE FIELD CONFIRMATION SERVICE LOCATORS SHOULD BE OBTAINED TO CONFIRM EXACT POSITION AND DEPTH.
11. SITE AREA SHOWN HAS BEEN CALCULATED BY SURVEY.
12. A SITE AND BOUNDARY SURVEY HAS BEEN CARRIED OUT.
13. ORIGIN OF LEVELS IS FM 14310, RL=87.970 A.H.D.
14. BEARINGS ARE ON M.G.A.

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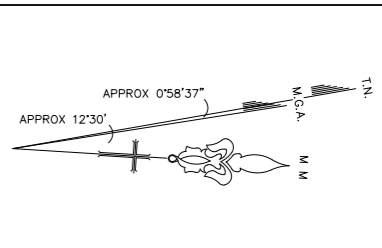
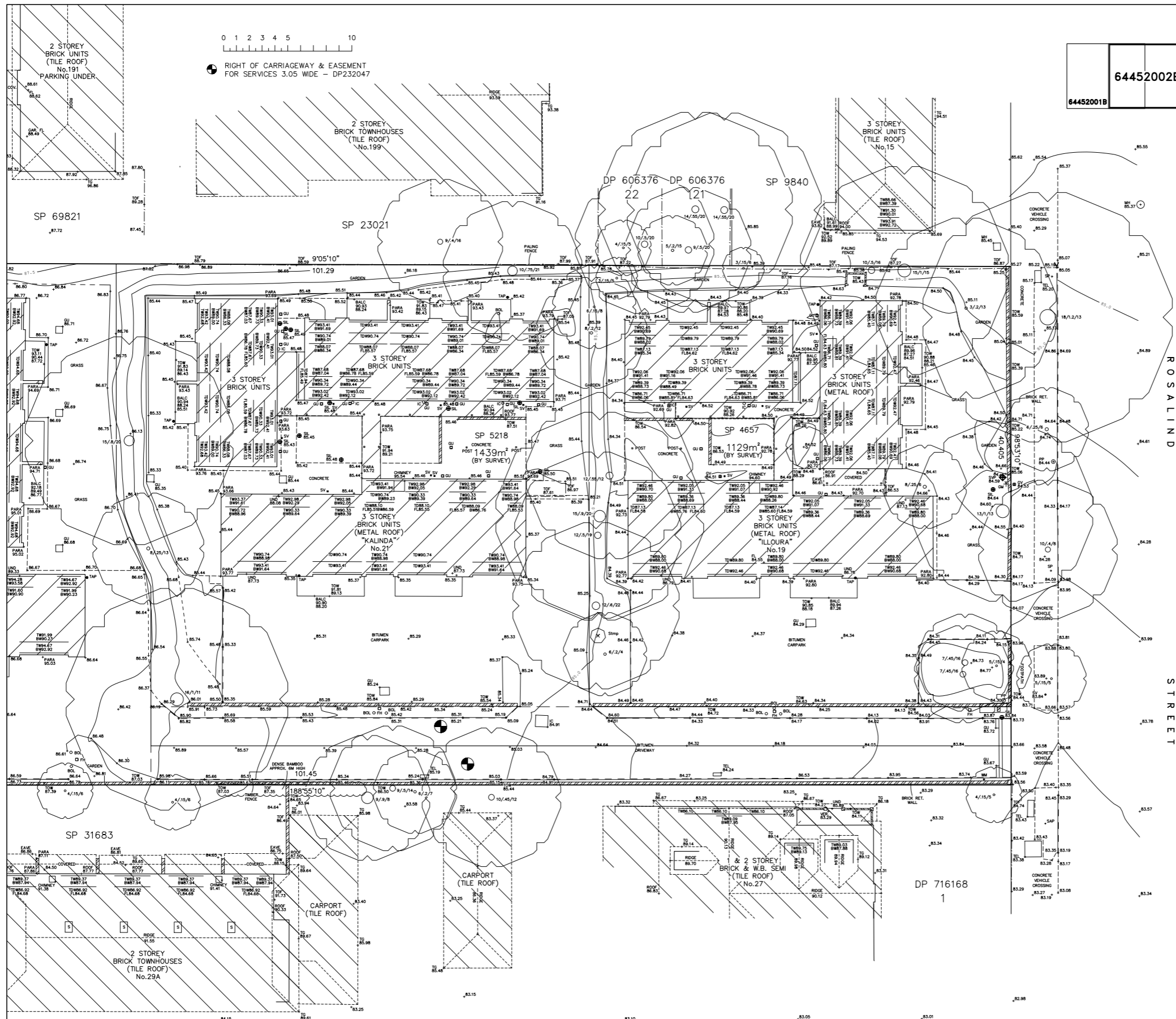
PROJECT
SHOWING SELECTED LEVELS & DETAIL AND BOUNDARY IDENTIFICATION SURVEY OF SP 16181, SP 5218 & SP 4657 BEING 19, 21 & 23 ROSALIND STREET, CAMMERAY

CLIENT RIVERVUE RESIDENCES	REGISTERED SURVEYOR PAUL CECELLERO ID NUMBER: 757	
LGA NORTH SYDNEY	SIGNATURE <i>Paul Ceccello</i>	
SCALE 1:100	DRAWN/PAPER SIZE AR/A0	
SURVEY DATE 03/02/2023	DRAWING No. 64452001B	
DATE 10/02/23	REV. 'A'	AMMENDMENTS FIRST ISSUE
DATE 04/08/25	REV. 'B'	AMMENDMENTS ADJOINING BUILDING DETAIL ADDED

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A	15/1/2026	Issue for DA
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PROJECT 19-23 Rosalind Street, Cammeray 19-23 Rosalind Street, Cammeray, NSW 2062	DRAWING TITLE SURVEY 1/2							
PROJECT NUMBER 25023	DATE 15/01/26	DRAWN KN/WD	CHECKED MG	SHEET SCALE 1:100@A0	SHEET SIZE A3 GA	NORTH 	DRAWING NUMBER DA-001	REVISION A



LEGEND

Building	BALC	Balcony Height
Walls	BOL	Bollard
Concrete edge	BS	Bus Stop
Kerb top	BW	Bottom of Window
Barrier	C/Box	Control Box
Fence	CHIM	Chimney Height
Manholes	ER	Earth Rod
Survey Station & Name	E/Box	Elec. Control Box
Bench Mark	FH	Fire Hydrant
Sapling	FL	First Floor Level
Tree, 12/0.5/10 (Spread/Trunk/Height)	FL	Ground Floor Level
Area Of Undergrowth	GM	Gas Meter
Gate	GV	Gas Valve
IC	HT	Height
Inspection chamber	IC	Inspection Cover
Cover level	LFL	Lower Floor Level
Invert level	MH	Manhole
Pipe invert (diameter)	PARA	Parapet Height
Gully	PP	Power Pole
Back Gully	SFL	Second Floor Level
Beam	SIL	Sewer Inspection Lid
Walls	SP	Sign Post
Door	SV	Stop Valve
Window	SVP	Sewer Vent Pipe
	TD	Top of Door
	TG	Top of Gutter
	TEL	Telecommunications
	TL	Top of Lintel
	TL	Top of Window
	TOF	Top of Fence
	TW	Top of Wall
	UND	Understore Height
	WM	Water Meter
	W-B	Wall to Boundary
	B	Beam Height
	CH	Ceiling Height
	CI	Window Cill Height
	FL	Floor Level
	Hd	Window Head Height
	HT	Height
	TD	Door Height

NOTES:

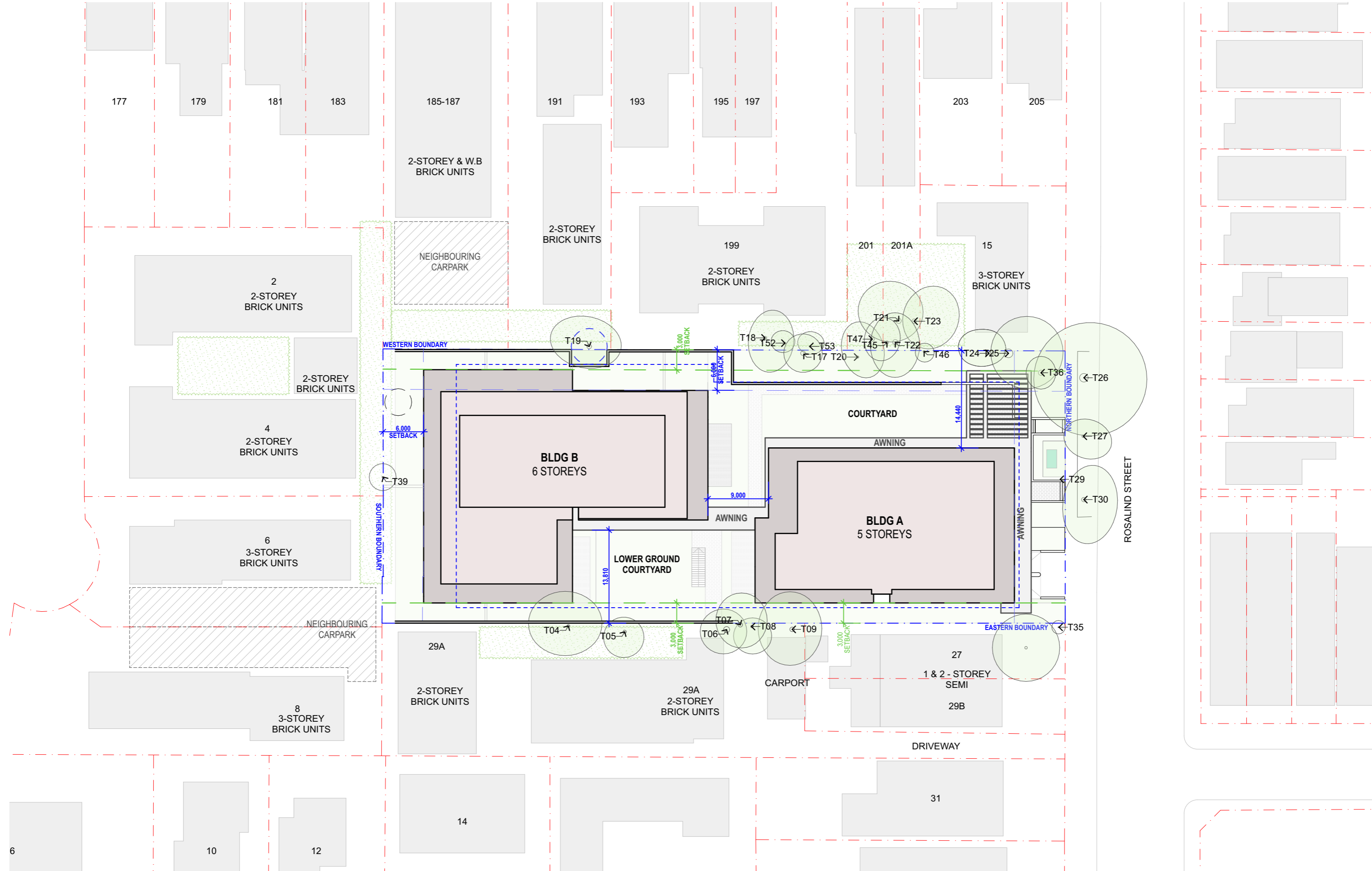
1. ALL DIMENSIONS AND LEVELS SHOULD BE CHECKED ON SITE PRIOR TO DESIGN AND CONSTRUCTION.
2. THIS INFORMATION ON THIS SURVEY IS TO BE USED FOR DA PURPOSES ONLY.
3. IF THERE IS ANY POINT OR FEATURE (A FLOOR LEVEL, WALL POSITION, ROOF OR RIDGE HEIGHT ETC) CRITICAL TO THE PREPARATION OF DESIGN PLANS OR CONSTRUCTION, THAT POINT OR FEATURE SHOULD BE MADE KNOWN TO US SO ITS ACCURACY CAN BE CONFIRMED PRIOR TO THE COMPLETION OF DESIGN PLANS OF COMMENCEMENT OF CONSTRUCTION.
4. SOME STRUCTURES AND FEATURES ARE APPROXIMATE ONLY IF USED FOR DESIGN CONFIRMATION OF ACCURACY SHOULD BE CONFIRMED.
5. FENCES ARE APPROXIMATE ONLY UNLESS SPECIFICALLY DIMENSIONED TO BOUNDARY.
6. SURVEY MARKS MUST BE PLACED PRIOR TO CONSTRUCTION OR ERECTION OF FENCES.
7. FREE INFORMATION HAS BEEN SURVEYED FROM GROUND LEVEL AND THEREFORE SHOULD BE TREATED AS APPROXIMATE ONLY. THE EXENT OF THE CANOPY IS APPROXIMATE AND DIAGRAMMATIC ONLY.
8. STAIR RISES, STEPS AND LANDINGS HAVE NOT BEEN INDIVIDUALLY LOCATED AND ARE DIAGRAMMATIC ONLY.
9. THE RECORDS OF THE SERVICE PROVIDERS HAVE NOT BEEN INVESTIGATED, ONLY THOSE SERVICES THAT ARE VISIBLE AND ACCESSIBLE AT THE DATE OF SURVEY HAVE BEEN SHOWN.
10. SERVICES SHOWN ARE INDICATIVE ONLY. OTHER SERVICES MAY EXIST THAT ARE NOT SHOWN. THEREFORE FIELD CONFIRMATION SERVICE LOCATORS SHOULD BE OBTAINED TO CONFIRM EXACT POSITION AND DEPTH.
11. SITE AREA SHOWN HAS BEEN CALCULATED BY SURVEY.
12. A SITE AND BOUNDARY SURVEY HAS BEEN CARRIED OUT.
13. ORIGIN OF LEVELS IS: FM 14310, RL=87.970 A.H.D.
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PROJECT
 SHOWING SELECTED LEVELS & DETAIL AND BOUNDARY IDENTIFICATION SURVEY OF SP 16181, SP 5218 & SP 4657 BEING 19, 21 & 23 ROSALIND STREET, CAMMERAY

CLIENT	RIVERVUE RESIDENCES	REGISTERED SURVEYOR	PAUL CECHELLERO
LGA	NORTH SYDNEY	ID NUMBER:	757
SCALE	1:100	SIGNATURE	<i>Paul Cechellero</i>
SURVEY DATE	03/02/2023	DRAWN/PAPER SIZE	AR/AO
		DRAWING No.	64452002B
DATE	REV.	AMMENDMENTS	
10/02/23	'A'	FIRST ISSUE	
04/08/25	'B'	ADJOINING BUILDING DETAIL ADDED	



ARCHITECT

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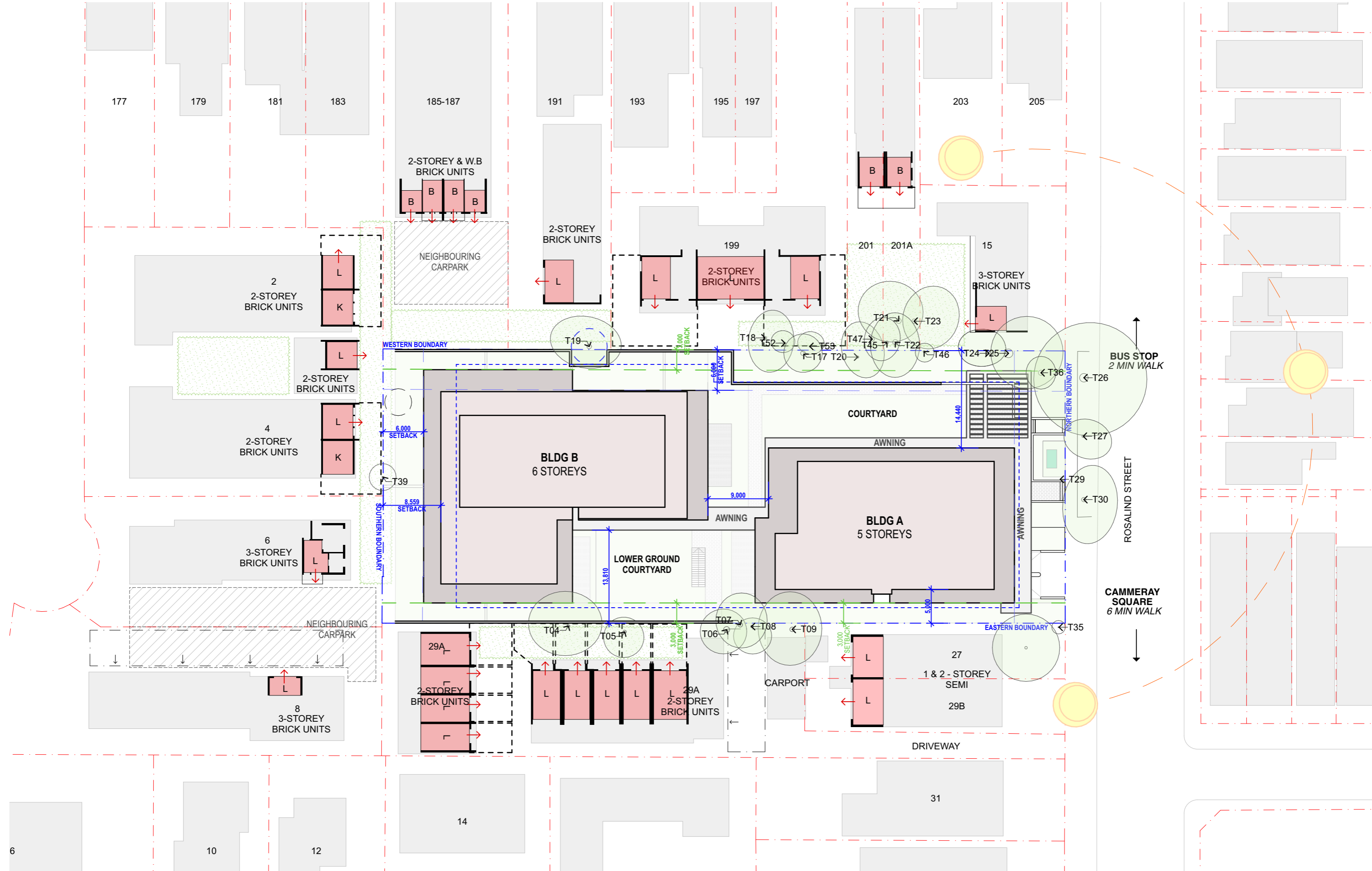
A 15/1/2026 Issue for DA

PROJECT
 19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:500	A3 GA	

DRAWING TITLE
SITE PLAN

DRAWING NUMBER	REVISION
DA-003	A



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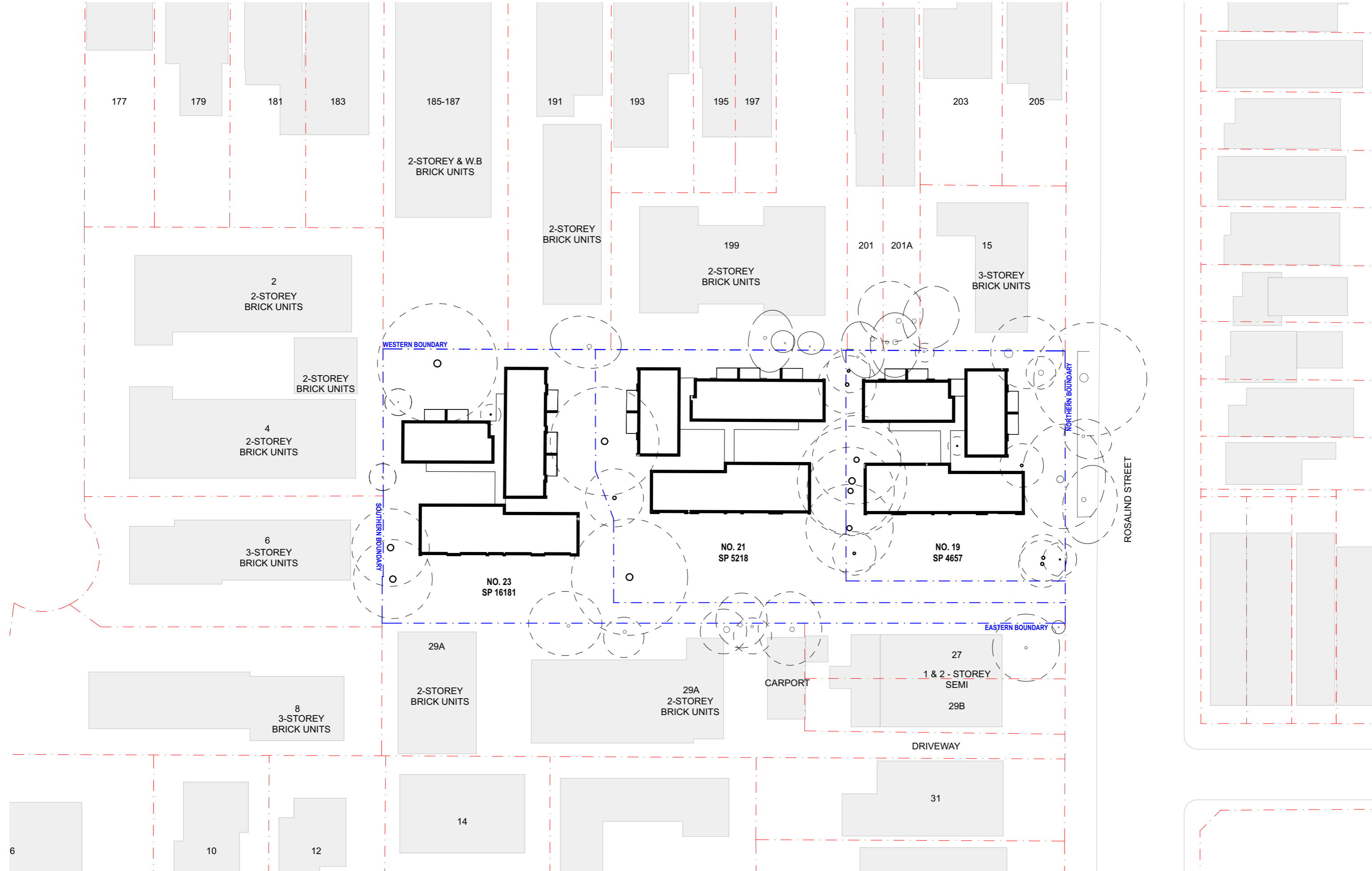
A 15/1/2026 Issue for DA

PROJECT
 19-23 Rosalind Street, Cammeray
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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:500	A3 GA	

DRAWING TITLE
SITE ANALYSIS

DRAWING NUMBER	REVISION
DA-004	A



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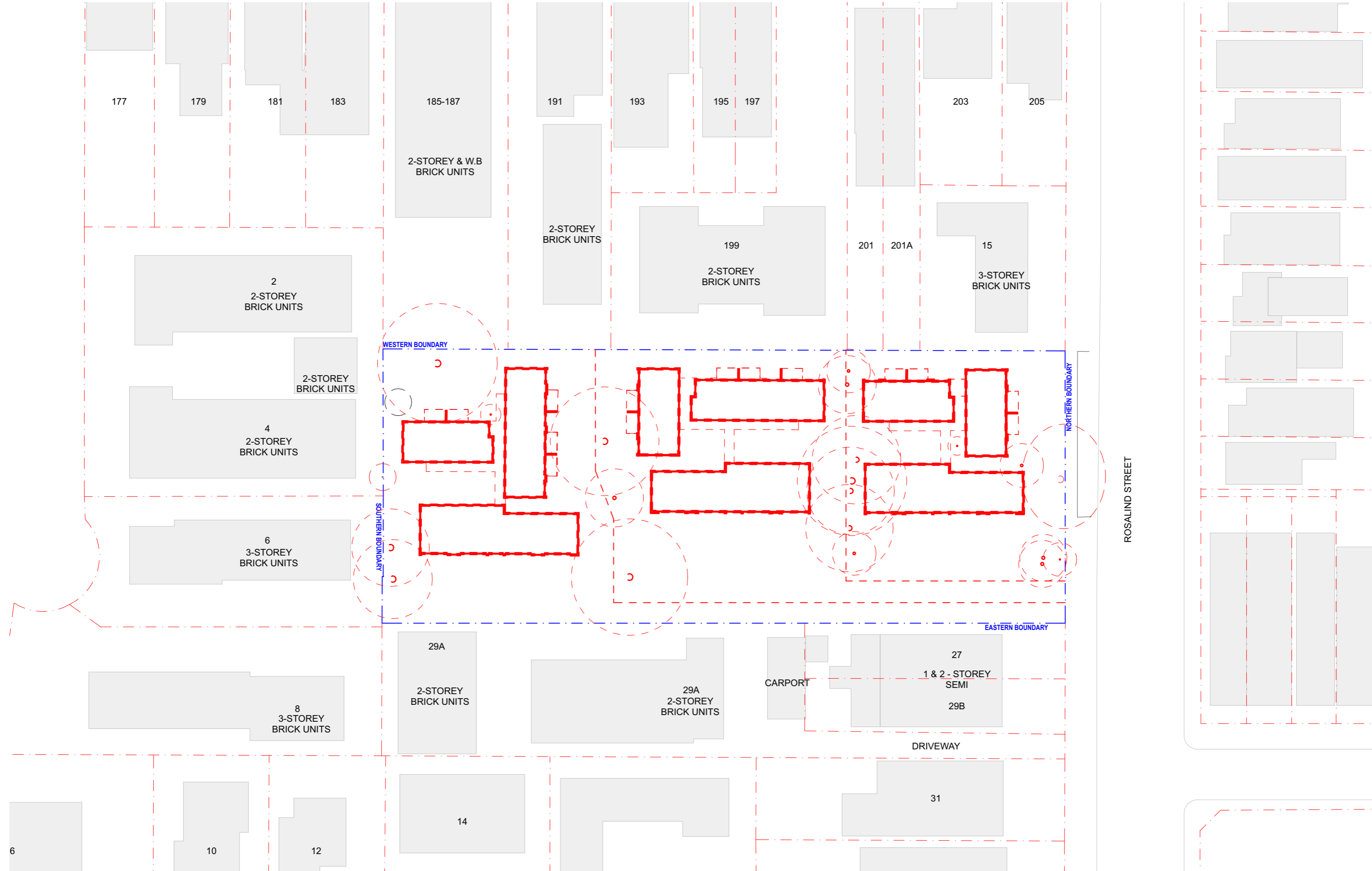
A 15/1/2026 Issue for DA

PROJECT
 19-23 Rosalind Street, Cammeray
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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:500	A3 GA	

DRAWING TITLE
 EXISTING PLAN

DRAWING NUMBER	REVISION
DA-005	A



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PROJECT
 19-23 Rosalind Street, Cammeray
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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:500	A3 GA	

DRAWING TITLE
DEMOLITION PLAN

DRAWING NUMBER	REVISION
DA-006	A

CARPARK SPACES YIELD		
LEVEL	TYPE	QUANTITY
BASEMENT 2	2.4m	27
BASEMENT 2	3.2m	22
BASEMENT 2	AS2890.6	6
		55
BASEMENT 1	2.4m	12
BASEMENT 1	3.2m	11
BASEMENT 1	AS2890.6	4
		27
		82



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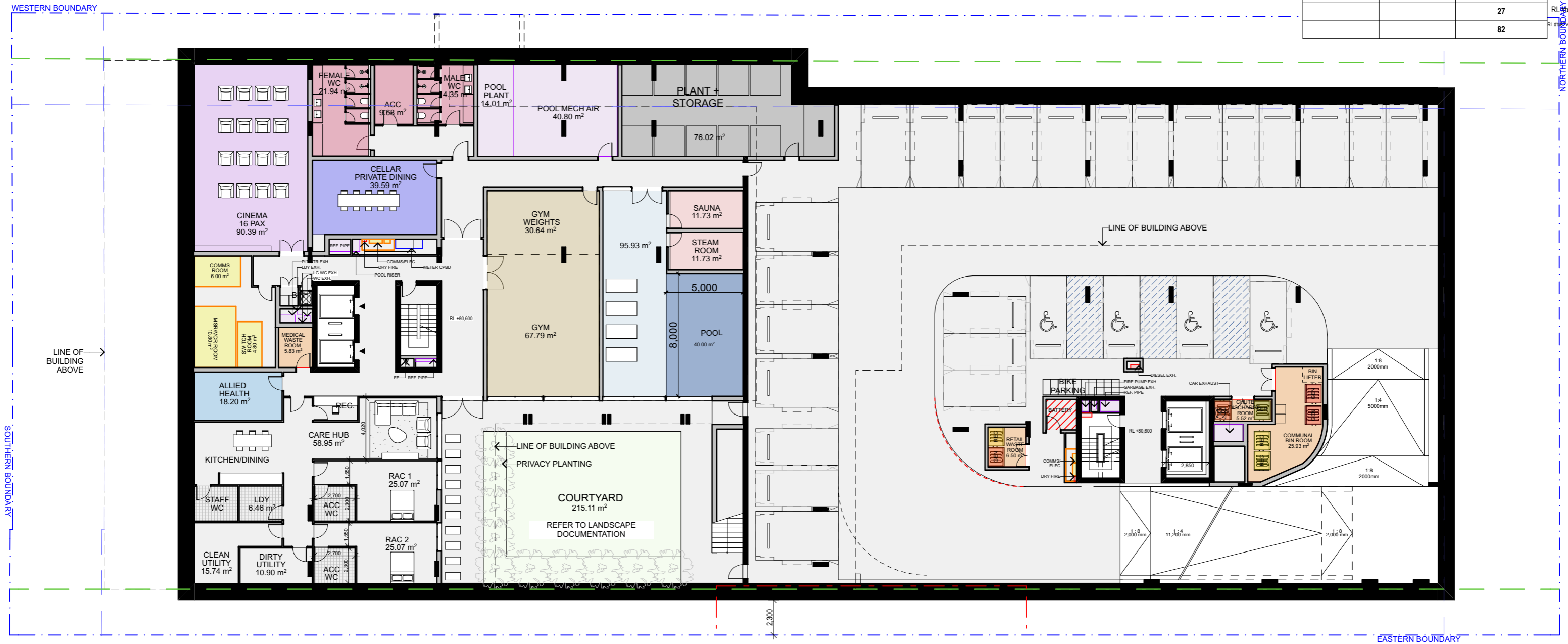
PROJECT
 19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:250	A3 GA	

DRAWING TITLE
BASEMENT 2 - PROPOSED PLAN

DRAWING NUMBER	REVISION
DA-100	A

CARPARK SPACES YIELD		
LEVEL	TYPE	QUANTITY
BASEMENT 2	2.4m	27
BASEMENT 2	3.2m	22
BASEMENT 2	AS2890.6	6
		55
BASEMENT 1	2.4m	12
BASEMENT 1	3.2m	11
BASEMENT 1	AS2890.6	4
		27
		82



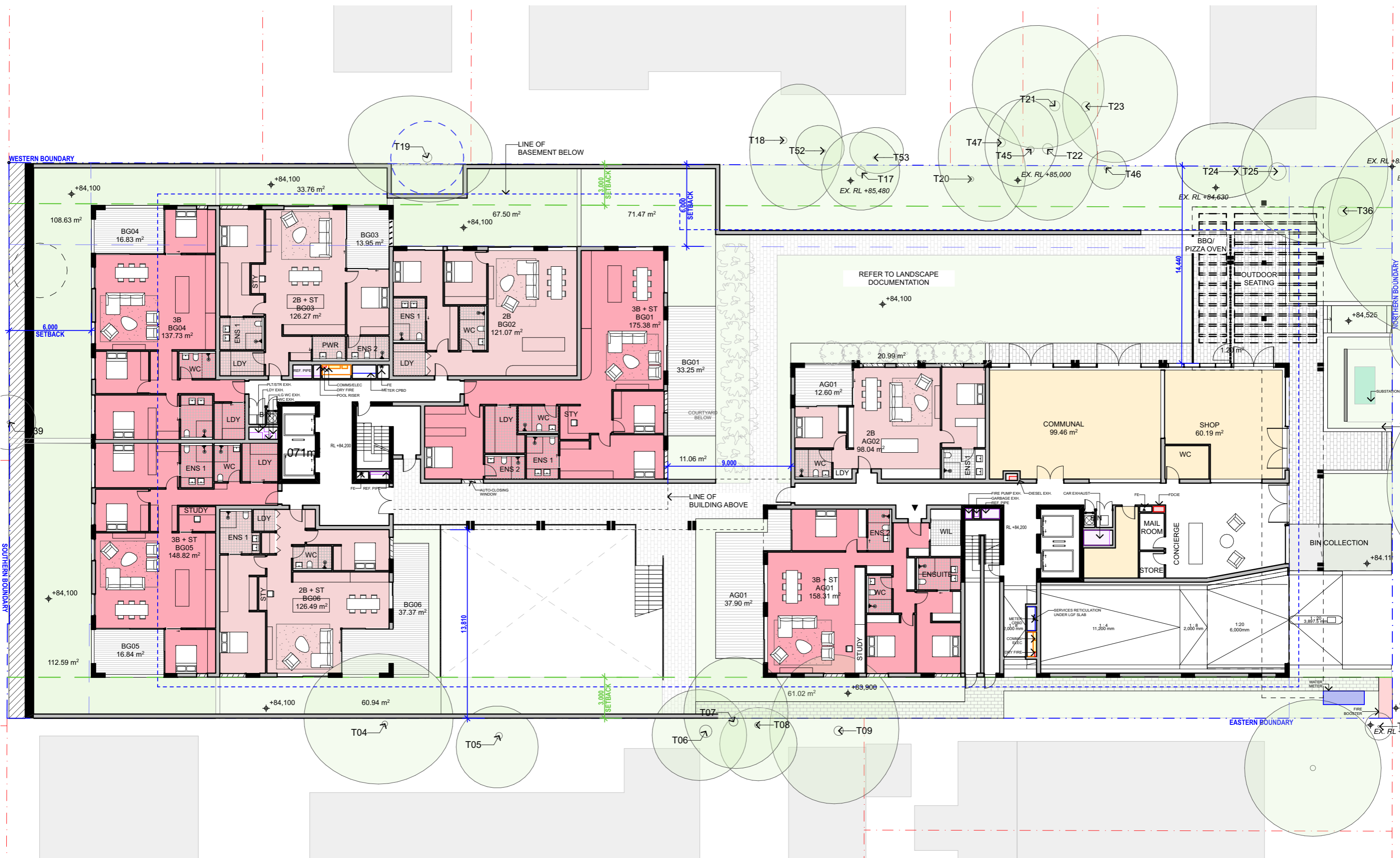
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PROJECT
 19-23 Rosalind Street, Cammeray
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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:250	A3 GA	

DRAWING TITLE
LOWER GROUND - PROPOSED PLAN
 DRAWING NUMBER
 DA-101
 REVISION
 A



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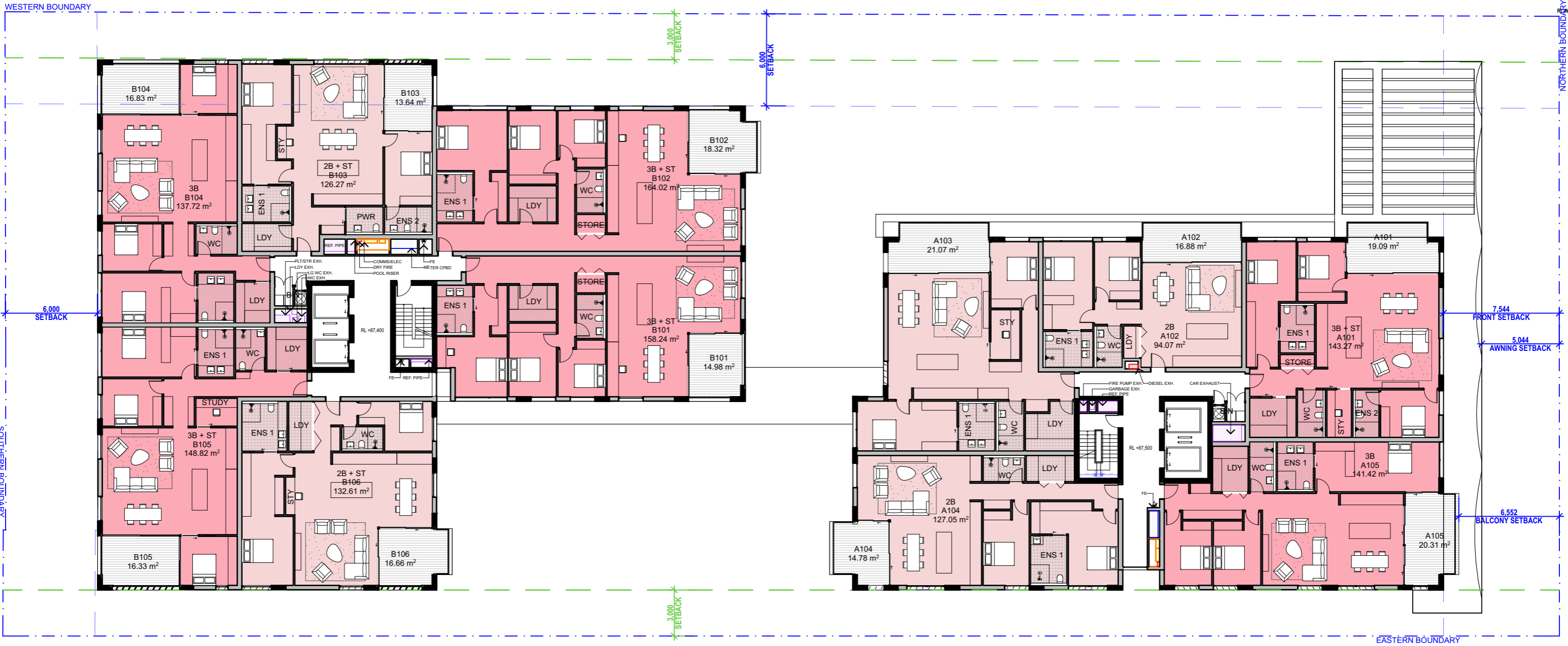
A 15/1/2026 Issue for DA

PROJECT
19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:250	A3 GA	

DRAWING TITLE
GROUND - PROPOSED PLAN

DRAWING NUMBER	REVISION
DA-102	A



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PROJECT

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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:250	A3 GA

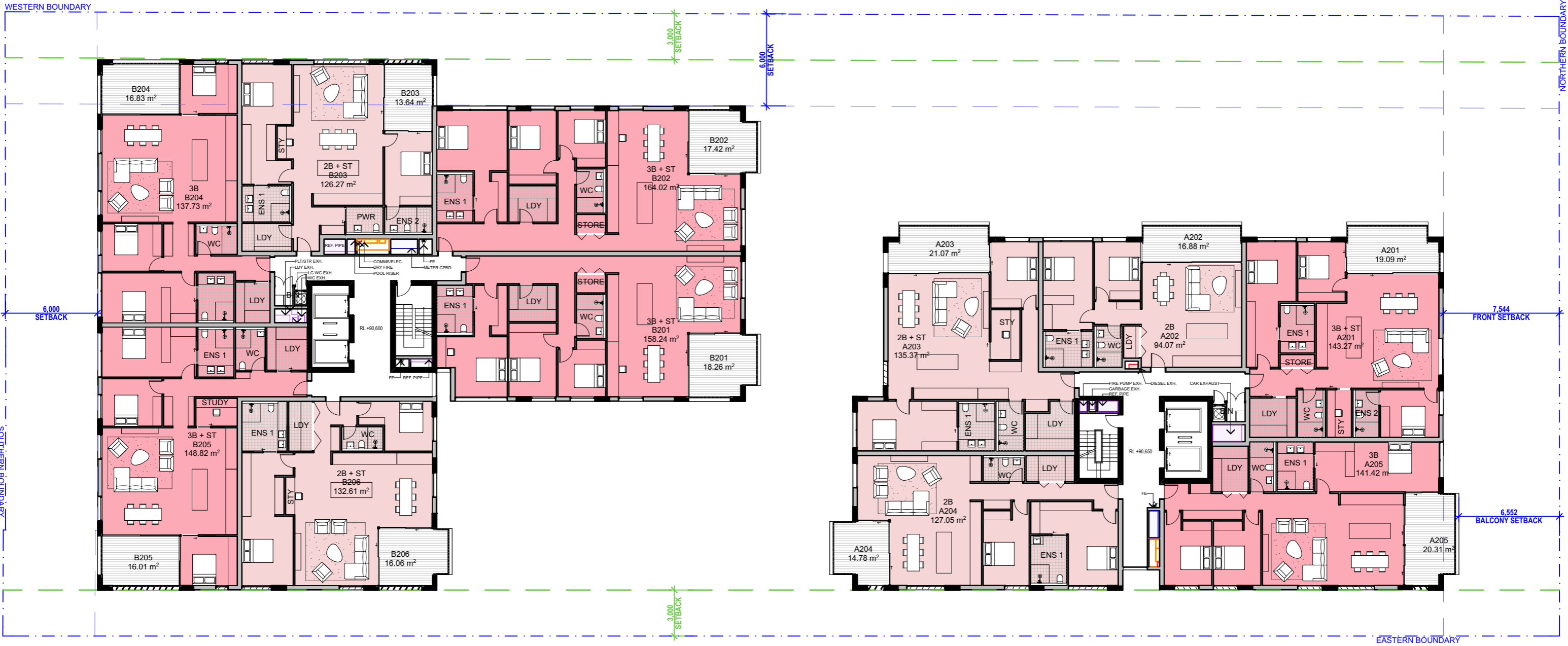
NORTH

DRAWING TITLE

LEVEL 1 - PROPOSED PLAN

DRAWING NUMBER
DA-103

REVISION
A



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PROJECT

19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:250	A3 GA

NORTH



DRAWING TITLE

LEVEL 2 - PROPOSED PLAN

DRAWING NUMBER
DA-104

REVISION
A



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PROJECT

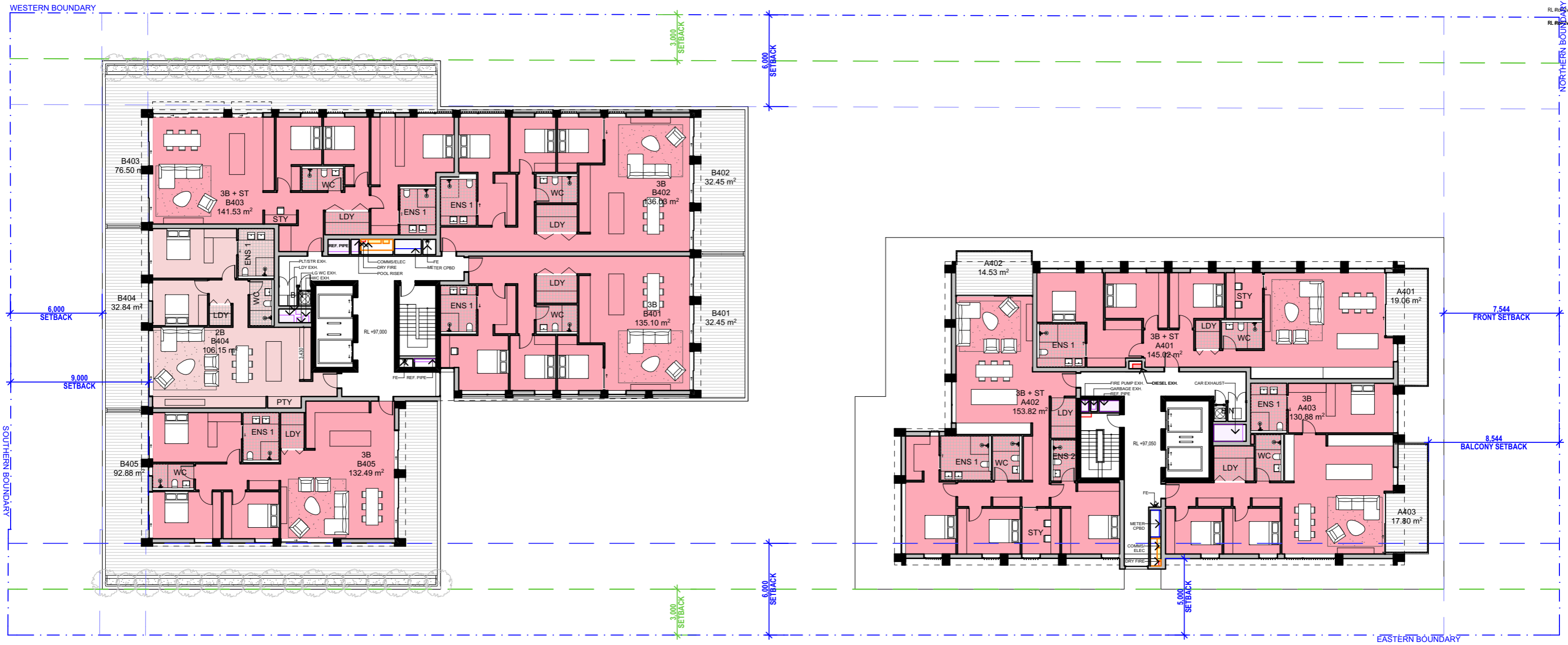
19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:250	A3 GA	

DRAWING TITLE

LEVEL 3 - PROPOSED PLAN

DRAWING NUMBER	REVISION
DA-105	A



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PROJECT

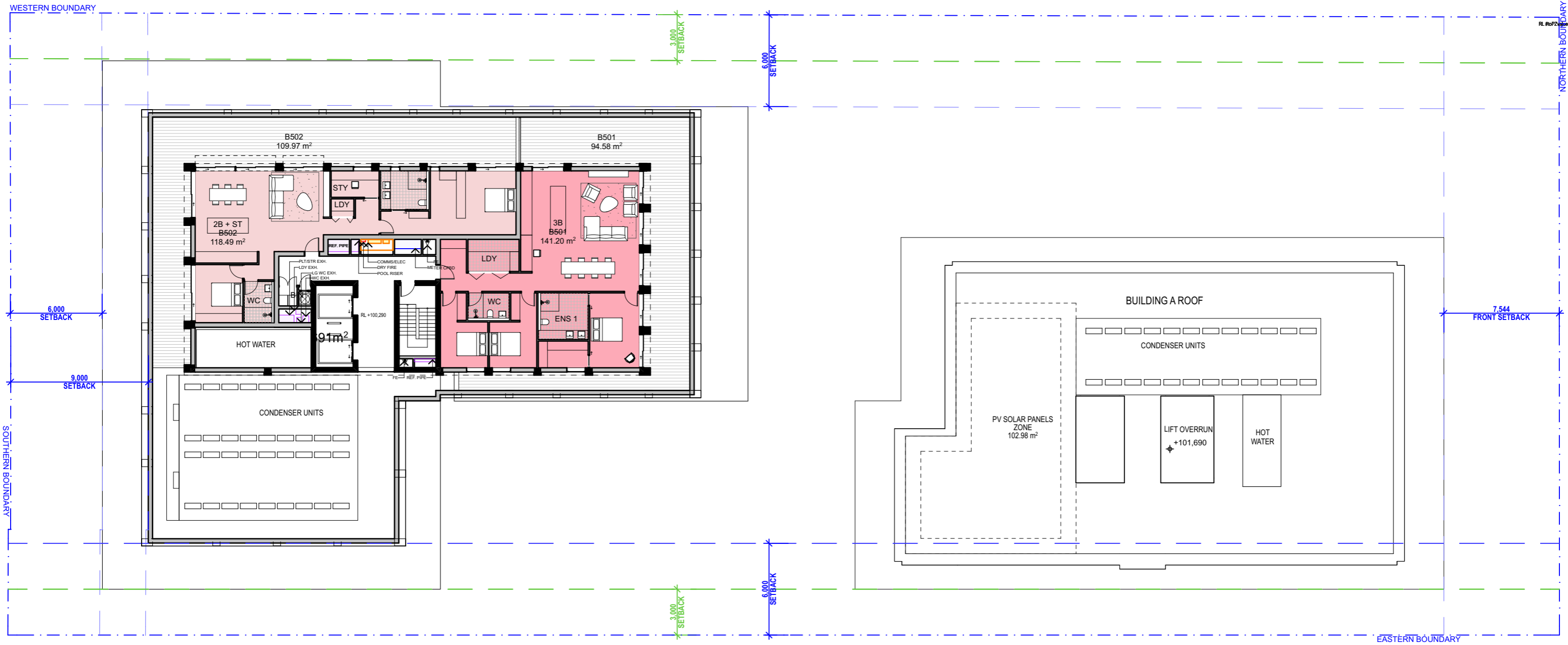
19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:250	A3 GA	

DRAWING TITLE

LEVEL 4 - PROPOSED PLAN

DRAWING NUMBER	REVISION
DA-106	A



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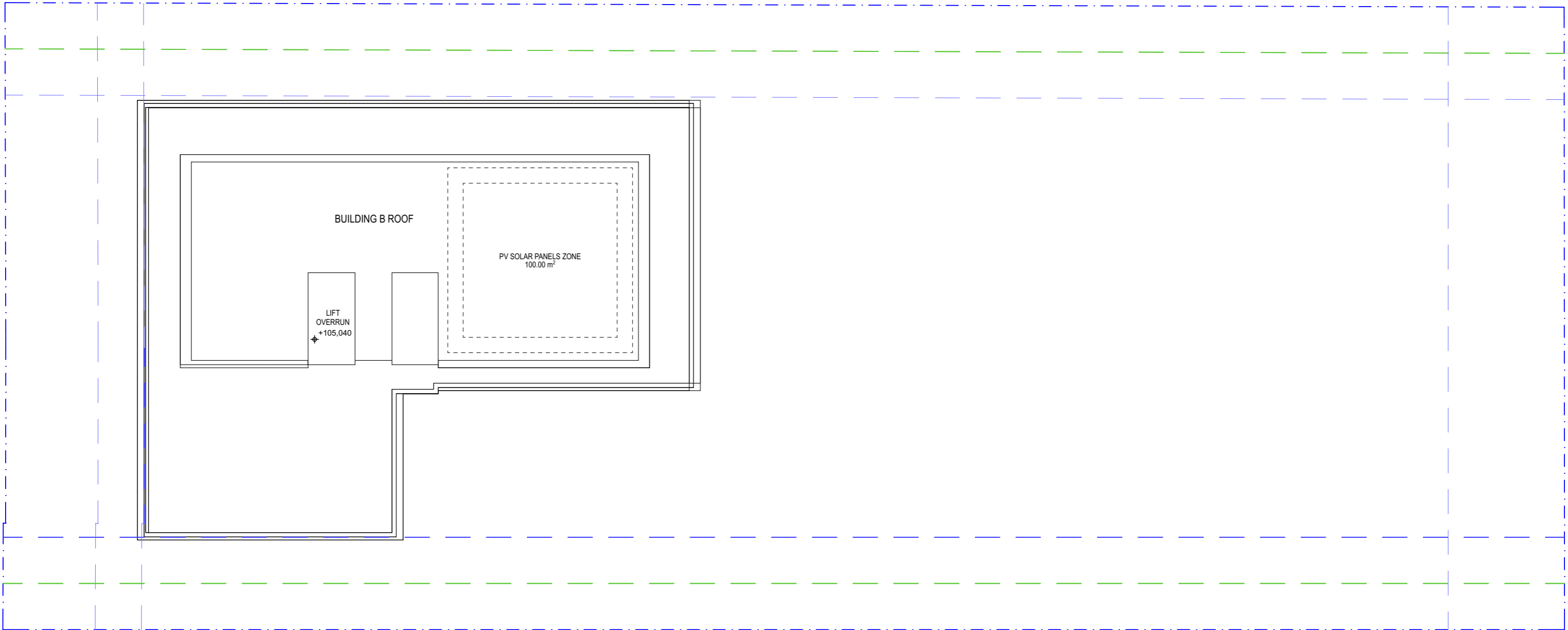
A 15/1/2026 Issue for DA

PROJECT
 19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:250	A3 GA	

DRAWING TITLE
LEVEL 5 - PROPOSED PLAN

DRAWING NUMBER	REVISION
DA-107	A



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A | 15/1/2026 | Issue for DA

PROJECT

19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:250	A3 GA



DRAWING TITLE

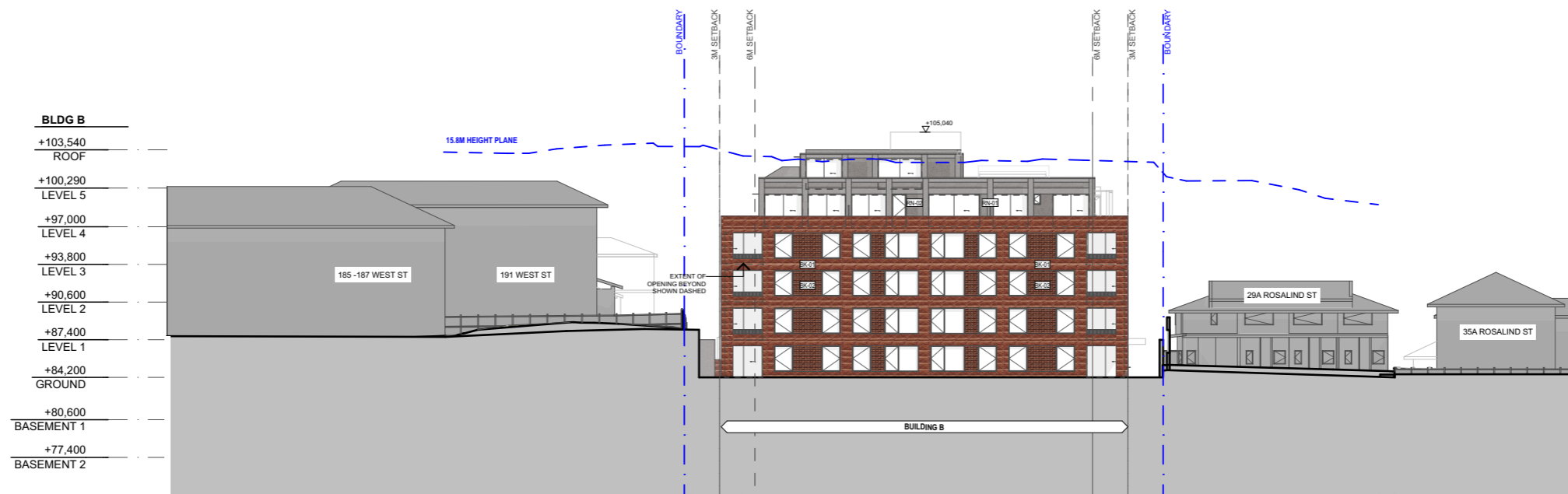
ROOF - PROPOSED PLAN

DRAWING NUMBER	REVISION
DA-108	A



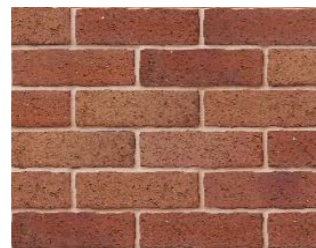
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NORTH ELEVATION
1:500



2
-

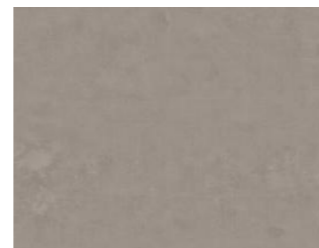
SOUTH ELEVATION
1:500



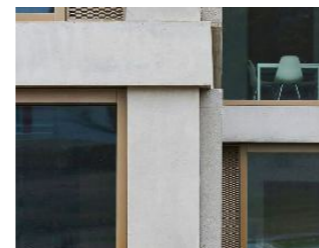
BK-01
RED BRICK
TINTED MORTAR



BK-02
RED BRICK
TINTED MORTAR
LINEAR RECESS



CN-01
CONCRETE
WARM GREY



RN-01
STO RENDER SMOOTH
LIGHT GREY



RN-02
STO RENDER TEXTURED
WARM/DARK GREY

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257 187 NOMINATED ARCHITECT T/A ROYAL FIGHERA 6565 STEVEN FIGHERA 6569
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A 15/1/2026 Issue for DA

PROJECT

19-23 Rosalind Street, Cammeray
19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE	NORTH
25023	15/01/26	KN/WD	MG	1:500	A3 GA	

DRAWING TITLE

ELEVATIONS

DRAWING NUMBER
DA-200

REVISION
A



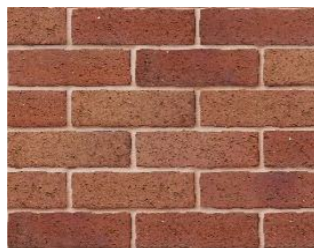
WEST ELEVATION
1:500

1
-



EAST ELEVATION
1:500

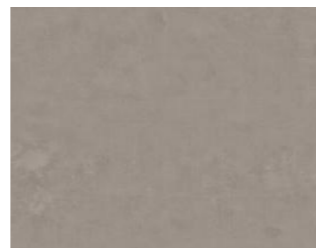
2
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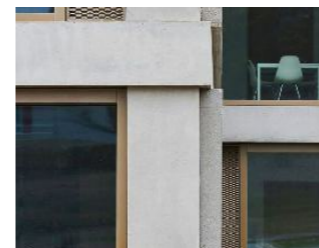
BK-01
RED BRICK
TINTED MORTAR



BK-02
RED BRICK
TINTED MORTAR
LINEAR RECESS



CN-01
CONCRETE
WARM GREY



RN-01
STO RENDER SMOOTH
LIGHT GREY



RN-02
STO RENDER TEXTURED
WARM/DARK GREY

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15/1/2026

Issue for DA

PROJECT

19-23 Rosalind Street, Cammeray
19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER

25023

PLOT DATE

15/01/26

DRAWN

KN/WD

CHECKED

MG

SHEET SCALE

1:500

SHEET SIZE

A3 GA

NORTH

⊕

DRAWING TITLE

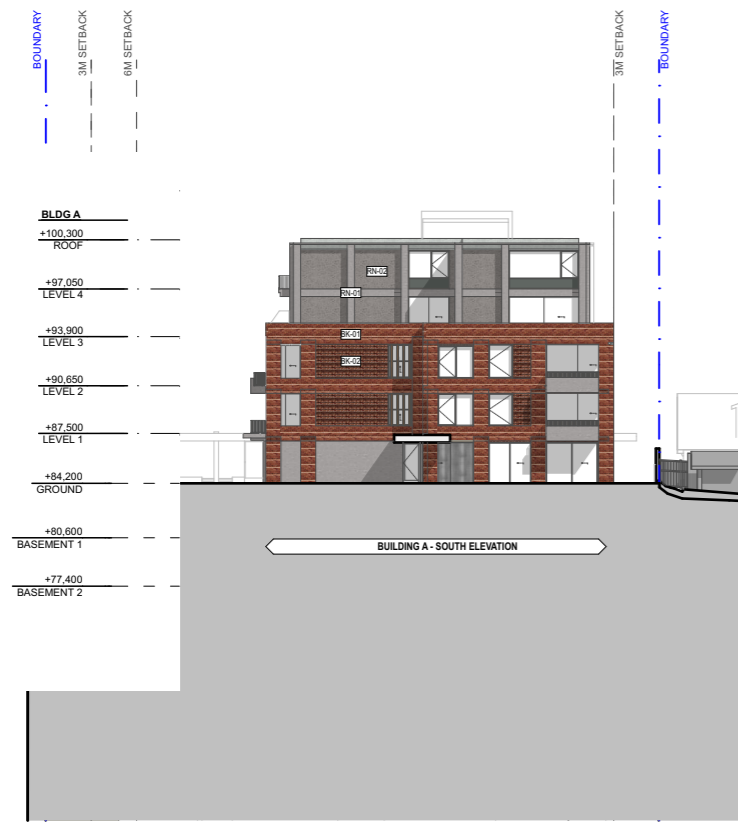
ELEVATIONS

DRAWING NUMBER

DA-201

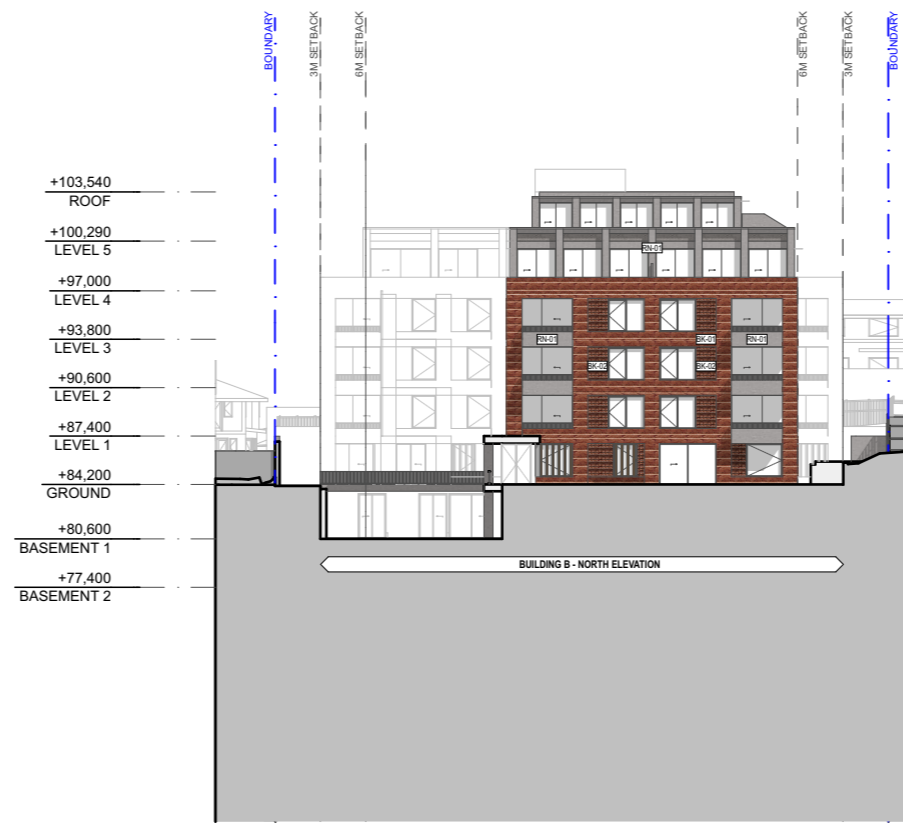
REVISION

A



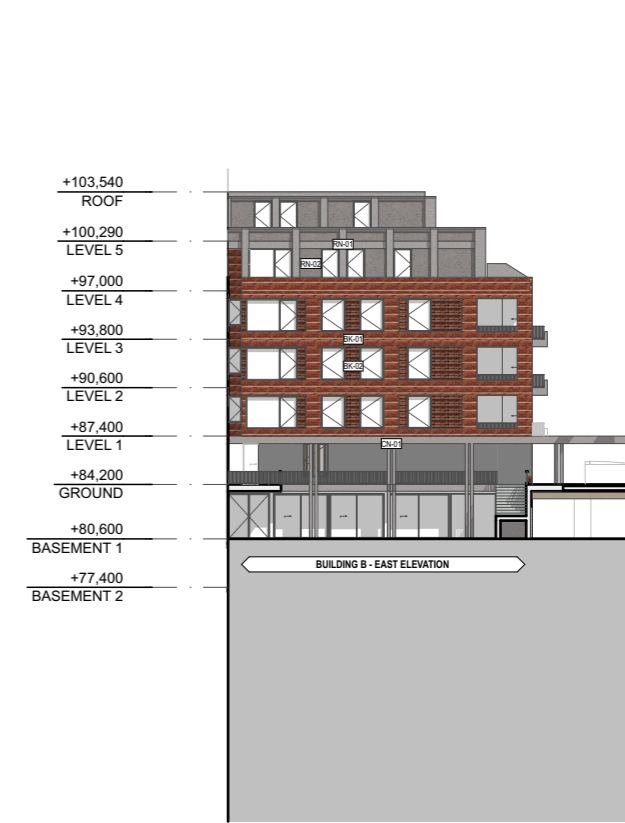
1
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SOUTH ELEVATION
1:500



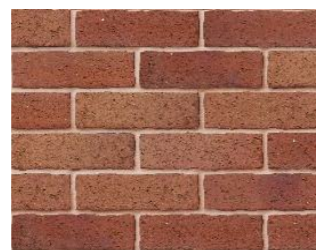
2
-

NORTH ELEVATION
1:500



3
-

EAST ELEVATION
1:500



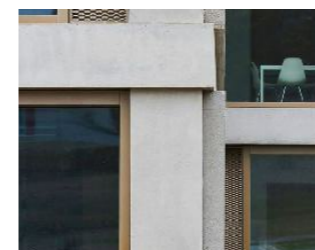
BK-01
RED BRICK
TINTED MORTAR



BK-02
RED BRICK
TINTED MORTAR
LINEAR RECESS



CN-01
CONCRETE
WARM GREY



RN-01
STO RENDER SMOOTH
LIGHT GREY



RN-02
STO RENDER TEXTURED
WARM/DARK GREY

ARCHITECT

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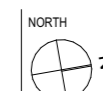
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PROJECT
19-23 Rosalind Street, Cammeray
19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

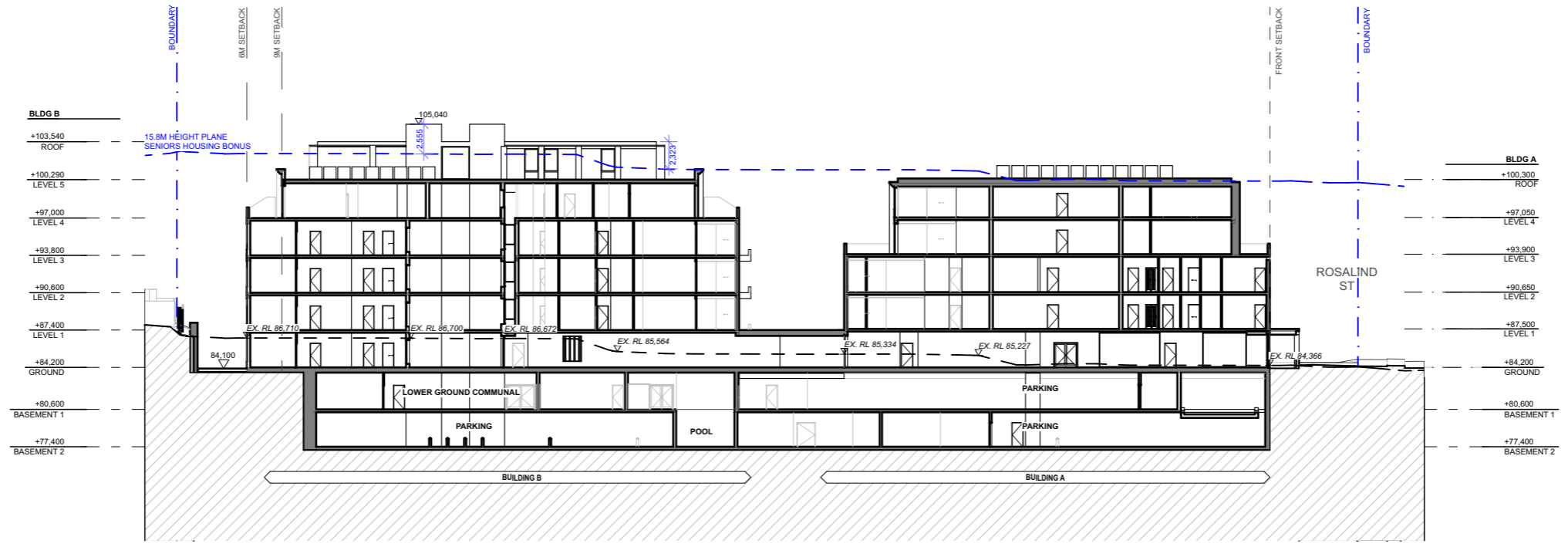
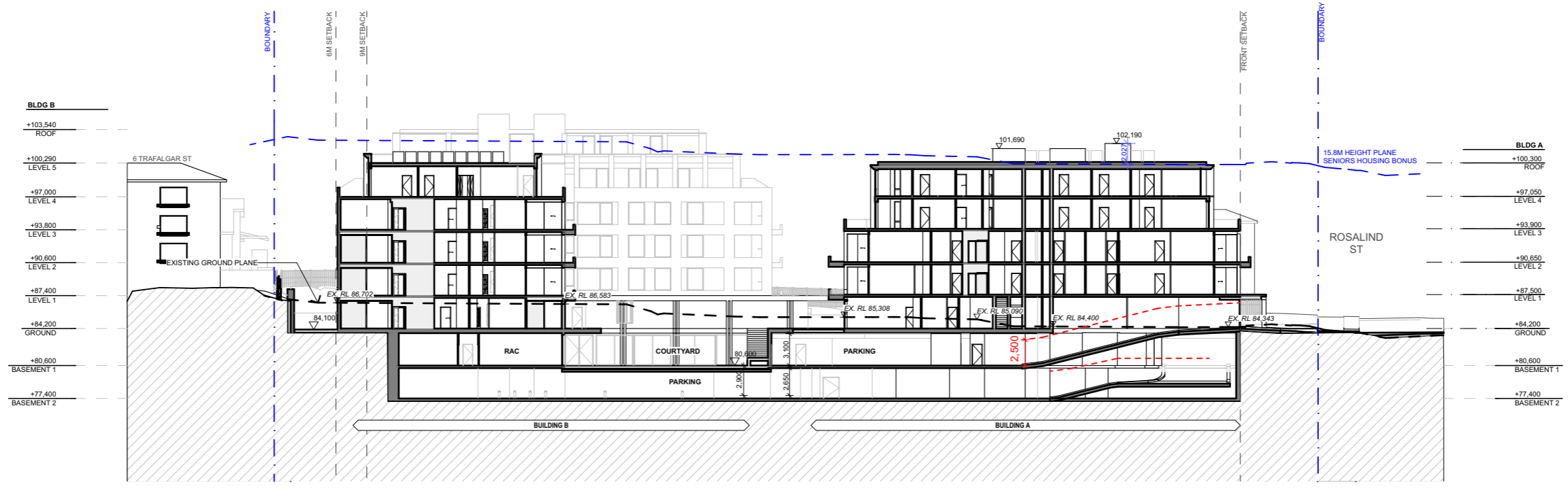
SHEET SCALE	SHEET SIZE
1:500	A3 GA



DRAWING TITLE
ELEVATIONS

DRAWING NUMBER
DA-202

REVISION
A

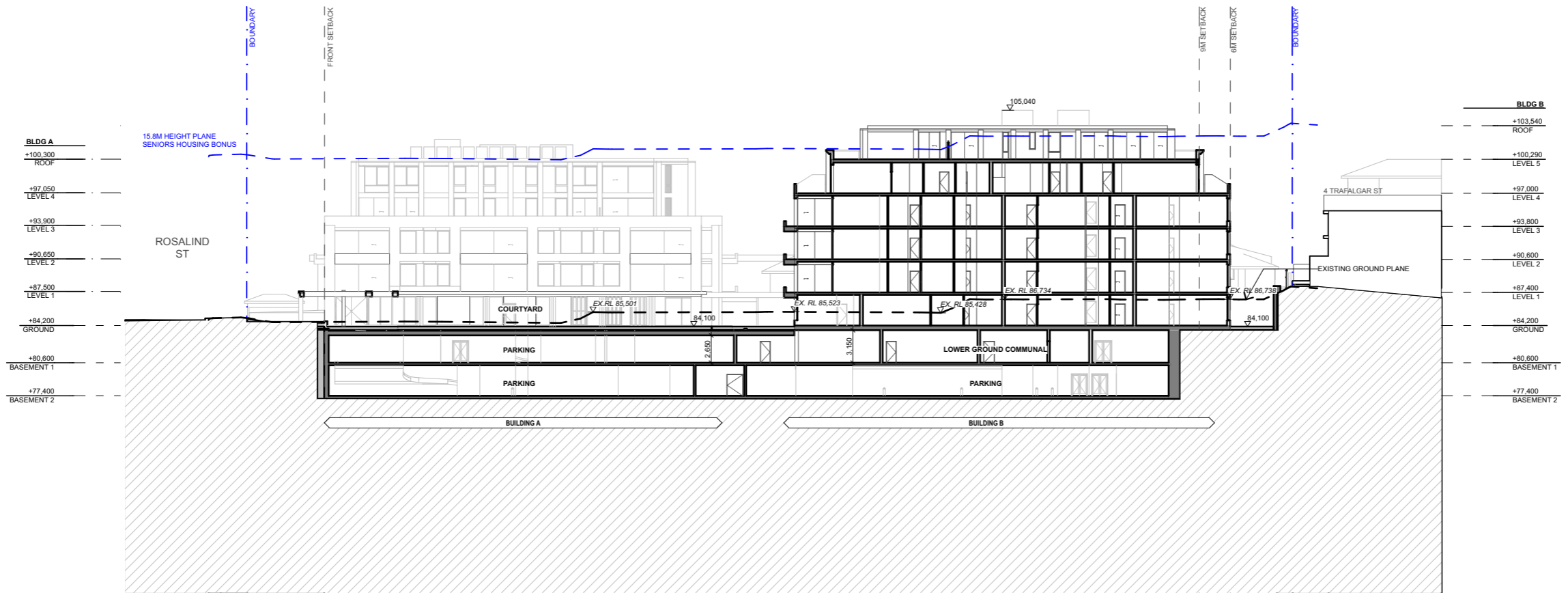


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PROJECT 19-23 Rosalind Street, Cammeray 19-23 Rosalind Street, Cammeray, NSW 2062				DRAWING TITLE SECTIONS	
PROJECT NUMBER 25023	PLOT DATE 15/01/26	DRAWN KN/WD	CHECKED MG	SHEET SCALE 1:500	SHEET SIZE A3 GA
NORTH				DRAWING NUMBER DA-300	

REVISION
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A 15/1/2026 Issue for DA

PROJECT
 19-23 Rosalind Street, Cammeray
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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:500	A3 GA

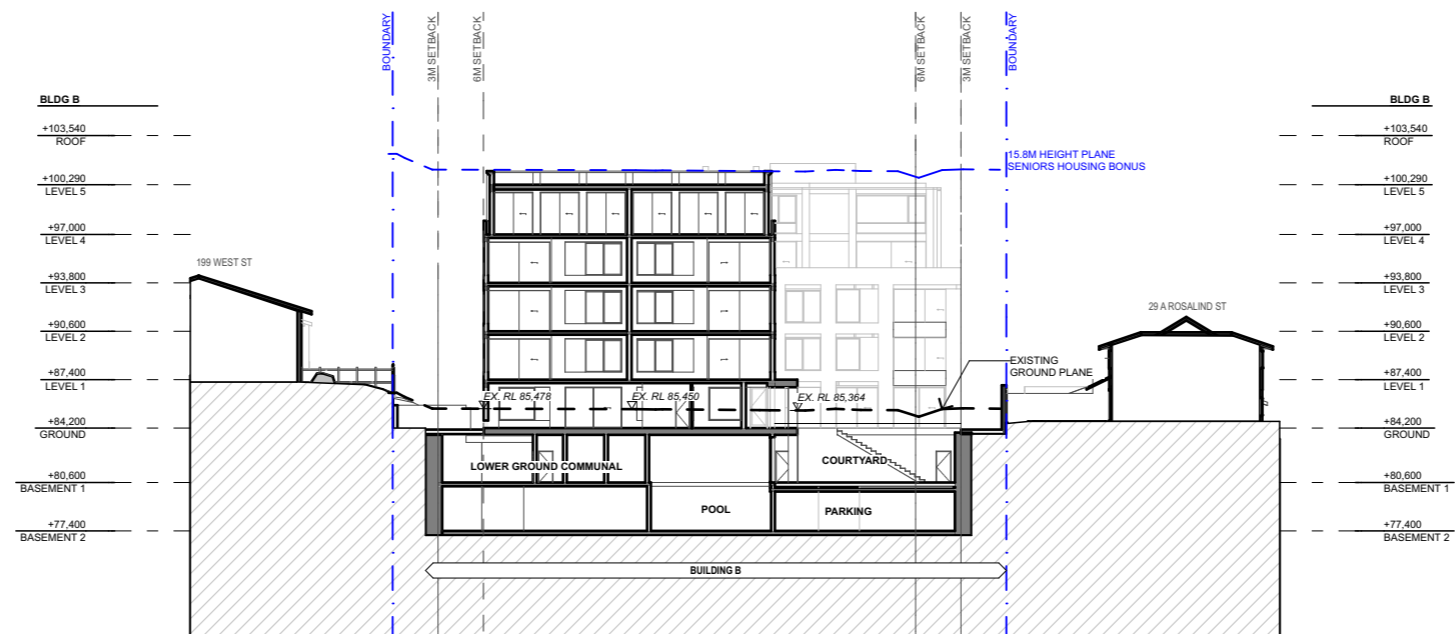
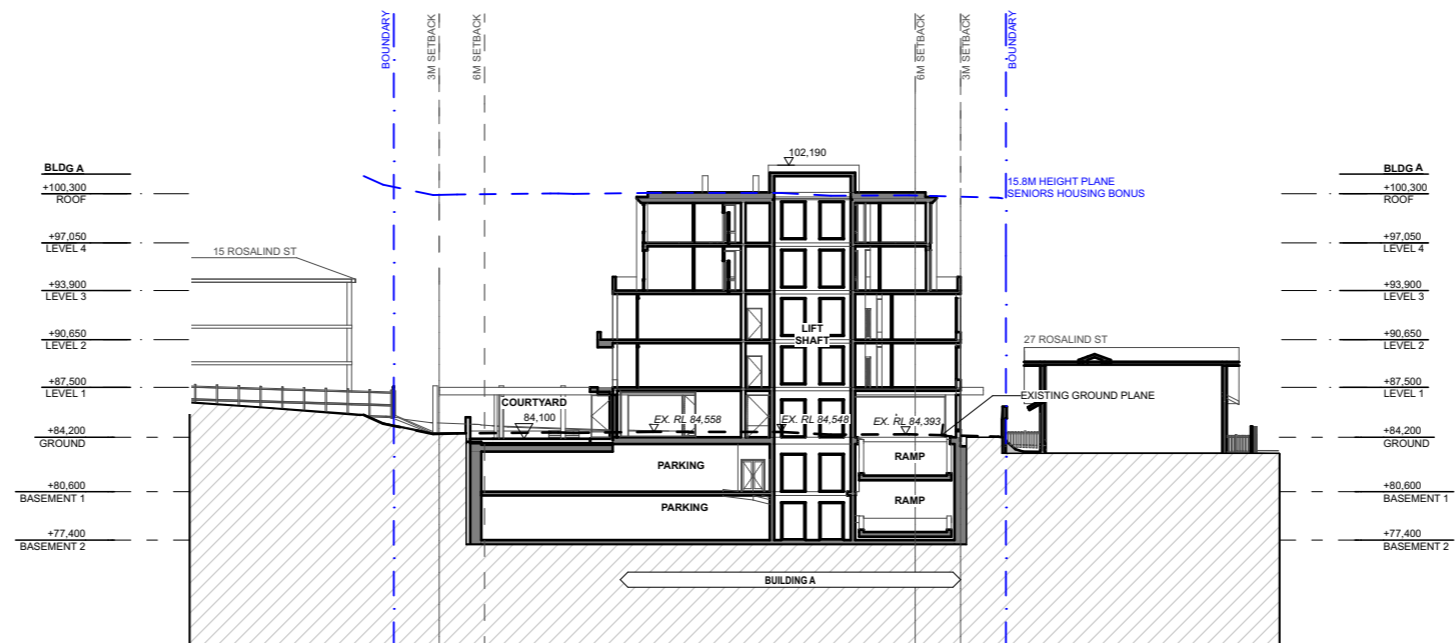
NORTH

DRAWING TITLE

SECTIONS

DRAWING NUMBER
DA-301

REVISION
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PROJECT

19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:500	A3 GA

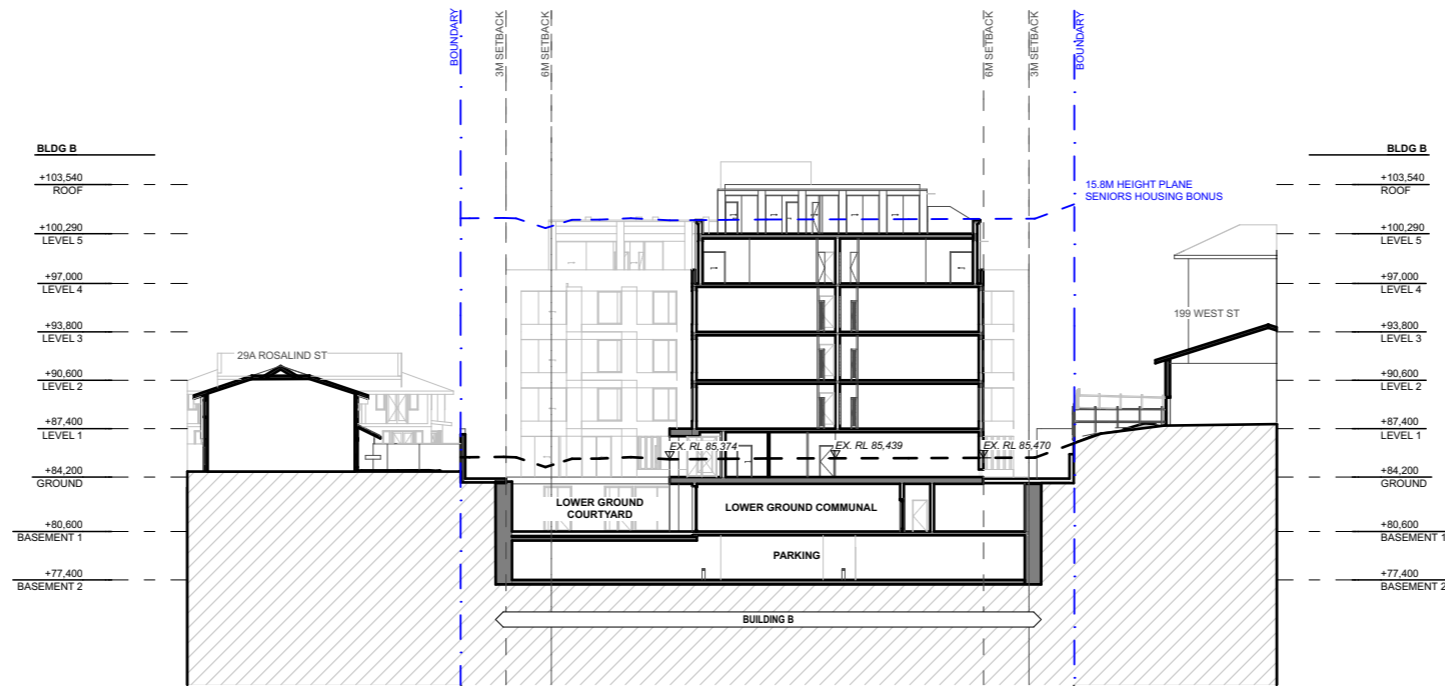
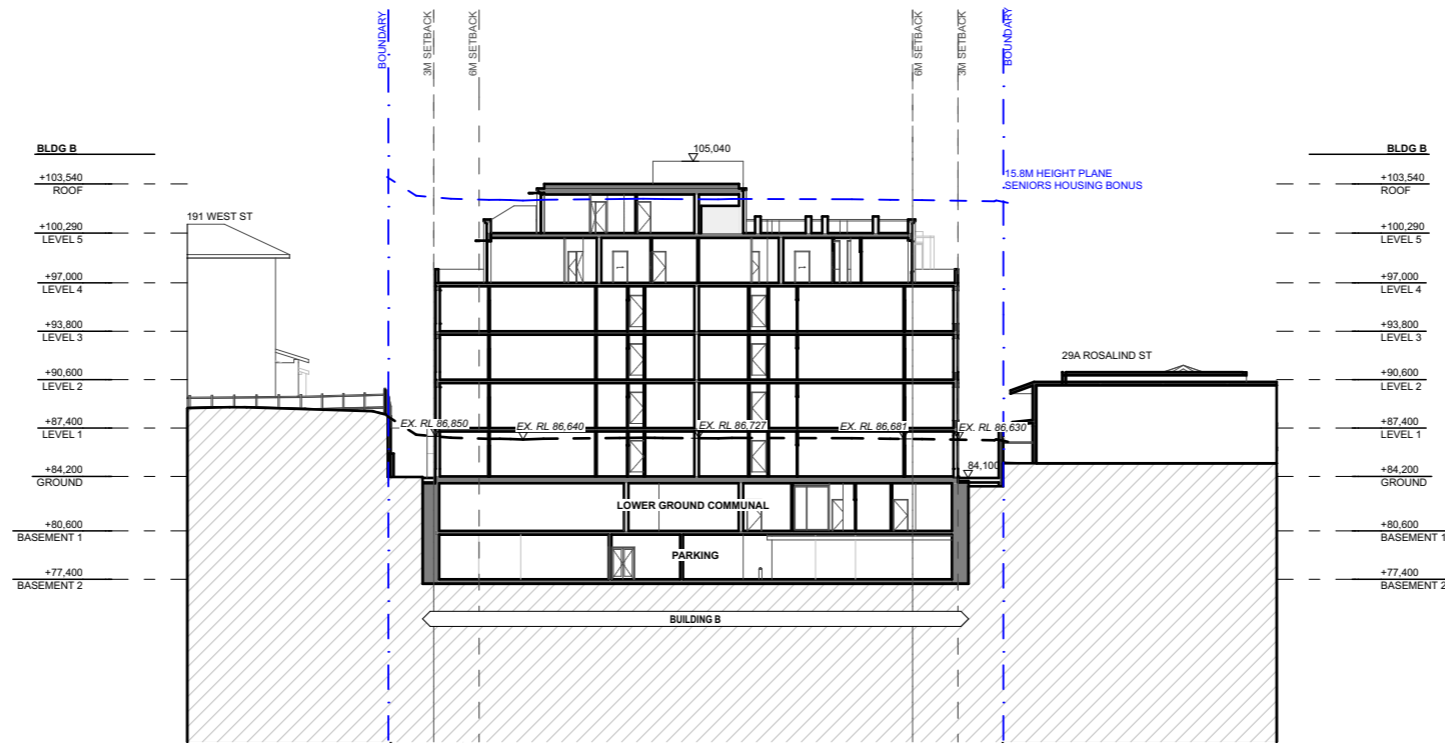


DRAWING TITLE

SECTIONS

DRAWING NUMBER
DA-302

REVISION
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PROJECT

19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:500	A3 GA

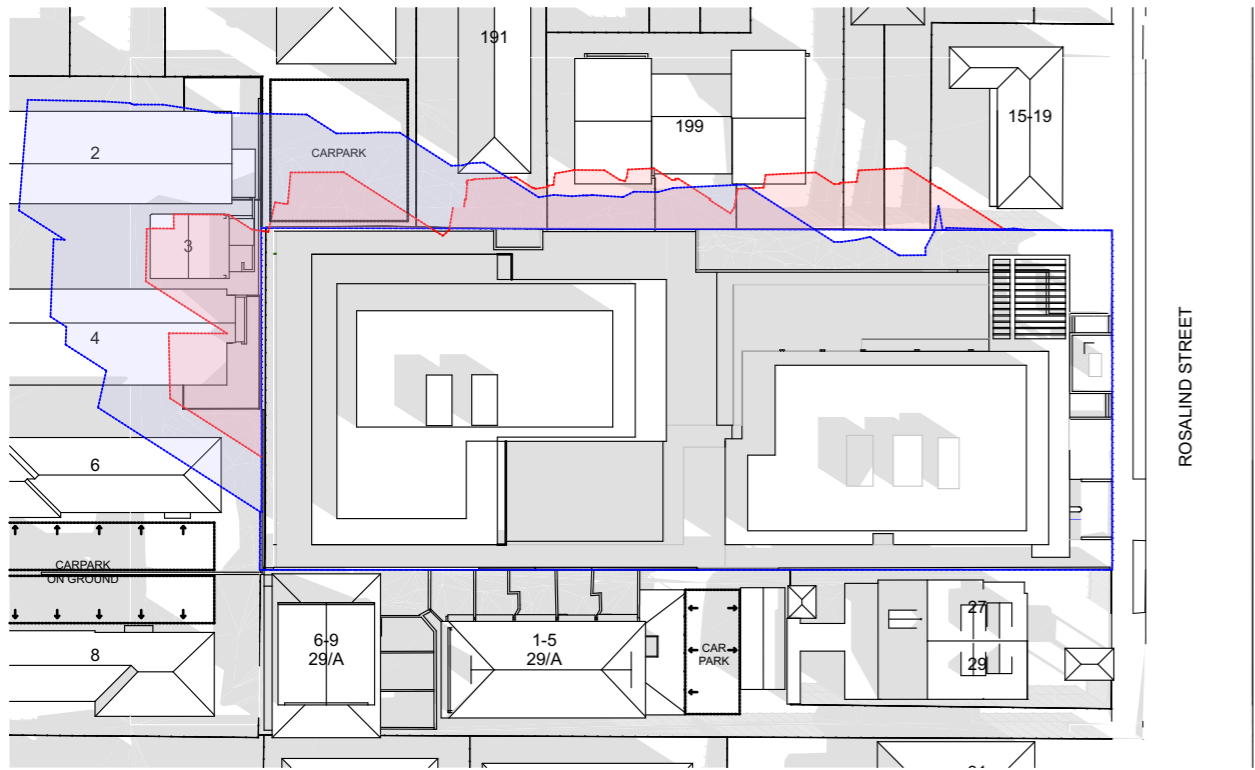
NORTH

DRAWING TITLE

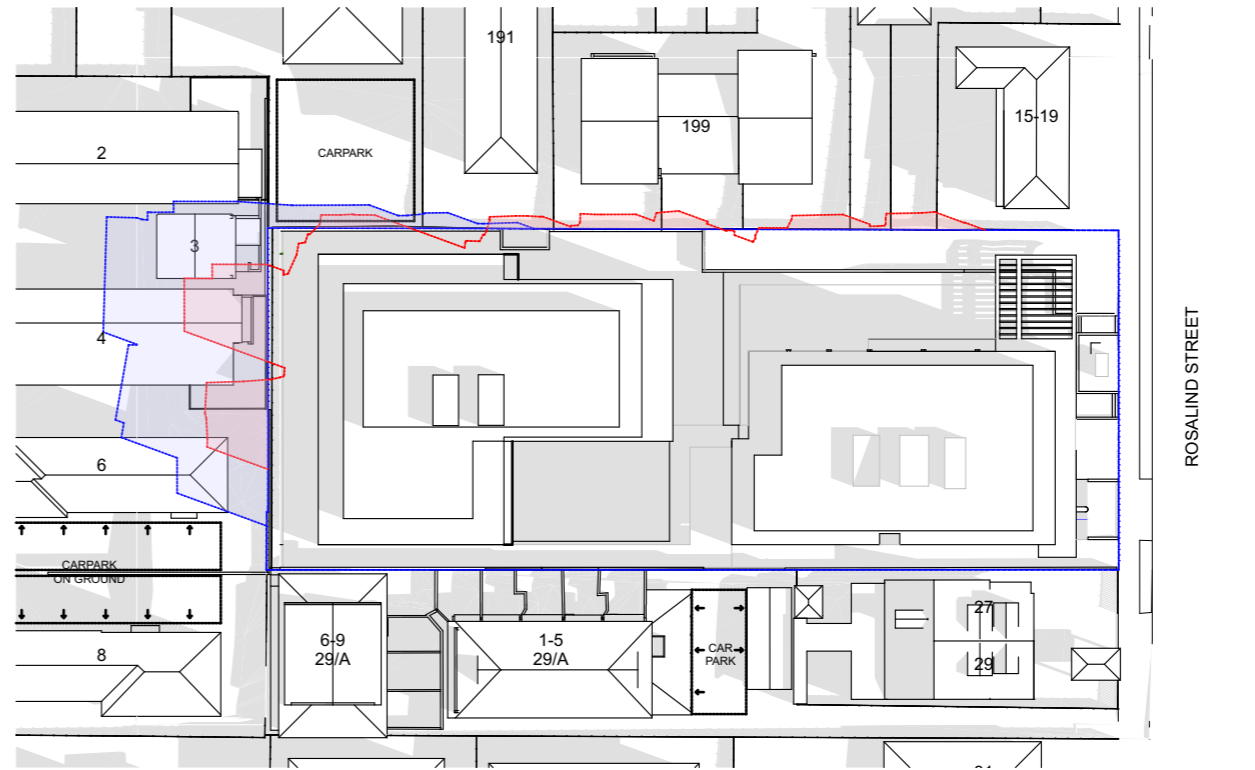
SECTIONS

DRAWING NUMBER
DA-303

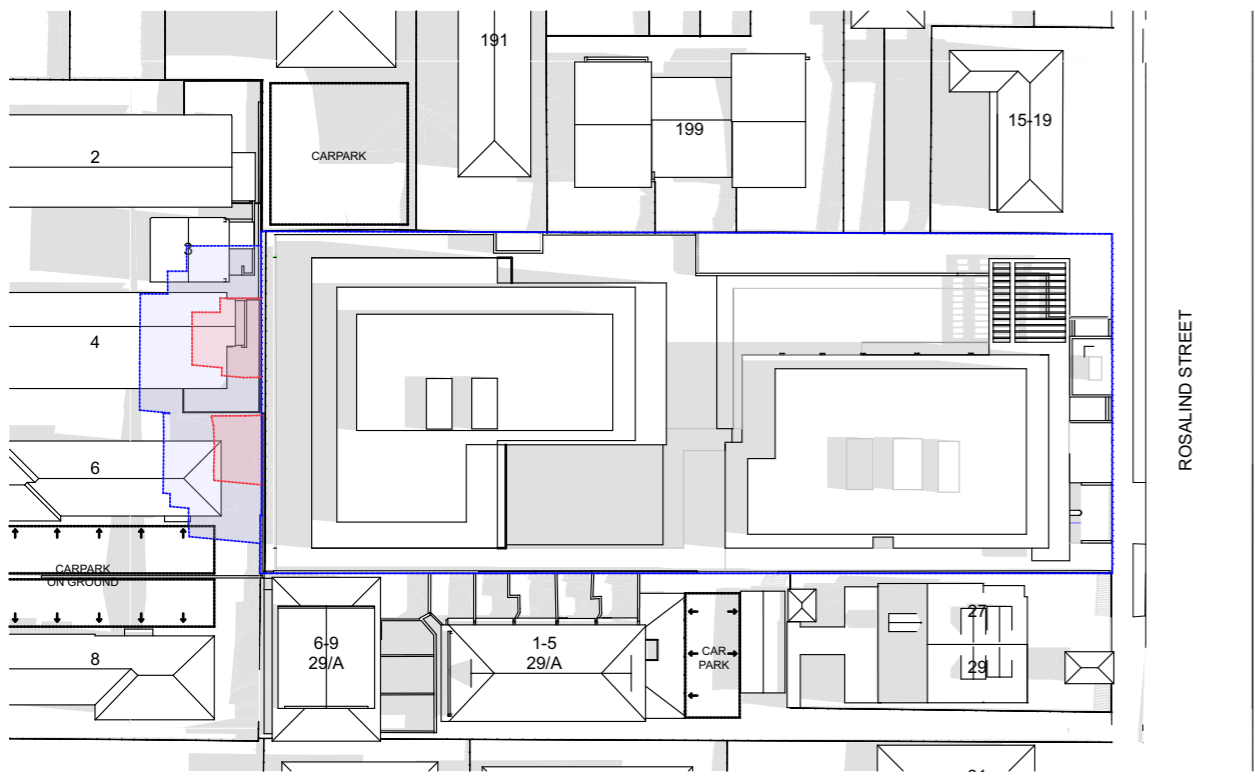
REVISION
A



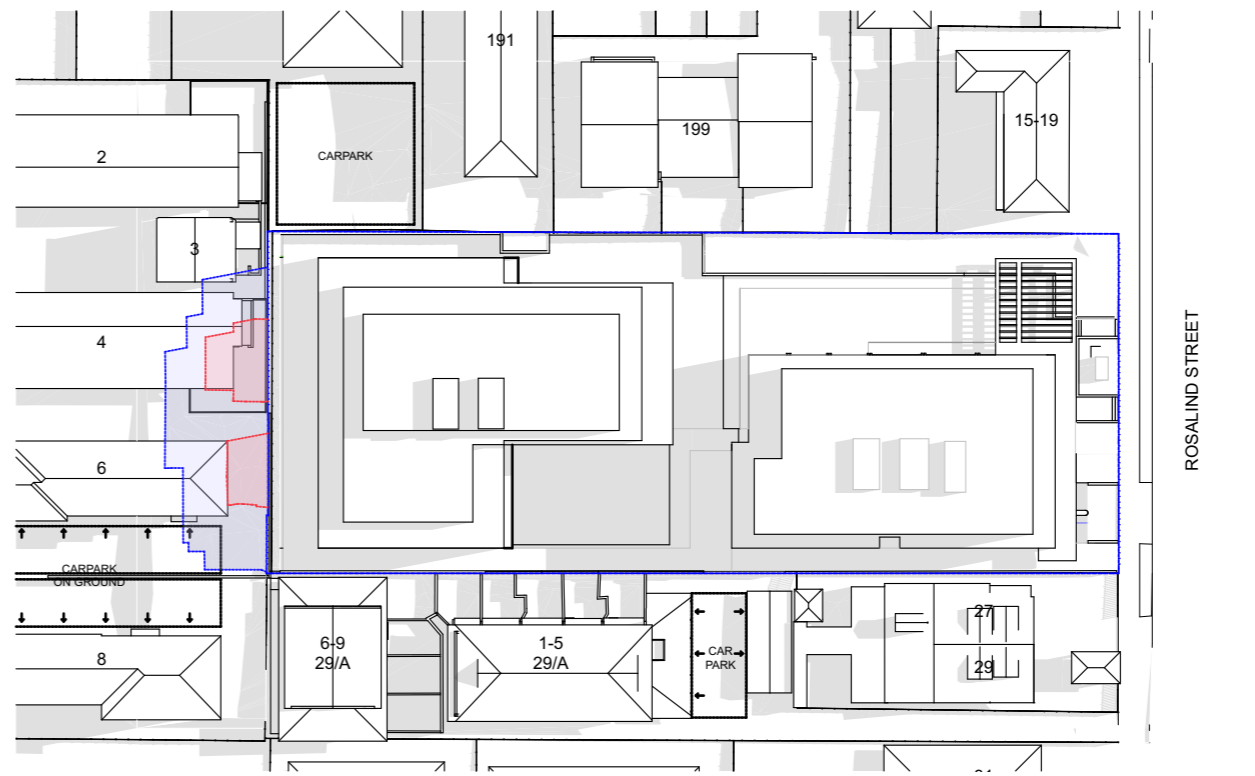
1 9AM - PROPOSED



2 10AM - PROPOSED

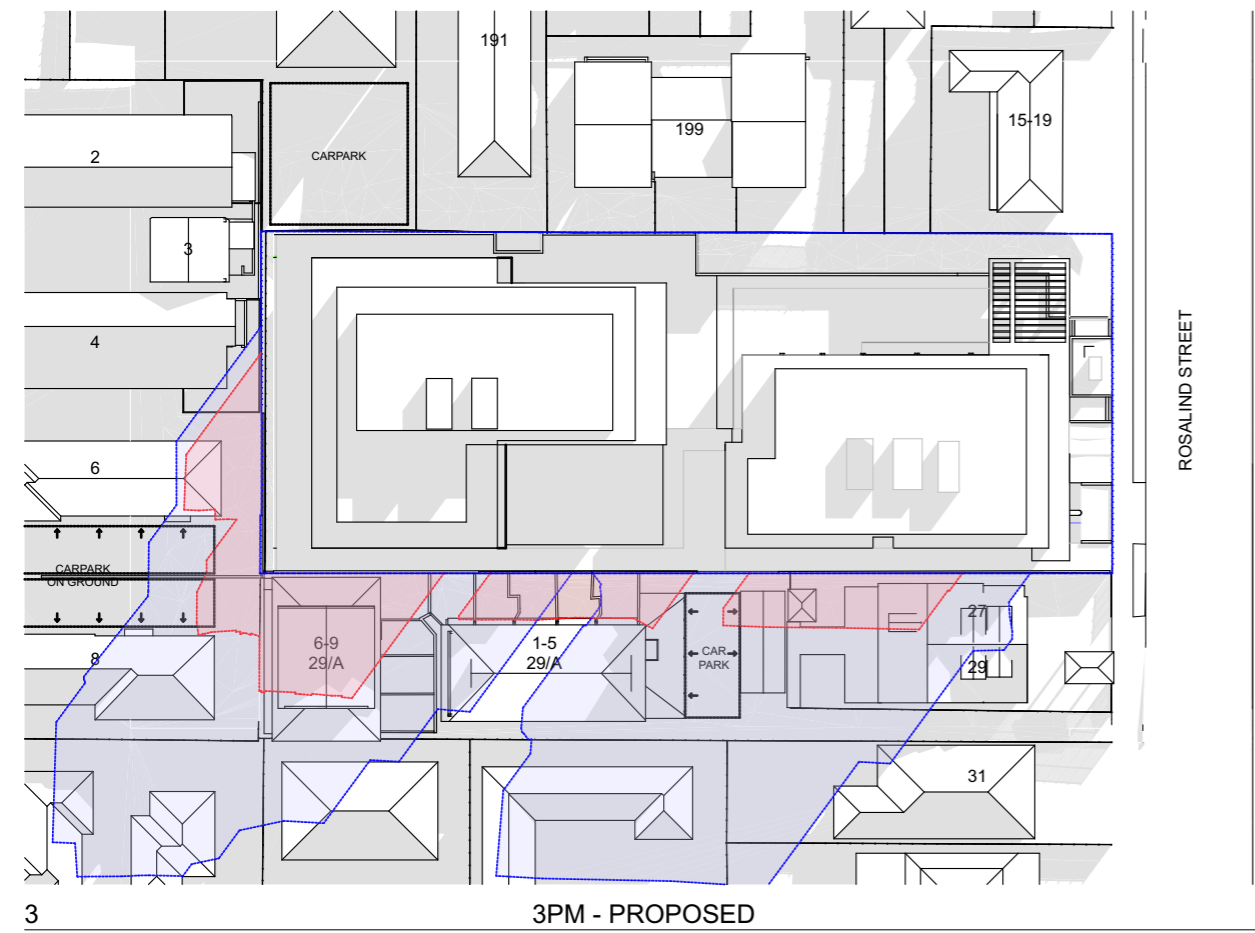
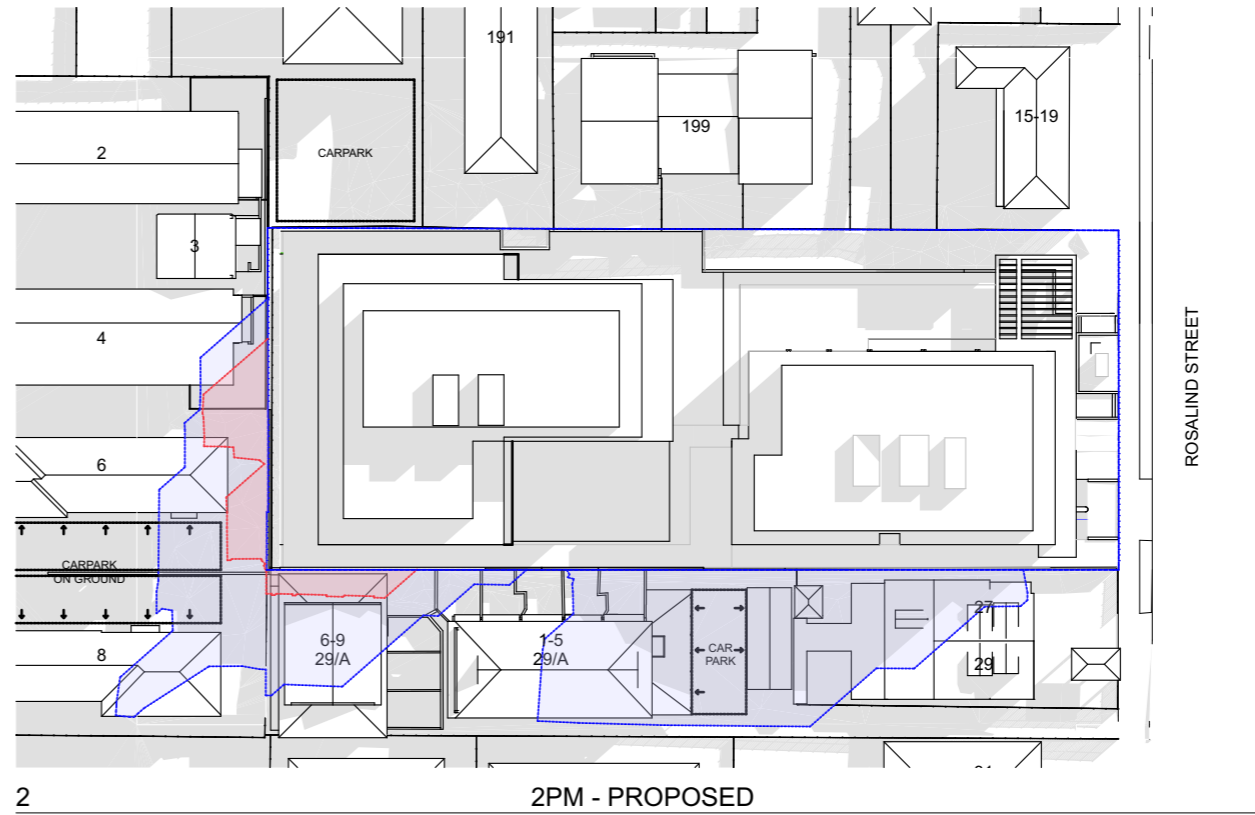
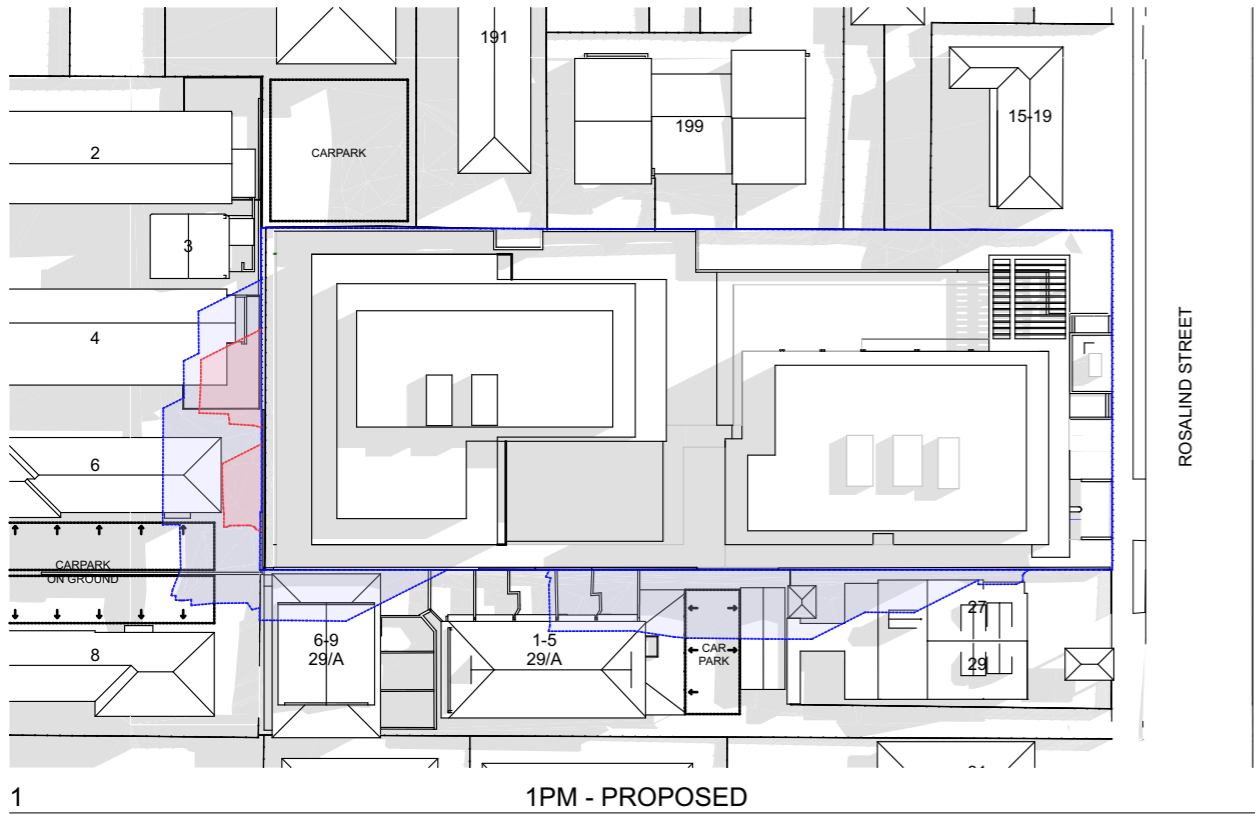


3 11AM - PROPOSED



4 12PM - PROPOSED

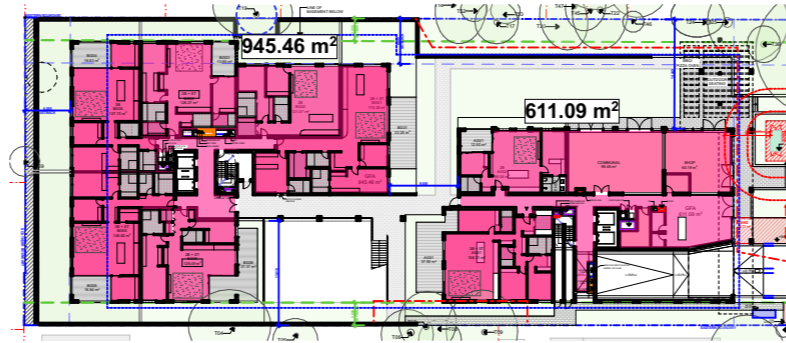
EXISTING SHADOW
PROPOSED SHADOW



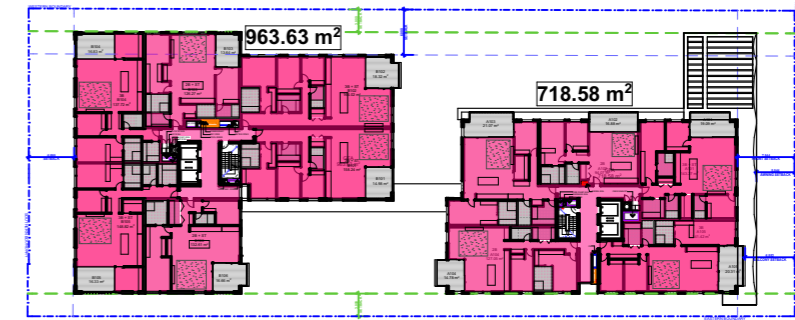
EXISTING SHADOW
PROPOSED SHADOW



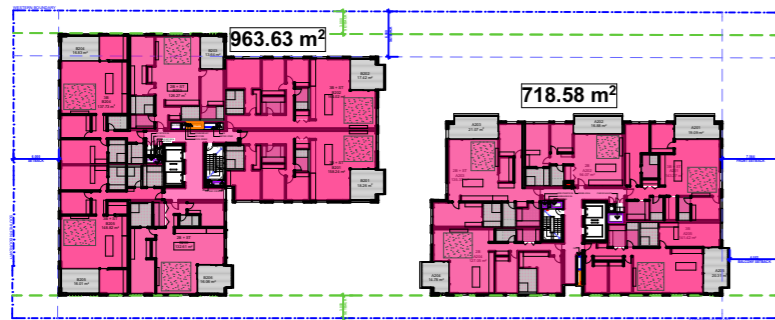
1
- BASEMENT 1
1:1000



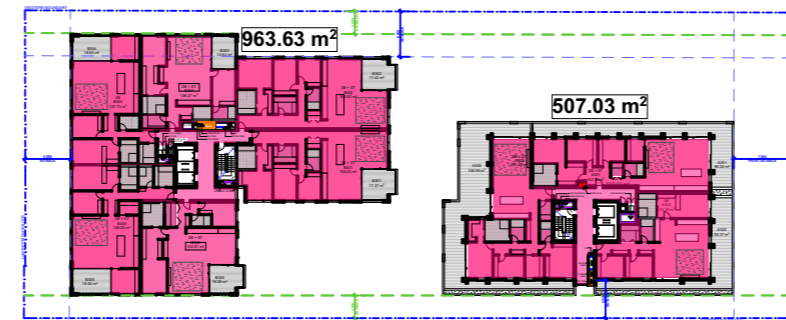
2
- GROUND
1:1000



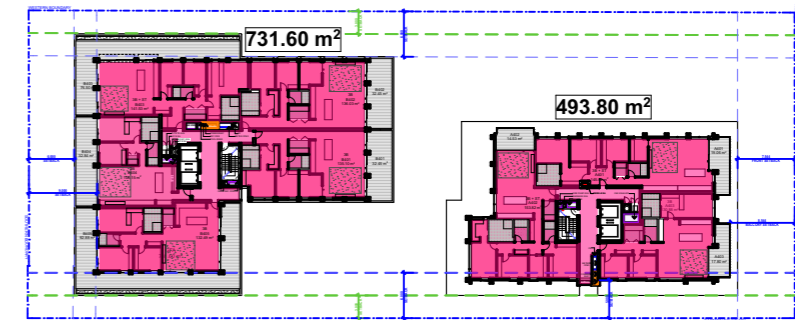
3
- LEVEL 1
1:1000



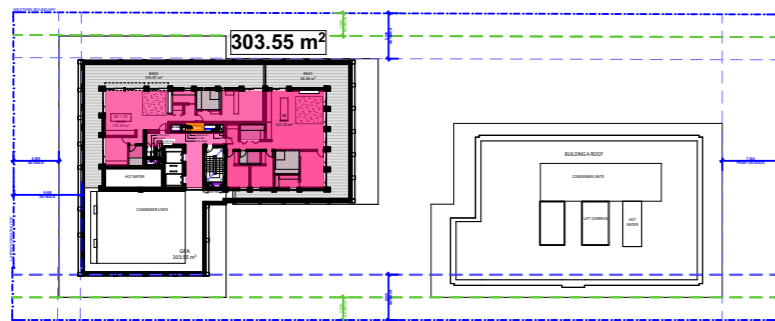
4
- LEVEL 2
1:1000



5
- LEVEL 3
1:1000



6
- LEVEL 4
1:1000



7
- LEVEL 5
1:1000

GROSS FLOOR AREA (M2)		
LEVEL	GFA (m2)	BUILDING ID
BASEMENT 1		
	766.02	B
GROUND		
	611.09	A
	945.46	B
LEVEL 1		
	718.58	A
	963.63	B
LEVEL 2		
	718.58	A
	963.63	B
LEVEL 3		
	507.03	A
	963.63	B
LEVEL 4		
	493.80	A
	731.60	B
LEVEL 5		
	303.55	B
	8,686.60 m²	

GFA

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A 15/1/2026 Issue for DA

PROJECT

19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER 25023
 PLOT DATE 15/01/26
 DRAWN KN/WD
 CHECKED MG

SHEET SCALE 1:1000, 1:1
 SHEET SIZE A3 GA

NORTH

DRAWING TITLE

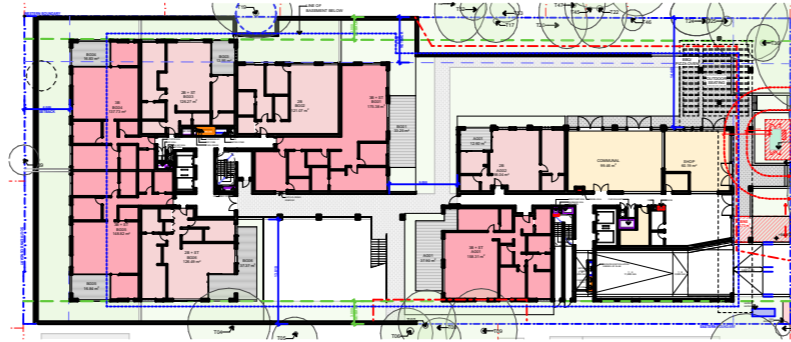
GFA AREA SCHEDULES & PLANS

DRAWING NUMBER DA-500

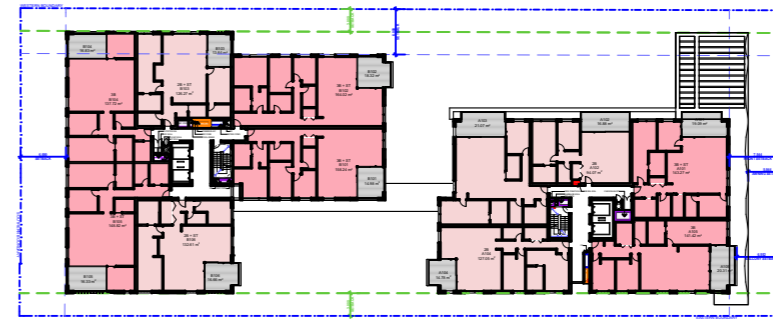
REVISION A



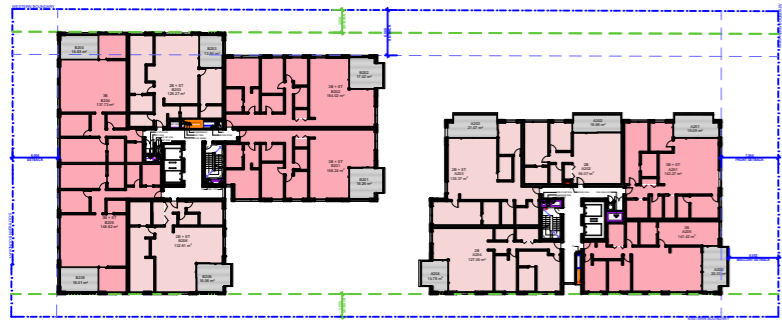
1
-
BASEMENT 1
1:1000



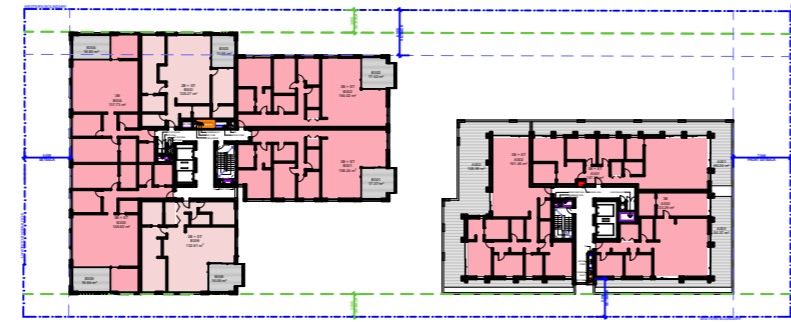
2
-
GROUND
1:1000



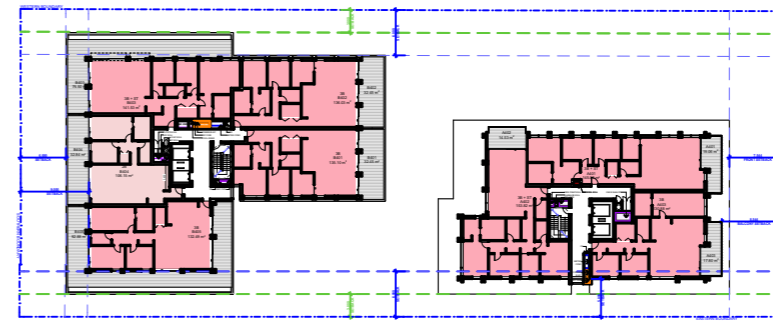
3
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LEVEL 1
1:1000



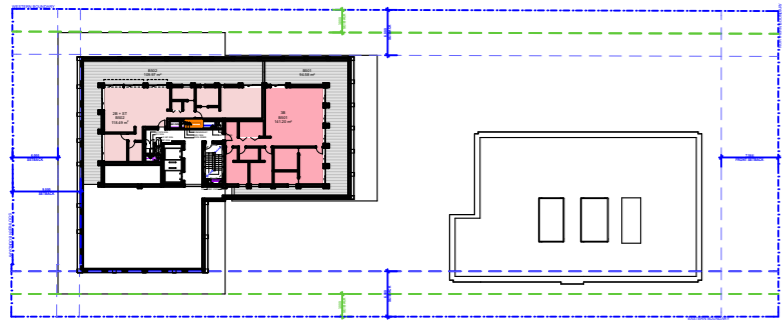
4
-
LEVEL 2
1:1000



5
-
LEVEL 3
1:1000



6
-
LEVEL 4
1:1000



7
-
LEVEL 5
1:1000

APARTMENT MIX		
LEVEL	UNIT NUMBER	APT. TYPE
GROUND		
	AG01	3B + ST
	AG02	2B
	BG01	3B + ST
	BG02	2B
	BG03	2B + ST
	BG04	3B
	BG05	3B + ST
	BG06	2B + ST
LEVEL 1		
	A101	3B + ST
	A102	2B
	A103	2B + ST
	A104	2B
	A105	3B
	B101	3B + ST
	B102	3B + ST
	B103	2B + ST
	B104	3B
	B105	3B + ST
	B106	2B + ST
LEVEL 2		
	A201	3B + ST
	A202	2B
	A203	2B + ST
	A204	2B
	A205	3B
	B201	3B + ST
	B202	3B + ST
	B203	2B + ST
	B204	3B
	B205	3B + ST
	B206	2B + ST
LEVEL 3		
	A301	3B + ST
	A302	3B + ST
	A303	3B
	B301	3B + ST
	B302	3B + ST
	B303	2B + ST
	B304	3B
	B305	3B + ST
	B306	2B + ST
LEVEL 4		
	A401	3B + ST
	A402	3B + ST
	A403	3B
	B401	3B
	B402	3B
	B403	3B + ST
	B404	2B
	B405	3B
LEVEL 5		
	B501	3B
	B502	2B + ST
		49

MIX SUMMARY TABLE		
UNIT TYPE	TOTAL UNITS	MIX
1-Bed	0	
2-Bed	7	14%
2-Bed +Study	11	22%
3 Bed	18	37%
3-Bed+Study	13	27%
4-Bed	0	
TOTAL	49	

ARCHITECT

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A 15/1/2026 Issue for DA

PROJECT

19-23 Rosalind Street, Cammeray
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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED	SHEET SCALE	SHEET SIZE
25023	15/01/26	KN/WD	MG	1:1000	A3 GA



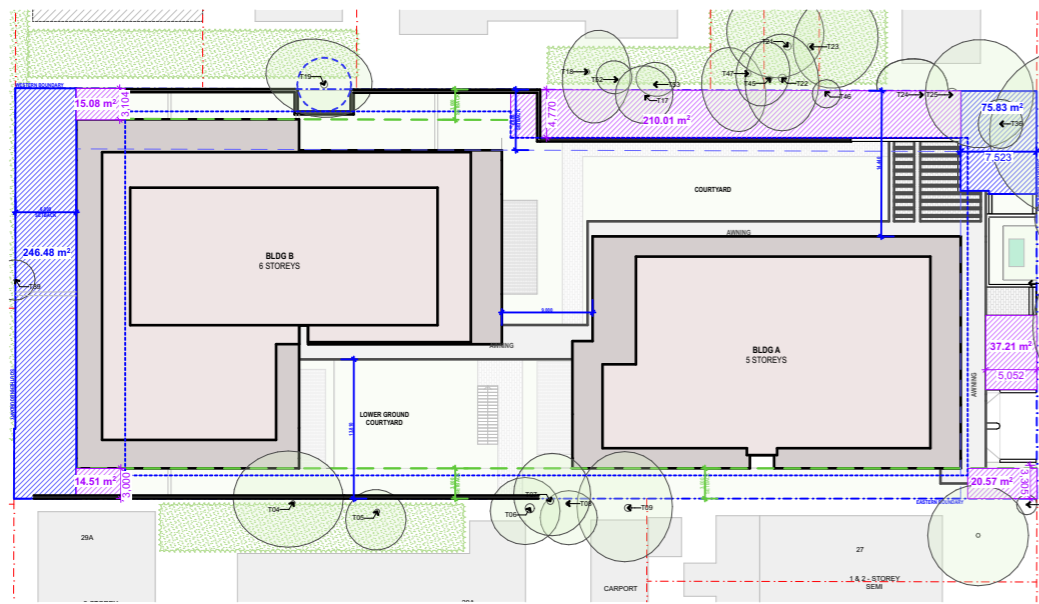
DRAWING TITLE

UNIT MIX

DRAWING NUMBER
 DA-501

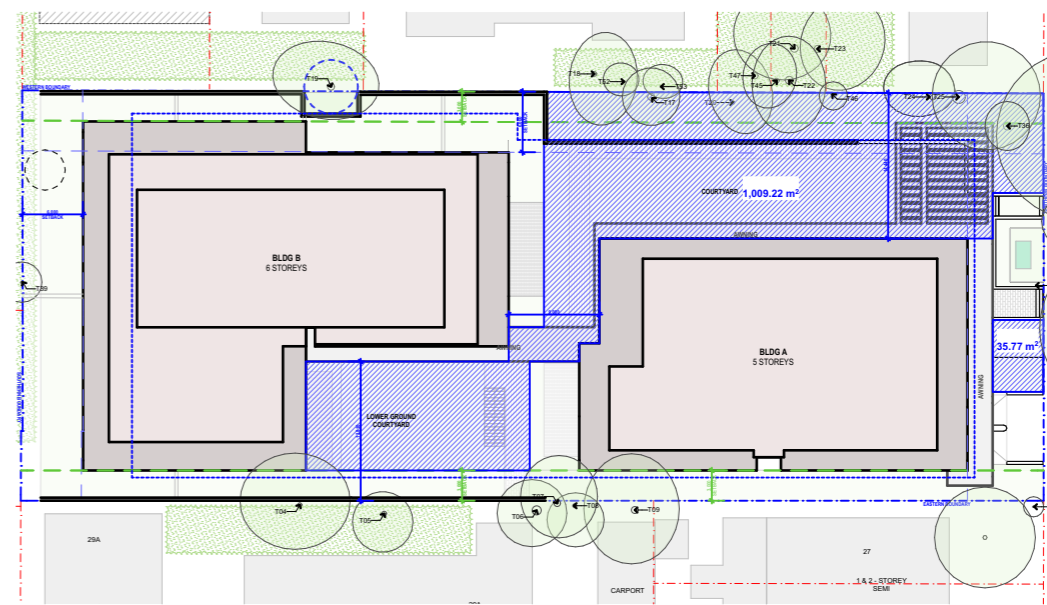
REVISION

A



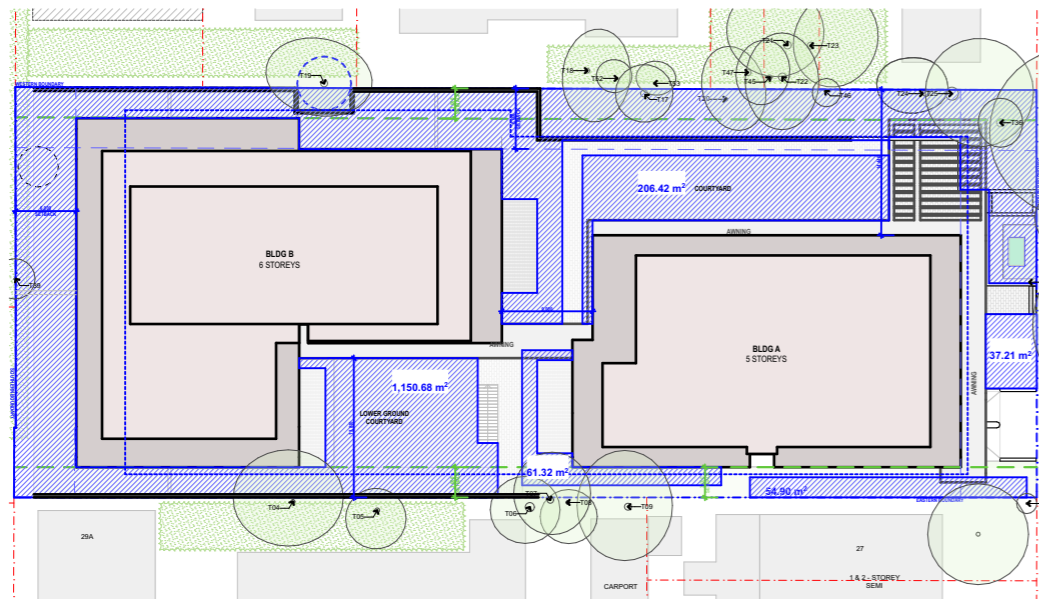
- DEEP SOIL - WIDTH < 6M
- DEEP SOIL - WIDTH > 6M

DEEP SOIL	
DEEP SOIL (M2) * < 6M WIDTH	297.38
DEEP SOIL (M2) * > 6M WIDTH	322.31
TOTAL AREA	619.69 m²
% OF SITE AREA	15%
SITE AREA (M2)	4106
MIN SEPP REQ. (M2)	616M2 (15%)



- COMMUNAL OPEN SPACE

COMMUNAL OPEN SPACE	
TOTAL AREA (M2)	1,044.99
% OF SITE AREA	25%
SITE AREA (M2)	4106
MIN ADG REQ. (M2)	1027 (25%)



- LANDSCAPED AREA

LANDSCAPED AREA	
TOTAL AREA (M2)	1,510.53
% OF SITE AREA	37%
SITE AREA (M2)	4106
MIN SEPP REQ. (M2)	1232 (30%)

PRIVATE OPEN SPACE			
UNIT TYPE	RANGE PROVIDED	SEPP MIN.	COMPLIES
1 - Bed	N/A	8m2	N/A
2 - Bed	13m2 - 110m2	10m2	YES
3 - Bed	14m2 - 129m2	12m2	YES
4 - Bed	N/A	12m2	N/A

ARCHITECT

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 257 187 NOMINATED ARCHITECT TAI ROPHA 6566 STEVEN FIGUERA 6609
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A 15/1/2026 Issue for DA

PROJECT

19-23 Rosalind Street, Cammeray
 19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:750, 1:1, 1:1.25	A3 GA

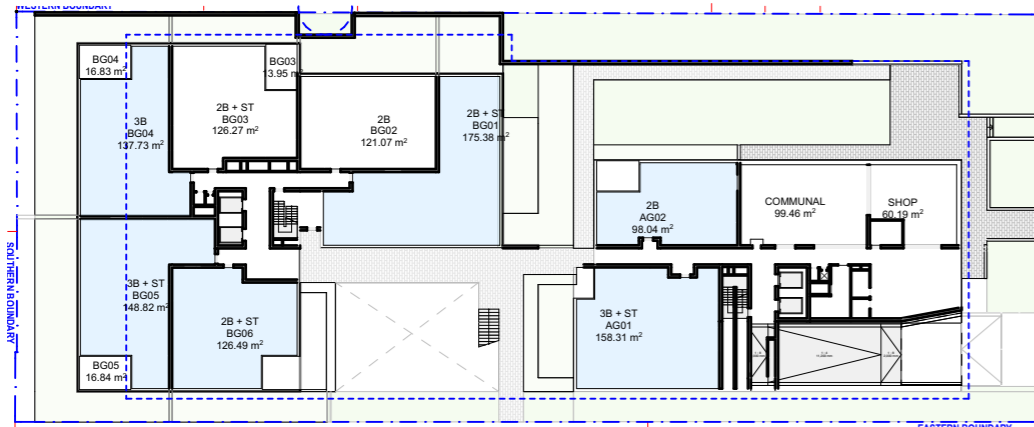
NORTH

DRAWING TITLE

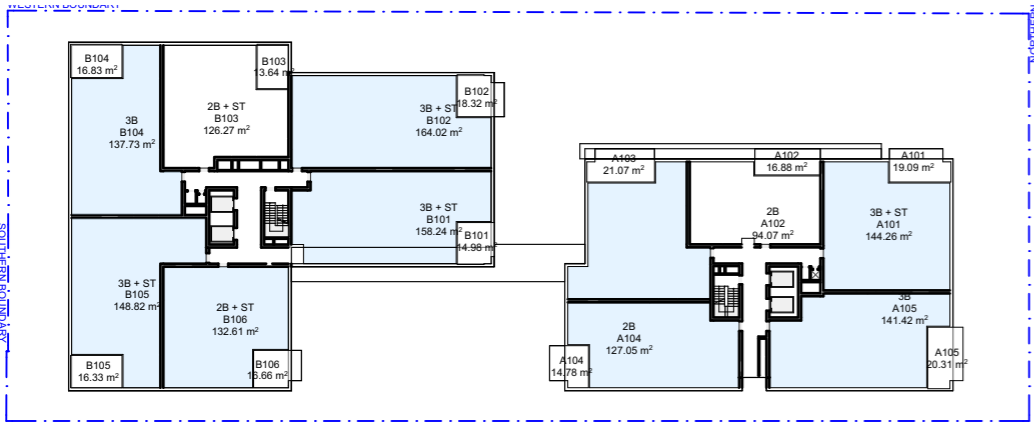
COMPLIANCE DIAGRAMS

DRAWING NUMBER
 DA-502

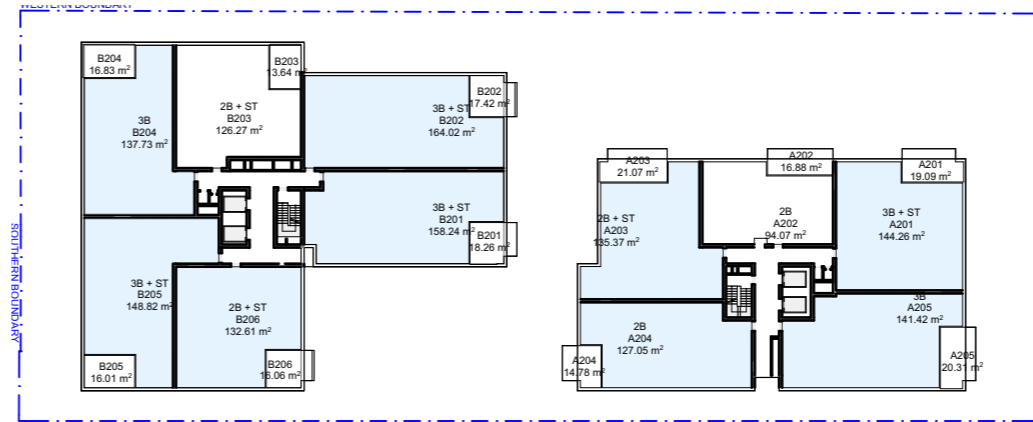
REVISION
 A



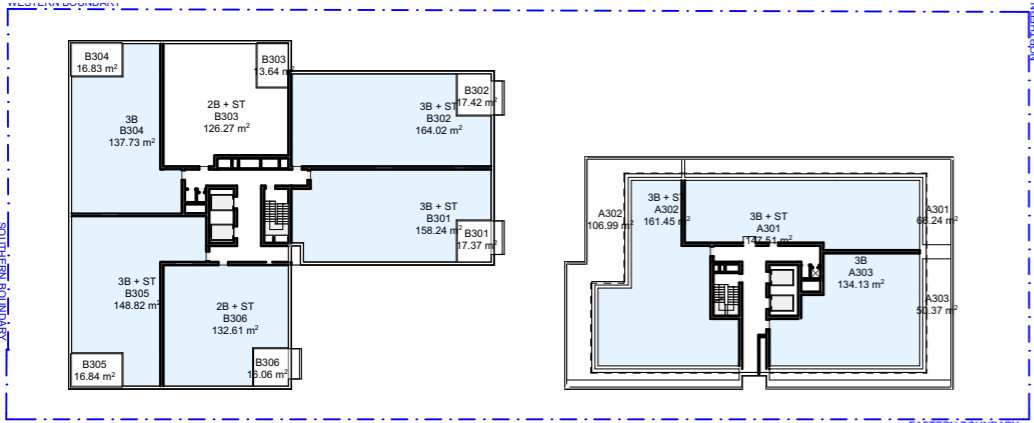
GROUND



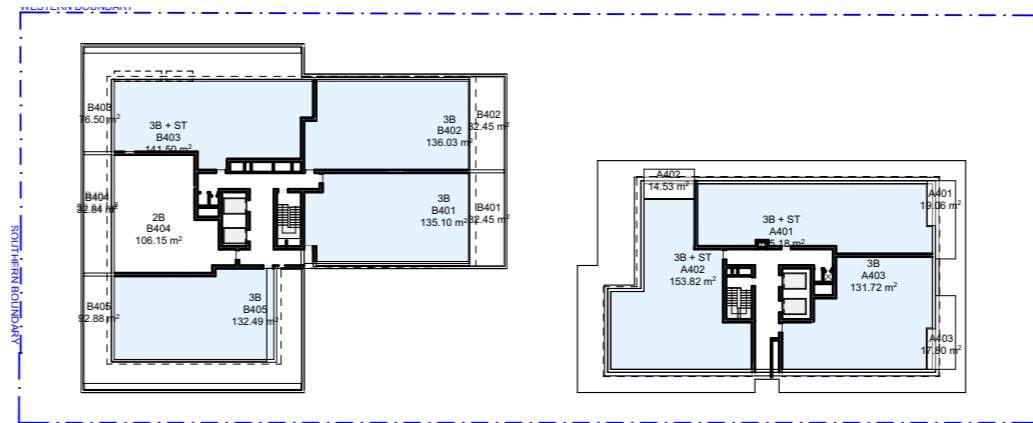
LEVEL 1



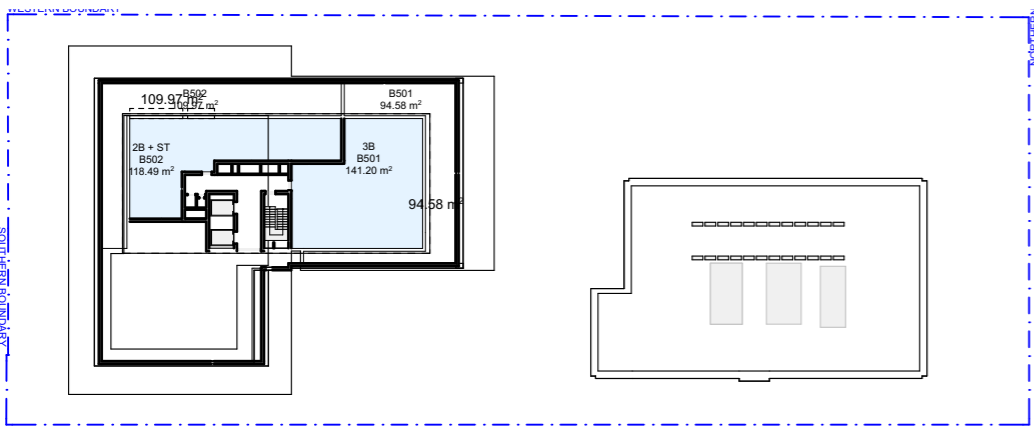
LEVEL 2



LEVEL 3



LEVEL 4



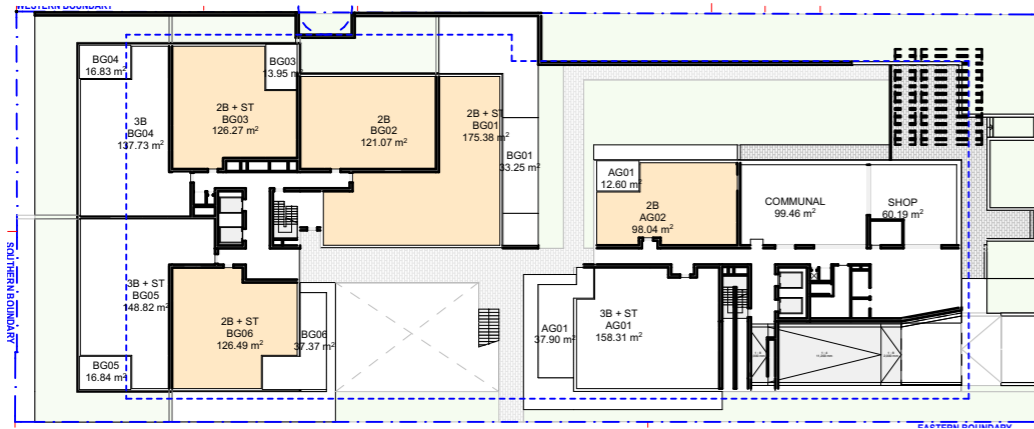
LEVEL 5

ADG - CROSS VENTILATION			
LEVEL	UNIT NUMBER	COMPLIANCE	
GROUND	AG01	YES	
	AG02	YES	
	BG01	YES	
	BG02	NO	
	BG03	NO	
	BG04	YES	
8	BG05	YES	
	BG06	YES	
	LEVEL 1	A101	YES
		A102	NO
		A103	YES
		A104	YES
A105		YES	
B101		YES	
11	B102	YES	
	B103	NO	
	B104	YES	
	B105	YES	
	B106	YES	
	LEVEL 2	A201	YES
A202		NO	
A203		YES	
A204		YES	
A205		YES	
B201		YES	
11	B202	YES	
	B203	NO	
	B204	YES	
	B205	YES	
	B206	YES	
	LEVEL 3	A301	YES
A302		YES	
A303		YES	
B301		YES	
B302		YES	
B303		NO	
9	B304	YES	
	B305	YES	
	B306	YES	
	LEVEL 4	A401	YES
		A402	YES
		A403	YES
B401		YES	
B402		YES	
B403		YES	
8	B404	NO	
	B405	YES	
	B405	YES	
LEVEL 5	B501	YES	
	B502	YES	
2			
49			

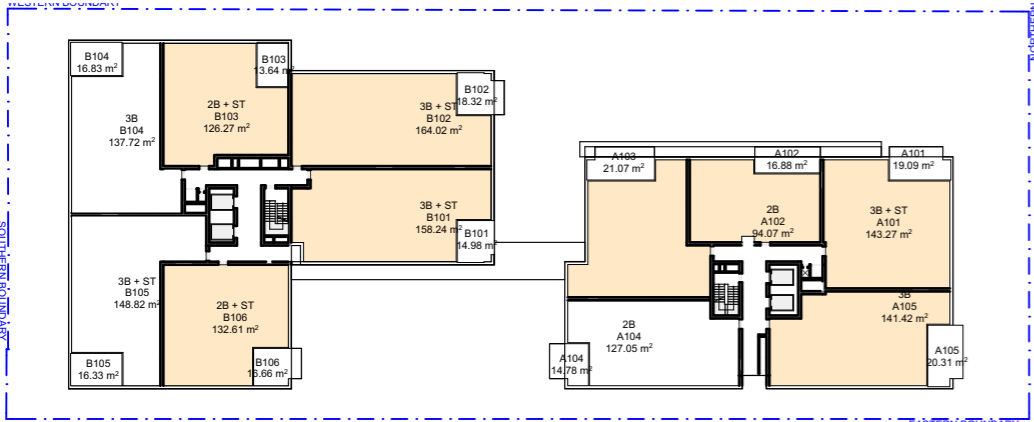
SUMMARY 41/49 (83%)
COMPLIES ✓

MIN. ADG REQ. 29/49 (60%)

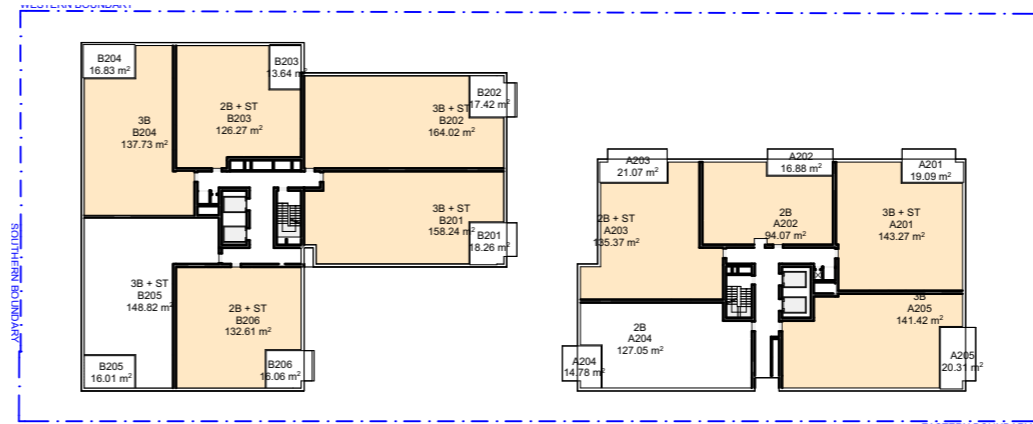
● ACHIEVES SOLAR COMPLIANCE AS PER ADG



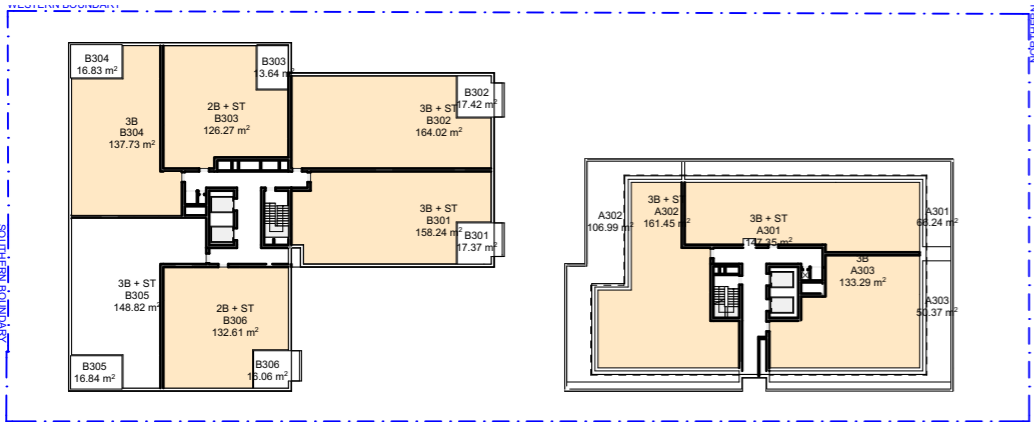
GROUND



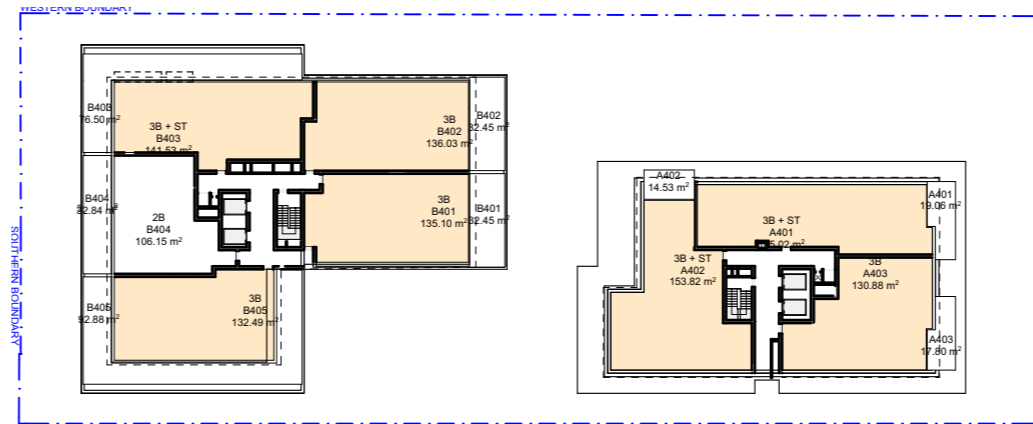
LEVEL 1



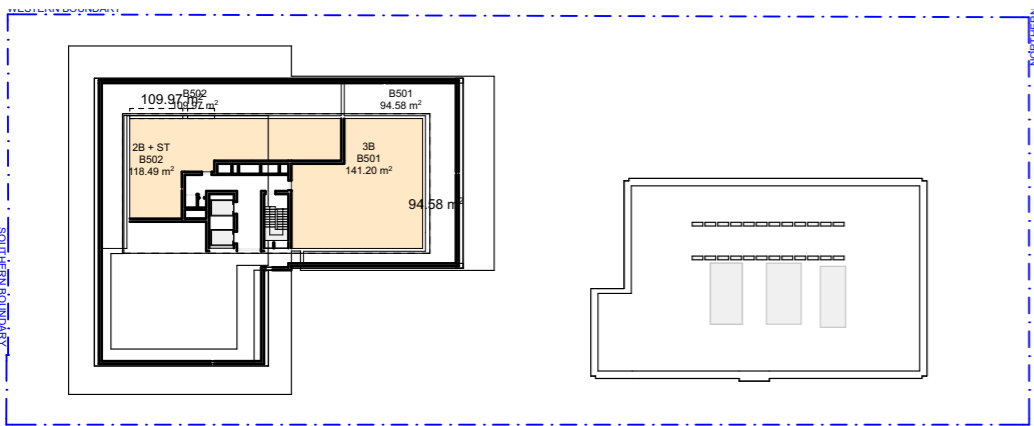
LEVEL 2



LEVEL 3



LEVEL 4



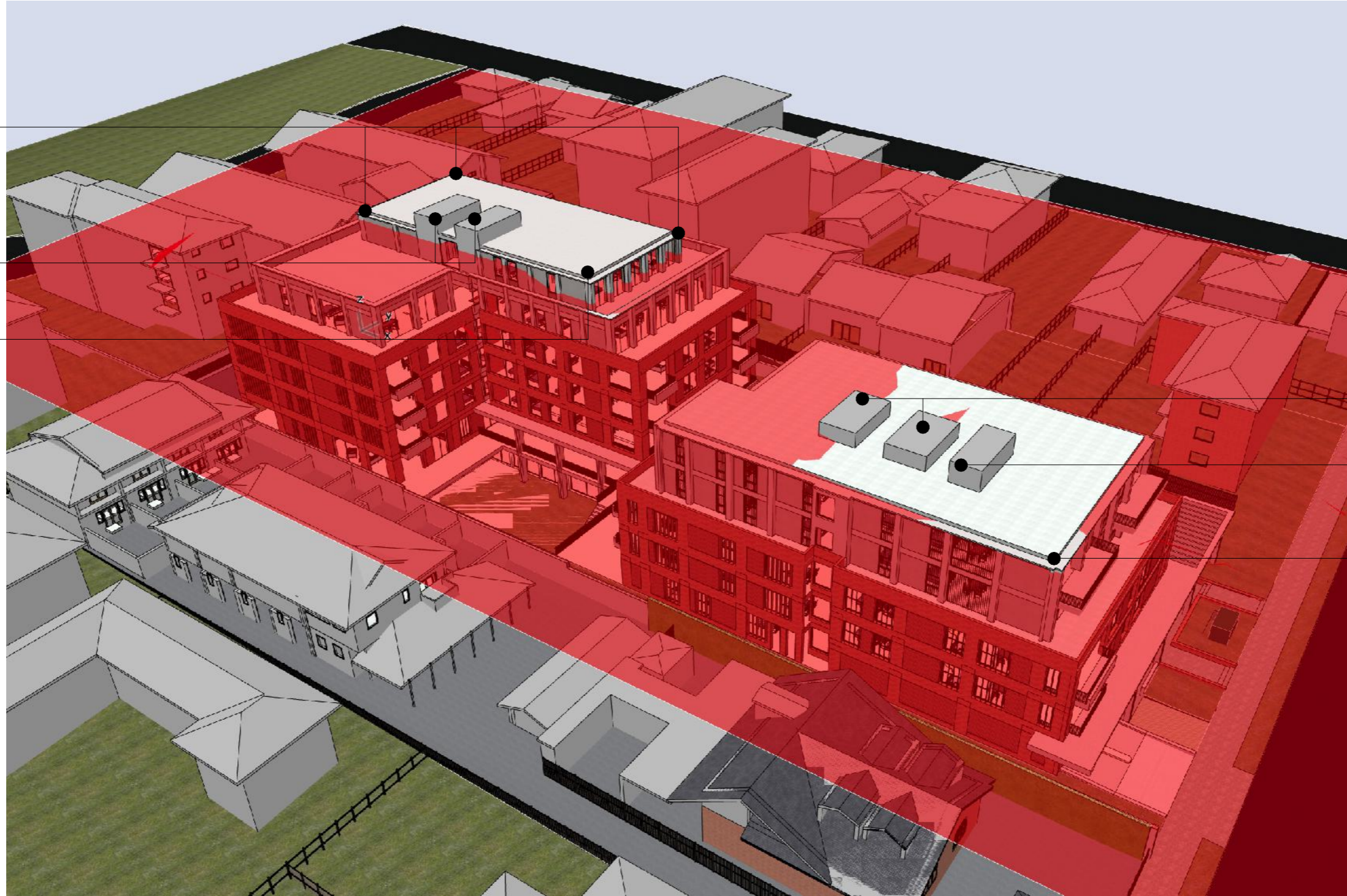
LEVEL 5

ADG - SOLAR			
LEVEL	UNIT NUMBER	COMPLIANCE	
GROUND	AG01	NO	
	AG02	YES	
	BG01	YES	
	BG02	YES	
	BG03	YES	
	BG04	NO	
8	BG05	NO	
	BG06	YES	
	LEVEL 1		
	A101	YES	
	A102	YES	
	A103	YES	
A104	NO		
A105	YES		
B101	YES		
B102	YES		
B103	YES		
B104	NO		
B105	NO		
B106	YES		
11			
LEVEL 2			
A201	YES		
A202	YES		
A203	YES		
A204	NO		
A205	YES		
B201	YES		
B202	YES		
B203	YES		
B204	YES		
B205	NO		
B206	YES		
11			
LEVEL 3			
A301	YES		
A302	YES		
A303	YES		
B301	YES		
B302	YES		
B303	YES		
B304	YES		
B305	NO		
B306	YES		
9			
LEVEL 4			
A401	YES		
A402	YES		
A403	YES		
B401	YES		
B402	YES		
B403	YES		
B404	NO		
B405	YES		
8			
LEVEL 5			
B501	YES		
B502	YES		
2			
49			

SUMMARY 39/49 (79%)
COMPLIES ✓

MIN. ADG REQ. 34/49 (70%)

● ACHIEVES SOLAR COMPLIANCE AS PER ADG



BLDG B RL
RL 103,540

BLDG B MAX RL
RL 105,040

BLDG B RL
RL 103,540

BLDG A LIFT OVERRUN
RL 101,690

BLDG A MAX RL
RL 102,190

BLDG A RL
RL 100,390

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PROJECT
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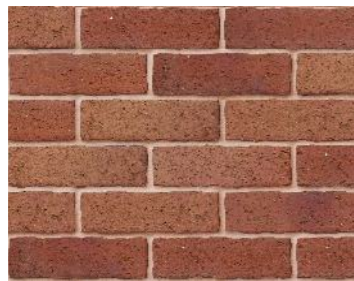
PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
	A3 GA



DRAWING TITLE
HEIGHT PLANE DIAGRAM

DRAWING NUMBER	REVISION
DA-505	A



BK-01
RED BRICK
TINTED MORTAR



BK-02
RED BRICK
TINTED MORTAR
LINEAR RECESS



CN-01
CONCRETE
WARM GREY



RN-01
STO RENDER SMOOTH
LIGHT GREY



RN-02
STO RENDER TEXTURED
WARM/DARK GREY

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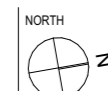
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PROJECT

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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:4	A3 GA

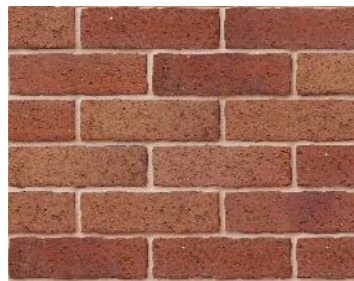


DRAWING TITLE

STREET VIEW 1

DRAWING NUMBER
DA-600

REVISION
A



BK-01
RED BRICK
TINTED MORTAR



BK-02
RED BRICK
TINTED MORTAR
LINEAR RECESS



CN-01
CONCRETE
WARM GREY



RN-01
STO RENDER SMOOTH
LIGHT GREY



RN-02
STO RENDER TEXTURED
WARM/DARK GREY

ARCHITECT

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PROJECT

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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:4	A3 GA



DRAWING TITLE

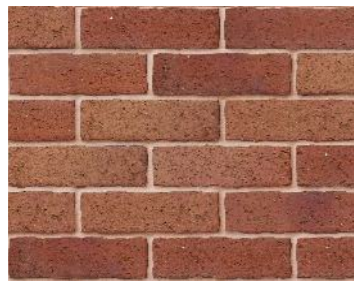
STREET VIEW 2

DRAWING NUMBER

DA-601

REVISION

A



BK-01
RED BRICK
TINTED MORTAR



BK-02
RED BRICK
TINTED MORTAR
LINEAR RECESS



CN-01
CONCRETE
WARM GREY



RN-01
STO RENDER SMOOTH
LIGHT GREY



RN-02
STO RENDER TEXTURED
WARM/DARK GREY

NOTE: STREET TREES REMOVED FOR CLARITY

ARCHITECT

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PROJECT

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PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:4	A3 GA

NORTH

DRAWING TITLE

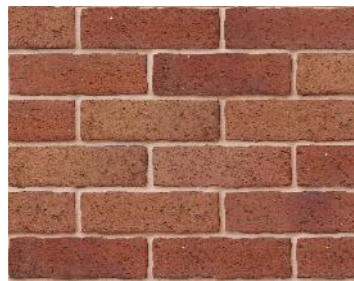
STREET VIEW 3

DRAWING NUMBER

DA-602

REVISION

A



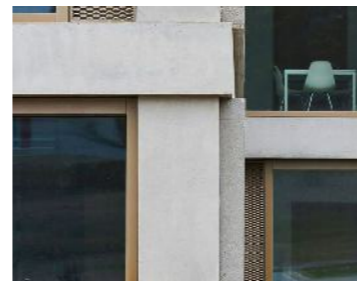
BK-01
RED BRICK
TINTED MORTAR



BK-02
RED BRICK
TINTED MORTAR
LINEAR RECESS



CN-01
CONCRETE
WARM GREY



RN-01
STO RENDER SMOOTH
LIGHT GREY



RN-02
STO RENDER TEXTURED
WARM/DARK GREY

ARCHITECT

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PROJECT

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19-23 Rosalind Street, Cammeray, NSW 2062

PROJECT NUMBER	PLOT DATE	DRAWN	CHECKED
25023	15/01/26	KN/WD	MG

SHEET SCALE	SHEET SIZE
1:4	A3 GA



DRAWING TITLE

COURTYARD VIEW 1

DRAWING NUMBER
DA-603

REVISION
A

APPENDIX C: SUMMARY TABLES



Table C2

Sample Information		Heavy Metals							TRH		BTEX						PAH							
SAMPLE ID	Date	ARSENIC	CADMIUM	CHROMIUM	COPPER	LEAD	MERCURY	NICKEL	ZINC	F1 (C ₆ -C ₁₀) ²	F2 (>C ₁₀ -C ₁₆) ³	BENZENE	TOLUENE	ETHYL BENZENE	M/P-XYLENE	O-XYLENE	NAPHTHALENE	TOTAL-XYLENE	BENZO(A)PYRENE	ANTHRACENE	PHENANTHRENE	FLUORANTHENE	NAPHTHALENE	
Foundation Earth Sciences DSI 2025																								
BH1 / GW1	03.10.2025	<1	<0.1	2	<1	<1	<0.1	10	22	<50	<60	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1.5	<0.01	<0.01	<0.01	<0.01	<0.02	
BH3 / GW2	03.10.2025	<1	<0.1	2	<1	<1	<0.1	9	23	<50	<60	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1.5	<0.01	<0.01	<0.01	<0.01	<0.02	
BH6 / GW3	03.10.2025	3	<0.1	6	7	<1	<0.1	13	55	<50	<60	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1.5	<0.1	<0.1	<0.1	<0.1	<0.1	
Limit of Resolution (LOR)		1	0.1	1	1	1	0.1	1	1	50	60	0.5	0.5	0.5	1	0.5	0.5	-	0.1	0.1	0.1	0.1	0.1	
GILs - NEPM (2013) - Groundwater Investigation Levels <i>Marine Water</i> ²		-	0.7	4.4	1.3	4.4	0.1	7	15			500	-	-	-	-	-	-	0.1 ^b	0.01 ^b	0.6 ^b	1 ^b	50	
Groundwater HSLs - NEPM (2013) HSL B (SAND) 2m to <4m										1,000	1,000	800	NL	NL	-	-	NL	NL						
Solubility Limit										9,000	3,000	59,000	61,000	3,900	-	-	170	21,000						

Notes

- 1 All units are in ug/L
- 2 Investigation Levels apply to typical slightly-moderately disturbed systems
- 3 QSAR derived, statistical distribution method used, 95% trigger values applied as per ANZECC 2000
- 4 Investigation levels are taken from the health values of the Australian Drinking Water Guidelines NHMRC 2011
- NL Non Limiting


Table C3

Sample Information		ALKANES								ALKENES				BENZENES										Other VOC					
SAMPLE ID	GME DATE	TETRACHLOROMETHANE (CARBON TETRACHLORIDE)	TRICHLOROMETHANE (CHLOROFORM)	BROMODICHLOROMETHANE	TRIHALOMETHANES (TOTAL)	1, 2-DICHLOROETHANE	CYCLOHEXANE	DICHLOROMETHANE (METHYLENE CHLORIDE)	1,1,2-TRICHLOROETHANE	CHLOROETHENE (VINYL CHLORIDE)	TRICHLOROETHENE	CIS-1,2-DICHLOROETHENE	1,1-DICHLOROETHENE	TETRACHLOROETHENE (PCE PERCHLOROETHENE)	CHLOROBENZENE	1,2-DICHLOROBENZENE	1,3-DICHLOROBENZENE	1,4-DICHLOROBENZENE	1,2,3-TRICHLOROBENZENE	1,2,4-TRICHLOROBENZENE	ISOPROPYL BENZENE (CUMENE)	SEC-BUTYL BENZENE	1,3,5-TRIMETHYL BENZENE	N-PROPYL BENZENE	N-BUTYL BENZENE	1,2,4-TRIMETHYLBENZENE	4-ISOPROPYL TOULENE	HEXACHLOROBUTADIENE	
Foundation Earth Sciences DSI 2025																													
BH1 / GW1	03.10.2025	<0.5	4.9	<0.5	4.9	<0.5	-	<5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH3 / GW2	03.10.2025	<0.5	4.7	<0.5	4.7	<0.5	-	<5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
BH6 / GW3	03.10.2025	<0.5	2.8	<0.5	2.8	<0.5	-	<5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Limit of Resolution (LOR)		0.1	1	0.5	-	0.5	-	5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
GILs - NEPM (2013) - Groundwater Investigation Levels																													
<i>Marine Water ²</i>																													
<i>Marine Low reliability</i>		370								1,900				60 20															

Notes

- 1 All units are in ug/L
2 Investigation levels apply to typical slightly-moderately disturbed systems
4 Investigation levels are taken from the health values of the Australian Drinking Water Guidelines NHMRC 2011
- NV - no derived value
- " - " Not Tested
a: QSAR derived, statistical distribution method used, 99% trigger value applied as per ANZECC guidelines for slightly-moderately disturbed systems
b: QSAR derived, statistical distribution method used, 95% trigger value applied as per ANZECC guidelines for slightly-moderately disturbed systems
c: US EPA Region 9 RSL (MCLs) utilised in absence of criteria from NEPM 2013. MCLs are legally enforceable USEPA drinking water standards
d: US EPA Region 9 RSL (Tapwater) utilised in absence of criteria from NEPM 2013. Non cancer

Table C4

			Heavy Metals (mg/kg)							TRH (mg/kg)				BTEX (mg/kg)				PAH (mg/kg)		OCP (mg/kg)		OPP	PCB (mg/kg)	ASBESTOS ID (Presence / Absence)		
			ARSENIC	CADMIUM	CHROMIUM	COPPER	LEAD	MERCURY	NICKEL	ZINC	C6-C9	C10-C14	C15-C28	C29-C36	C10-C36 ¹	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	BENZO(a)PYRENE	TOTAL PAH	Other OCPs	TOTAL ENDOSULFAN ¹¹		CHLORPYRIPHOS (OPP)	TOTAL PCB
NSW EPA Waste Criteria (No Leachates)																										
CT1			100	20	100	-	100	4	40	-	NA	-	-	-	NA	10	288	600	1000	0.8	200	<50	60	4	<50	Detected
CT2			400	80	400	-	400	16	160	-	NA	-	-	-	NA	40	1152	2400	4000	3.2	800	<50	240	16	<50	
NSW EPA Waste Criteria (With Leachates)																										
SCC1			500	100	1900	-	1500	50	1050	-	650	-	-	-	10000	18	518	1080	1800	10	200	Total = <50**	108	7.5	<50**	
SCC2			2000	400	7600	-	6000	200	4200	-	2600	-	-	-	40000	72	2073	4320	7200	23	800	Total = <50**	432	30	<50**	
Limit of Resolution (LOR)																										
Sample ID	Date Sampled	Depth	4	0.4	5	5	5	0.10	5	5	25	50	100	100	NA	0.2	0.5	1	3	0.05	0.05	0.1	0.1	0.1	0.1	
FES DSI 2025																										
BH1	23/09/25	0.3-0.4	5	0.3	10.0	24	150	0.14	7.6	100	<20	<20	140	100	240	<0.1	<0.1	<0.1	<0.3	0.2	2	0.8	<0.1	<0.2	0.6	Detected
BH2	23/09/25	0.4-0.5	3	<0.3	24	15	61	0.06	3.1	43	<20	<20	<45	62	<110	<0.1	<0.1	<0.1	<0.3	0.7	5.9	<0.1	<0.1	-	<0.1	ND
BH3	24/09/25	1-1.1	3	<0.3	13.0	3	29	0.07	1.1	42	<20	<20	<45	<45	<110	<0.1	<0.1	<0.1	<0.3	0.3	2.8	<0.1	<0.1	-	<0.1	ND
BH4	22/09/25	0.1-0.2	48	0.6	14	11.0	100	9	2.9	95.0	<20	<20	<45	<45	<110	<0.1	<0.1	<0.1	<0.3	0.3	2.7	<0.1	<0.1	-	<0.1	ND
BH5	24/09/25	0.2-0.3	38	0.4	12.0	18.0	37	0.07	3.2	73	<20	<20	<45	<45	<110	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.1	<0.1	-	<0.1	ND
BH6	23/09/25	0.1-0.2	15	0.9	10.0	36.0	60	0.06	5.6	160	<20	<20	<45	<45	<110	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.1	<0.1	-	<0.1	ND
BH7	23/09/25	0.2-0.3	4	<0.3	2.6	3.7	28	0.06	1.4	32	<20	<20	<45	52	<110	<0.1	<0.1	<0.1	<0.3	0.2	1.3	<0.1	<0.1	<0.2	<0.1	ND
BH8	23/09/25	0.2-0.3	8	<0.3	15	23.0	76	0.28	2.2	160	<20	<20	<45	<45	<110	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.1	<0.1	-	<0.1	ND
BH8	23/09/25	0.5-0.6	3	<0.3	21.0	<0.5	9	0.06	1.1	17	<20	<20	<45	<45	<110	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.1	<0.1	-	<0.1	ND
BH9	24/09/25	0.1-0.2	15	0.4	15	34	61	0.21	10.0	170	<20	<20	230	330	560	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	0.5	<0.1	-	1	ND
BH10	24/09/25	0.3-0.4	4	<0.3	7	14	52	0.15	3.7	69	<20	<20	<45	74	<110	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	0.2	<0.1	-	<0.1	ND
BH11	24/09/25	0.1-0.2	5	0.6	11	82	100	0.25	8.5	280	<20	<20	84	260	350	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	0.2	<0.1	-	<0.1	ND
BH12	24/09/25	0.0-0.1	18	0.4	6	22	69	0.35	3.0	110	<20	<20	<45	<45	<110	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	0.1	<0.1	<0.2	<0.1	ND
BH13	24/09/25	0.1-0.2	4	<0.3	4	6	43	0.09	1.9	36	<20	<20	72	96	170	<0.1	<0.1	<0.1	<0.3	0.2	1.2	<0.1	<0.1	-	<0.1	ND

Notes

- 1 CT1,
- 2 SCC1,
- 3 Concent
- 4 Concent
- 5 Concent
- 6 Concent
- 7 Concentrations in YELLOW indicate the presence of Asbestos
- 8 NA = Not Applicable
- 9 ** Not Tested
- 10 *** Indicates Retest Result
- 11 Total Endosulfan = Endosulfan I, Endosulfan II and Endosulfan Sulphate