GEOTECHNICAL INVESTIGATION REPORT

PROPOSED RSL CLUB REDEVELOPMENT
20 - 22 MELWOOD AVENUE, FORESTVILLE NSW

PREPARED FOR THE FORESTVILLE RSL CLUB LTD
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Client:
Forestville RSL Club Ltd
22 Melwood Avenue
Forestville NSW 2087

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1 PROJECT INFORMATION

1.1 INTRODUCTION AND OBJECTIVES

Geo-Environmental Engineering Pty Ltd (GEE) was commissioned by the Forestville RSL Club Ltd to complete a geotechnical investigation at 20 - 22 Melwood Avenue, Forestville New South Wales (herein referred to as 'the site'). The site covers an area of approximately 8,970m^2 (by calculation) and encompasses the following legal allotments:

- Lot 31 Deposited Plan (DP) 366454 (No. 20 Melwood Ave)
- Lot 2589 DP 752038 (No. 22 Melwood Ave)

A survey plan showing the layout of the site is provided in **Appendix A**, while a site location map is provided as **Figure 1**.

The investigation relates to the proposed redevelopment of Club, including seniors living apartments, and it was requested to support a Development Application (DA) with the Northern Beaches Council (formerly Waringah Council). It was also requested to:

- Provide preliminary advice to assist with the design and construction of the development which will include two separate basements,
- Address the requirements of Part E, Clause E10 of the Warringah Development Control Plan (KDCP) relating to landslip risk because the site partly lies within "Area B – flanking Slopes 5 to 25%",
- Address the requirements of Part 6, Clause 6.2 of the Warringah Local Environment Plan 2011, because proposed earthworks work has the potential to impact on adjoining developments,
- Satisfy the requirements for 'groundwater wells' as detailed in the Department of Planning and Environment (DPIE) 2022: Minimum requirements for building site groundwater investigations and reporting (reference 1), and
- To facilitate the assessment of water levels beneath the site which will inform the preparation of a separate hydrogeologist report and dewatering management plan (by others).

The report presents the factual and interpreted results of the field investigations and provides interpretation and recommendations regarding the ground conditions at the site, in accordance with client requirements and the agreed scope of work.

1.2 NORTHERN BEACHES COUNCIL DCP

The Northern Beaches Council DCP/E10-Landslide Risk for Warringah requires a geotechnical assessment for land subject to Hazard Mapping (Landslide Risk). Council's mapping has zoned the land at this site as Area B (Flanking Slopes from 5 to 25 Degrees).

The site has been developed by constructing on the natural slope across a shallow stepped sandstone cliff line. The site outcrop, natural slopes and subsurface profiles observed are consistent with Councils definition of Area B.

Definitions of Area B

B	*Flanking slopes.*	*5 to 25*	*Colluvial and residual soils, possibly deeper than in Class A, developed on Hawkesbury Sandstone. Minor detached sandstone blocks, occasional exposures of sandstone in cliffs and road cuts. Occasional fill areas associated with playing fields, roads and some developments.*

This report includes an assessment of landslide risk in accordance with Council's DCP.

1.3 PROPOSED DEVELOPMENT

Based on the architectural plans provided in **Appendix A**, it is proposed to construct the proposed development in two stages.

The first stage of the development will comprise:

◊ The construction of a new RSL Club and seniors living apartments at the southern end of the site where the existing Bowling Greens are located. The new development will comprise three levels above ground with the RSL Club at ground level and the seniors living apartments occupying the upper two levels. There will also be a basement for parking and general storage that comprises three, split levels. During this stage of works the existing Club and the open-air parking area to the north will be retained and remain operational.

The second stage of the development will comprise:

◊ The demolition of the existing Club and associated carparking area in the northern part of the site, followed by the construction of a seniors living apartment building which will comprise three, three-level buildings over a single level basement for parking.

The proposed basements for each stage of the development will be separate and the approximate outline of each of the basements are indicated on the attached **Figure 2** which includes an extract of the survey plan, and **Figure 3**, which includes a recent aerial photograph.

The southern basement is proposed to extend up to the western boundary and will be within proximity (~1 metre) of the existing Club building to the north and the southern boundary. It will also be setback approximately 9.0 metres from the eastern boundary. The lowest of the southern basement levels is proposed to have a Finished Floor Level of between 118.0 and 119.5 metres AHD. Based on existing surface elevations, GEE expects that excavation of between approximately 8.5 to 9.5 metres depth will be required with deeper excavations are also expected to be required locally to accommodate the proposed lift shafts.

The northern, single level basement is proposed to have a FFL of 124.0 metres above Australian Height Datum (AHD) and GEE expects that excavation of between approximately 4.0 to 4.5 metres depth will be required. This basement is proposed to be setback approximately 7.0 metres from the southern basement, 8 metres from the western boundary and approximately 9.0 metres from the eastern boundary. The northern side of this basement will be setback approximately 7 metres from the northern boundary although it will extend up to the western end of Lot 31 / DP366454 (i.e No. 22 Melwood Avenue) which also adjoins the low to medium density residential development located to the north-west of the site.

1.4 PREVIOUS INVESTIGATIONS

In 2023, JK Geotechnics completed a geotechnical report for the site which was associated with an earlier version of the proposed Club redevelopment (reference 2). This investigation included the drilling of three boreholes (BH1 to BH3) across the southern part of the site and the installation of a groundwater monitoring well within one of the boreholes (i.e. BH1).

The information from these boreholes and well have been incorporated into our summary of the subsurface conditions across the site, while the borehole logs are also provided in **Appendix B**. The approximate locations of these boreholes are also shown on **Figure 2** and **Figure 3**.

1.5 SCOPE OF WORK

To satisfy the above objective, GEE completed the following scope of work:

- ◊ Performance of a Before-You-Dig-Australia (BYDA) desktop search for buried services followed by a scan for buried services using a specialised contractor,
- ◊ Review of the previous geotechnical report by JK Geotechnics,
- ◊ Visual appraisal of the site conditions and locality,
- ◊ Review of published geological, soils and acid sulfate maps for the area,
- ◊ Drilling of 2 boreholes (BH101 and BH102) at accessible locations across the northern part of the site to complement the previous boreholes and to better assess the nature and consistency of subsurface soils and the strength and quality of the bedrock formation throughout the depth of the proposed basement levels,
- ◊ The performance of Standard Penetrometer Tests (SPTs) within the boreholes to assess the consistency and/or relative density of the soil profile,
- ◊ Collection and analysis of representative soil samples for an assessment of the salinity and aggressivity of the soil profile on buried concrete and/or steel,
- ◊ Collection of rock samples from the boreholes for selective laboratory strength testing to assist with characterisation of the rock profile,
- ◊ Installation of a groundwater monitoring well within each of the boreholes,
- ◊ Development of each well followed by the measurement of standing water levels and slug testing to assess the rate of water inflow,
- ◊ Engineering assessment and reporting.

2 SITE INFORMATION

2.1 SITE IDENTIFICATION

A summary of the site identification details is provided below, while a site location map is provided as **Figure 1**:

Street Address:	20 - 22 Melwood Avenue, Forestville NSW 2087
Legal Description:	No. 20: Lot 2589 in Deposited Plan DP 752038
	No. 22: Lot 31 in Deposited Plan DP 366454
Coordinates (MGA 56):	-33.762765 Lat., 151.210648 Long
Local Government Area:	Northern Beaches Council
Site Area:	8,790m^2 (approximately)
Current Zoning:	R2 – Low Density Residential [1]
Current Use:	Commercial / Retail
Proposed Zoning:	R2 – Low Density Residential
Proposed Use:	Mixed (Commercial/Retail and Residential)

2.2 SITE DESCRIPTION

The site is bounded by Melwood Avenue to the east (beyond which are low-density residential properties), a low to medium density residential development to the north, and to the west, Forestville Dog Park, Community Hall and Scouts Hall. To the south of the site are the Forestville War Memorial Playing Fields, which also includes the ANZAC Memorial Pathway, Poppy Park Memorial playground and BBQ area, Forest Rugby Club, Forest Killarney Football Club (Melwood Oval) and their associated carparks and sports fields / courts.

The two-storey Forestville RSL Club building is located centrally to the site and is bounded by an open-air, asphalt paved carpark to the north, two bowling greens to the south and a war memorial garden to the east (between the Club Building and Melwood Avenue).

[1] Warringah Local Environmental Plan 2011

The western side of the bowling greens have been formed with a low cut into the natural hillslope. The cut is retained by a low mortared brick retaining wall to 1.0 metre in height. The retaining wall appears to have been strengthened at some time with additional buttresses to support the wall. The remaining bowling green area has been constructed by extending a low fill embankment to the southeast off the natural hillslope. The fill embankment around the perimeter of the bowling greens is partly supported by a mortared concrete block wall 0.60 to 1.20 metres in height along the southern boundary adjacent to the carparking area and a mortared brick retaining wall to 1.60 metres in height along the eastern boundary adjacent to a public footpath and Melwood Avenue. Some cracking was observed in the brickwall which was leaning between 2 to 7° with displacements along the crack lines of 4 to 30mm with evidence of seepages from the cracking. The makeup of the concrete block and brick walls and their founding conditions were not determined.

At the time of our investigation neither of the bowling greens were being utilised (or maintained) for lawn bowling, and half of the bowling green on the western side had been converted into an alfresco dining area.

Plans obtained from our BYDA search indicates that a 150mm diameter, Cast Iron and cement Lined (CICL) water main is present just beyond, and parallel to the eastern boundary of the site. Sewer from the site is also directed to a 150mm diameter Vitreous Clay (VC) pipeline located approximately midway along the eastern boundary which flows away from the site to the east.

A site plan with a recent aerial photograph of the site is provided as **Figure 2**, while Photographs of the site are provided for reference in **Plates 1 to 11** below.

Plate 1 – View towards the west showing the front entrance of the RSL Club (central portion of the site).

Plate 2 – View towards the south-west showing the bowling greens (southern portion of the site).

Plate 3 – View towards the north-east showing the back of the RSL Club.

Plate 4 – View to the north-west showing the memorial garden and fire response pump shed to the right.

Plate 5 – View to the south-west showing the alfresco area within the former bowling green.

Plate 6 – View to the north-east, showing the garden bed and fill batter at the southern end of the site.

Plate 7 – View to the south-west, showing the garden bed and fill batter at the southern end of the site.

Plate 8 – View to the south, showing the low cut into the natural hillslope supported by a mortared brick retaining wall.

Plate 9 – Google Maps view of the mortared brick retaining wall at the southeastern corner of the site, prior to painting, detailing existing cracking.

Plate 10 – Developed lean in highest section of the mortared brick retaining wall, viewed to south.

Plate 11 – View to the east across the carpark at the northern end of the site.

2.3 TOPOGRAPHY

Our site inspection revealed that the site is located on a hilltop and has an overall fall of about 1 to 2° down to the south-east. A review of the survey plan (**Appendix A**) indicates that the site surface elevation is approximately 127.8m AHD at the northern end of the site and falls to approximately 126m AHD in the south-eastern corner.

2.4 REGIONAL GEOLOGY AND SOIL

A review of the regional geological map (reference 3) indicates that the site is underlain by the Triassic aged Hawkesbury Sandstone Formation. The Hawkesbury Sandstone Formation typically comprises "*…Medium to coarse-grained quartz sandstone, very minor shale and laminite lenses*".

A review of the regional soils map indicates that the site is located within the Lucas Heights Soil Landscape Group (reference 4), recognised by gently undulating crests and ridges on plateau surfaces. Local reliefs are generally up to 30m, slopes typically less than 10% in gradient. Soils of the Lucas Heights Group typically comprise residual sands and clays, are often stony and have low soil fertility.

The site-specific stratigraphy across the site is summarised in Section 4.1 and incorporates any the relevant information from the former geotechnical and our recent boreholes.

2.5 REGIONAL HYDROGEOLOGY

Based on the geological information it was anticipated that the regional and permanent groundwater in the vicinity of the site is likely to be confined, or partly confined, within discrete water-bearing zones within the bedrock formation. However, intermittent 'perched' water seepage is likely to occur at the soil-bedrock interface and from defects in the bedrock following heavy and prolonged rainfall events.

A search of the NSW Water Information database (http://waterinfo.nsw.gov.au/gw/) for registered groundwater bores in the vicinity of the was completed and there were 18 bores within 500m of the site. Each of these were environmental monitoring bores that are usually installed to monitor groundwater contamination rather that extraction bores.

Site specific information on groundwater levels across the site from the three monitoring wells is provided in Section 4.1.2.

2.6 ACID SULFATE SOIL RISK

Acid Sulfate Soils are naturally occurring sediments and soils containing iron sulfides (principally iron sulfide, iron disulfide or their precursors). Oxidation of these soils through exposure to the atmosphere or through lowering of groundwater levels results in the generation of sulfuric acid.

Land that may contain potential acid sulfate soils was mapped by the NSW Department of Land and Water Conservation (DLWC) and based on these maps local Councils produced their own acid sulfate soil maps to be used for planning purposes.

The regional DLWC Acid Sulfate Soil Risk Map (reference 5), which covers Forestville, indicates that the site lies within an area with no known occurrences of acid sulphate soil and land activities within this area are "...*not likely to be affected by acid sulphate soil materials*".

The ASS Planning Map produced by Council, and available via interactive online mapping service provided by the NSW Department of Planning and Environment, indicates that the site is lies within an area with no known occurrences of acid sulphate soil and land activities within this area are "...*not likely to be affected by acid sulphate soil materials*".

The Acid Sulfate Soils Map produced by the NSW Department of Planning and Environment for Council, and available via interactive online mapping, indicates that the

site lies outside areas defined as "Class 1" to "Class 5". In this regard, there is no need for an acid sulphate soil assessment or management plan.

3 FIELD INVESTIGATIONS

3.1 BOREHOLE DRILLING AND LOGGING

Fieldwork was undertaken on the 25th July 2024 by Zachary Ziesel from GEE and the fieldwork comprised:

- ◊ A site inspection and mapping of landslip risk issues,
- ◊ The drilling of two boreholes (BH101 and BH102) across the northern part of the site to complement the former boreholes by JK Geotechnicas and to better assess the subsurface conditions across the site including the strength and quality of the bedrock formation,
- ◊ The performance of SPTs within the boreholes to assess the consistency and/or relative density of the soil profile,
- ◊ The collection of representative soil samples for the preliminary analysis of soil salinity and aggressivity,
- ◊ The collection of rock samples from the boreholes for selective strength testing to assist with characterisation of the rock profile,
- ◊ Installation of a groundwater monitoring well within each of the boreholes, and
- ◊ Development of each well followed by the measurement of water levels and the performance of slug testing to evaluate the groundwater inflow rate.

Prior to commencement of the bores, a scan for potential underground services and utilities was completed and cross-checked with the results of the BYDA search.

Both boreholes were drilled with a mechanical rig which was owned and operated by Terratest Pty Ltd, utilising solid flight augers (SFA) through the soil profile and into the upper part of the weathered bedrock formation, while NMLC diamond coring was adopted within the deeper sandstone bedrock formation. Borehole BH101 was terminated at 10.23 metres below ground surface (bgs), while BH101 was terminated at 5.7 metres bgs. These depths equate to elevations of approximately 117.4 and 121.8 metres AHD, respectively.

During drilling, the encountered fill and natural soils were geologically logged by an experienced engineering geologist taking care to describe the presence and depth of fill material / previously disturbed ground, the natural stratum, moisture, seeps or water bearing zones, elevation of the water level/hydraulic head, and adverse aesthetics such as discolouration, odours or obvious evidence of contamination.

A summary of the borehole information, including total depth, the depth of filling and the depth to bedrock, is provided in **Table 1** and their locations are shown on **Figure 2** and **Figure 3**. Also included in **Table 1** and the Figures is the relevant information from the former JK Geotechnics boreholes.

Table 1: Summary of the Borehole Information

Borehole ID	Date Completed	Drilling Method	Total Depth	Depth of Filling [1]	Depth to Bedrock [1]	Well Screen Interval
			(m BGS)	(m BGS)	(m BGS)	(m BGS)
GEE Geotechnical Boreholes 2023						
BH101	25 July 2024	SFA / NMLC	10.23	0.10	1.72	5.0 – 9.0
BH102	25 July 2024	SFA / NMLC	5.70	0.30	1.50	2.6 – 5.6
JK Geotechnics Boreholes 2018						
BH1	16 Nov 2018	SFA / NMLC	9.00	0.70	1.60	3.0 – 9.0
BH2	12 Nov 2018	SFA / NMLC	8.92	1.65	3.10	-
BH3	12 Nov 2018	SFA / NMLC	8.98	0.80	2.00	-

m BGS = metres below ground surface
SFA = Solid Flight Auger
NMLC = Diamond Coring
Note 1: Depth of fill included the surface pavements.

3.2 WELL INSTALLATION AND GROUNDWATER SAMPLING

A groundwater monitoring well was installed within each of the GEE boreholes in general accordance with the Land and Water Biodiversity Committee (2012) *Minimum Construction Requirements for Water Bores in Australia* (reference 6), using 50 mm diameter uPVC pipe, with a machine slotted screen section and a 2 mm sand pack around the slotted section and a bentonite seal above. The wells were also installed in accordance with the requirements of the DPIE (2022) Minimum requirements for building site groundwater investigations and reporting (reference 1) for wells adjacent to a single level basement.

Each of the wells, including the former well in BH1, were screened within the bedrock formation with the depths shown in **Table 1** above. GEE notes that the final depth of each well is between approximately 2.2m and 6.5m below the bulk excavation level for the proposed basement. The groundwater well installation details are also shown on the borehole logs in **Appendix C** and the location of the wells are shown on **Figure 2** and **Figure 3.**

3.3 SOIL SAMPLING

Soil samples were collected from the boreholes and placed in a sealed, plastic zip-lock bag immediately upon extraction from the ground. The samples were then submitted to Envirolab Services for NATA accredited testing as part of a preliminary assessment of soil salinity and soil aggressivity towards buried concrete and/or unprotected steel. The analytical results are presented in **Appendix C** and summarised in Section 4.2 below.

3.4 ROCK SAMPLING

To characterise the strength of the bedrock formation, sections of the recovered rock core were analysed for point load strength index testing by GEE. The point load tests were conducted at approximately 1 metre intervals, subject to the rock quality. The test results are presented in **Appendix C** and summarised in Section 4.3.1. The UCS tests (3 in total) were primarily used to provide correlation with the point load tests. Refer to Section 4.3.2 for a summary of the results, while the lab reports are presented in **Appendix C**.

4 INVESTIGATION RESULTS

4.1 SUBSURFACE CONDITIONS

4.1.1 GEOLOGICAL MODEL

The subsurface conditions, as observed in the boreholes, typically comprised a layer of fill material over natural sandy soil which then graded into sandstone bedrock.

Detailed descriptions of the subsurface conditions on site are provided in the borehole logs provided in **Appendix B**, while a summary of the subsurface conditions across the site are provided in **Table 2**.

Table 2: Summary of Subsurface Conditions and Geological Model

Layer / Unit	Description	Depth to Base of Layer (m)[1]	Soil Consistency / Relative Density[1] / Rock Strength
1 - FILL	ASPHALT / CONCRETE	0.1 – 1.65	--
	Silty SAND / Clayey SAND / Gravelly SAND: orange, red, brown, grey, fine to coarse sand and gravel with trace anthropogenic inclusions (brick) in BH3, moist.		Variable
2 - NATURAL SOIL	SAND / Silty SAND with Clay: red, orange, brown, grey fine to medium grained, bands of highly weathered sandstone, moist. *BH201 and BH203 only*	1.5 – 3.1	Medium Dense to Dense
3a - BEDROCK	SANDSTONE: red, orange, grey and dark grey, fine to coarse grained, highly to moderately weathered. (Class V/IV sandstone - Pells et al (reference 10).	4.8 – 5.5	Very Low to Low Strength
3b - BEDROCK	SANDSTONE: orange, grey, red, fine to coarse, moderately to slightly weathered and fresh. (Class III sandstone - Pells *et al* (reference 10).	>10.23	Medium to High Strength

Adverse aesthetics, specifically odours associated with potential contamination, were not noted during the fieldwork. Additionally, no potentially Asbestos Containing Material (ACM) was observed in the bores during the drilling.

4.1.2 Groundwater Levels and Monitoring

Groundwater was not observed in our boreholes prior to the introduction of water during the drilling process (i.e. NMLC Coring). Upon completion of the wells, they were developed by pumping them dry. The standing water levels were recorded on the 6th August 2024 with these levels summarised in **Table 3**. Also included in **Table 3** is a measurement of the water level in the pre-existing well in BH1.

Table 3: Measured Groundwater Levels – 6th Aug 2024

Well ID	Approximate Surface Elevation (m AHD)	Stabilised Water Levels	
		6th August 2024	
		m BGS	~RL (m AHD)
BH101	127.6	3.23	124.37
BH102	127.5	2.80	124.70
BH1	126.5	2.31	124.19

m BGS = metres below ground surface
m AHD = metres above Australian Height Datum

Based on the layout of the wells and the water elevations, the groundwater is following the regional topography and flowing towards the southeast. GEE has installed water level monitors in each of the wells for continuous monitoring over a minimum period of 3 months as required by the DPIE.

To assess potential seepage inflow rates, GEE performed a slug test on the three wells before using the Hvorslev (1951) method to estimate the hydraulic conductivity (reference 7). The slug test involved the withdrawal of a certain amount of water from the well before measuring the rate of water level recovery (or rise). The measured hydraulic conductivity is in the order of order of 10^{-7} to 10^{-8} m/sec which is consistent with the expected mass hydraulic conductivity of the sandstone formation Pels et al 2019, (reference 11).

4.2 Laboratory Soil Test Results

Representative samples of soil were collected during the fieldwork and submitted to ALS Laboratories for testing, which included:

- ◊ Electrical Conductivity (EC) to provide a detailed assessment of the salinity potential of the soil profile, and
- ◊ Resistivity, Sulphate, Chloride and pH to determine the exposure classification of the soil with respect to buried structural concrete and unprotected steel.

The laboratory test results are presented in **Appendix C**, while a summary of the results is provided in the following sections.

4.2.1 Soil Salinity Testing

An assessment of soil salinity conditions has been undertaken with reference to guidance published by the Department Land and Water Conservation NSW (reference 8). In this regard, selected samples of natural soil were submitted to ALS for NATA accredited testing of Electrical Conductivity (EC), which is the primary indicator of salinity. The raw EC results and the EC_e results are provided in **Table 4**.

Table 4: Electrical Conductivity Results

Sample Location / Depth (m)	Sample Description	EC (dS/m)	Multiplication Factor[1]	EC_e (dS/m)
BH101/0.5m	Nat – SAND	0.083	17	1.41
BH102 / 0.5m	Nat - SAND	0.037	17	0.63

Note 1: EC_e results are EC data multiplied by a conversion factor which depends upon the soil texture / type (reference 7)

According to the Department Land and Water Conservation NSW the soil salinity classes are as follows:

ECe (dS/m)	Class
<2	Non-Saline
2 – 4	Slightly Saline
4 – 8	Moderately Saline
8 – 16	Very Saline
>16	Highly Saline

The above test data indicate that the soil profile is non-saline.

4.2.2 Exposure Classification Tests

Selected soil samples were submitted to ALS for NATA accredited testing of pH, sulfate, chloride and resistivity to provide a preliminary assessment of the exposure classification (or aggressiveness/corrosiveness potential) of the soil with respect to future buried steel and/or concrete (e.g. footings).

To determine the aggressiveness of the soil and water environment on concrete or steel, the chemical test results are compared to Tables 6.4.2(C) and 6.5.2(C) from Section 6 of the Australian Standard AS 2159 (reference 9). This section provides assessment criteria to assess the 'exposure classification' for a concrete or steel pile. The Standard has two classes of soil conditions:

(A) high permeability soils below groundwater; and
(B) low permeability soils and all soils above groundwater.

For this site, condition 'B' soil is considered most appropriate. Based on the chemical testing results, the standard provides a range of 'exposure classifications' from non-aggressive to very severe. For the range of chemical conditions in the soil surrounding the structure, the condition leading to the most severe aggressive conditions is adopted. A summary of the soil results is provided in **Table 5**, and it includes the previous JK Geotechnical testing.

Table 5: Exposure classification (aggressivity) test results

Sample Location and Depth (m)	**Type**	**Soil Condition**	**pH**	**Resistivity** ohm.cm	**Chloride** mg/kg	**Sulphate** (SO_4) mg/kg
BH101 / 0.5	Nat – SAND	B	4.3	-	29	59
BH102 / 0.5	Nat - SAND	B	4.8	-	10	50
BH2 / 0.5 – 0.95	Fill – Silty SAND	B	6.8	12,000	<10	<10
BH1 / 2.2 – 2.4	Nat. Sandstone	B	5.1	3,500	<10	38
BH1 / 6.15 – 6.2	Nat. Sandstone	B	5.8	11,000	<10	<10

The aggressivity potential of an environment on concrete is dependent on the sulphate, and pH levels of the soil. Based on the above test results and taking the most severe aggressive condition for each of the soil samples, the natural soil is considered to be moderately aggressive towards buried concrete. According to Australian Standard AS 3600-2009 (reference 10), specifically Table 4.8.1, this equates to an exposure classification of 'B1'.

The corrosive potential of an environment on unprotected steel is normally dependent on pH, chloride, and resistivity levels of the soil. Based on the limited number of test results above and with reference to AS2159-2009, the subsurface profile is non-aggressive/corrosive.

4.3 ROCK STRENGTH TESTING

4.3.1 POINT LOAD TESTING

Representative samples of rock core from borehole BH101 and BH102 were sampled at approximately 1.0m intervals and tested for strength using the point load index (I_{s50}) test. Point load tests are a simple and economical test for estimating the strength of a rock and the tests results are routinely multiplied by a factor of 15 - 20 to estimate an Ultimate Compressive Strength (UCS) value, although the correlation is known to vary significantly. For this reason, GEE supplemented the point load tests with three UCS tests.

For point load testing, the recovered rock core samples were loaded until failure and the failure load recorded. Samples of the core were loaded diametrally and axially and the failure loads for each recorded. The results for core samples loaded axially ranged from 0.08MPa to 2.3MPa with an average of 0.66MPa, while the diametrally loaded samples ranged from 0.03MPa to 1.37Pa with an average of 0.52MPa. Overall, the diametrally loaded results were commensurate with the axially loaded results which reflects the type of rock (i.e. no laminated or particularly layered). Considering that future foundations load the bedrock in a similar direction as the axial loaded point load tests, then more emphasis is placed on these results.

Assuming a UCS/Is50 correlation factor of 15, the inferred UCS values for all the point load test results, when loaded axially, are estimated to be between approximately 1.20 MPa to 34.55MPa, with an average of 10.42MPa. A copy of the laboratory test results is presented in **Appendix C**.

4.3.2 UCS TESTING

A summary of the UCS test results are provided in **Table 6**. When compared to the axial point load test results conducted on similar sections of recovered rock core, the multiplication factor was between 18 and 28 although the best comparison is considered to be from the Unit 3b rock which is more consistent, and this had the 18 multiplication factor when compared to the corresponding point load test result.

Table 6: UCS Test Results

Rock Unit	Location/ Depth (m)	Material Type	Failure Mode	UCS (MPa)
Unit 3A	BH101 / 4.06 – 4.23	Sandstone	Mixed mode	9.8
Unit 3B	BH101 / 7.05 – 7.29	Sandstone	Mixed mode	22
Unit 3A	BH102 / 3.08 – 3.20	Sandstone	Mixed mode	3.4

4.4 LANDSLIP RISK DEFINITION

4.4.1 WARRINGAH DCP

The Northern Beaches Council DCP/E10-Landslide Risk for Warringah requires a geotechnical assessment for land subject to Hazard Mapping (Landslide Risk). Council's mapping shows the land at this site is within Area B (Flanking Slopes from 5 to 25 Degrees).

For land in Area B, a Checklist and Flow Chart (below) are used to determine whether or not a geotechnical report is required, addressing geotechnical risk in accordance with AGS 2007 Guidelines (reference 12).

The site and slope features within and affecting the property were assessed at the time of the geotechnical site visit undertaken on 25th July 2024, to determine requirements under the Warringah DCP in connection with the proposed development.

Our assessment and opinions on slope instability risk for the site and proposed development, presented in the following sections, are determined in accordance with the Australian Geomechanics Society's Landslide Risk Management Concepts and Guidelines (2007) (reference 12) as required by the DCP.

It should be noted that the Warringah DCP (***Objectives** – to ensure development is "geotechnically stable"*) does not define the level of "acceptable risk". In accordance with usual practice (refer Table 1 in AGS 2007), we have adopted Low Risk as the threshold for acceptable risk level for property damage/economic consequence, and 10^{-6} per annum for loss of life.

4.4.2 ASSESSMENT REQUIREMENTS

Reference to the checklist and flowchart confirm a landslide risk assessment is required by virtue of the proposed excavation depth of up to approximately 9.5 metres into the existing slope will be required as part of the proposed development.

Our assessment is discussed in Section 5.4 below.

CHECKLIST

1.0	***LANDSLIP RISK CLASS (circle Landslip Risk Class in which site is located)***
	A Geotechnical report not normally required.
✓	*B Preliminary assessment of site conditions required to determine whether a geotechnical report is required.*
✓	*C Geotechnical report required.*
	D Preliminary assessment of site conditions required to determine whether a geotechnical report required.
	E Geotechnical report required.

2.0	***SITE LOCATION***
20-22 Melwood Avenue, Forestville NSW, Located on the eastern side of Melwood Avenue, Area of 8970m2 and described as Lot 31 in DP366454 and Lot2589 DP752038.	

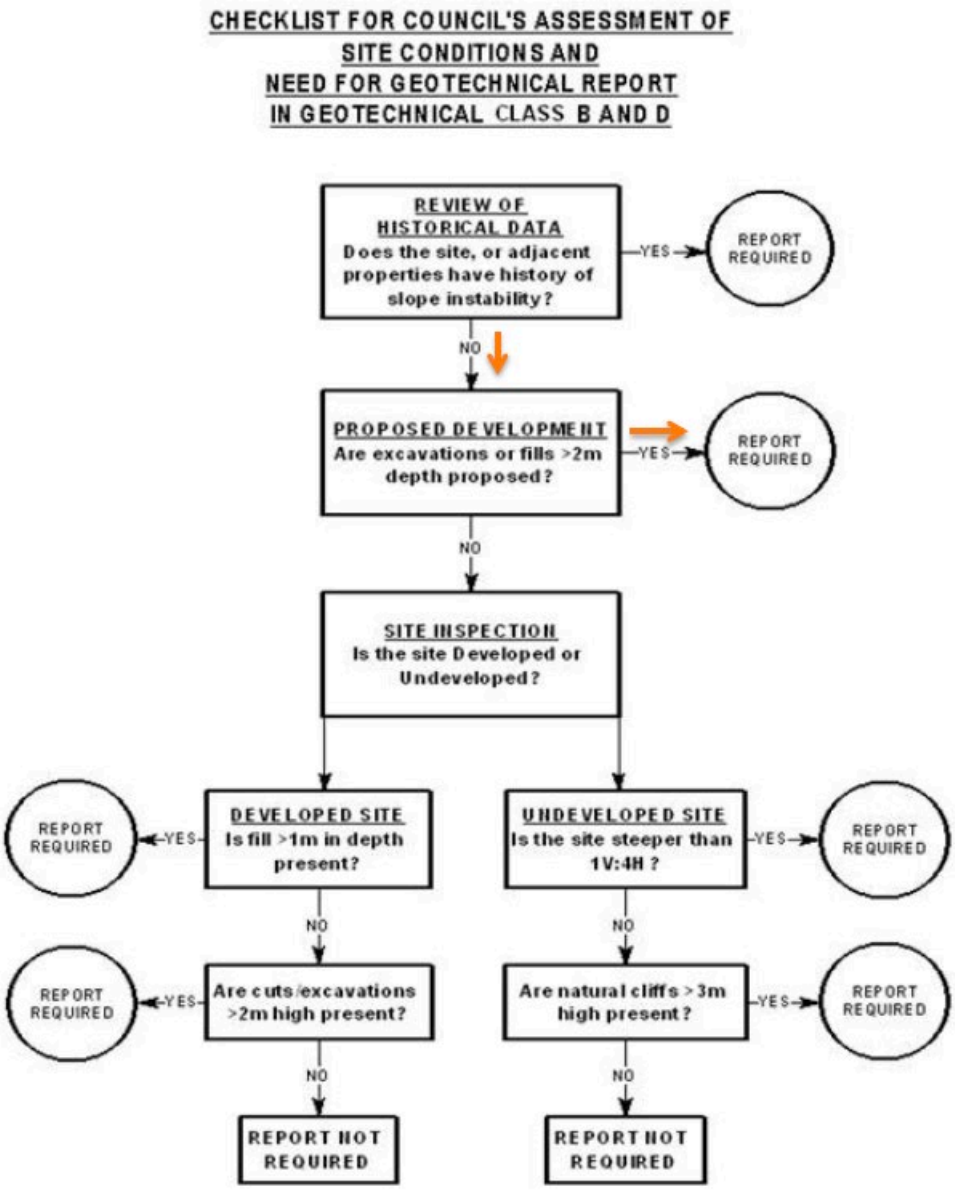
3.0	***PROPOSED DEVELOPMENT***
Redevelopment of Forestville RSL Club. Two basement excavations into existing slope of up to approximately 4.5 metres and 9.50 metres respectively.	

4.0	***EXISTING SITE DESCRIPTION***
Refer to Site description in Geotechnical Report E24016FOR-R01F	

5.0	***RECOMMENDATIONS***
Geotechnical landslide risk assessment required by virture of proposed excavation depths in excess of 2m Engineering design required at CC stage for excavation and footings	

6.0	**DATE OF ASSESSMENT:**	25th July 2024
7.0	**ASSESSMENT BY:**	Matthew Kilham

Refer to Flowchart below:


CHECKLIST FOR COUNCIL'S ASSESSMENT OF SITE CONDITIONS AND NEED FOR GEOTECHNICAL REPORT IN GEOTECHNICAL CLASS B AND D
REVIEW OF HISTORICAL DATA
Does the site, or adjacent properties have history of slope instability?
YES
REPORT REQUIRED
NO
PROPOSED DEVELOPMENT
Are excavations or fills >2m depth proposed?
YES
REPORT REQUIRED
NO
SITE INSPECTION
Is the site Developed or Undeveloped?
DEVELOPED SITE
Is fill >1m in depth present?
YES
REPORT REQUIRED
NO
Are cuts/excavations >2m high present?
YES
REPORT REQUIRED
NO
REPORT NOT REQUIRED
UNDEVELOPED SITE
Is the site steeper than 1V:4H ?
YES
REPORT REQUIRED
NO
Are natural cliffs >3m high present?
YES
REPORT REQUIRED
NO
REPORT NOT REQUIRED

5 DISCUSSION OF THE RESULTS

5.1 INITIAL SITE PREPARATION

Prior to bulk excavation works and construction of the new development, all topsoil with organic matter and any pavement materials, should be removed from the proposed building and pavement areas. Stripped topsoil should be stockpiled for re-use as landscape material or disposed of off-site.

5.2 DILAPIDATION SURVEY

Considering the extent of excavation proposed and the proximity of adjoining structures / utilities, it is recommended that a dilapidation report is obtained prior to commencing demolition and construction work. The purpose of a dilapidation report is to confirm that demolition and construction works, are not causing damage to adjoining structures and therefore may prevent future claims of damage arising from the works. Preferably these surveys should be agreed to, and the report signed, by the owners of the adjacent structures prior to work commencing.

5.3 EARTHWORKS

Based on the development plans provided (**Appendix A**) the proposed basements for each stage of the development will be separate and the approximate outline of each of the basements are indicated on the attached **Figure 2** which includes an extract of the survey plan, and **Figure 3**, which includes a recent aerial photograph.

The southern basement is expected to extend up to the western boundary The lowest basement levels below the southern building is proposed to have a Finished Floor Level (FFL) of between 118.0 and 119.5 metres AHD. Based on existing surface elevations, GEE expects that excavation of between approximately 8.5 to 9.5 metres depth will be required with deeper excavations are also expected to be required locally to accommodate the proposed lift shafts. This basement is proposed to extend up to the western boundary and will be within proximity (~1 metre) of the existing Club building to the north and the southern boundary. It will also be setback approximately 9.0 metres from the eastern boundary.

The northern, single level basement is proposed to have a FFL of 124.0 metres above Australian Height Datum (AHD) and GEE expects that excavation of between approximately 4.0 to 4.5 metres depth will be required. This basement is proposed to be setback approximately 7.0 metres from the southern basement, 8 metres from the western boundary and approximately 9.0 metres from the eastern boundary. The

northern side of this basement will be setback approximately 7 metres from the northern boundary although it will extend up to the western end of Lot 31 / DP366454 (i.e No. 22 Melwood Avenue) which also adjoins the low to medium density residential development located to the north-west of the site.

5.3.1 Expected Excavation Conditions

Based on the ground conditions across the site and as described in Section 4.1, the basement excavation will encounter a surface layer of uncontrolled fill material over a layer of natural sandy soil before encountering sandstone bedrock from a depth of between approximately 1.5 to 3.1 metres.

The strength of bedrock within the depth of the proposed basement is expected to initially be very low to low strength but will become medium to high strength with depth and therefore an impact hammer will likely be required, particularly where unfavourable rock-defect geometry occurs. When using an impact hammer, the effects of vibration should be considered and are discussed further in Section 5.3.6. Additionally, the use of a rock saw is preferred along the boundaries of the excavations to create a more aesthetic rock face at the conclusion of excavation, and to minimise the risk of overbreak and loosening of the rock mass.

GEE also recommends that the earthworks contractor make their own determination of the excavatability of the bedrock and base their assessment on the strength of the rock from the point load test results rather than the rock classification for foundations which include a factor of safety which ultimately underestimates the strength.

Finally, material removed from site will need to be managed in accordance with the provisions of current legislation and may include segregation by material type classification in accordance with NSW EPA (2014) *Waste Classification Guidelines* (reference 13) and disposal at facilities appropriately licensed to receive the particular materials. GEE notes that the natural soil and bedrock may be classified as Virgin Excavated Natural Material (VENM) and re-used on other sites rather than disposed at a landfill, although it must be proven to be free of contamination.

5.3.2 Groundwater

Stabilised groundwater levels in our wells have been measured at elevations of between 124.19 to 124.70 metres AHD, which is within the depth of the proposed basements. Groundwater will be encountered by the proposed basement. In accordance with the DPI (2012) NSW Aquifer Interference Policy (reference 14), basements that intersect the water table (i.e. an aquifer) are considered to be an aquifer interference activity.

Such activities are subject to the Water Management Act 2000 and are regulated by the Department of Planning and Environment (DPE), WaterNSW and Natural Resource Access Regulator (NRAR).

Furthermore, according to Clause 7 of Schedule 4 in the Water Management (General) Regulation 2018 a Water Access Licence (WAL) and a Water Supply Works (WSW) approval may be required for the site from Water NSW (or NRAR). A WAL is a licence that provides an allocation of a certain volume of water in the aquifer to a user. However, it does not provide the right to extract this water. To extract or pump water from an aquifer, such as will be required during construction phase and long-term if a drained basement is adopted, a WSW approval is required. The WAL is required where extraction of water from the aquifer exceeds 3ML/year, where a water year coincides with a financial year. Where extraction volumes are less than this value, a WAL is not required. As detailed in a Fact Sheet provided by Water NSW (reference 15), 3ML/year is similar to the volume taken by landholders in accordance with domestic and stock rights held under Section 52 of the Water Management Act 2000 for which a water access licence is not required to be held.

Based on slug testing performed within the groundwater wells, the hydraulic conductivity is estimated to be in the order of order of 10^{-7} to 10^{-8} m/sec which is consistent with the mass hydraulic conductivity of the Hawkesbury sandstone formation. The Dupuit Thiem Equation (reference 16) was then used to estimate potential inflow to the excavation area for the proposed basement. Based on our calculations and the extent of the excavation, the volume of groundwater required to be withdrawn during excavation works, and long term, is expected to be less that the 3ML/year limit and therefore a WAL will not be required.

Given the above-mentioned mass hydraulic conductivity, a sump and pump, or 'drained' basement will be feasible. However, this will require ongoing management and maintenance of the system and approval from the DPE.

Regardless of the type of basement, a minimum of 3-months of continuous water level monitoring will be required to satisfy the requirements of the DPIE (2022) guidelines, with this exercise to be completed within the six months to support a development application and a water supply works approval application. A site hydrogeology report will also be required that includes the results of the water level monitoring, hydraulic conductivity testing, predicted water extraction volumes and impact on surrounding buildings and water users. This report is then incorporated into a Dewatering

Management Plan (DMP), which is necessary for submission when applying for the relevant licence(s).

5.3.3 BATTER SLOPES

The proposed basement excavations may be temporarily battered as detailed below:

- ◊ Fill / Topsoil / Natural Soil: 2 Horizontal (H) to 1 Vertical (V).
- ◊ Unit 3a Bedrock: 0.5H to 1V
- ◊ Unit 3b Bedrock: Vertical.

It is recommended that regular inspections by an experienced engineering geologist or geotechnical engineer be conducted during excavation works to ensure that the proposed batters have been correctly installed and that the excavation stability is not affected by unsuitable defects or detached boulders. These inspections should be carried out at no more than 1.5 metre vertical increments and where defects or detached blocks that affect the batter, stability are encountered, then conventional stabilisation techniques such as rock bolting, meshing or shotcrete may be required. The removal of some detached blocks may also be required where stabilisation is not considered safe.

5.3.4 RETAINING STRUCTURES

Where the above batters cannot fit within the confines of the site, then a shoring system will need to be installed prior to excavation commencing. The choice of support should be discussed with an experienced contractor and will primarily depend on cost, although other factors such as the aesthetics of the final wall, whether it can function as a structural support and provide a watertight seal will need to be considered. It will also depend on how the DPI Water regulations are interpreted.

To minimise disturbance of the upper soil profile and weathered Unit 3a sandstone bedrock, (i.e. rock that can be excavated without the need for hydraulic hammers) around the perimeter of the excavations the use of a piled wall is recommended, noting soldier pile, contiguous or secant pile walls are all likely to be suitable with socket depths into the underlying Unit 3b sandstone recommended. GEE notes for the proposed deeper southern basement the lower Unit 3b sandstone bedrock should be self-supporting. It is recommended that the piling contractor should complete any investigation necessary to determine the drillability of the sandstone bedrock which based on our point load strength index and UCS testing includes high strength sandstone.

If a suitable socket cannot be achieved, and if the piles are founded above the depth of excavation, temporary anchors will need to be installed in the toe of the piles to provide lateral restraint.

The design of the shoring walls may be undertaken in accordance with AS 4678-2002 *Earth Retaining Structures* (reference 17) and should consider the short- and long-term configurations while making allowance for all applicable surcharge loadings including adjacent buildings. Consideration should also be given to the possibility of a hydrostatic pressure due to build-up of water behind the wall (*e.g.* from broken services), unless permanent subsurface drainage can be provided.

In the short term, should the shoring walls be cantilevered or supported by a single row of anchors and some wall movements can be tolerated (flexible wall), the pressure acting on the wall can be estimated on the basis of a triangular earth pressure distribution. When internal props, such as the ground floor slab, restrain retaining wall movement, or where significant movements cannot be tolerated (rigid wall), an 'at-rest' earth pressure coefficient (Ko) should be adopted with either a uniform or trapezoidal pressure distribution. This may also include the section of shoring adjacent to adjoining residential development to the north that will be immediately adjacent to the northern basement. It should be noted that shoring which is designed for this 'at rest' coefficient will still undergo some lateral movements, depending on the final configuration of the wall and construction sequence.

Finally, computer aided analysis is recommended to assess potential ground movements based on different wall designs and construction sequence, so as to control deflections to within tolerable limits. It is also considered prudent to carry out surveys before and after installation to measure the actual movement of the wall or soil.

Geotechnical parameters for the soil and bedrock profile encountered at the site are provided in **Table 7** below.

Table 7: Geotechnical Design Parameters – Retaining Walls / Shoring

Units	Bulk Unit Weight (kN/m³)	Earth Pressure Coefficients			Elastic Modulus (MPa)	Drained Cohesion (c′) (kPa)	Poisson Ratio (ν′)	Effective Friction Angle (φ′) (degree)
		Active (Ka)	Rest (Ko)	Passive (Kp)				
1 – Fill	17	0.36	0.53	-	5	0	0.35	28
2 – Natural Soil	18	0.36	0.53	-	20	0	0.35	28
3a – Sandstone	22	0.3	0.47	3.25	100	40	0.3	32
3b – Sandstone	24	0.2	0.33	5.0	500	300	0.25	42

5.3.5 TEMPORARY ANCHORS

Temporary ground anchors may be required for the lateral restraint of boundary shoring walls until such time that the walls are permanently strutted by the building floor slabs. The suggested allowable bond stresses for the design of temporary ground anchors in the upper bedrock formation (Unit 3a – Table 2) is 100kPa, while the allowable bond stress for the lower bedrock formation (Unit 3b – Table 2) is 200kPa.

Ground anchors should be designed to have a free length that extends beyond an imaginary line drawn upwards at an angle of 45° from the toe of the wall, to cater for possible 45° faults or joints behind the wall. The minimum free length should be 3 metres. After installation, each anchor should be proof loaded to 125% of the design working load and locked-off at about 80% of the working load. Periodic checks should be carried out during the construction phase to ensure that the lock-off load is maintained and not lost due to creep effects or other causes. The above parameters assume that the anchor holes are clean and thoroughly flushed, with grouting and other installation procedures carried out carefully and in accordance with normal good anchoring practice. The successful anchoring contractor should be required to demonstrate that the above bond values are achievable with the proposed anchor construction method.

5.3.6 CONSTRUCTION / EXCAVATION INDUCED VIBRATION

The structures on the adjacent properties including any nearby utilities are sensitive to vibrations above certain threshold levels (regarding potential for cracking) and when using impact tools such as a hydraulic hammer, vibrations will be transmitted through

the ground and potentially impact on the adjoining structures. Where possible, the use of other techniques not involving impact (*e.g.* rock saws), should be adopted as they would reduce or possibly eliminate risks of damage due to vibrations.

Monitoring of construction induced vibration should be undertaken at the commencement of such activities at the nearest vibration receptor and in consultation with the project superintendent and a vibration specialist engineer so that excessive vibration effects are not generated.

Peak Particle Velocity (PPV) is usually the adopted measure of ground vibration, and the safe limits depend on the sensitivity of the adjoining structures and services. There is a number of Australian and overseas publications which provide vibration velocity guideline levels (or safe limits) including:

- Australian Standard AS2187.2-2006 Explosives - Storage and use - Use of explosives - Appendix J: Ground Vibrations and Airblast Overpressure (reference 18)
- Australian Standard AS2670.2-1990 Evaluation of human exposure to whole-body vibration - Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz) (reference 19).
- DIN 4150 – Part 3 – 1999. Effects if Vibration on Structures (reference 20).
- Department of Environment and Conservation NSW, 2006. Assessing Vibration: a technical guideline (reference 21).
- British Standard BS 7385-1:1990. Evaluation and measurement for vibration in buildings. Guide for measurement of vibrations and evaluation of their effects on buildings (reference 22).
- British Standard BS 7385-2:1993. Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration (reference 23).

Furthermore, the owners of adjoining assets/utilities sometimes have their own limits. In the absence of PPV guidelines from affected asset owners, GEE recommends that a limit of 5 mm/s be adopted for the adjoining structures and utilities.

If vibration levels are found to be unacceptable during the earthworks, it may be necessary to adopt vibration mitigation measures such as:

- The use of smaller excavation plant and hydraulic hammers,

- ◊ The use of a rock sawing or grinder adjacent to the site boundaries. GEE notes that this equipment also reduces the possibility of over-break and loosening of the rock mass.
- ◊ Hammering at 50% capacity in short bursts to prevent the buildup of resonant frequencies,
- ◊ The use of low vibration techniques such as rotary grinders or chemical rock splitting,
- ◊ Progressive breakage from open excavated faces,
- ◊ Selective breakage along open joints, where present, and
- ◊ Orientation of the rock hammer pick away from property boundaries and into the existing open excavation.

Finally, GEE notes human discomfort levels caused by vibration are typically less than the levels that are likely to cause cosmetic or structural damage to structures. Therefore, complaints may be lodged by neighbours before any cosmetic or structural damage occurs. In this regard, consideration may be given to adopting more stringent vibration limits recommended for human amenity or, as a minimum, ensuring that vibration monitoring is undertaken as reassurance to confirm that vibrations are within safe limits. Acceptable vibration limits for human comfort caused by construction and excavation equipment are provided in DEC (2006) (reference 21). Specifically, maximum acceleration limits as specified in Table 2.2 of the guideline should be adopted.

5.4 LANDSLIP RISK ISSUES

5.4.1 PRESENT SLOPE CONDITIONS

The existing slope above and through the site has been altered by minor excavations into the existing hillslope and filling to form the bowling greens and to allow the construction of the existing buildings which were constructed sometime after 1957 when the land for the RSL club was acquired.

The two-storey Forestville RSL Club building is located centrally to the site and is bounded by an open-air, asphalt paved carpark to the north, two bowling greens to the south and a war memorial garden to the east (between the Club Building and Melwood Avenue). A review of the 1943 'Sixmaps' air photo details a gentle south easterly dipping hillslope with likely original slopes of 5 to 10°, now covered by buildings and the bowling greens.

The air photo shows low natural vegetation with sporadic outcrops of Hawkesbury Sandstone. There are no definable cliff or drainage lines evident within the area now occupied by the site.

The western side of the bowling greens have been formed with a low cut into the natural hillslope. The cut is retained by a low mortared brick retaining wall to 1.0 metre in height. The retaining wall appears to have been strengthened at some time with additional buttresses to support the wall. The remaining bowling green area has been constructed by extending a low fill embankment to the southeast off the natural hillslope. The fill embankment around the perimeter of the bowling greens is partly supported by a mortared concrete block wall 0.60 to 1.20 metres in height along the southern boundary adjacent to the carparking area and a mortared brick retaining wall to 1.60 metres in height along the eastern boundary adjacent to a public footpath and Melwood Avenue. Some cracking was observed in the brickwall which was leaning between 2 to 7° with displacements along the crack lines of 4 to 30mm with evidence of seepages from the cracking. The makeup of the concrete block and brick walls and their founding conditions were not determined.

5.4.2 IDENTIFIED HAZARDS

Site Geotechnical Hazards

One geotechnical hazard was identified during the site inspection, and this was the mortared brick wall retaining the eastern side of the bowling greens adjacent to the public footpath running parallel with Melwood Avenue was considered to be in poor condition with a developed lean and cracking evident in the wall. There was no observable drainage installed within the wall. The makeup and foundation condition of the wall was not determined during the investigation. The condition of the wall is likely related to, inadequate design of the wall given its height, a poor foundation condition and no purposeful installed drainage.

The wall in its current condition and proximity to a public footpath would be considered to pose an unacceptable risk to life given in the short to medium term. However, GEE notes that the wall will be removed / replaced as part of the proposed construction works.

There is no evidence the slope in this locality, and both within or adjacent to the site has experienced landsliding since its early settlement and residential development.

5.4.3 Assessment and Control of Identified Hazards

As noted, there is no evidence the slope in this locality and within or adjacent to the site at the Forestville RSL Club has experienced landsliding since its early settlement and development.

In the absence of any direct or presumed evidence of recent slope instability (last several hundred years and more), the likelihood of landslide activity initiating on or adjacent to (but influencing) the site over a notional design life for the continuing existence of the present developments on these properties of 50 years, is considered 'UNLIKELY'.

The slope risk assessment has been carried out based on the current slope conditions and how they would be expected to interact with the proposed development and also for the slope condition where engineering controls have been implemented during construction.

For the existing slope condition, the site has a 'INSIGNIFICANT' consequence for property damage, with an assessed risk of LOW. Where engineering controls are implemented, the site has a 'INSIGNIFICANT' consequence for property damage, with an assessed risk of VERY LOW.

For potential loss of life for the identified hazards, the risk to persons is assessed using the risk equation 4, in AGS 2007. For the existing slope condition, the hazard with the highest calculated risk level is 2.24×10^{-5} per annum, which under the AGS 2007 guidelines for new development is considered to be unacceptable. Where engineering controls are applied to the identified hazards the risk to life decreases to 2.24×10^{-9} which is considered to be acceptable.

5.4.4 Construction Stage

Risk of instability during construction needs to be considered regarding the excavations necessary for the construction of the proposed basements.

As noted, the brick retaining wall supporting the eastern side of the bowling greens is in poor condition. In the short-term GEE recommends that the wall be inspected by a qualified structural engineer. The addition of purposeful drainage (weepholes) would assist in improving the walls stability but some strengthening of the footing system may be required.

During the construction phase of the project the wall would be considered unlikely to be able to support loading from construction equipment that may be utilised. GEE recommends that a construction methodology report (CMR) be compiled noting safeguards to protect the wall from loading.

Excavation in the fill and residual sandy soils and the Unit 3a sandstone bedrock will extend to depths of up to 5.50 metres. Engineering control over proposed batter slopes will be required to provide temporary or permanent support with the latter being recommended to minimise disturbance around the excavation perimeter. The underlying Unit 3b sandstone bedrock could be excavated as a self-supporting face, subject to geotechnical inspections to confirm the rock quality. It is recommended that mapping of excavated faces be carried out by a geotechnical professional during the excavation phase to verify the ground conditions.

In our opinion, with the above controls properly detailed as part of the engineering design for the Construction Certificate, and implemented, the stability of the construction-stage excavations can be maintained at appropriate levels by suitable engineering design for temporary support systems and staging, backed up by a robust Excavation Methodology Statement prepared for the work as part of the usual documentation for a Construction Certificate.

5.4.5 COMPLETED DEVELOPMENT

It is our opinion that the proposed development can be completed so that the slope conditions and structural elements will have a low risk or lower in regard to slope instability, when assessed in accordance with the guidelines in AGS 2007.

This is contingent on the following:

- ◊ All recommendations of this report being faithfully implemented, and
- ◊ The engineering design, construction controls and monitoring, and final engineering verifications as appropriate, being properly undertaken in accordance with the normally accepted practice and regulation for this type of development.

5.5 PAVEMENTS

Pavement designs are based on the CBR, and modulus of the subgrade materials encountered after any excavation or re-grading has taken place. The principal aim of the subgrade preparation is to provide a uniform foundation over the entire pavement formation which will not give rise to unevenness in the pavement surface under the design loads.

No site-specific lab testing was carried out on the existing pavement subgrade, although the subgrade at BH101 and BH102 did comprise sand-based soils. Such soil is suitable as a subgrade provided the material performs satisfactorily under proof rolling and meets the definition of suitable material as defined in as defined by Section 4.4 of AS3798-2007 (reference 24). For sand-based soils such as those encountered at BH101 and BH102, it is likely that a design CBR value of 10% may be achieved without site specific testing of the proposed pavement areas, GEE recommends that a conservative design CBR of 5%. If clay-based soils are imported to site, then the design CBR should be re-assessed and is likely be 3% or less. Compaction of road and pavement subgrades should be undertaken in accordance to the recommendations in AS3798.

Finally, GEE recommends subsoil drains are adopted to protect the pavement and subgrade from becoming saturated.

5.6 FOUNDATIONS

Following excavation of the single level basement at the northern end of the site, the bulk excavation level is expected to comprise the Unit 3a (**Table 2**) sandstone formation which is assessed as being at least Class V/IV sandstone (reference 11). With respect to the three-level basement at the southern end of the site, the bulk excavation level is expected to comprise the Unit 3b sandstone formation which is assessed as being at least Class III sandstone. The foundation design parameters for these sandstone units are provided in **Table 8**.

Table 8: Foundation Design Parameters

Founding Stratum	Serviceability End Bearing Pressure (kPa)[1]	Serviceability Compressive Socket Side Shear (kPa)[2]	Elastic Modulus (MPa)
Unit 3a Sandstone	1,000	100	100
Unit 3b Sandstone	3,500	350	500

Note 1: Settlements for the serviceability bearing pressure are expected to be <1% of the minimum footing dimension.
Note 2: Assumes a rough socket of category R2 or better.

For piles, the above design parameters assume that the piles are socketed at least 0.5m into the bedrock class.

Footing systems should be designed by a suitably qualified and experienced structural engineer and GEE recommends that inspection by a geotechnical engineer is undertaken during the excavation and/or piling stage to confirm that the design founding conditions have been achieved.

5.7 AGGRESSIVITY / EXPOSURE CLASSIFICATION

Based on the preliminary exposure classification test results (Section 4.2.2), and in accordance with AS 2159-2009 (reference 9), the subsurface concrete structures (*e.g.* footings) may be designed based on moderately-aggressive soil conditions for concrete. According to Australian Standard AS 3600-2009 (reference 10) the exposure classification is 'B1'. For buried steel that is unprotected, the sub-surface profile is considered to be non-aggressive/corrosive.

5.8 SALINITY RISK

The testing carried out on the soil profile (refer to Section 4.2.1) indicates that the soil profile across the site is non saline. In this regard, a site-specific management plan is not warranted.

6 CONCLUSION AND RECOMMENDATIONS

GEE considers that sufficient information has been gained to be confident of the subsurface conditions across the site, to assist with design of the proposed development and to provide Council with assurances regarding the geotechnical feasibility of the proposed development.

Based on the results of the investigation, it is concluded that the development can be undertaken with appropriate engineering design and construction controls, such that the risks of slope instability associated with the works and the completed development will be acceptable, i.e. low risk, in accordance with AGS Guidelines.

Additionally, GEE concludes that the existing rock formation can withstand the proposed loads to be imposed, and standard shoring works (provided they are designed by experienced geotechnical and structural engineers), or batters as described herein, will ensure the stability of the excavation and provide protection to both the proposed development and adjacent structures. Notwithstanding this, GEE recommends that regular 'holdpoint' inspections by the relevant engineers are detailed in a CMR to be undertaken during the excavation phase of the development to confirm the geological model and design founding conditions have been achieved.

The geotechnical issues associated with the proposed development have been addressed by the investigation and are discussed in this report. If, during construction, any conditions are encountered that vary significantly from those described or inferred in the above report, it is a condition of the report that we be advised so that those conditions, and the conclusions discussed in the report, can be reviewed and alternative recommendations assessed, if appropriate.

GEE will be pleased to assist with any further advice or geotechnical services required in regard to the proposed development.

7 GENERAL LIMITATIONS

Soil and rock formations are variable. The logs or other information presented as part of this report indicate the approximate subsurface conditions only at the specific test locations. Boundaries between zones on the logs or stratigraphic sections are often not distinct, but rather are transitional and have been interpreted.

The precision with which subsurface conditions are indicated depends largely on the frequency and method of sampling, and on the uniformity of subsurface conditions. The spacing of test sites also usually reflects budget and schedule constraints. Groundwater conditions described in this report refer only to those observed at the place and under circumstances noted in the report. The conditions may vary seasonally or as a consequence of construction activities on the site or adjacent sites.

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities or changes to the design of the development, it is a condition of this report that GEE be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of changed soil and rock conditions requires experience and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

The comments given in this report are intended only for the guidance of the design engineer, or for other purposes specifically noted in the report. The number of boreholes or test excavations necessary to determine all relevant underground conditions which may affect construction costs, techniques and equipment choice, scheduling, and sequence of operations would normally be greater than has been carried out for design purposes. Contractors should therefore rely on their own additional investigations, as well as their own interpretations of the borehole data in this report, as to how subsurface conditions may affect their work.

8 REFERENCES

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18. Australian Standard AS2187.2-2006 Explosives - Storage and use - Use of explosives - Appendix J: Ground Vibrations and Airblast Overpressure.
19. Australian Standard AS2670.2-1990: Evaluation of human exposure to whole-body vibration - Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz).
20. DIN 4150 – Part 3 – 1999. Effects if Vibration on Structures.
21. Department of Environment and Conservation NSW, 2006. Assessing Vibration: a technical guideline.
22. British Standard BS 7385-1:1990. Evaluation and measurement for vibration in buildings. Guide for measurement of vibrations and evaluation of their effects on buildings.
23. British Standard BS 7385-2:1993. Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.
24. Australian Standard (AS) 3798 – 2007: Guidelines on earthworks for commercial and residential developments.

FIGURES

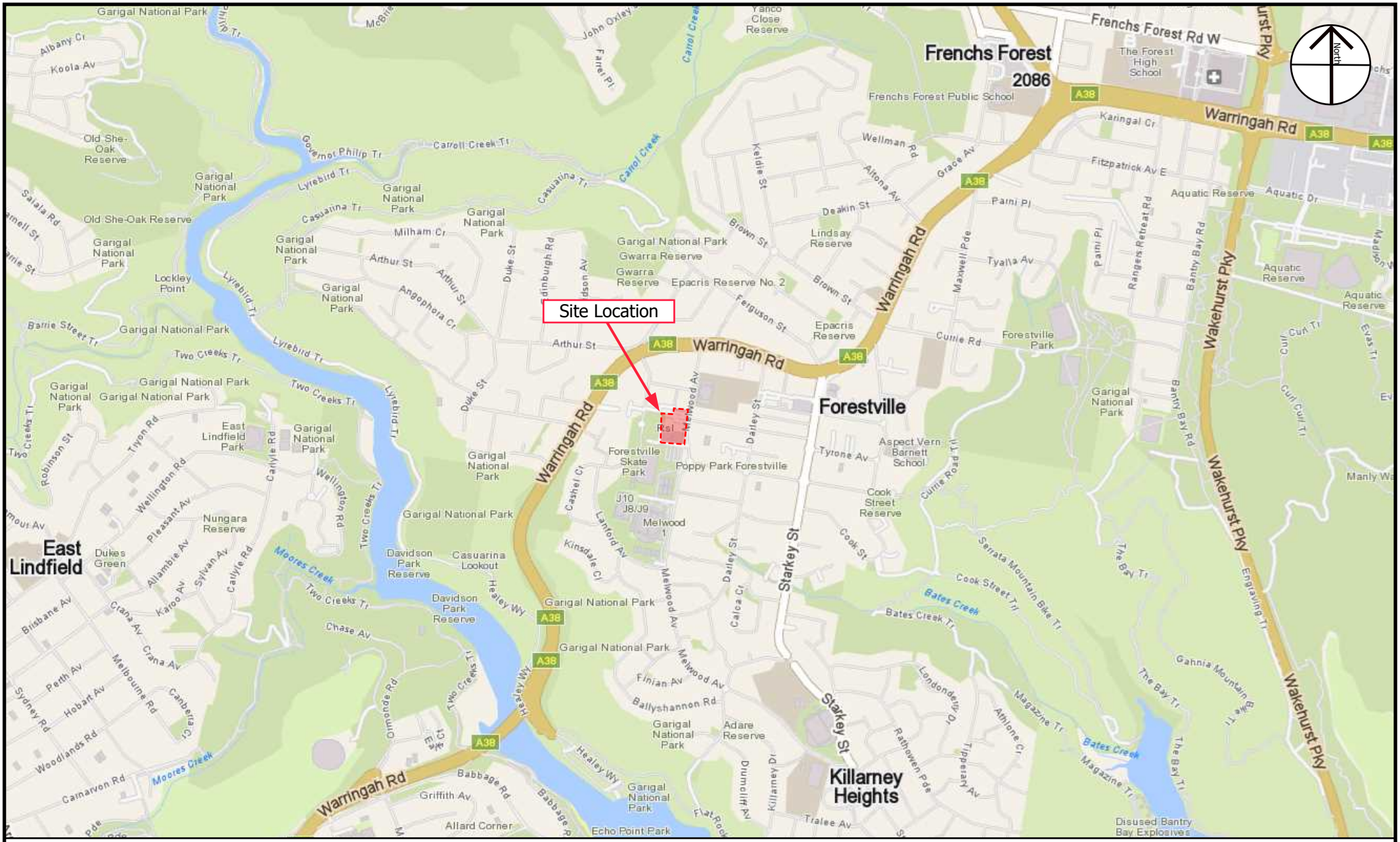
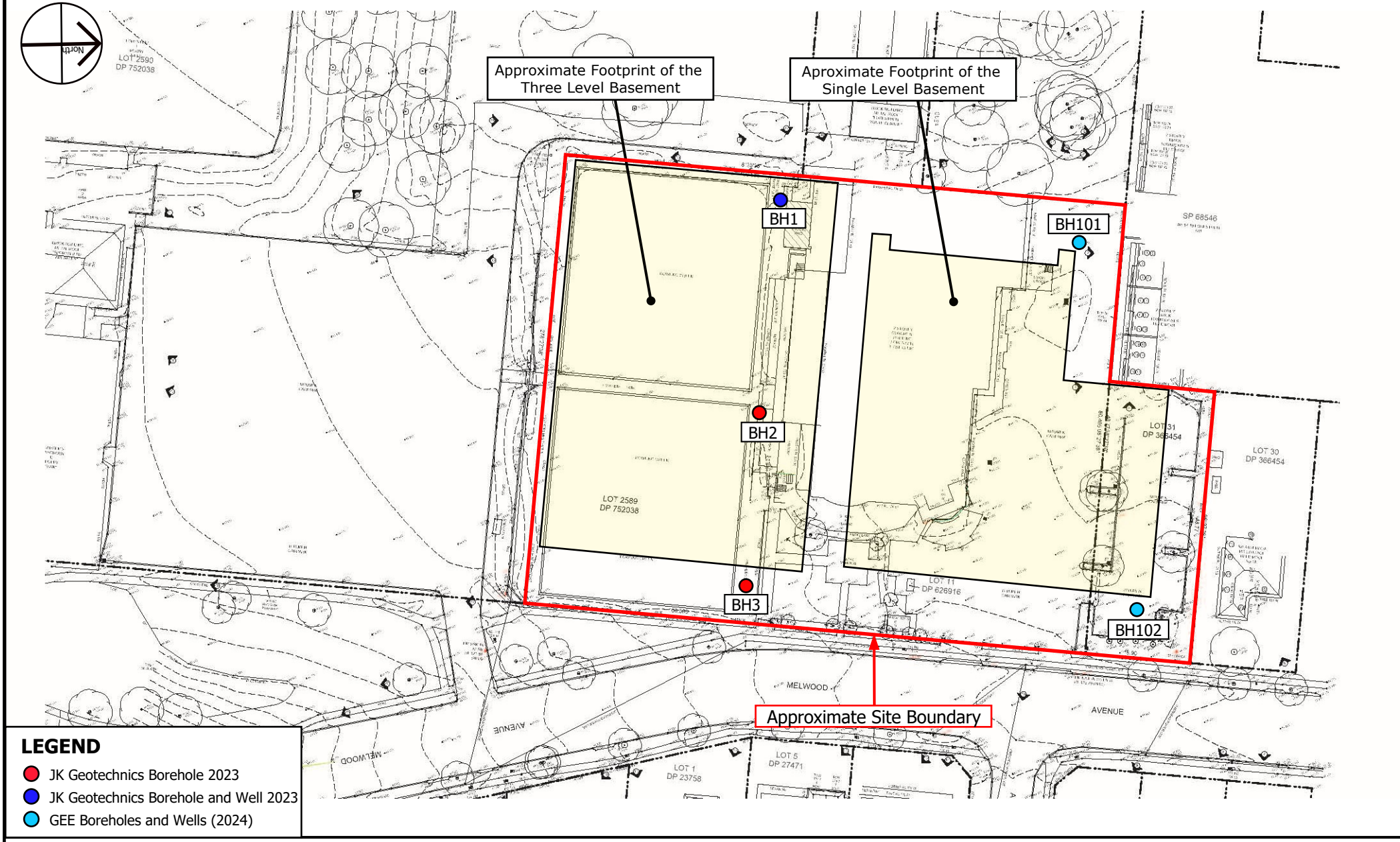


Image Source: www.whereis.com Map data © OpenStreetMap contributors

geo-environmental ENGINEERING
82 BRIDGE STREET
LANE COVE NSW 2066
P - 61 (2) 9420 3361
E - info@geoenvironmental.com.au
www.geoenvironmental.com.au

TITLE: SITE LOCATION MAP 20 - 22 Melwood Ave, Forestville NSW	SCALE: **N.T.S**	DATE: **15 July 2024**	FIGURE No.: **1**
	DRAWN: **S.Gartland**	JOB No.: **E24016FOR**	REVISION: **A**



Survey Image Provide by Quattro Architecture - Dated 20th April 2023

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Unit 2 / 5 - 7 Malta Street
FAIRFIELD EAST NSW 2165
P - 0431480980
E - info@geoenvironmental.com.au
www.geoenvironmental.com.au

TITLE: **Site Plan (SURVEY)** 20-22 Melwood Ave, Forestville NSW	SCALE: N.T.S	DATE: 15 Aug 2024	FIGURE No.: 2
	DRAWN: Z.Ziesel	JOB No.: E24016FOR	REVISION: A

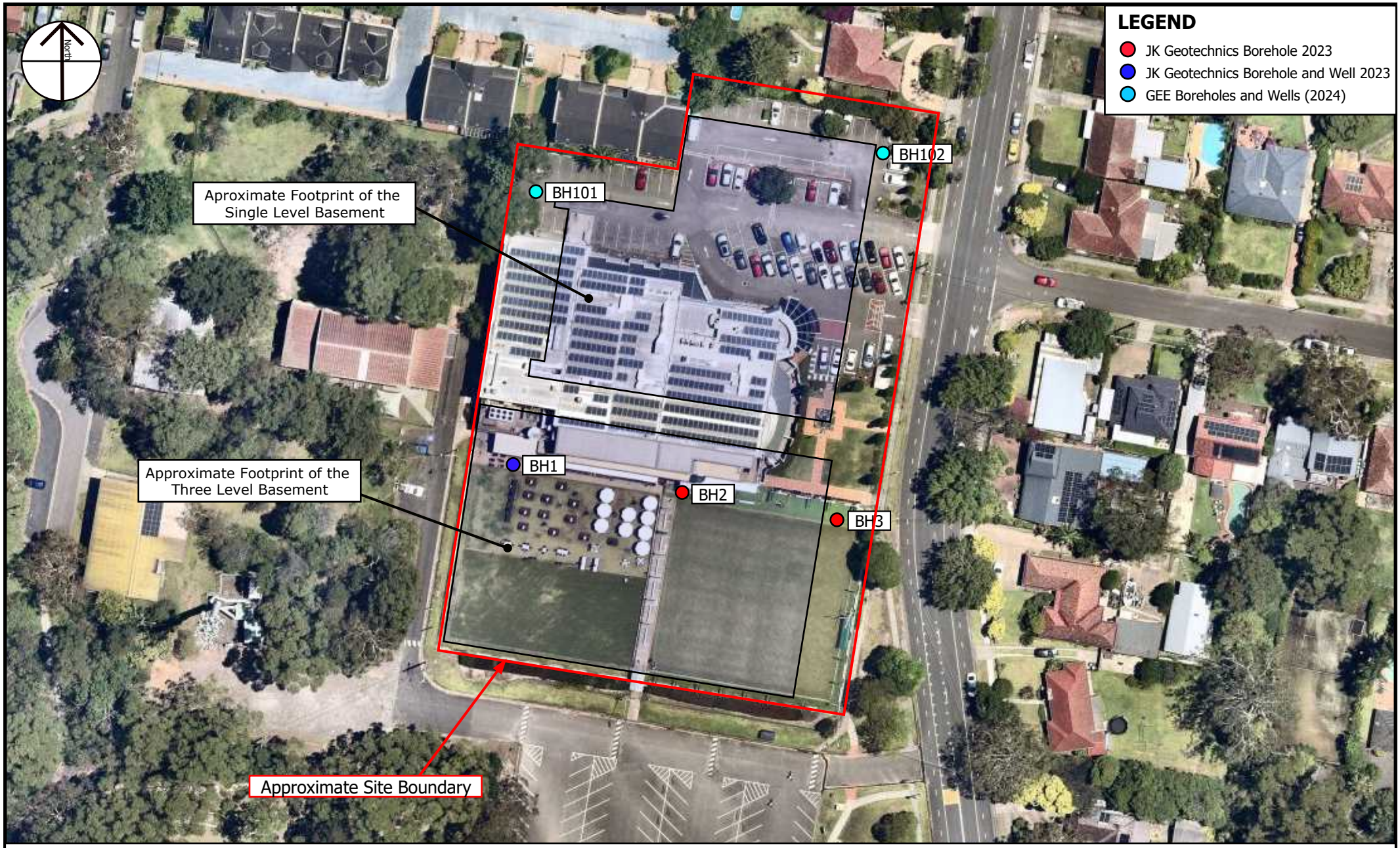

Image Provide by Nearmap (http://maps.au.nearmap.com.au) - Image Date: 9 January 2023

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Unit 2 / 5 - 7 Malta Street
FAIRFIELD EAST NSW 2165
P - 0431480980
E - info@geoenvironmental.com.au
www.geoenvironmental.com.au

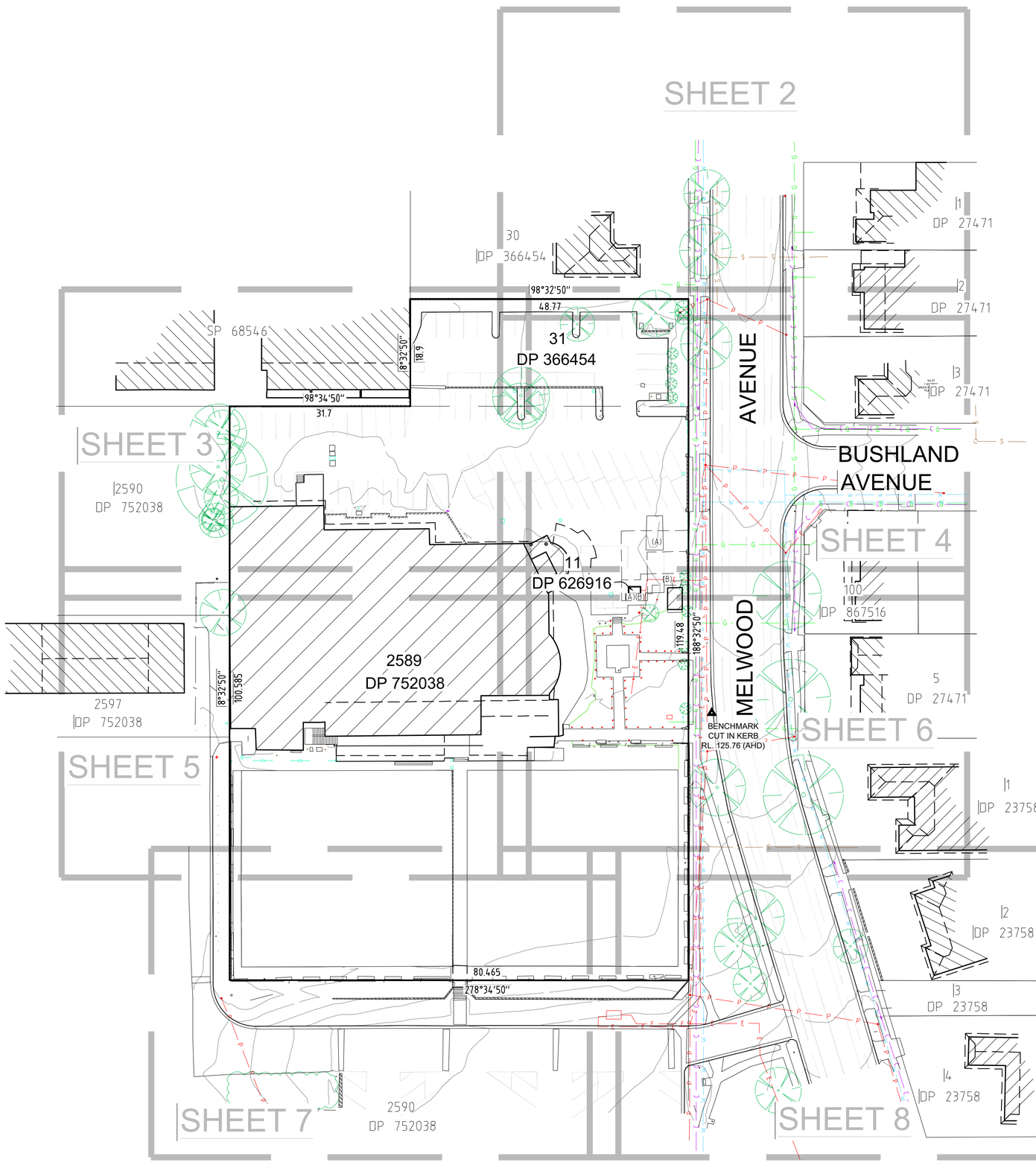
TITLE: **SITE PLAN (AERIAL)** 20-22 Melwood Ave, Forestville NSW	SCALE: **N.T.S**	DATE: **15 Aug 2024**	FIGURE No.: **3**
	DRAWN: **S.Gartland**	JOB No.: **E24016FOR**	REVISION: **A**

APPENDIX A

Survey and Architectural Plans (34 Sheets)

LEGEND

BENCH MARK	▲
TELSTRA PIT	TEL
ELECTRIC LIGHT POLE	ELP
ELECTRIC LIGHT BOLLARD	LB
ELECTRICITY PIT	EPIT
ELECTRICITY BOX	EL
POWER POLE	PP
POWER POLE WITH LIGHT	PPL
GRATED INLET PIT	GIP
DRAIN	DRN
SEWER MANHOLE	SMH
SEWER INSPECTION POINT	SIP
STOP VALVE	SV
HYDRANT	HYD
WATER METER	WM
WATER TAP	TAP
PIT WITH CONCRETE LID	CLID
PIT WITH METAL LID	MLID
STREET SIGN	SS
BOLLARD	BOL
PLAQUE	PLQ
VEHICLE CROSSING	(VC)
PRAM CROSSING	(PC)
WINDOW	W
DOOR	D
HEAD/SILL	H/S
COMMUNICATIONS (DBYD)	C
ELECTRICITY (U'GROUND DBYD)	E
ELECTRICITY (OVERHEAD)	P
SEWER (DBYD)	S
WATER (DBYD)	W
GAS (DBYD)	G
STORMWATER PIPE	SW



NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED ON GROUND
2. THE BOUNDARY SURVEY (DIMENSIONS AND AREA) HAVE BEEN SURVEYED IN ACCORDANCE WITH SURVEYING AND SPATIAL INFORMATION REGULATION 2017 CLAUSE 10 "IDENTIFICATION SURVEYS" AND ARE SUBJECT TO FINAL SURVEY
3. ADJOINING BOUNDARIES WITHIN THIS FILE HAVE BEEN ADDED FROM DCDB DATA OBTAINED FROM NSW LAND REGISTRY SERVICES AND ARE APPROXIMATE ONLY
4. ORIGIN OF **MGA2020** COORDINATES IS TAKEN FROM **SSM 489** - E.**334242.546**, N.**6262662.240** IN MELWOOD AVENUE
5. ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM **SSM 489** R.L. **126.683** (A.H.D.) IN MELWOOD AVENUE
6. CONTOUR INTERVAL **0.5m**
7. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
8. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
9. FLOOR LEVELS SHOWN ARE THRESHOLD LEVELS. NO INVESTIGATION OF INTERNAL FLOOR LEVELS HAS BEEN UNDERTAKEN
10. NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. SERVICES HAVE BEEN PLOTTED FROM RELEVANT AUTHORITIES INFORMATION AND HAVE NOT BEEN SURVEYED. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE
11. 8/4.7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
12. SHOWS APPROXIMATE POSITION OF ROAD LINEMARKING AND IS INDICATIVE ONLY
13. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

EASEMENTS & RESTRICTIONS

(A) RIGHT OF WAY (GOV GAZ DATED 24-6-1983 FOL 2925 & DP626916)
(B) EASEMENT FOR ELECTRICITY PURPOSES 2 WIDE (GOV GAZ DATED 24-6-1983 FOL 292 & DP626916)

COVENANTS AFFECTING WHOLE OF LOT 31 IN DP366454
- POSITIVE COVENANT (3933586)
- POSITIVE COVENANT (6795670)

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GDA2020

0 8 16 24 32 40
SCALE 1: 400 @ A1

Revision	Date	Description	Reference
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00
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C	00/00/00	–	00
B	00/00/00	–	00
A	00/00/00	–	00

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THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

Registered Surveyor NSW

Client CONSTRUCTION MANAGEMENT SERVICES

Drawing title
PLAN OF DETAIL AND LEVELS OVER LOT 2589 IN DP 752038 & LOT 31 IN DP 366454, KNOWN AS FORESTVILLE RSL, No.22 MELWOOD AVENUE, FORESTVILLE

datum	AHD	reference number	52165 002DT
site Area	9015m² (CALC)	scale	1: 400 @A1
LGA	NORTHERN BEACHES	date of survey	17/07/2024
		SHEET	1 OF 11

MGA

TN

APPROX 1:00

No.18
1 STOREY
BRICK RESIDENCE
TILE ROOF

RIDGE 133.47

30
DP 366454

No.18 MELWOOD AVENUE - SOUTH ELEVATION

No.18 MELWOOD AVENUE - EAST ELEVATION

AVENUE

MELWOOD

1
DP 27471

No.23
2 STOREY
BRICK RESIDENCE
TILE ROOF

RIDGE 133.77

2
DP 27471

No.25
1 STOREY
BRICK RESIDENCE
TILE ROOF

RIDGE 130.98

98°32'50"
48.77

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GDA2020

0 2 4 6 8 10
SCALE 1:100 @ A1

SEE SHEET 1 FOR LEGEND & NOTES

ADJOINS SHEET 4

Revision	Date	Description	Reference
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00
D	00/00/00	–	00
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B	00/00/00	–	00
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datum	AHD	reference number	52165 002DT
site Area	9015m² (CALC)	scale	1:100 @A1
LGA	NORTHERN BEACHES	date of survey	17/07/2024
		SHEET	2 OF 11

MGA

TN

APPROX 1°00'

No.17
2 STOREY
BRICK RESIDENCE
TILE ROOF

RIDGE 136.18

SP 68546

No.17
2 STOREY
BRICK RESIDENCE
TILE ROOF

RIDGE 136.32

30
DP 366454

BRICK WALL

GARDEN

KERB

BITUMEN CARPARK

8°32'50"
18.9

31
DP 366454

SPEED HUMP

BRICK WALL

PALING FENCE

98°34'50"
31.7

BRICK WALL

ELEVATION 1 - No.17 FORESTVILLE AVENUE

ELEVATION 2 - No.17 FORESTVILLE AVENUE

SHEET 4

GATE FENCE WIRE GATE CHAIN POST GRASS

2590
DP 752038

2589
DP 752038

BITUMEN CARPARK

CONCRETE LOADING DOCK

CONCRETE PANEL WALL

PARAPET 136.50

2 STOREY
BRICK & RENDERED
BUILDING
"FORESTVILLE RSL"

GATE

BIN

ADJOINS

SEE SHEET 1 FOR LEGEND & NOTES

ADJOINS

SHEET 5

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GDA2020

0 2 4 6 8 10

SCALE 1:100 @ A1

Revision	Date	Description	Reference
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G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00

Revision	Date	Description	Reference
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C	00/00/00	–	00
B	00/00/00	–	00
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datum AHD | reference number 52165 002DT

site Area 9015m² (CALC) | scale 1:100 @A1 | date of survey 17/07/2024

LGA NORTHERN BEACHES | SHEET OF 11 | 3

ADJOINS

SHEET 2

98°32'50"
48.77

BRICK

GARDEN

WALL

TOP

DF

KERB

BRICK WALL

BITUMEN CARPARK

31
DP 366454

GRASS

FOOTPATH

CONCRETE

GARDEN

TOP OF KERB

CONCRETE DRIVEWAY

RENDERED WALL

AVENUE

2
DP 27471

No.25
1 STOREY
BRICK RESIDENCE
TILE ROOF

RIDGE 130.98

3
DP 27471

No.27
1 STOREY
BRICK RESIDENCE
TILE ROOF

RIDGE 130.93

PALING

FENCE

CONCRETE

FOOTPATH

MGA

TN

APPROX 1.00

SHEET 3

ADJOINS

2589
DP 752038

BITUMEN CARPARK

SPEED HUMP

(A)

(B)

(A)(B)

HANDRAIL

PAVED

REND

GRADED DRAIN

MELWOOD

BUSHLAND AVENUE

100
DP 867516

No.31
1 STOREY
BRICK RESIDENCE
METAL ROOF

PARAPET 129.96

SEE SHEET 1 FOR LEGEND & NOTES

ADJOINS

SHEET 6

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GDA2020

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SCALE 1:100 @ A1

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G	00/00/00	–	00
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E	00/00/00	–	00

Revision	Date	Description	Reference
D	00/00/00	–	00
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A	00/00/00	–	00

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datum	AHD	reference number	52165 002DT
site Area	9015m² (CALC)	scale	1:100 @A1
date of survey	17/07/2024		
LGA	NORTHERN BEACHES	SHEET OF	11 | 4

ADJOINS

SHEET 3

MGA

TN

100 APPROX

2590
DP 752038

"FORESTVILLE COMMUNITY HALL"
2 STOREY
BRICK STRUCTURE
TILE ROOF
RIDGE 133.67

2597
DP 752038

2590
DP 752038

2 STOREY
BRICK & RENDERED
BUILDING
"FORESTVILLE RSL"

2589
DP 752038

8°32'50" 100.585

RIDGE 136.49

SHEET 6

GUTTER 135.06

ADJOINS

GATE
FENCE
GRASS
CONCRETE DRIVEWAY
METAL
WALL
RAMP
BALCONY
AWNING
CONCRETE
PATH
EDGE
GRATED DRAIN
DRIVEWAY
KERB
BITUMEN
BENCH
BRICK
RETAINING
LAWN BOWL GREEN

SEE SHEET 1 FOR LEGEND & NOTES

ADJOINS

SHEET 7

Revision	Date	Description	Reference
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
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D	00/00/00	–	00
C	00/00/00	–	00
B	00/00/00	–	00
A	00/00/00	–	00

SCALE 1:100 @ A1

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datum AHD
reference number 52165 002DT
site Area 9015m² (CALC)
scale 1:100 @A1
date of survey 17/07/2024
LGA NORTHERN BEACHES
SHEET 5 OF 11

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ADJOINS

SHEET 4

SHEET 5

ADJOINS

SHEET 8

11
DP 626916

2589
DP 752038

100
DP 867516

5
DP 27471

1
DP 23758

2 STOREY
BRICK & RENDERED
BUILDING
"FORESTVILLE RSL"

REND
SERVICE
HUT

ANZAC
MONUMENT

BENCHMARK
CUT IN KERB
RL. 125.76 (AHD)

LAWN BOWL
GREEN

SYNTHETIC
GRASS

AVENUE

MELWOOD

No.31
1 STOREY
BRICK RESIDENCE
METAL ROOF

No.33
2 STOREY
BRICK RESIDENCE
TILE ROOF

No.35
1 STOREY
BRICK RESIDENCE
TILE ROOF

MGA

TN

100
APPROX

SEE SHEET 1 FOR LEGEND & NOTES

SCALE 1:100 @ A1

Revision	Date	Description	Reference
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00
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B	00/00/00	–	00
A	00/00/00	–	00

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datum	AHD
site Area	9015m² (CALC)
LGA	NORTHERN BEACHES
reference number	52165 002DT
scale	1:100 @A1
date of survey	17/07/2024
SHEET OF	6 OF 11

ADJOINS

SHEET 5

MGA

TN

APPROX 1:00

2589
DP 752038

LAWN BOWL GREEN

LAWN BOWL GREEN

DRIVEWAY

BITUMEN

SPEED HUMP

KERB

TOP OF BANK

FENCE

WALL

BENCH

BRICK

CONCRETE

EDGE

GRASS

METAL

RET WALL

RETAINING WALL

CONCRETE PATH

PATH

AWNING

80.465 CONCRETE

278°34'50"

GARDEN

BLOCK

SUBSTATION

KERB

SPEED HUMP

SPEED HUMP

SPEED HUMP

BITUMEN

DRIVEWAY

BITUMEN CARPARK

BITUMEN CARPARK

GROUP OF SMALL TREES

2590
DP 752038

ADJOINS

SHEET 8

SEE SHEET 1 FOR LEGEND & NOTES

Revision	Date	Description	Reference
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00
D	00/00/00	–	00
C	00/00/00	–	00
B	00/00/00	–	00
A	00/00/00	–	00

SCALE 1:100 @ A1

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datum AHD | reference number 52165 002DT

site Area 9015m² (CALC) | scale 1:100 @A1 | date of survey 17/07/2024

LGA NORTHERN BEACHES | SHEET 7 OF 11

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ADJOINS

SHEET 6

SHEET 7

ADJOINS

MELWOOD AVENUE

2589
DP 752038

2590
DP 752038

2
DP 23758

3
DP 23758

4
DP 23758

No.37
1 STOREY
BRICK RESIDENCE
TILE ROOF

No.41
1 STOREY
BRICK RESIDENCE
TILE ROOF

MGA

TN

APPROX 1.00°

SEE SHEET 1 FOR LEGEND & NOTES

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SCALE 1:100 @ A1

Revision	Date	Description	Reference
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G	00/00/00	–	00
F	00/00/00	–	00
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A	00/00/00	–	00

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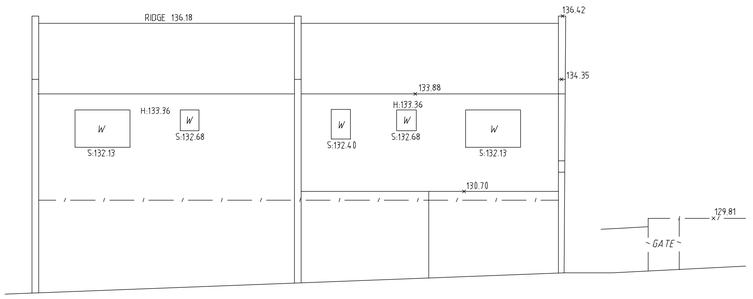
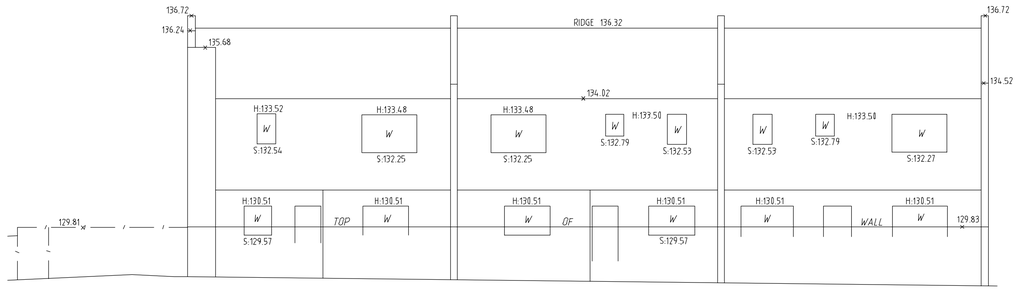
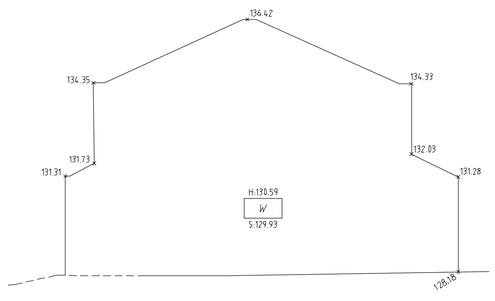
datum	AHD	reference number	52165 002DT
site Area	9015m² (CALC)	scale	1:100 @A1
LGA	NORTHERN BEACHES	date of survey	17/07/2024
		SHEET OF	8 / 11



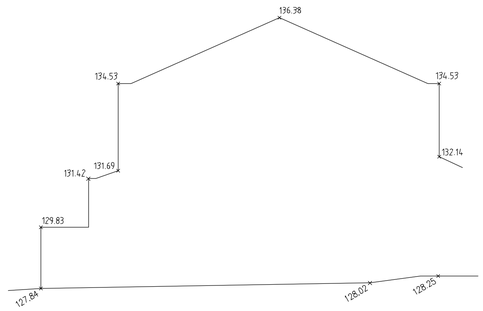
ELEVATION No.1 - 17 FORESTVILLE AVENUE



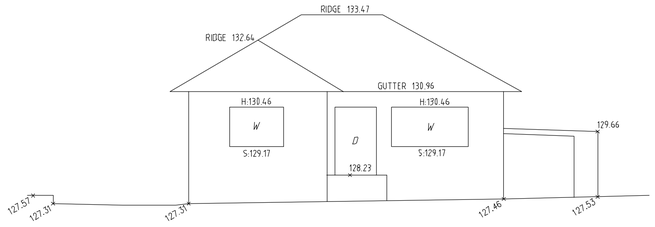
ELEVATION No.2 - 17 FORESTVILLE AVENUE



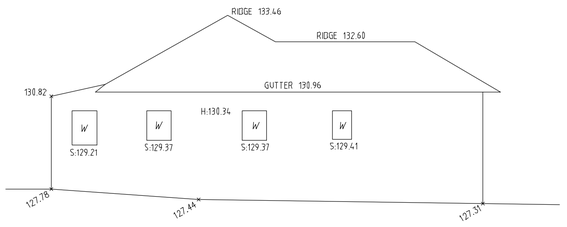
EAST ELEVATION - No.17 FORESTVILLE AVENUE LOT A



EAST ELEVATION - No.17 FORESTVILLE AVENUE LOT B



EAST ELEVATION - No.18 MELWOOD AVENUE



SOUTH ELEVATION - No.18 MELWOOD AVENUE

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GDA2020

SEE SHEET 1 FOR LEGEND & NOTES

0 2 4 6 8 10

SCALE 1:100 @ A1

Revision	Date	Description	Reference
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
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D	00/00/00	–	00
C	00/00/00	–	00
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A	00/00/00	–	00

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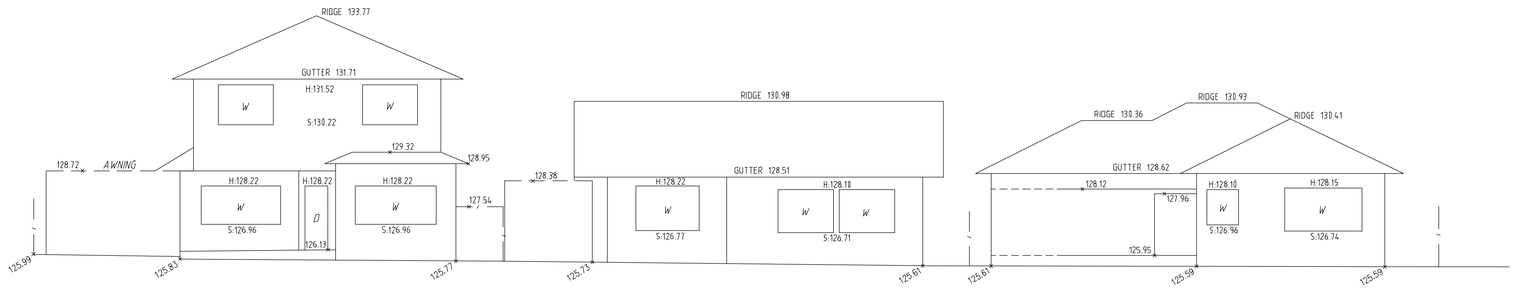
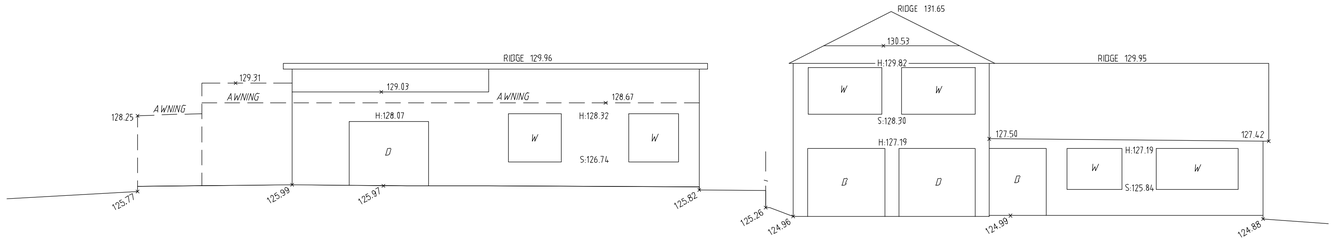
Client CONSTRUCTION MANAGEMENT SERVICES

Drawing title
PLAN OF DETAIL AND LEVELS OVER LOT 2589 IN DP 752038 & LOT 31 IN DP 366454, KNOWN AS FORESTVILLE RSL, No.22 MELWOOD AVENUE, FORESTVILLE

datum AHD
reference number 52165 002DT
site Area 9015m² (CALC)
scale 1:100 @A1
date of survey 17/07/2024
LGA NORTHERN BEACHES
SHEET 9 OF 11



WEST ELEVATION - No.23-27 MELWOOD AVENUE



WEST ELEVATION - No.31-33 MELWOOD AVENUE

SEE SHEET 1 FOR LEGEND & NOTES

Revision	Date	Description	Reference
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00

Revision	Date	Description	Reference
D	00/00/00	–	00
C	00/00/00	–	00
B	00/00/00	–	00
A	00/00/00	–	00

0 2 4 6 8 10
SCALE 1:100 @ A1

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

Registered Surveyor NSW

Client CONSTRUCTION MANAGEMENT SERVICES

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datum AHD | reference number 52165 002DT
site Area 9015m² (CALC) | scale 1:100 @A1 | date of survey 17/07/2024
LGA NORTHERN BEACHES | SHEET 10 OF 11

LTS CONFIDENCE TOGETHER
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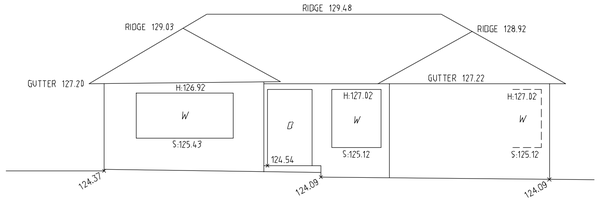
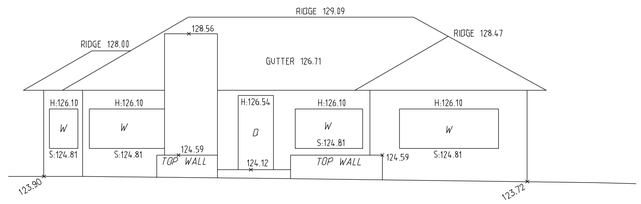
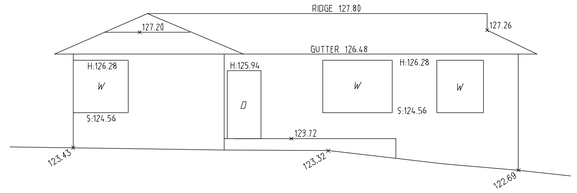


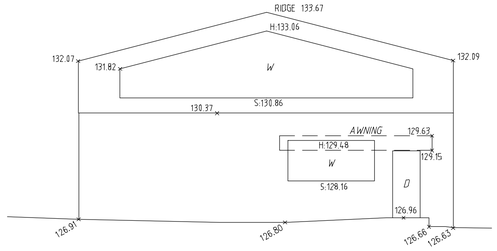
WEST ELEVATION - No.35 MELWOOD AVENUE



WEST ELEVATION - No.37 MELWOOD AVENUE



WEST ELEVATION - No.41 MELWOOD AVENUE



EAST ELEVATION - FORESTVILLE COMMUNITY HALL

SEE SHEET 1 FOR LEGEND & NOTES

0 2 4 6 8 10
SCALE 1:100 @ A1

Revision	Date	Description	Reference
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
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LGA NORTHERN BEACHES

reference number 52165 002DT
scale 1:100 @A1
date of survey 17/07/2024
SHEET 11 OF 11

N

FORESTVILLE RSL REDEVELOPMENT

LOT 2589 & LOT 31
DP752038 & DP 366454
20 MELWOOD AVE, FORESTVILLE NSW 2087

1.MASTERPLAN SET - SITE ANALYSIS

2. CLUB AND SENIORS LIVING - ADG / SHDG ANALYSIS
3. SENIORS LIVING - 3 X BUILDINGS - ADG / SHDG ANALYSIS
4. ADG SOLAR STUDY
5. SENIORS LIVING APARTMENT LAYOUTS

Name:	**Project**
Address:	CLUB REDEVELOPMENT22 MELWOOD AVELOT 2589 & LOT 31 DP752038 & DP 366454
Project ID:	22 MELWOOD AVELOT 2589 & LOT 31 DP752038 & DP 366454
	22-0716
Page:	
Sheet ID	**1 of 1**
DA_A_000	COVER SHEET
DA_A_047	REGIONAL SITE PLAN
DA_A_048	SURVEY & SURROUNDINGS
DA_A_049	SURVEY PHOTOS
DA_A_050	SITE ANALYSIS
DA_A_051	SITE ANALYSIS
DA_A_052	SITE ANALYSIS - CAR PARKING
DA_A_053	SITE ANALYSIS - OPEN SPACE
DA_A_054	SITE ANALYSIS - AREA CALCS
DA_A_055	SITE PLAN - EXISTING
DA_A_098	SITE PLAN - BASEMENT 3/4/5
DA_A_099	SITE PLAN - BASEMENT 1/2
DA_A_100	SITE PLAN - GROUND
DA_A_101	SITE PLAN - LEVEL 1
DA_A_102	SITE PLAN - LEVEL 2
DA_A_103	SITE PLAN - ROOF
DA_A_200	ELEVATIONS
DA_A_201	3D MONTAGE
DA_A_250	SECTIONS
DA_A_300	HEIGHT ENVELOPE STUDY
DA_A_301	HEIGHT ENVELOPE STUDY 9.5m
DA_A_302	HEIGHT ENVELOPE STUDY 11.5m
DA_A_400	SHADOW DIAGRAMS

01 EASTERN BUILDING ELEVATION - MELWOOD AVENUE
scale 1:200

DA

Quattro ARCHITECTURE

Sydney F: 61 2 9091 0190
Suite 129, 117 Old Pittwater Road
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Peter Hosking (Director) Registered Architect - 6854

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Unit 5, 71 Leichhardt Street
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Tim Zuber Registered Architect - 2384

ACN 150 198 842 **W:** www.qarch.com.au

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B	01/12/2023	CONCEPT UPDATE	PJH
C	12/04/2024	B5 ADDED	PJH
D	30/08/2024	DA	PH

CLIENT
FORESTVILLE RSL

PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
COVER SHEET

MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_000**	**D**

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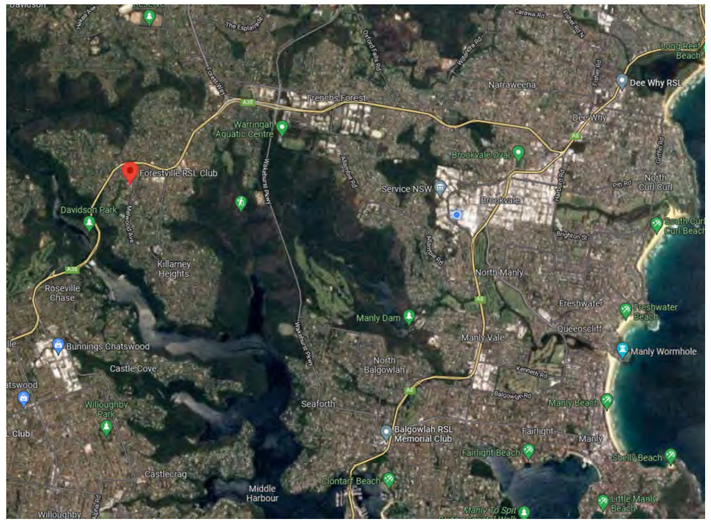


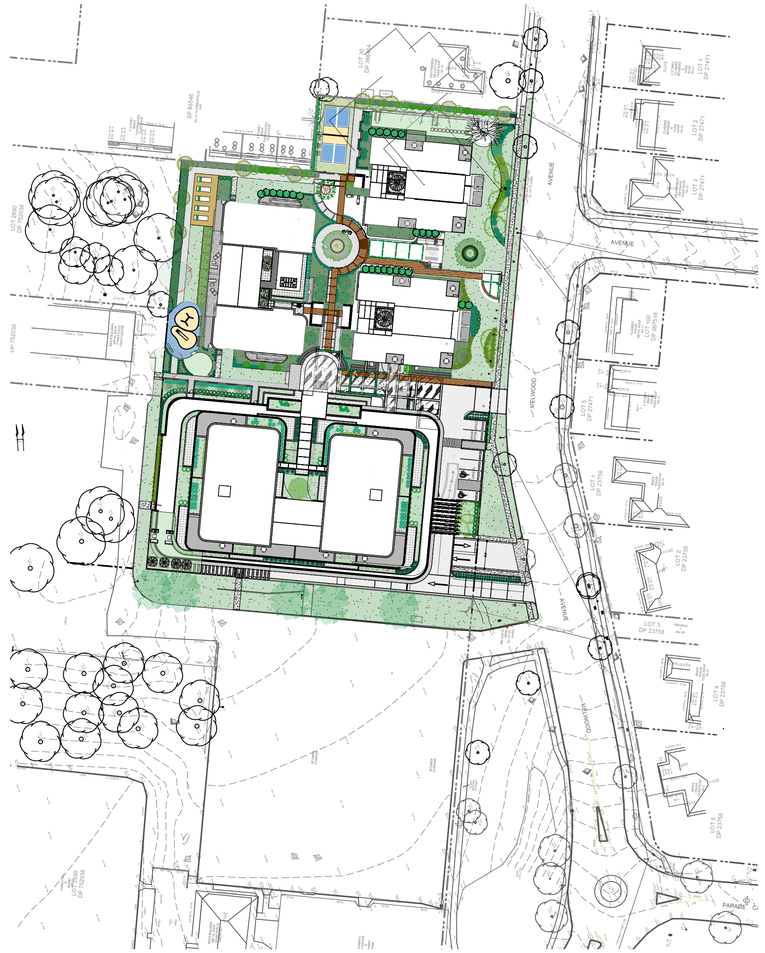
01 REGIONAL MAP
scale 1:NTS

Documentation	Required information	Provided	
		Yes (✓)	No (x)
Site location	Broad map or aerial photo showing site location in relation to surrounding centres, shops, civic/community facilities and transport	✓	
Aerial photograph	Colour aerial photographs of site in its context	✓	
Local context plan	Plan(s) of the existing features of the wider context including adjoining properties and the other side of the street, that show:	✓	
	• pattern of buildings, proposed building envelopes, setbacks and subdivision pattern	✓	
	• land use and building typologies of adjacent and opposite buildings in the street	✓	
	• movement and access for vehicles, servicing, pedestrians and cyclists	✓	
	• topography, landscape, open spaces and vegetation	✓	
	• significant views to and from the site	✓	
	• significant noise sources in the vicinity of the site, particularly vehicular traffic, train, aircraft and industrial noise	✓	

02 PRE-DA REQUIREMENTS
scale 1:-

03 LOCAL MAP
scale 1:NTS

04 SITE PLAN PHOTO EXISTING
scale 1:750



05 PROPOSED SITE PLAN
scale 1:750

DA

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CLIENT
FORESTVILLE RSL

PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

DRAWING
REGIONAL SITE PLAN

Scale at A1 1:750
Scale at A3 1:1500
0m 5 10 25 50 60

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MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_047**	**D**

Documentation	Required information	Provided	
		Yes (✓)	No (x)
Site context and survey plan	Plan(s) of the existing site based on a survey drawing showing the features of the immediate site including:	✓	
	• boundaries, site dimensions, site area, north point	✓	
	• topography, showing relative levels and contours at 0.5 metre intervals for the site and across site boundaries where level changes exist, any unique natural features such as rock outcrops, watercourses, existing cut or fill, adjacent streets and sites	✓	
	• location and size of major trees on site and relative levels where relevant, on adjacent properties and street trees	✓	
	• location and use of existing buildings or built features on the site	✓	
	• location and important characteristics of adjacent public, communal and private open spaces	✓	
	• location and height of existing windows, balconies, walls and fences on adjacent properties facing the site, as well as parapet and ridge lines	✓	
	• pedestrian and vehicular access points, driveways and features such as service poles, bus stops, fire hydrants etc.	✓	
	• location of utility services, including easements and drainage	✓	
	• location of any other relevant features	✓	

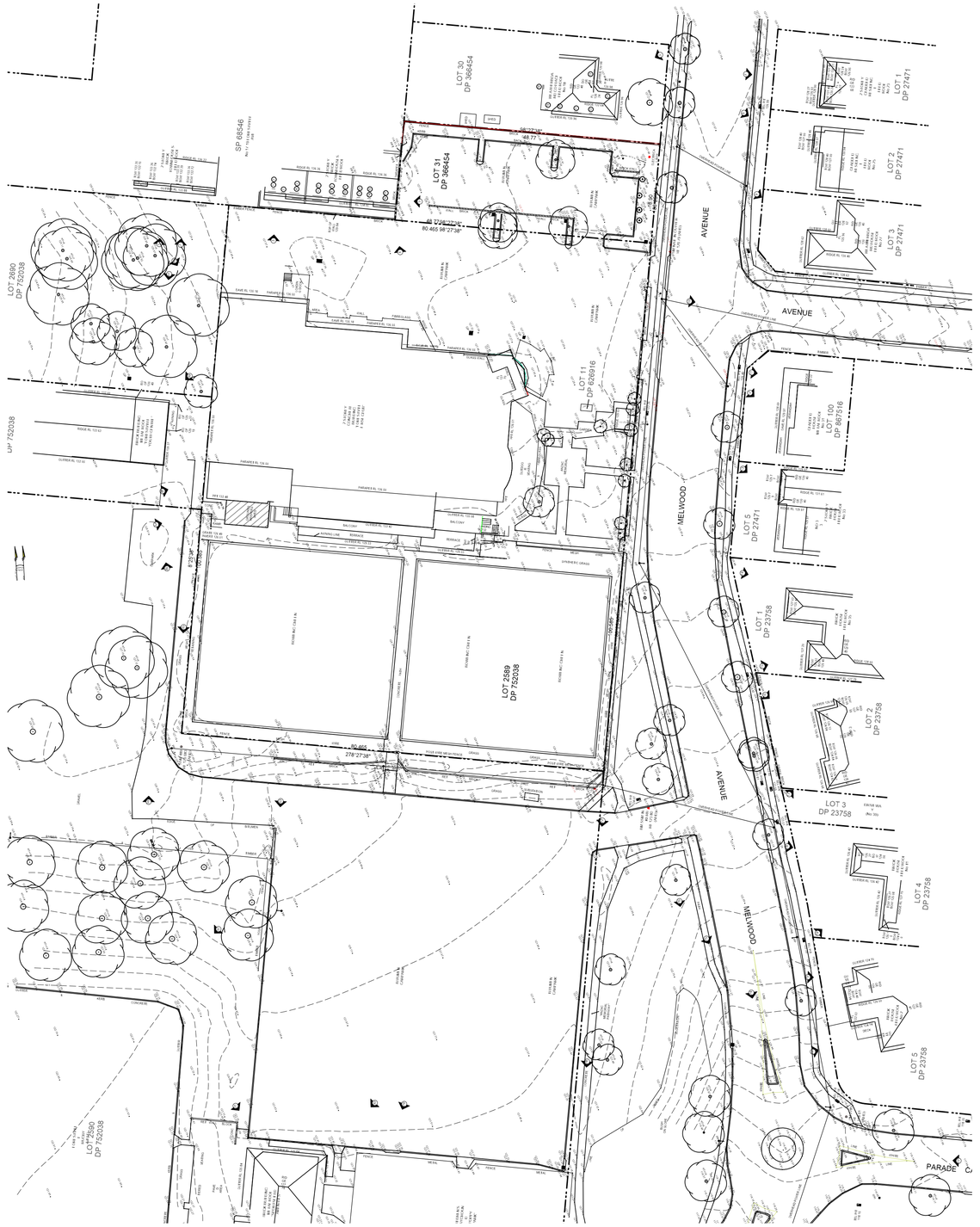
01 PRE-DA REQUIREMENTS
scale 1:-

02 EXISTING RSL CLUB PHOTO
scale 1:-

03 FORESTVILLE YOUTH CENTRE PHOTO
scale 1:-

04 EXISTING RSL CLUB ENTRY PHOTO
scale 1:-

05 MELWOOD AVENUE PHOTO
scale 1:-



01 SITE SURVEY
scale 1:500

DA

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CLIENT
FORESTVILLE RSL

PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
SURVEY & SURROUNDINGS

Scale at A1 1:500
Scale at A3 1:1000
0m 5 10 25 40

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MASTERPLAN SET

DRAWN	DATE	CHKD
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PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_048**	**D**

N


PHOTOGRAPH LOCATION 1
17-19 FORESTVILLE AVE


PHOTOGRAPH LOCATION 2
17-19 FORESTVILLE AVE


PHOTOGRAPH LOCATION 3
17-19 FORESTVILLE AVE


PHOTOGRAPH LOCATION 4
17-19 FORESTVILLE AVE


PHOTOGRAPH LOCATION 5
17-19 FORESTVILLE AVE


PHOTOGRAPH LOCATION 6
No.18 MELWOOD AVE


PHOTOGRAPH LOCATION 7
No.23 MELWOOD AVE


PHOTOGRAPH LOCATION 8


PHOTOGRAPH LOCATION 9
No.27 MELWOOD AVE


PHOTOGRAPH LOCATION 10
INTERSECTION BUSHLAND AVE


PHOTOGRAPH LOCATION 11
No.31 MELWOOD AVE


PHOTOGRAPH LOCATION 12
No.31 MELWOOD AVE


PHOTOGRAPH LOCATION 13
No.33 MELWOOD AVE


PHOTOGRAPH LOCATION 14
No.35 MELWOOD AVE


PHOTOGRAPH LOCATION 15
No.35 MELWOOD AVE


PHOTOGRAPH LOCATION 16
No.37 MELWOOD AVE


PHOTOGRAPH LOCATION 17
No.37 MELWOOD AVE


PHOTOGRAPH LOCATION 18
No.41 MELWOOD AVE


PHOTOGRAPH LOCATION 19
No.41 MELWOOD AVE


PHOTOGRAPH LOCATION 20
No.2 CANNONS PARADE


PHOTOGRAPH LOCATION 21
No.2 CANNONS PARADE


PHOTOGRAPH LOCATION 22


PHOTOGRAPH LOCATION 23


PHOTOGRAPH LOCATION 24


PHOTOGRAPH LOCATION 25


PHOTOGRAPH LOCATION 26


PHOTOGRAPH LOCATION 27


PHOTOGRAPH LOCATION 28


PHOTOGRAPH LOCATION 29


PHOTOGRAPH LOCATION 30


PHOTOGRAPH LOCATION 31


PHOTOGRAPH LOCATION 32


PHOTOGRAPH LOCATION 33


PHOTOGRAPH LOCATION 34


PHOTOGRAPH LOCATION 35


PHOTOGRAPH LOCATION 36


PHOTOGRAPH LOCATION 37


PHOTOGRAPH LOCATION 38


PHOTOGRAPH LOCATION 39


PHOTOGRAPH LOCATION 40

PHOTOGRAPH LOCATION 41
FORESTVILLE YOUTH CENTRE

DA

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CLIENT
FORESTVILLE RSL

PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
SURVEY PHOTOS

MASTERPLAN SET

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AL	20/04/2023	PH

PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_049**	**D**

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SITE ANALYSIS

SENIORS HOUSING

RESIDENTIAL FLAT BUILDING
APARTMENT DESIGN GUIDE
SENIORS HOUSING GUIDE 2023

3.1 FLOOR TO FLOOR HEIGHT
BOUNDARY SETBACKS 9 mtrs
BUILDING SEPARATION 12mtrs
BUILDING MAX SIZE 20m X 40m

EXISTING CLUB TO MAINTAIN TRADING WHILST NEW CLUB CONSTRUCTED

EXISTING BUILDING LINE
RESIDENTIAL NEIGHBOURS

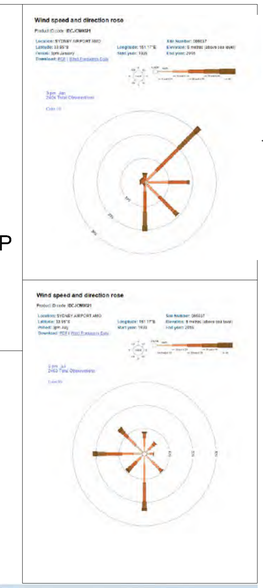
SPACE AVAILABLE FOR 3 X SENIORS BUILDINGS

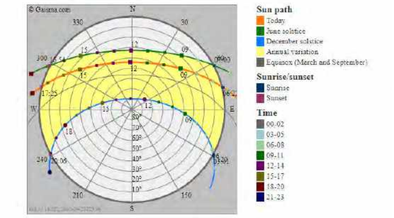
PLANNING

R 2 ZONE
HOUSING SEPP
9.5 MTR HEIGHT LIMIT WITH
11.5MTR MAX ALLOWED FOR
SERVICING EQUIPMENTS

8.5 MTR HEIGHT LIMIT
FOR THE CLUB FROM THE LEP

SITE AREA = 9,014m^2





EASIL ELOPED PORTION OF SITE

GREAT VEHICULAR ACCESS OFF MELWOOD AVE

IONAL VIEWS

COLD WINTER WINDS

COLD WINTER WINDS

COOL SUMMER WINDS

WINTER SUN

SUMMER SUN

AVENUE

MELWOOD

BUSHLAND

Documentation	Required information	Provided	
		Yes (✓)	No (x)
Streetscape elevations and sections	Photographs or drawings of the site in relation to the streetscape and along both sides of any street that the development fronts, that show:		
	• overall height (storeys, metres) and important parapet/datum lines of adjacent buildings		
	• patterns of building frontage, street setbacks and side setbacks		
	• planned heights		
Analysis	Plan that synthesises and interprets the context, streetscape and site documentation into opportunities and constraints that generate design parameters, including the following information:		
	• orientation and any overshadowing of the site and adjoining properties by neighbouring structures (excludes vegetation). The winter sun path should also be shown between 9 am and 3 pm on 21 June		
	• identification of prevailing wind	✓	
	• the geotechnical characteristics of the site and suitability of the proposed development	✓	
	• the public domain interface and street setback	✓	
	• relationship to and interface with adjacent properties, including side and rear setbacks	✓	
	• ventilation for the subject site and immediate neighbours	✓	
	• proposed building footprint location		
	• retained and proposed significant trees and deep soil zones		
	• proposed communal open space		
	• proposed car park footprint and depth		
	• proposed building entries		
	• supporting written material - this should include technical advice from specialists involved in the development process including landscape architects, arborists, geotechnical engineers and/or contamination specialists where applicable	✓	

01 SITE ANALYSIS
scale 1:500

DA

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CLIENT
FORESTVILLE RSL

PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
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DRAWING
SITE ANALYSIS

Scale at A1 1:500
Scale at A3 1:1000
0m 5 10 25 40

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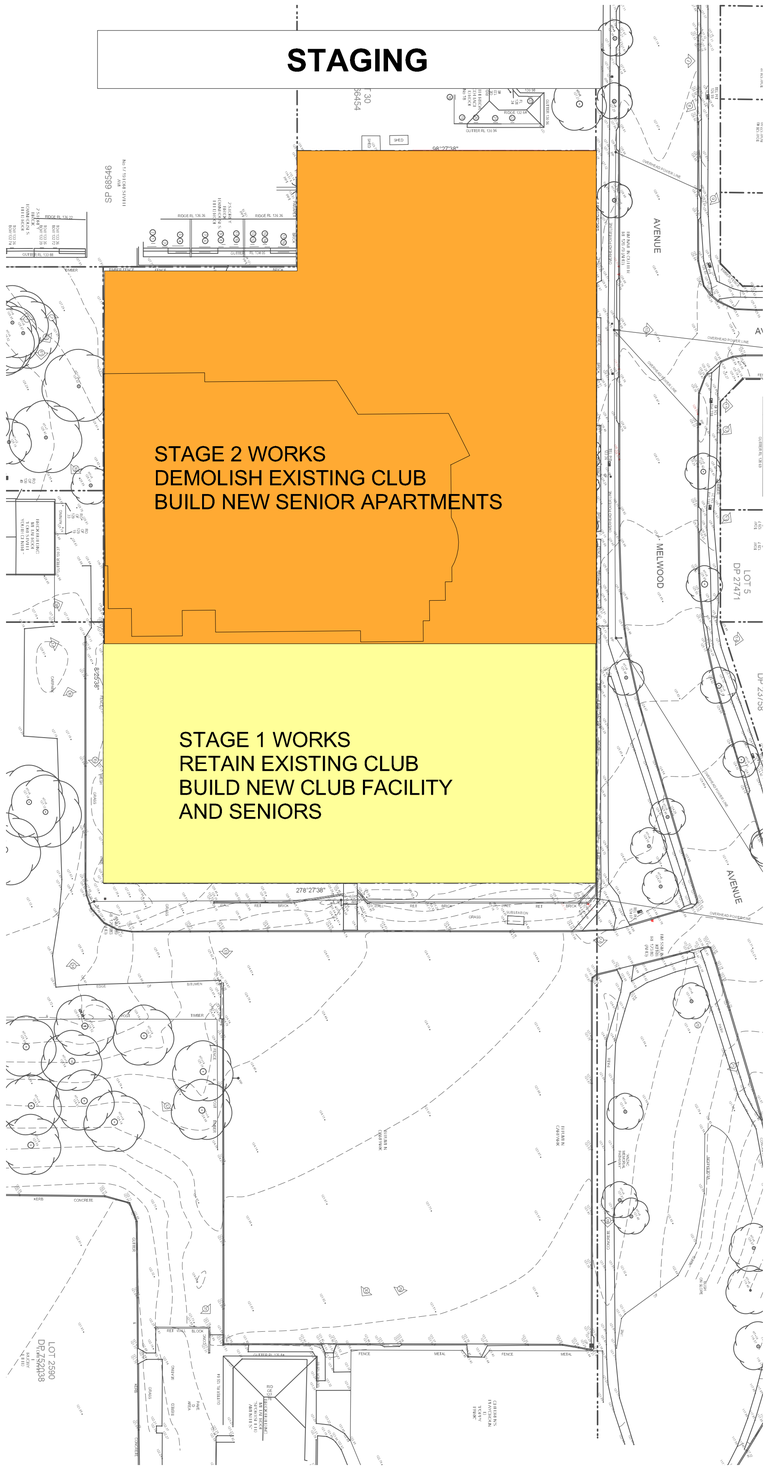
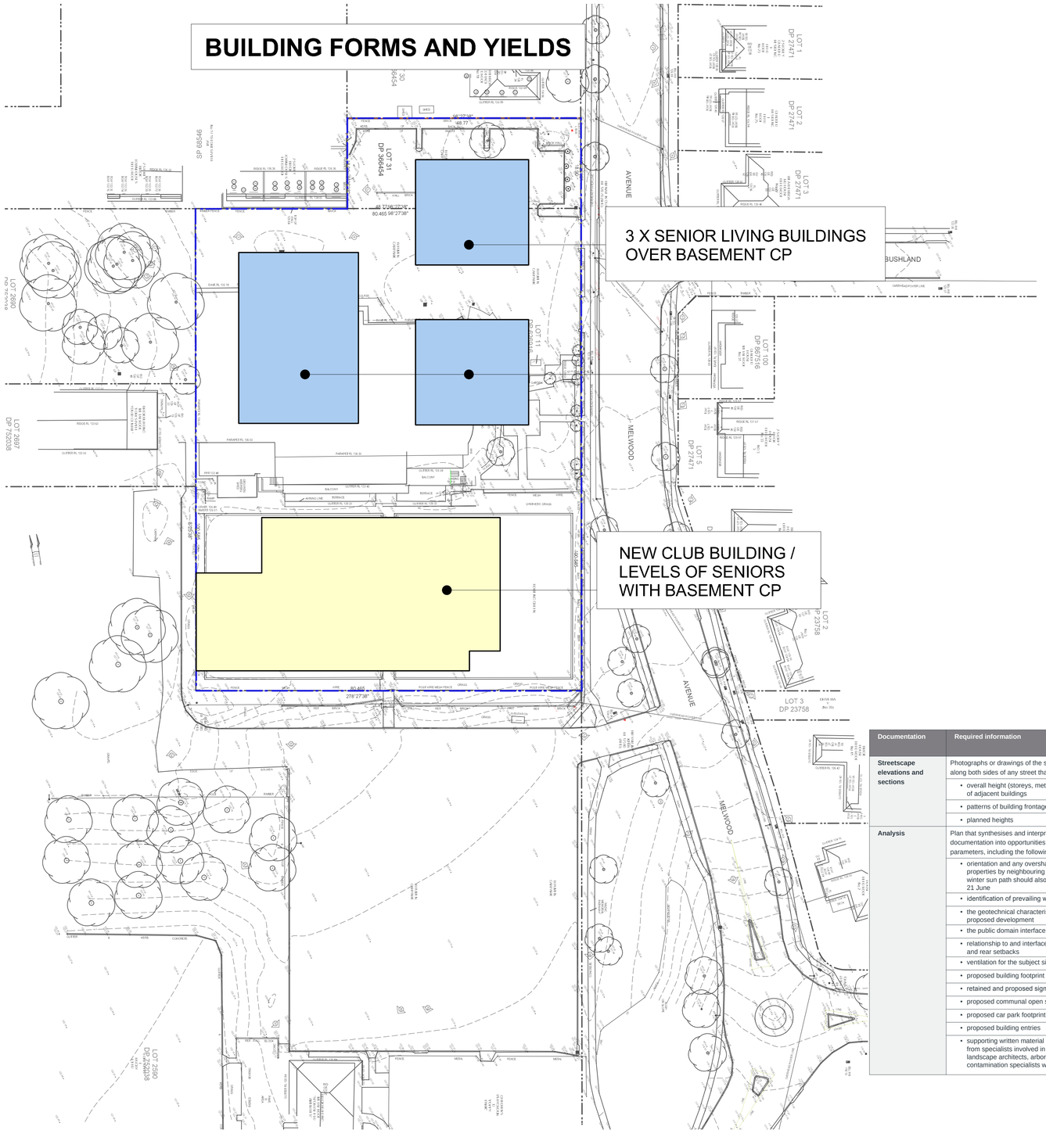
N

STAGING



BUILDING FORMS AND YIELDS



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	• the public domain interface and street setback	✓	
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	• proposed communal open space		
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DRAWING
SITE ANALYSIS

MASTERPLAN SET

Scale at A1 1:500
Scale at A3 1:1000
0m 5 10 25 40

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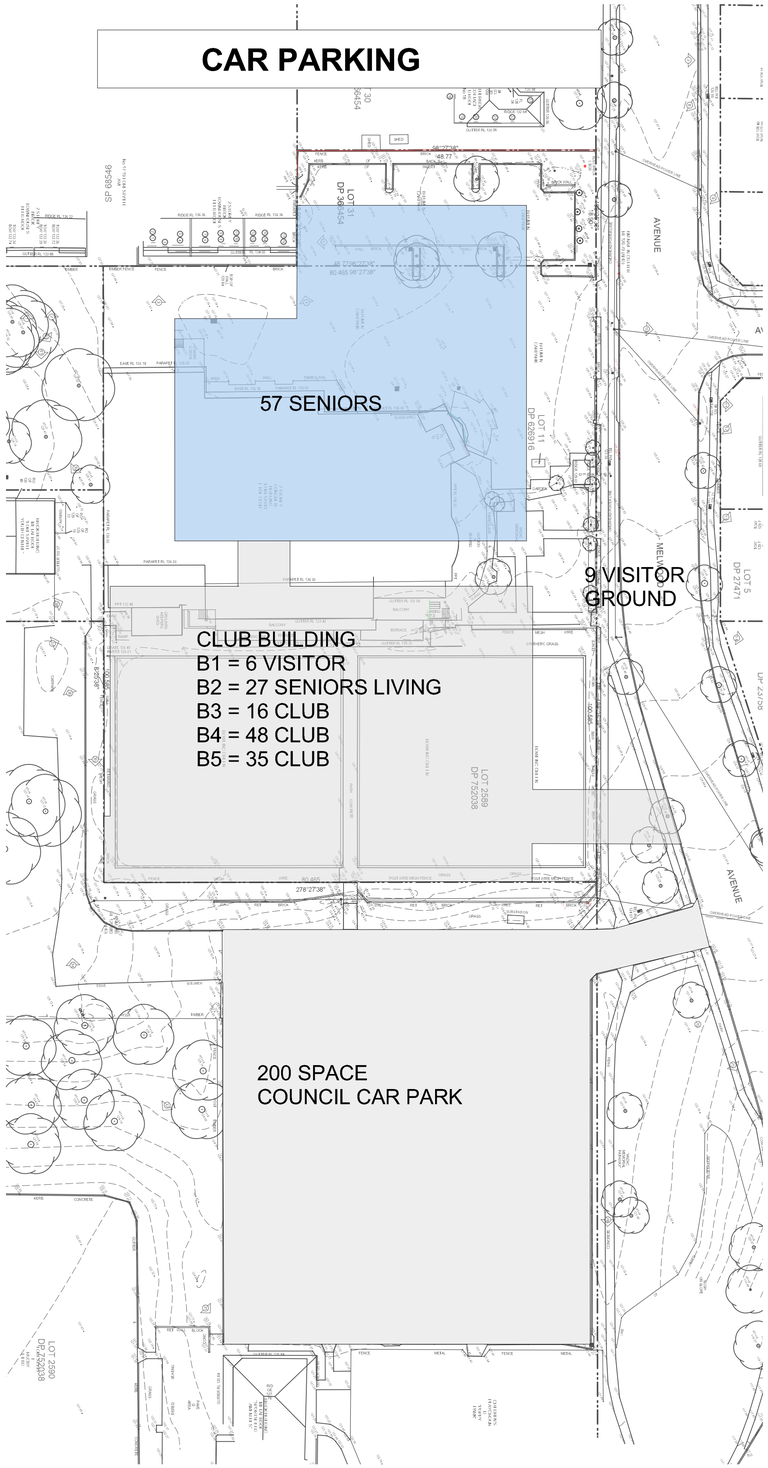
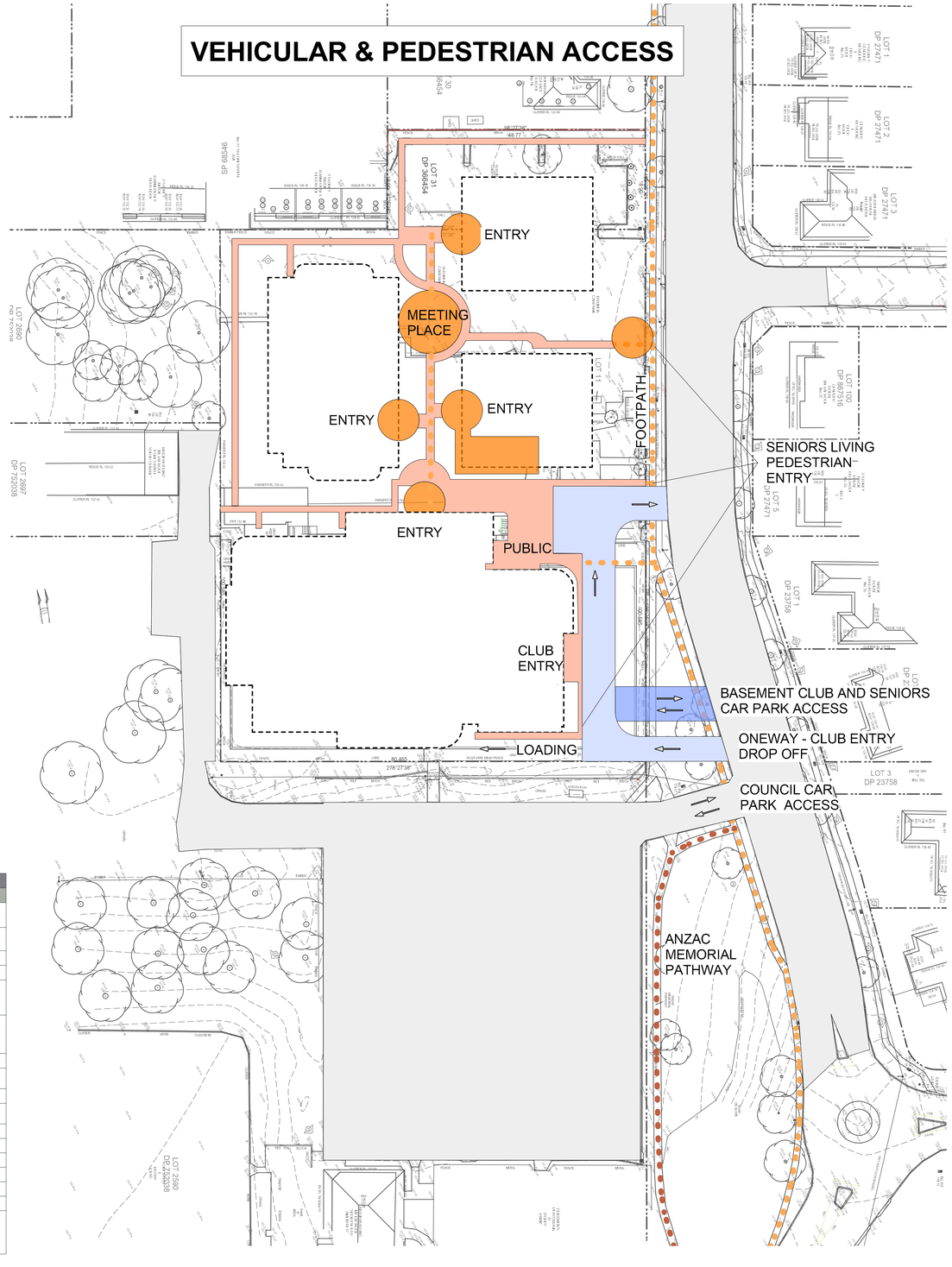
22-0716	DA_A_051	D





Documentation	Required information	Provided	
		Yes (✓)	No (x)
Streetscape elevations and sections	Photographs or drawings of the site in relation to the streetscape and along both sides of any street that the development fronts, that show:		
	• overall height (storeys, metres) and important parapet/datum lines of adjacent buildings		
	• patterns of building frontage, street setbacks and side setbacks		
	• planned heights		
Analysis	Plan that synthesises and interprets the context, streetscape and site documentation into opportunities and constraints that generate design parameters, including the following information:		
	• orientation and any overshadowing of the site and adjoining properties by neighbouring structures (excludes vegetation). The winter sun path should also be shown between 9 am and 3 pm on 21 June		
	• identification of prevailing wind		
	• the geotechnical characteristics of the site and suitability of the proposed development		
	• the public domain interface and street setback		
	• relationship to and interface with adjacent properties, including side and rear setbacks		
	• ventilation for the subject site and immediate neighbours		
	• proposed building footprint location		
	• retained and proposed significant trees and deep soil zones		
	• proposed communal open space		
	• proposed car park footprint and depth	✓	
	• proposed building entries	✓	
	• supporting written material - this should include technical advice from specialists involved in the development process including landscape architects, arborists, geotechnical engineers and/or contamination specialists where applicable		

DA

Quattro ARCHITECTURE

Sydney F: 61 2 9091 0190
Suite 129, 117 Old Pittwater Road
Brookvale NSW 2100
Peter Hosking (Director) Registered Architect - 6854

Canberra F: 61 2 6239 4044
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ACN 150 198 842 **W:** www.qarch.com.au

Rev. No.	Date	Revision	By
A	16/11/2022	CLIENT MEETING	PJH
B	01/12/2023	CONCEPT UPDATE	PJH
C	12/04/2024	B5 ADDED	PJH
D	30/08/2024	DA	PH

CLIENT
FORESTVILLE RSL

PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
SITE ANALYSIS - CAR PARKING

MASTERPLAN SET

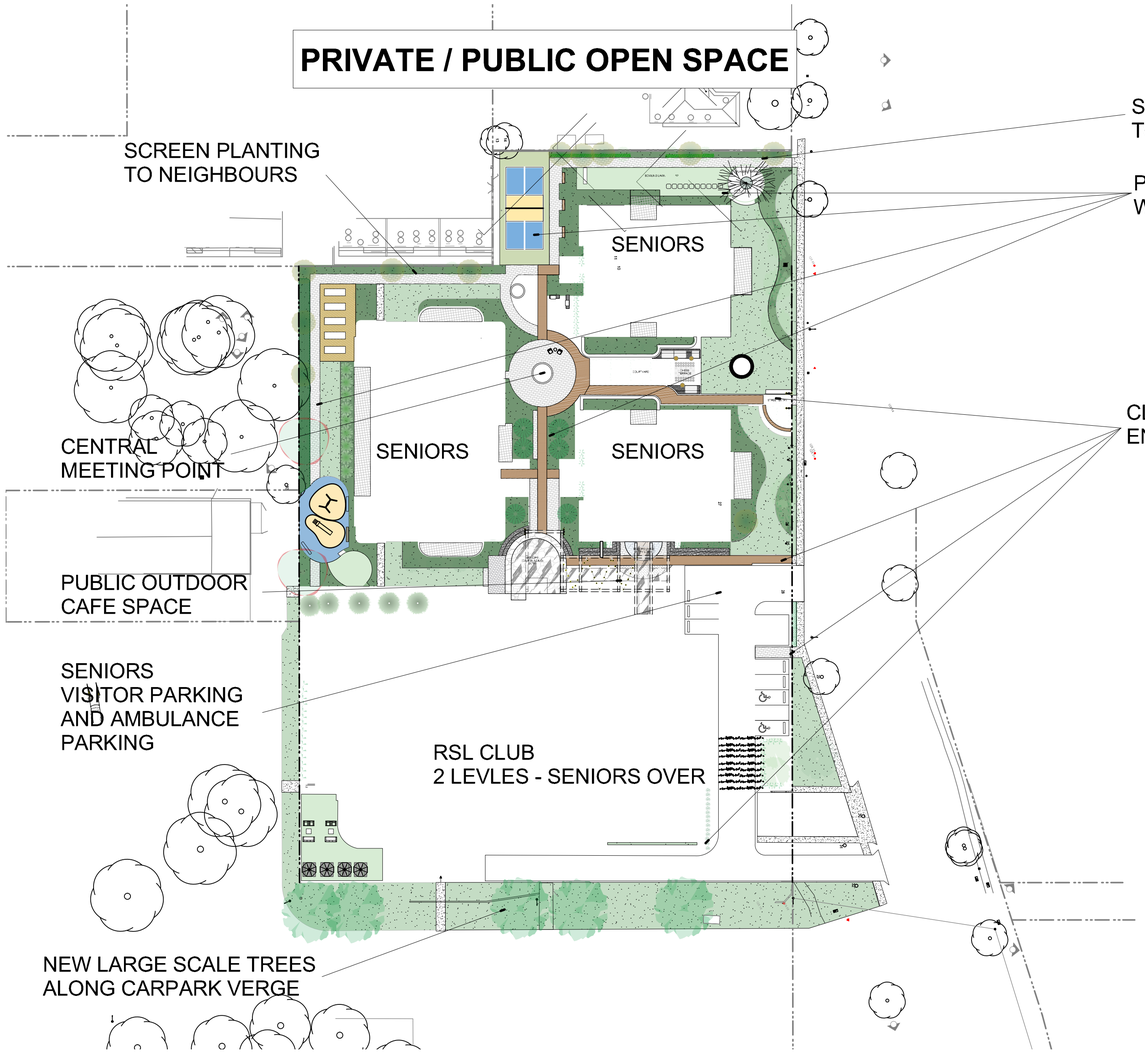
Scale at A1 1:500
Scale at A3 1:1000
0m 5 10 25 40

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

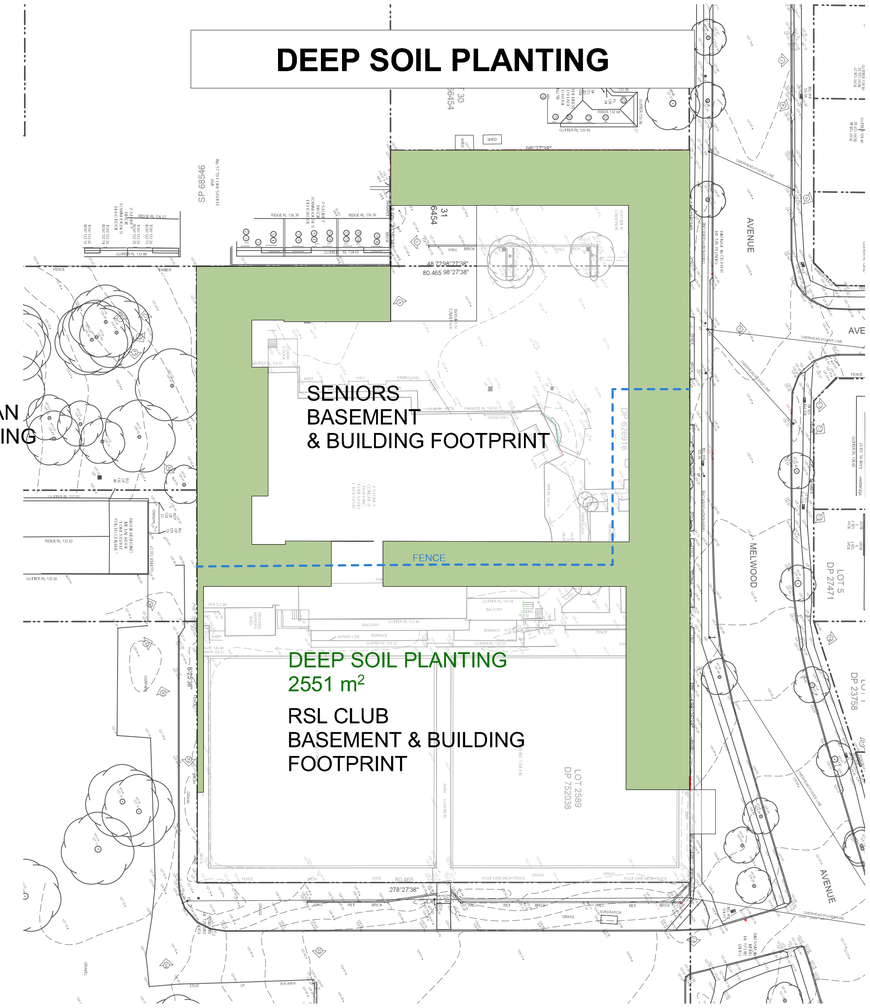
DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_052**	**D**

N

PRIVATE / PUBLIC OPEN SPACE



DEEP SOIL PLANTING



Documentation	Required information	Provided	
		Yes (✓)	No (x)
Analysis	Plan that synthesises and interprets the context, streetscape and site documentation into opportunities and constraints that generate design parameters, including the following information:		
	• orientation and any overshadowing of the site and adjoining properties by neighbouring structures (excludes vegetation). The winter sun path should also be shown between 9 am and 3 pm on 21 June		
	• identification of prevailing wind		
	• the geotechnical characteristics of the site and suitability of the proposed development		
	• the public domain interface and street setback		
	• relationship to and interface with adjacent properties, including side and rear setbacks		
	• ventilation for the subject site and immediate neighbours		
	• proposed building footprint location		
	• retained and proposed significant trees and deep soil zones	✓	
	• proposed communal open space	✓	
	• proposed car park footprint and depth		
	• proposed building entries		
	• supporting written material - this should include technical advice from specialists involved in the development process including landscape architects, arborists, geotechnical engineers and/or contamination specialists where applicable		

DA

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D	30/08/2024	DA	PH

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22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
SITE ANALYSIS - OPEN SPACE

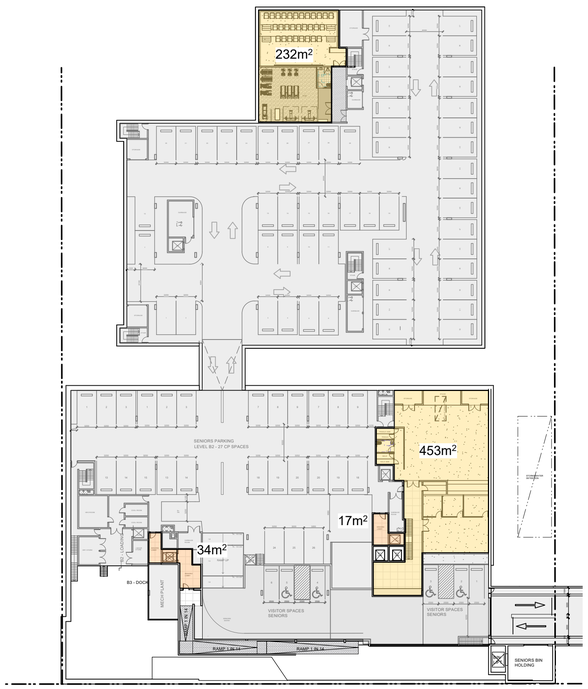
Scale at A1 1:500
Scale at A3 1:1000
0m 5 10 25 40

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

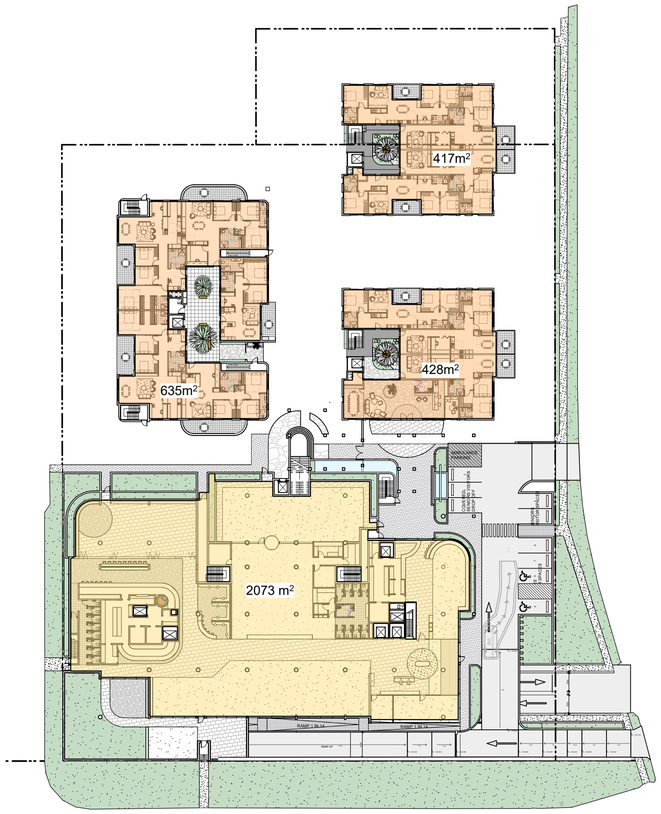
MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_053**	**D**

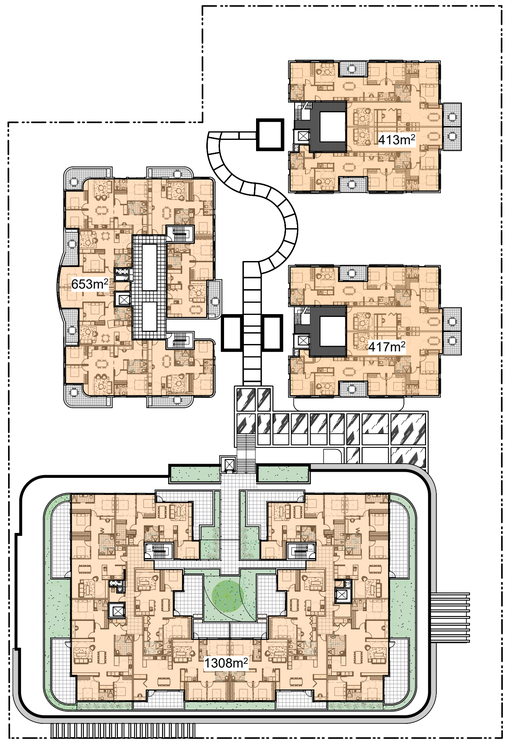
N



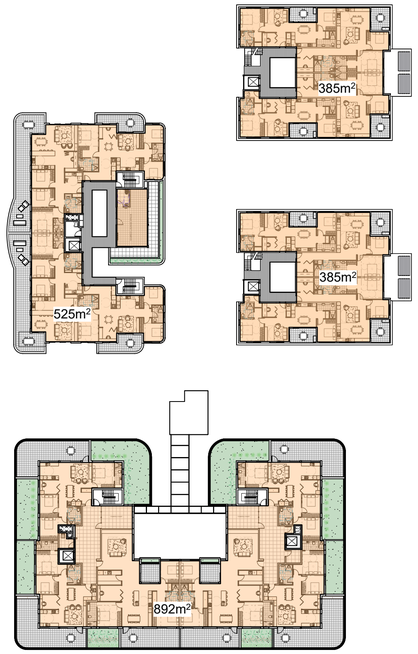
03 AREA CALCULATIONS - BASEMENT 1/2
scale 1:500



04 AREA CALCULATIONS - GROUND FLOOR
scale 1:500

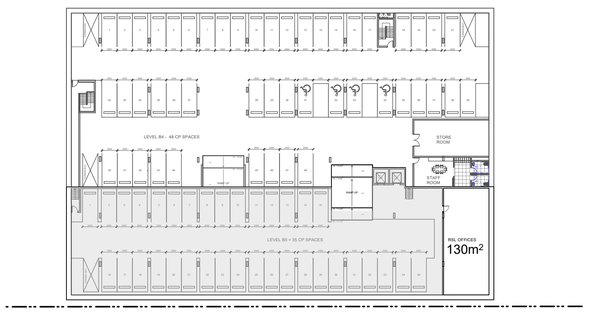


05 AREA CALCULATIONS - LEVEL 1
scale 1:500



06 AREA CALCULATIONS - LEVEL 2
scale 1:500

02 AREA CALCULATIONS - BASEMENT 3/4
scale 1:500



01 AREA CALCULATIONS - BASEMENT 5
scale 1:500

Forestville RSL - Building AREAS	GFA	
	m2	FSR
SITE AREA	9014	
SENIOR TOTAL GFA	6745	0.75:1
CLUB AREA GFA	2263	0.25:1
TOTAL	9008	1:1
Club Building		
	GFA	
B 5	130	
B3/B 4	60	
B1/B2	685	
G	2073	
	2263	
Retirement Living - Club	GFA	
B1	51	
1	1308	
2	892	
	2251	
Retirement Living - Building 1 - GFA	GFA	
B1	232	
G	428	
1	417	
2	385	
	1462	
Retirement Living - Building 2	GFA	
G	417	
1	417	
2	385	
	1219	
Retirement Living - Building 3	GFA	
G	635	
1	653	
2	525	
	1813	

DA

Quattro ARCHITECTURE

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CLUB REDEVELOPMENT
22 MELWOOD AVE
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DP752038 & DP 366454

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DRAWING
SITE ANALYSIS - AREA CALCS

MASTERPLAN SET

Scale at A1 1:500
Scale at A3 1:1000
0m 5 10 25 40

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

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22-0716	DA_A_054	D

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DRAWING
SITE PLAN - EXISTING

Scale at A1 1:200
Scale at A3 1:400

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	DA_A_055	D

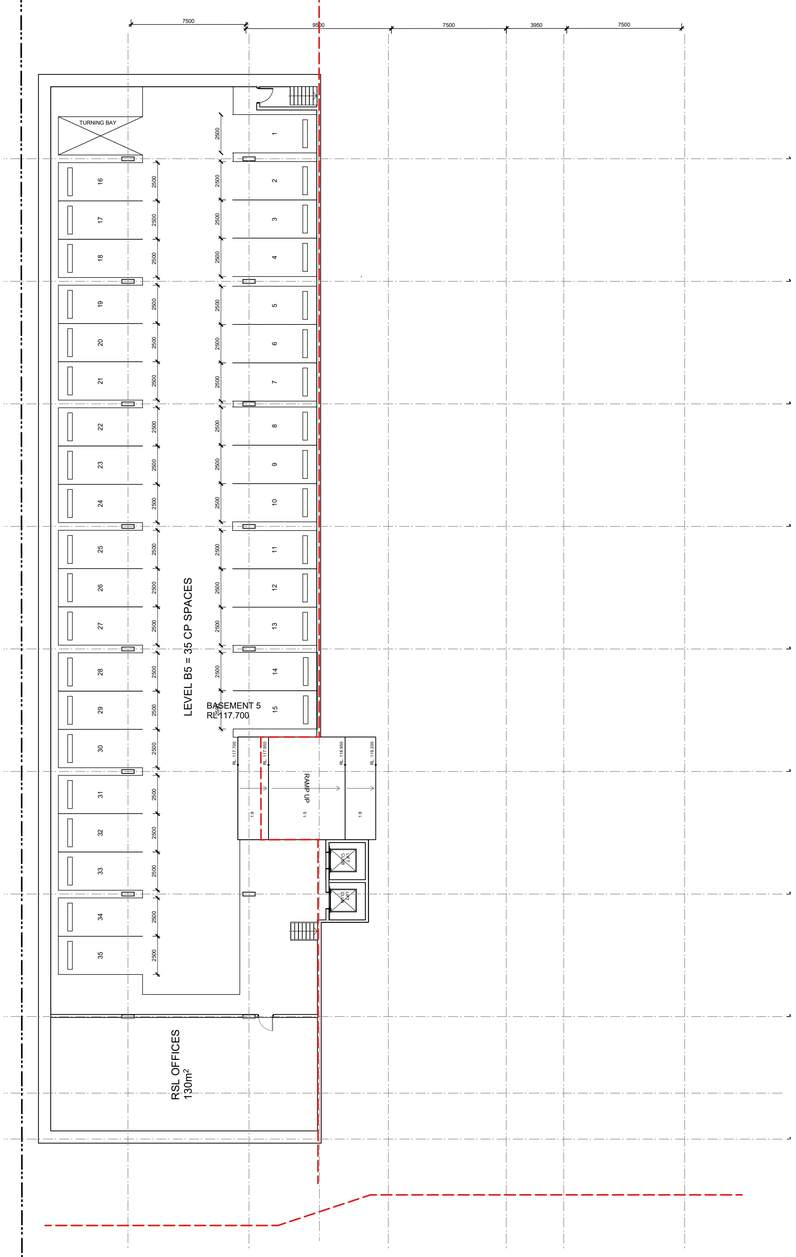
N

B3

B4

02 SITE PLAN - BASEMENT 3 / 4
scale 1:200

B5



01 SITE PLAN - BASEMENT 4 / 5
scale 1:200

DA

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22 MELWOOD AVE
LOT 2589 & LOT 31
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DRAWING
SITE PLAN - BASEMENT 3/4/5

Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

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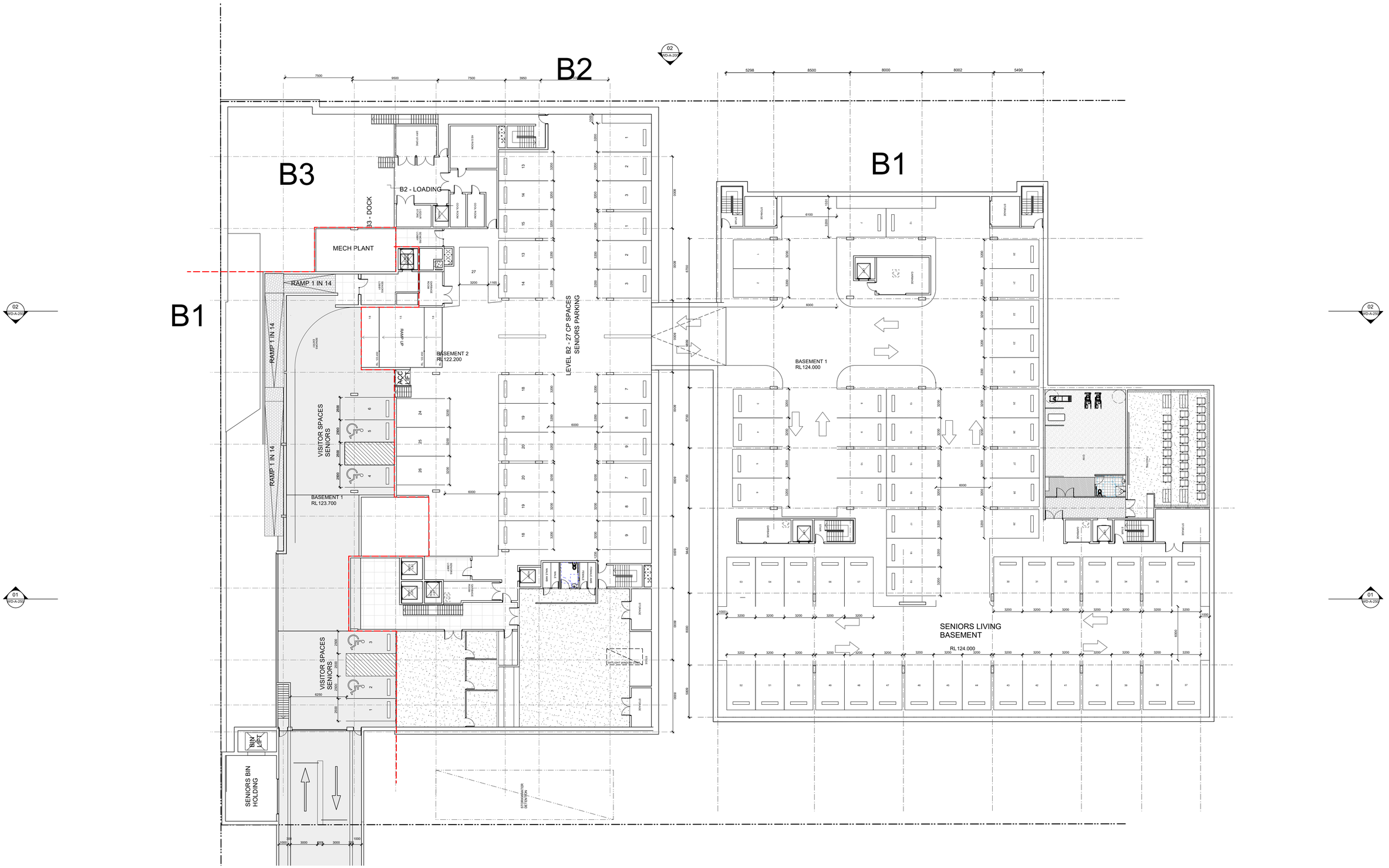
MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	DA_A_098	D



01 SITE PLAN - BASEMENT 1 / 2
scale 1:200

DA

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DRAWING
SITE PLAN - BASEMENT 1/2

Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

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MASTERPLAN SET

DRAWN	DATE	CHKD
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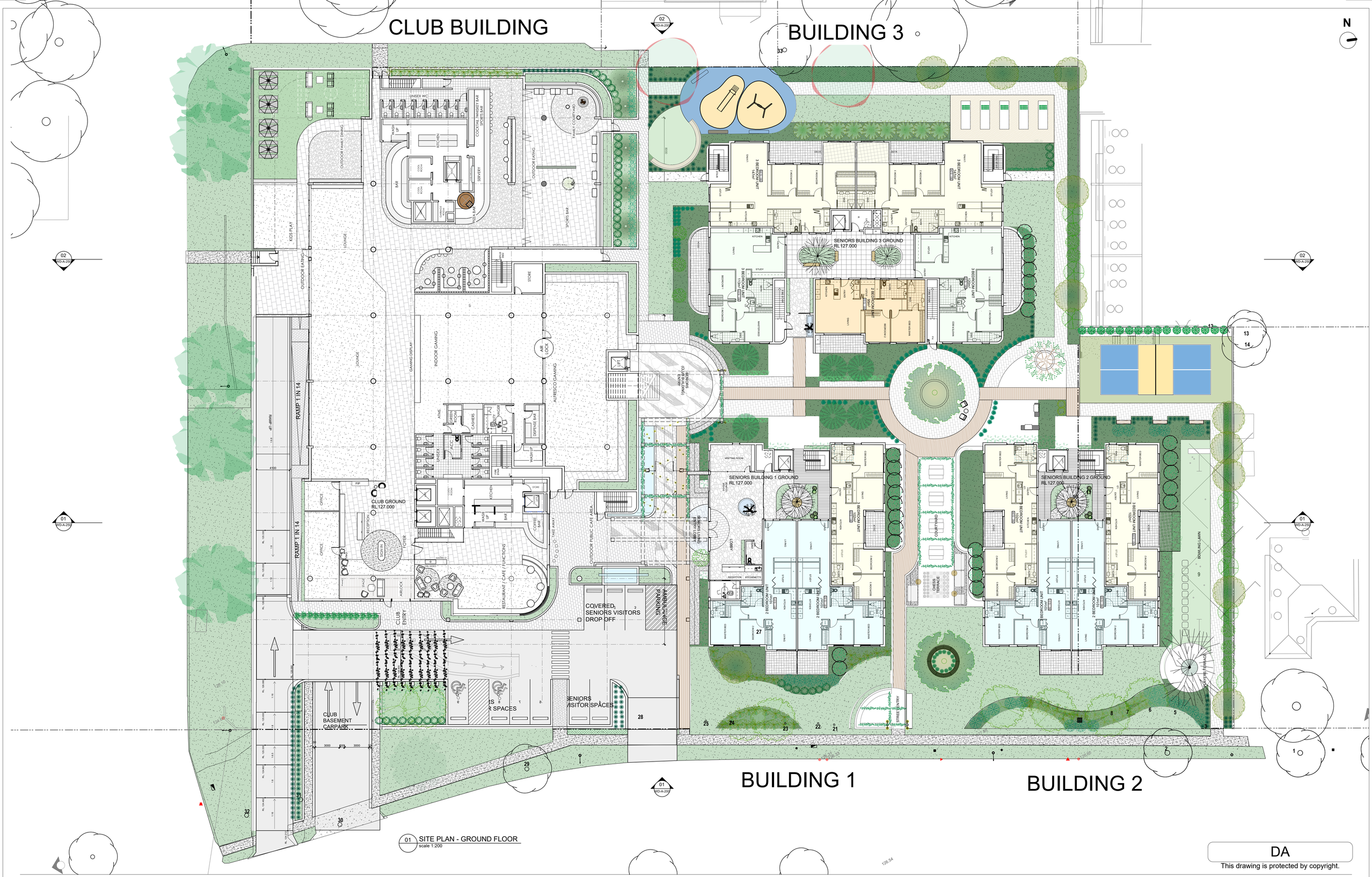
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_099**	**D**



01 SITE PLAN - GROUND FLOOR
scale 1:200

DA

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D	30/08/2024	DA	PH

CLIENT
FORESTVILLE RSL

PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
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DP752038 & DP 366454

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DRAWING
SITE PLAN - GROUND

MASTERPLAN SET

Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

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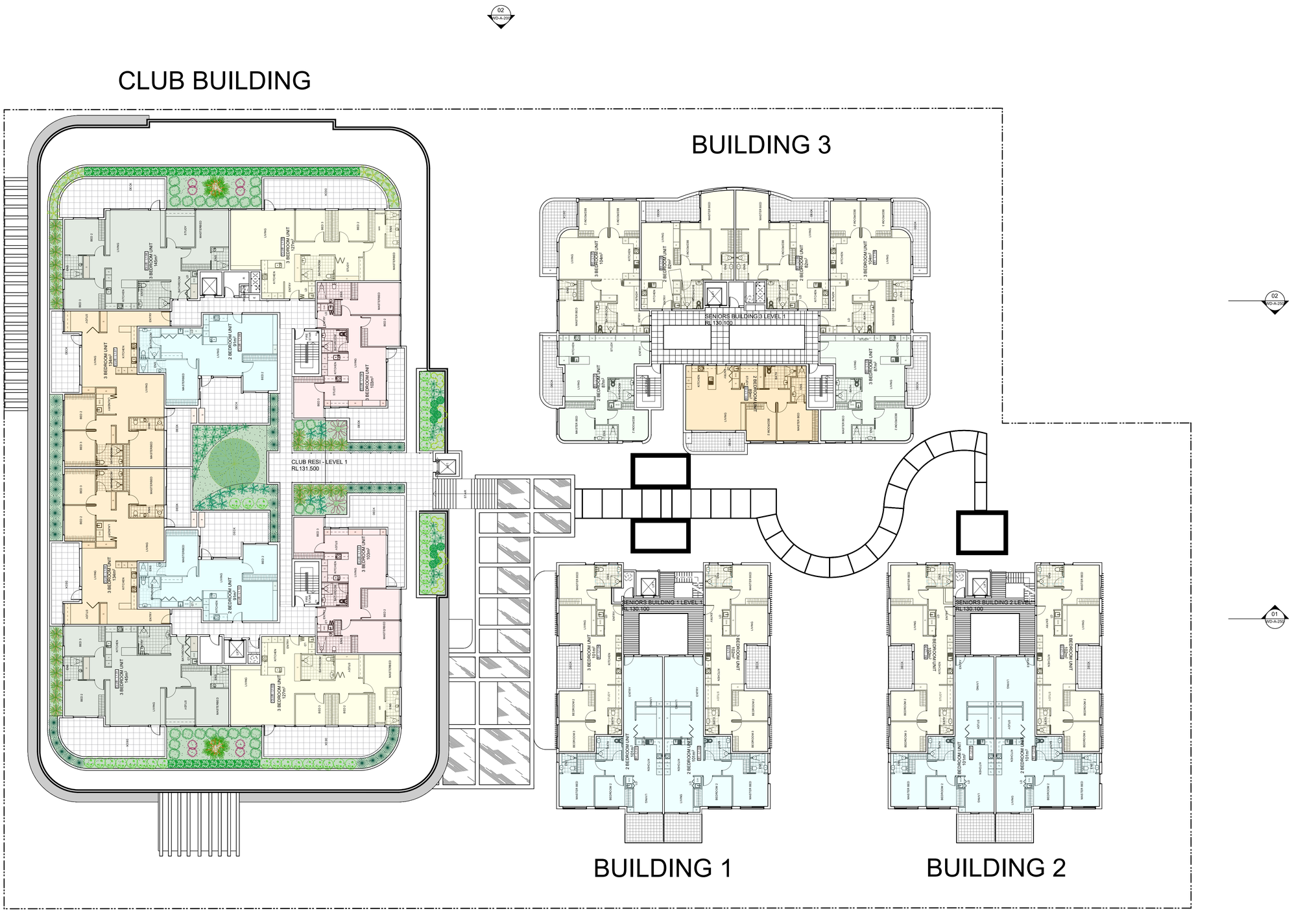

01 SITE PLAN - LEVEL 1
scale 1:200

DA

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DRAWING
SITE PLAN - LEVEL 1

MASTERPLAN SET

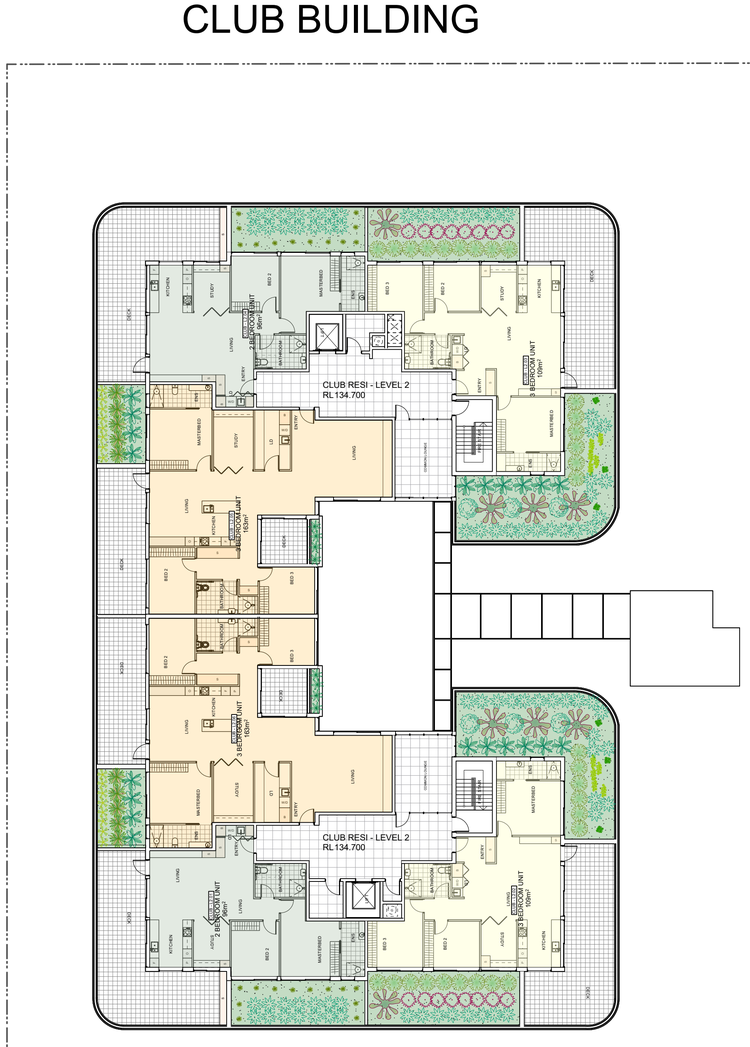
Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

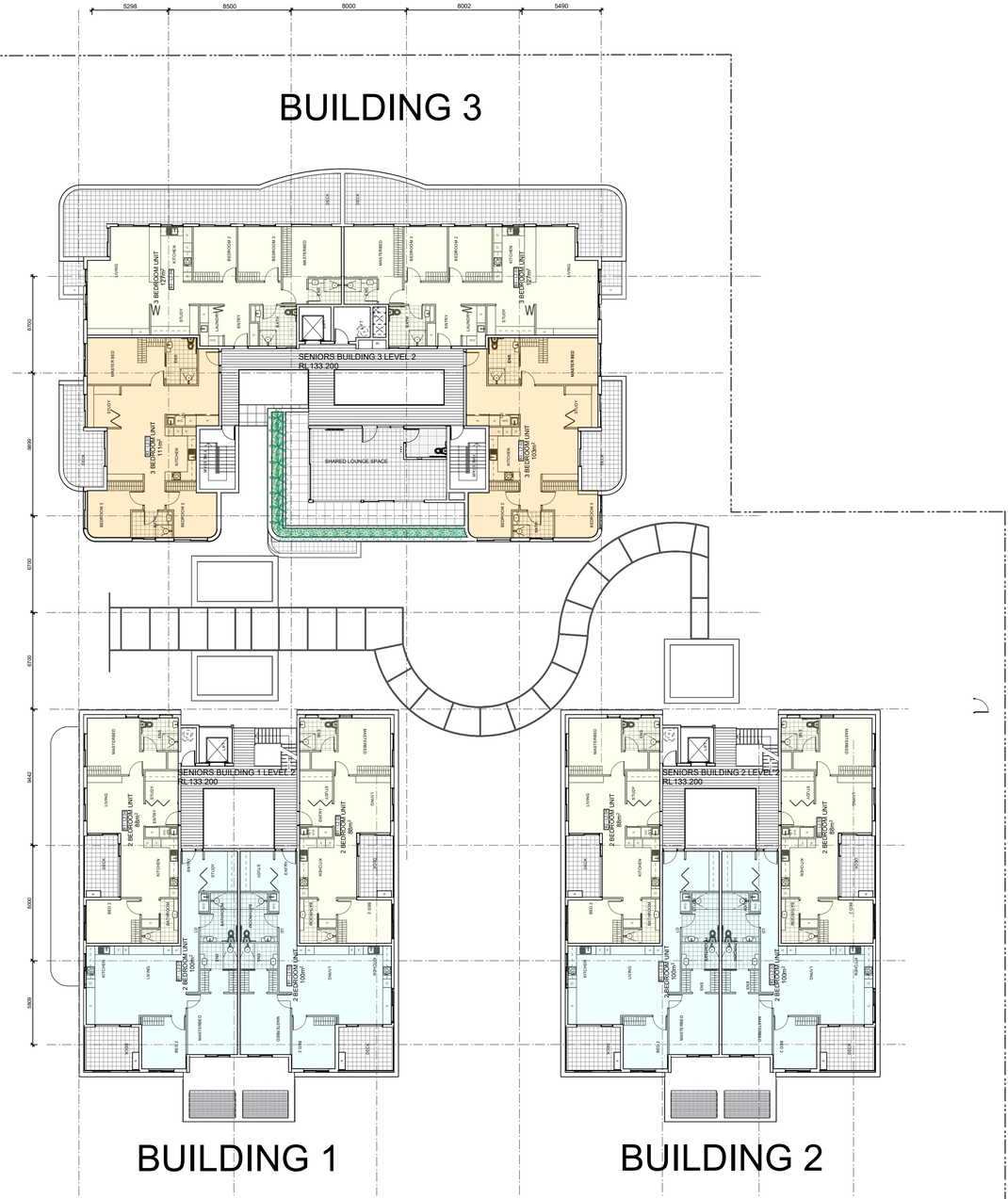
DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	DA_A_101	D

N

CLUB BUILDING



BUILDING 3



BUILDING 1

BUILDING 2

01 SITE PLAN - LEVEL 2
scale 1:200

DA

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DRAWING
SITE PLAN - LEVEL 2

Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

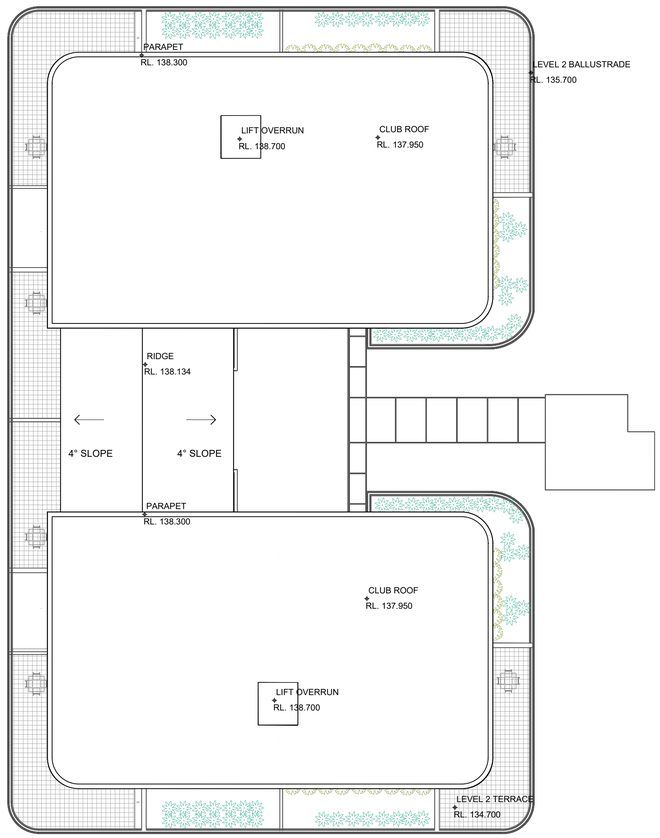
MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_102**	**D**

N

02 WD-A-202

CLUB BUILDING

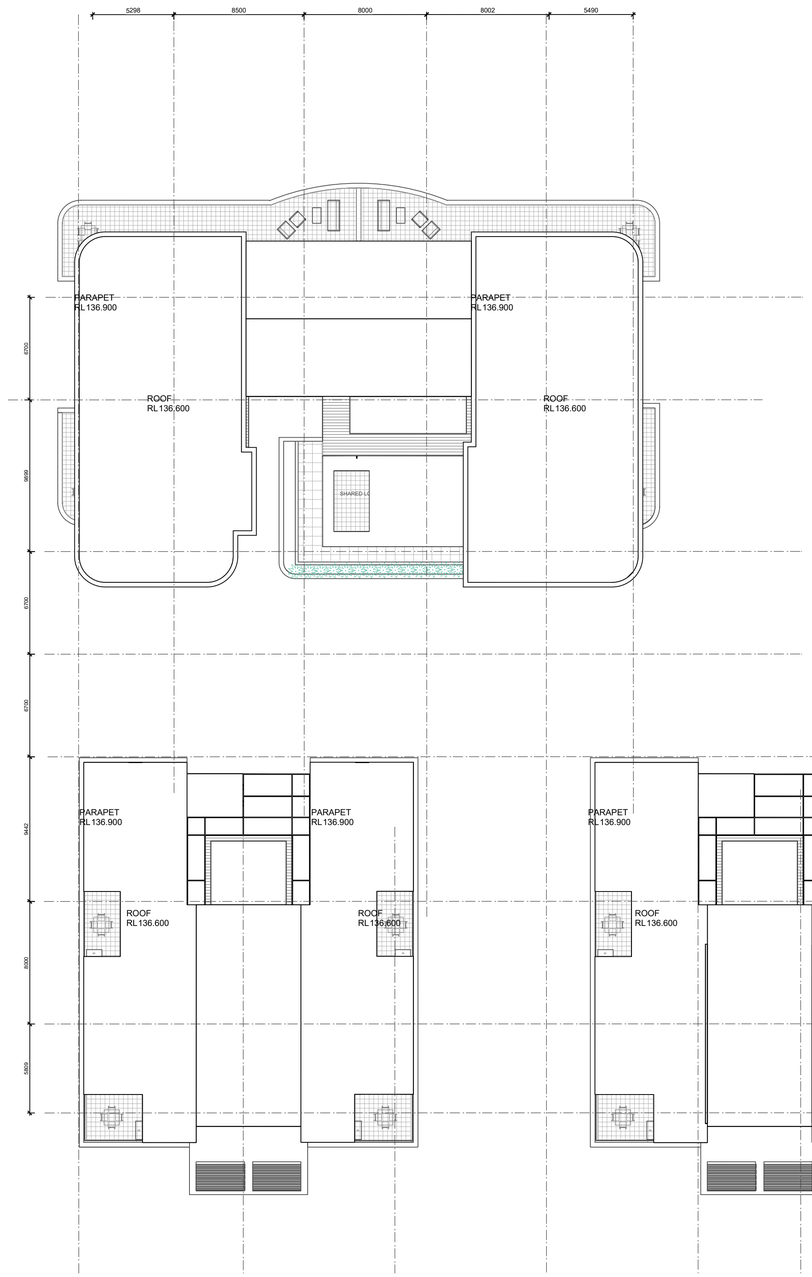


02 WD-A-250

01 WD-A-250

01 SITE PLAN -ROOF
scale 1:200

BUILDING 3



02 WD-A-250

01 WD-A-250

01 WD-A-200

BUILDING 1

BUILDING 2

DA

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DP752038 & DP 366454

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DRAWING
SITE PLAN - ROOF

Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

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MASTERPLAN SET

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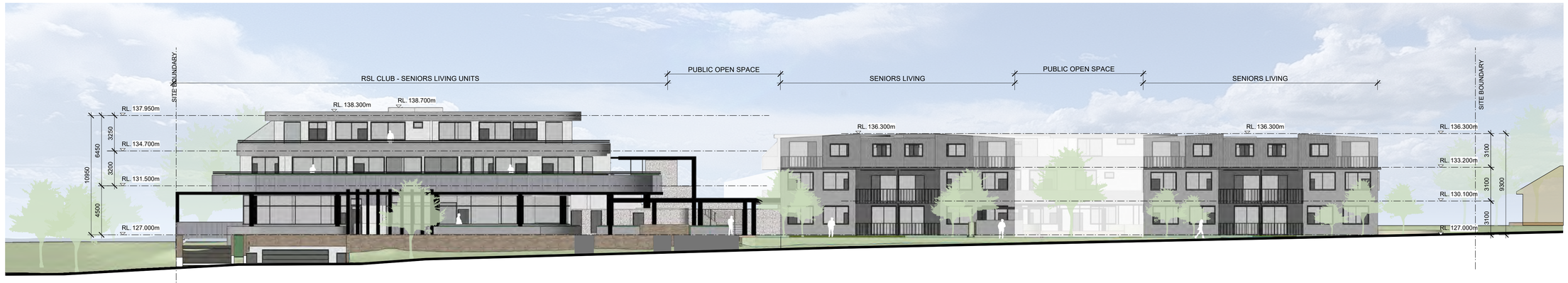
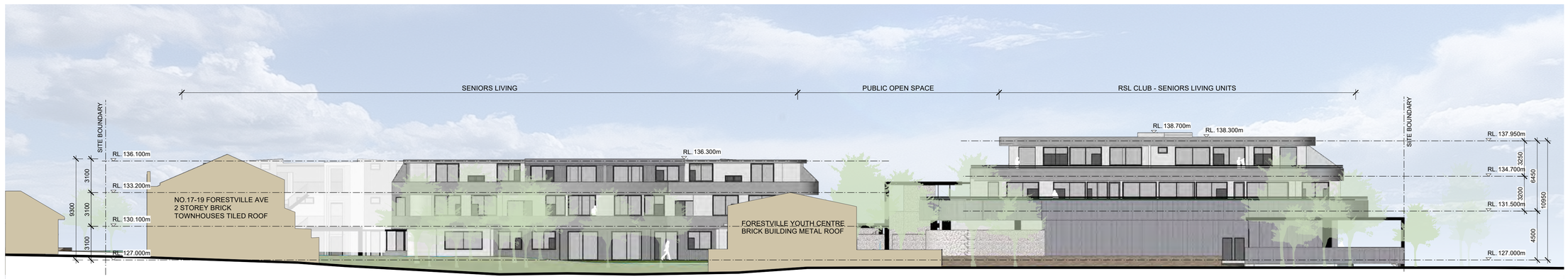
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_103**	**D**

N



01 EASTERN BUILDING ELEVATION - MELWOOD AVENUE
scale 1:200



03 WESTERN BUILDING ELEVATION - BACK
scale 1:200

05 PRE-DA CHECKLIST
scale 1:-

Documentation	Required information	Provided	
		Yes (✓)	No (x)
Streetscape elevations and sections	Photographs or drawings of the site in relation to the streetscape and along both sides of any street that the development fronts, that show:		
	• overall height (storeys, metres) and important parapet/datum lines of adjacent buildings	✓	
	• patterns of building frontage, street setbacks and side setbacks	✓	
	• planned heights	✓	

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B	01/12/2023	CONCEPT UPDATE	PJH
C	12/04/2024	B5 ADDED	PJH
D	30/08/2024	DA	PH

CLIENT
FORESTVILLE RSL

PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

FROM OUR FAMILY TO YOURS · SINCE 1959 ·

DRAWING
ELEVATIONS

Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_200**	**D**

N

DA

Quattro ARCHITECTURE

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Suite 129, 117 Old Pittwater Road
Brookvale NSW 2100
Peter Hosking (Director) Registered Architect - 6854

Canberra F: 61 2 6239 4044
Unit 5, 71 Leichhardt Street
Kingston ACT 2604
Tim Zuber Registered Architect - 2384

ACN 150 198 842 **W:** www.qarch.com.au

Rev. No.	Date	Revision	By
A	16/11/2022	CLIENT MEETING	PJH
B	01/12/2023	CONCEPT UPDATE	PJH
C	12/04/2024	B5 ADDED	PJH
D	30/08/2024	DA	PH

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LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
3D MONTAGE

Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

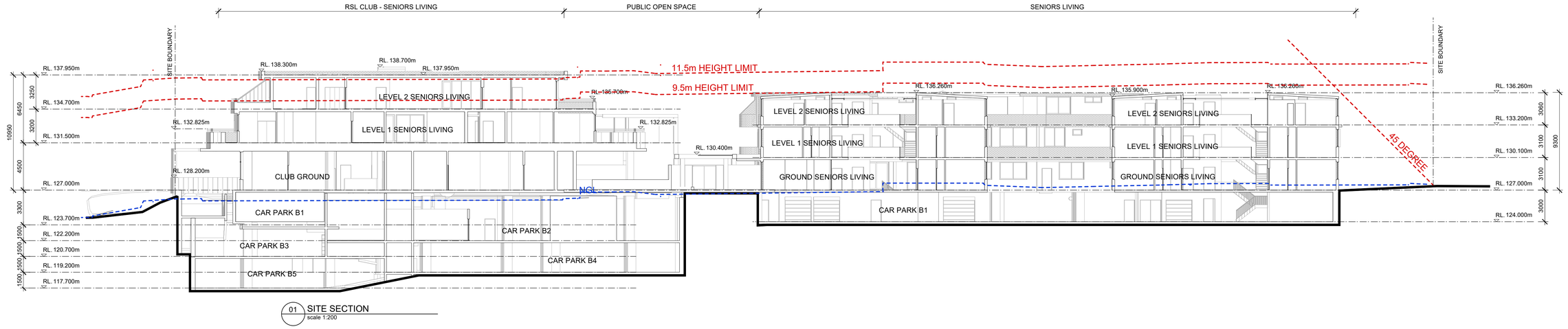
Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

MASTERPLAN SET

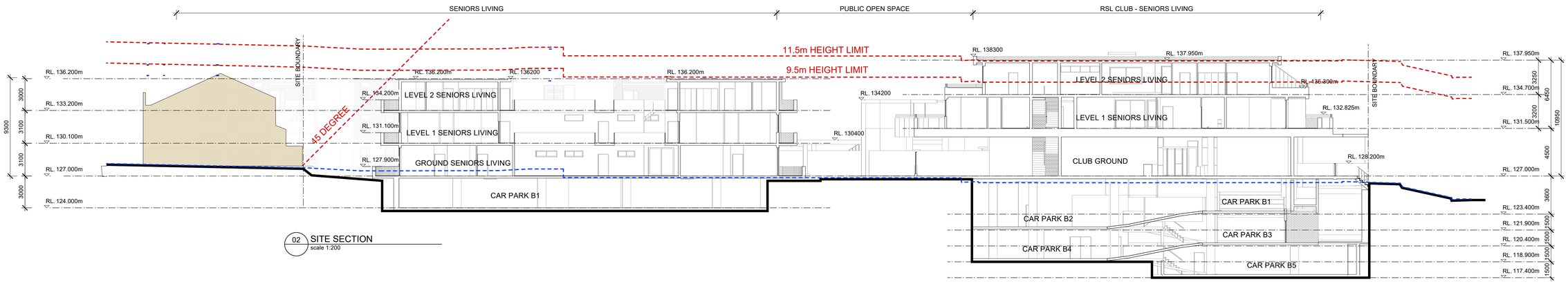
DRAWN	DATE	CHKD
AL	20/04/2023	PH

PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_201**	**D**

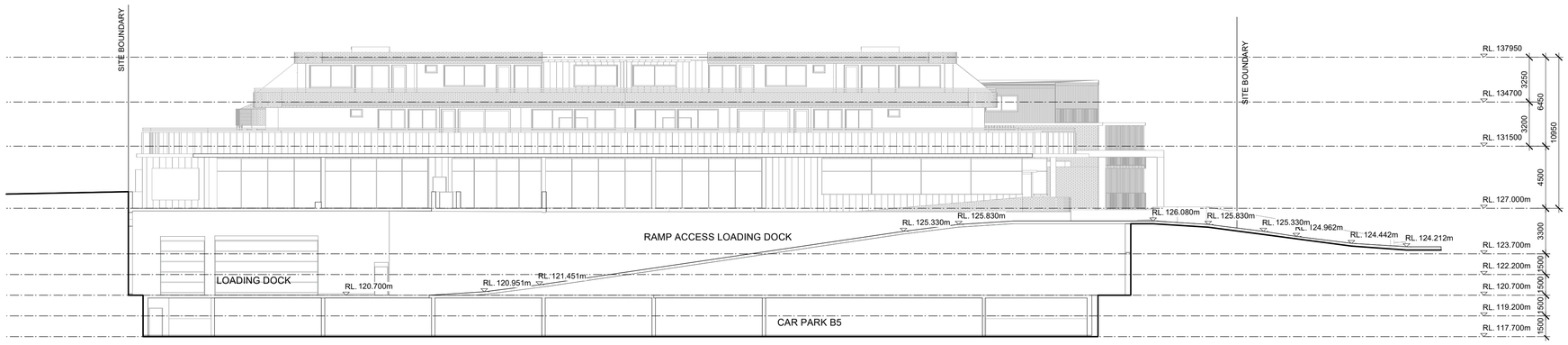
N



01 SITE SECTION
scale 1:200



02 SITE SECTION
scale 1:200



03 SITE SECTION
scale 1:200

DA

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C	12/04/2024	B5 ADDED	PJH
D	30/08/2024	DA	PH

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CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
SECTIONS

Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

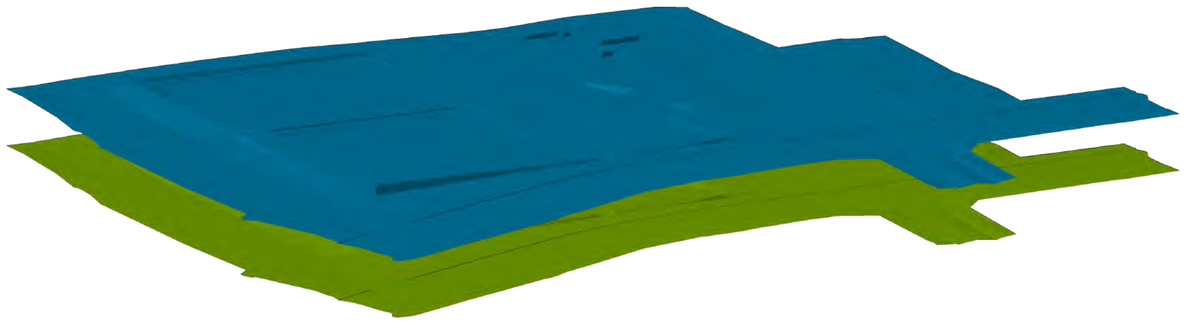
MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_250**	**D**

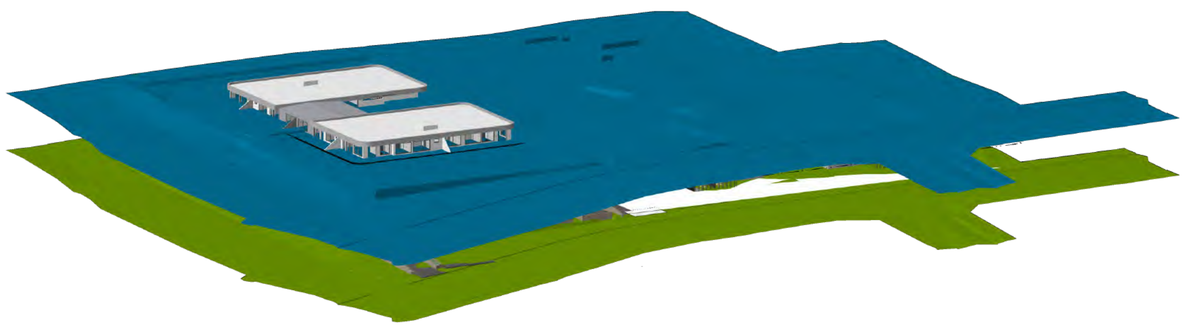
N

3D SITE SURVEY -REFERENCE LTS SURVEY: 52165002DT (GREEN)

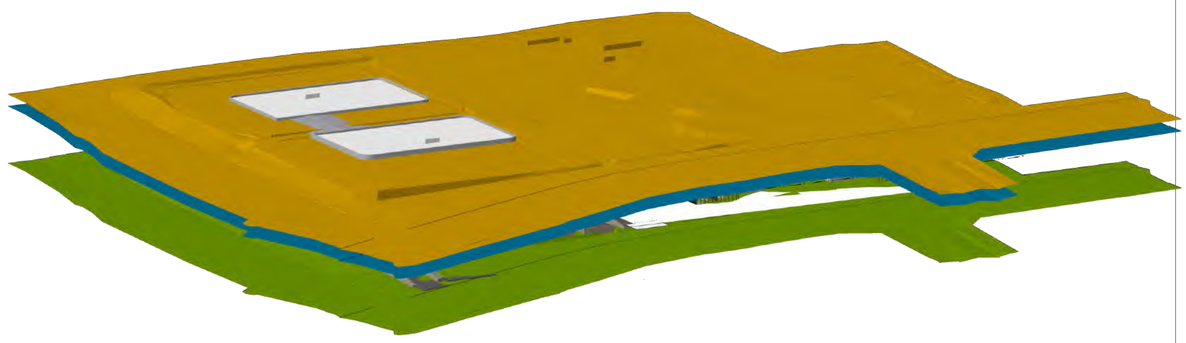
PROJECT OVERLAY - 3D SITE SURVEY -REFERENCE LTS SURVEY: 52165002DT



SENIORS HEIGHT LIMIT (9.5) - 3D SITE SURVEY -REFERENCE LTS SURVEY: 52165002DT



PROJECT OVERLAY WITH 9.5MTR HEIGHT PLANE



PROJECT OVERLAY WITH 11.5MTR HEIGHT PLANE

DA

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Rev. No.	Date	Revision	By
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B	01/12/2023	CONCEPT UPDATE	PJH
C	12/04/2024	B5 ADDED	PJH
D	30/08/2024	DA	PH

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PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
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DRAWING
HEIGHT ENVELOPE STUDY

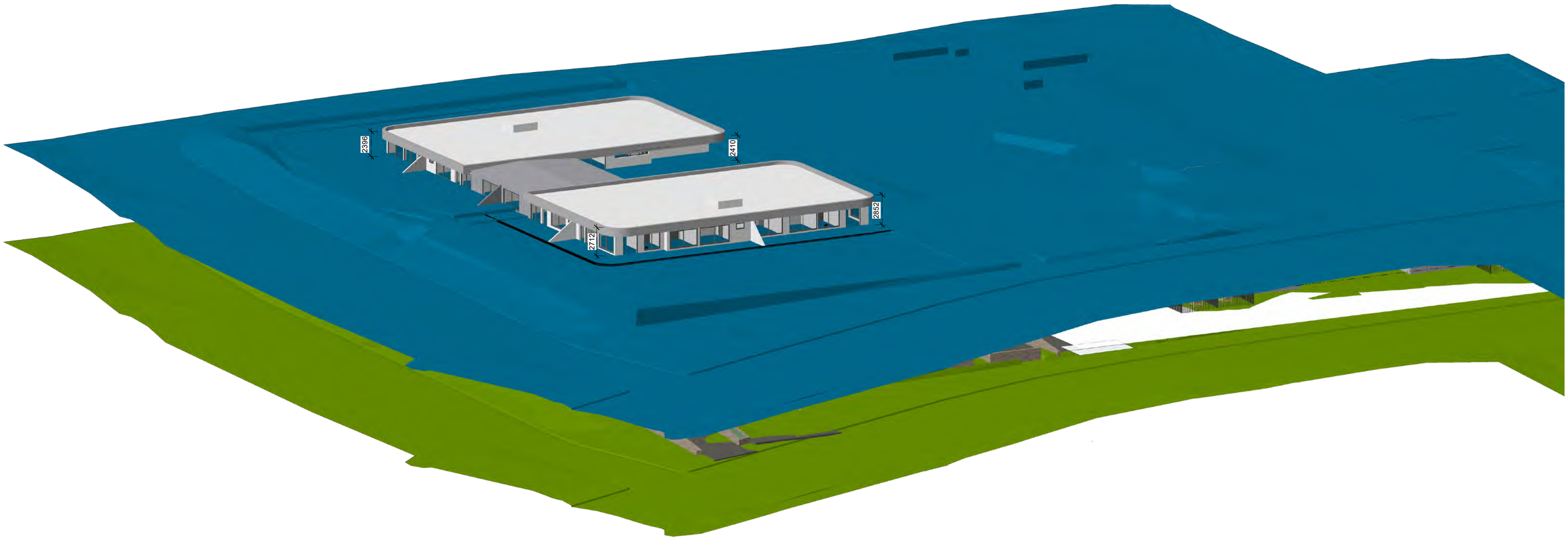
Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_300**	**D**

N



PROJECT OVERLAY WITH 9.5MTR HEIGHT PLANE

01 9.5 mtr HEIGHT LIMIT
scale 1:200

DA

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B	01/12/2023	CONCEPT UPDATE	PJH
C	12/04/2024	B5 ADDED	PJH
D	30/08/2024	DA	PH

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PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
HEIGHT ENVELOPE STUDY 9.5m

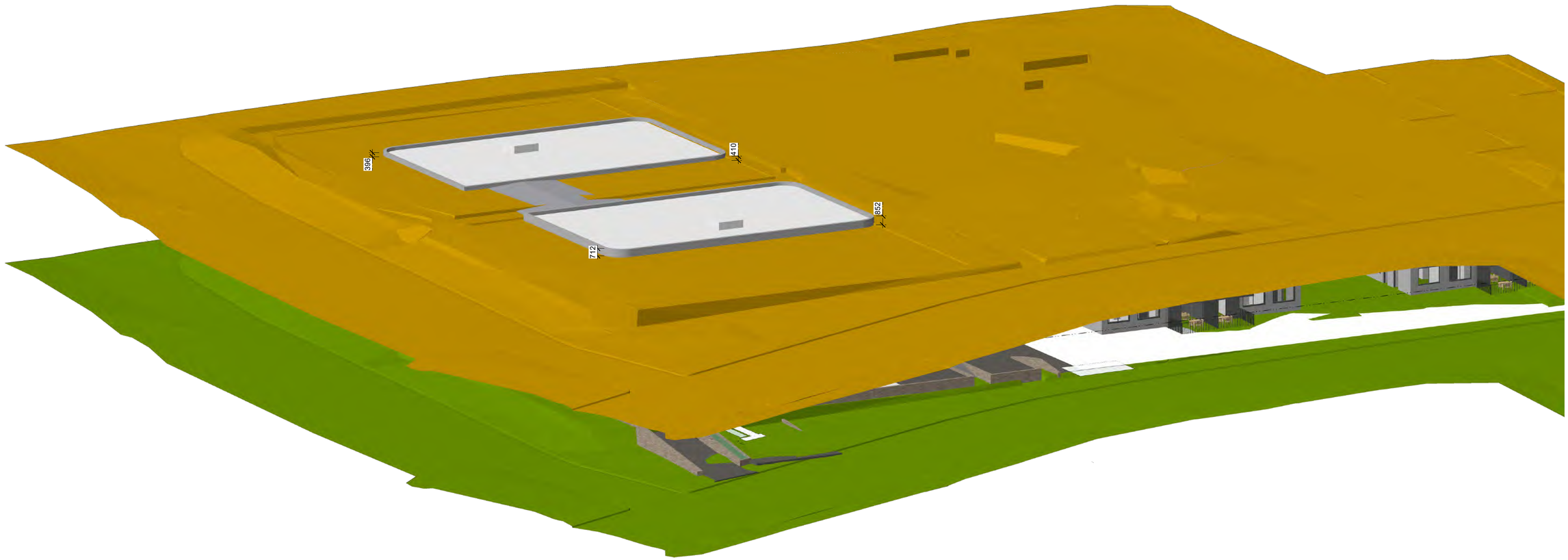
Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_301**	**D**

N



PROJECT OVERLAY WITH 11.5MTR HEIGHT PLANE

01 11.5 mtr HEIGHT LIMIT
scale 1:200

DA

Quattro ARCHITECTURE

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B	01/12/2023	CONCEPT UPDATE	PJH
C	12/04/2024	B5 ADDED	PJH
D	30/08/2024	DA	PH

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PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
HEIGHT ENVELOPE STUDY 11.5m

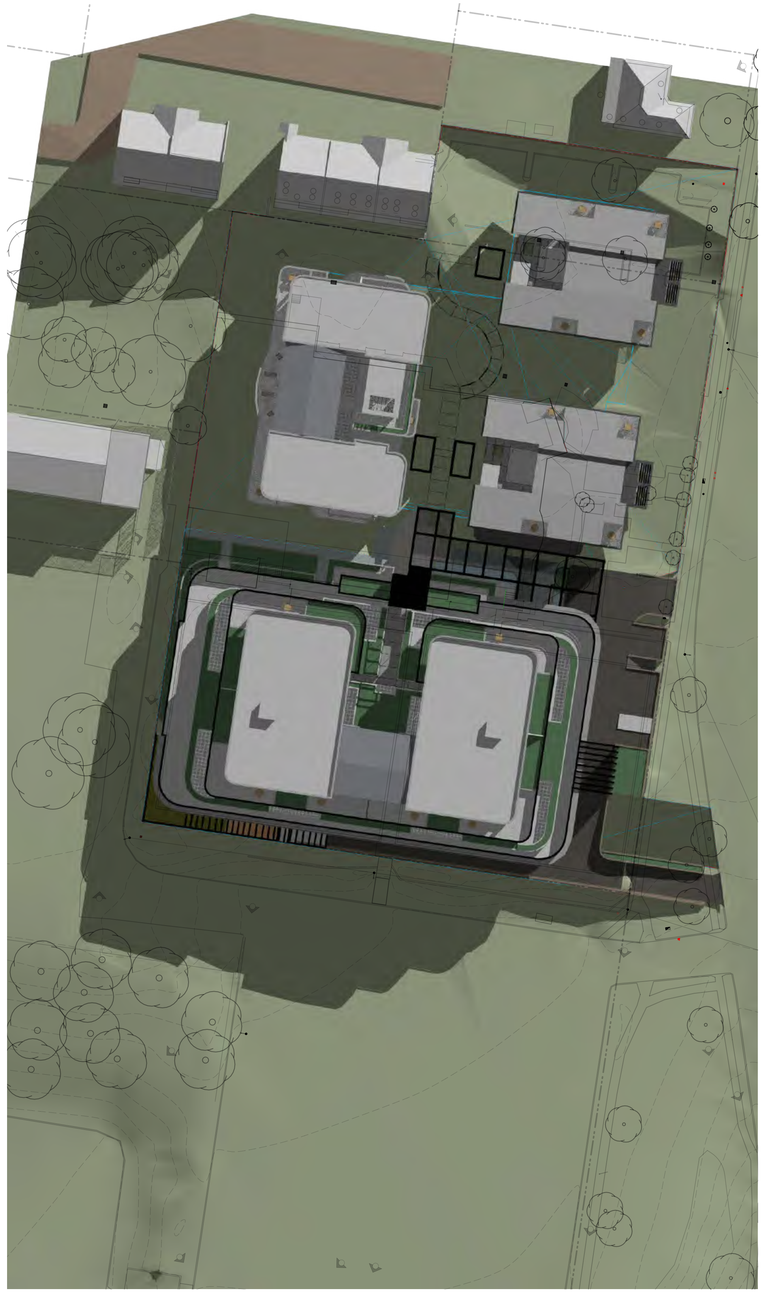
MASTERPLAN SET

Scale at A1 1:200
Scale at A3 1:400
0m 2.5 5 10 15 16

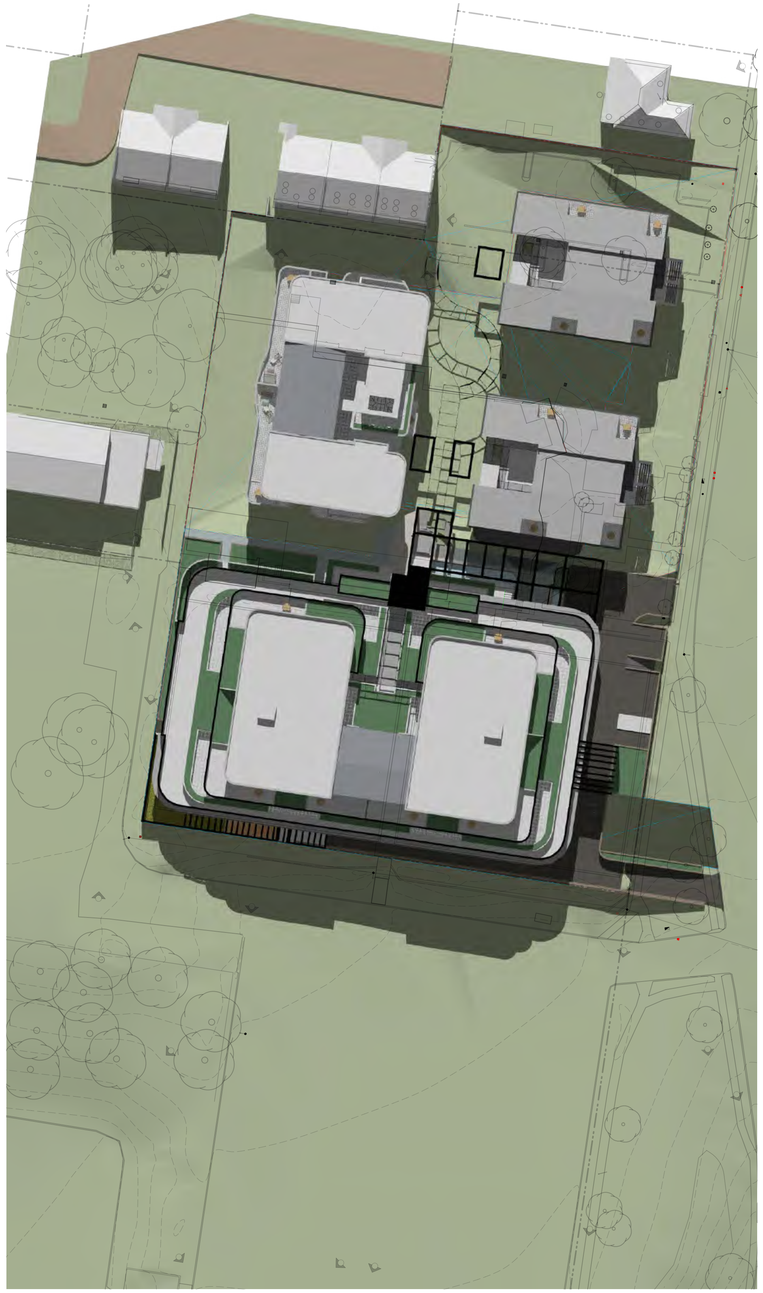
Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	**SHEET #**	**REVISION #**
22-0716	**DA_A_302**	**D**

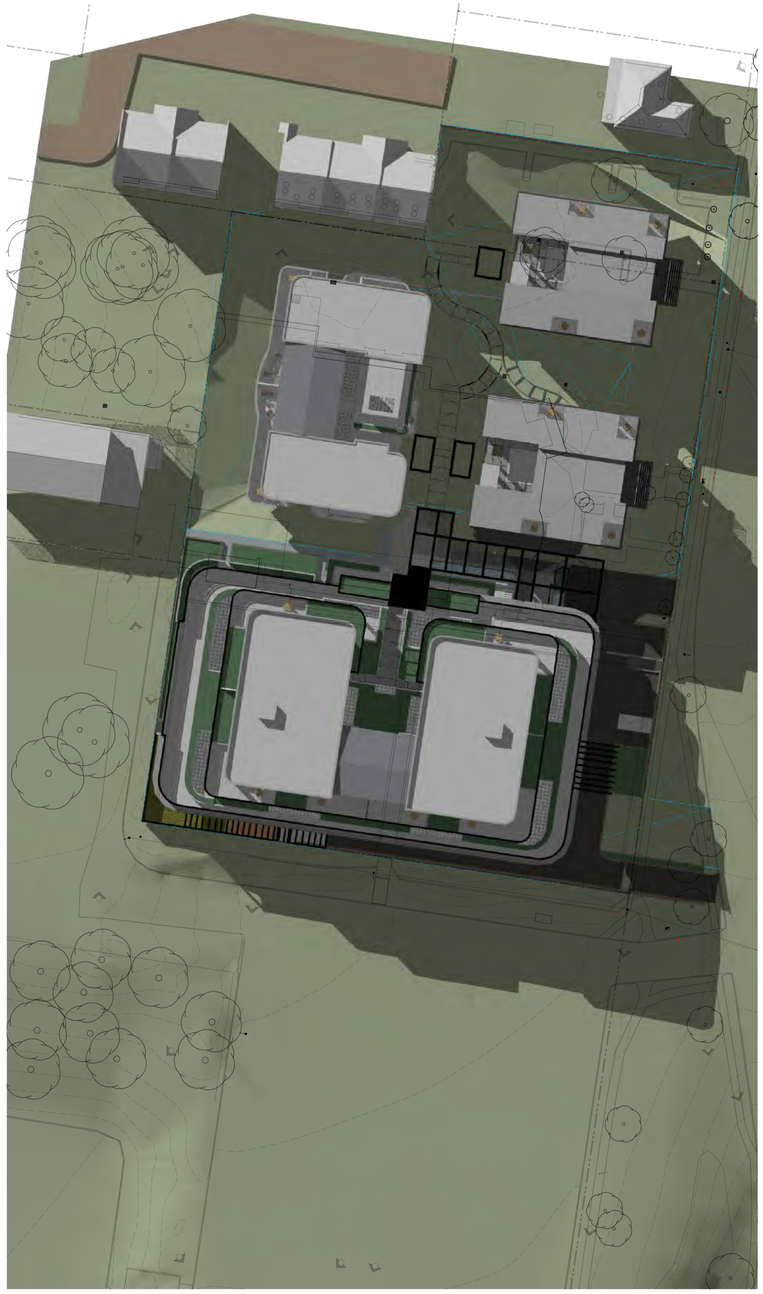
N



01 SHADOWS - JUNE 21 - 9AM
scale 1:500



02 SHADOWS - JUNE 21 - 12PM
scale 1:500



03 SHADOWS - JUNE 21 - 3PM
scale 1:500

DA

Quattro ARCHITECTURE

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Brookvale NSW 2100
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A	16/11/2022	CLIENT MEETING	PJH
B	01/12/2023	CONCEPT UPDATE	PJH
C	12/04/2024	B5 ADDED	PJH
D	30/08/2024	DA	PH

CLIENT
FORESTVILLE RSL

PROJECT
CLUB REDEVELOPMENT
22 MELWOOD AVE
LOT 2589 & LOT 31
DP752038 & DP 366454

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DRAWING
SHADOW DIAGRAMS

Scale at A1 1:500
Scale at A3 1:1000
0m 5 10 25 40

Figured dimensions shall take precedence over scale. Contractors must verify all dimensions on job before commencing any work or making shop drawings.

MASTERPLAN SET

DRAWN	DATE	CHKD
AL	20/04/2023	PH
PROJECT #	SHEET #	REVISION #
22-0716	**DA_A_400**	**D**

APPENDIX B

Borehole Logs (14 sheets)

Borehole Log Report

Geo Environmental Engineering
2 / 5-7 Malta Street
Fairfield East NSW 2165
T +61 2 9420 3361

Hole ID. **BH101**
Hole Depth: **10.23 m**
Sheet: **1 of**

Project Name: **PSI / Geotechnical Investigation** Project Number: **E24016FOR**
Location / Site: **20 - 22 Melwood Avenue, Forestville NSW** Client: **Forestville RSL Club Ltd**

Drilling Company: **Geo Environmental Engineering** Date Started: **25/07/2024** Ground Level: **RL127.6m** (approx)
Drill Method: **SFA / NMLC** Date Completed: **25/07/2024** Easting: ----------
Equipment: **Hanjin D&B 8D** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests: ID No.	Samples / Tests: SPT	Observations / Comments	Well Details	Well Construction
SFA		0	127.5		SC	Fill	**ASPHALT (80mm).**						0.00 0.05 0.15	
							FILL / DISTURBED- Clayey Sand, orange/red/brown, with Silt.	medium dense to dense	m	ZZ250724-01 0.2 -0.3m				
		1	127.0		SP	Residual Soil	**SAND (extremely weathered sandstone)**- red/orange/grey, fine to medium grained, trace clay, with bands of highly weathered sandstone.			BH101-0.5 0.5 -0.6m	5 30 Ref. blows 30+		1.00 Bentonite	
			126.5											
			126.0											
		2	125.5				*BH101 continued as cored hole from 1.72m*							
			125.0											
		3	124.5											
			124.0											
		4	123.5											
			123.0											
		5	122.5											
			122.0											
		6												

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Zachary Ziesel** Date: **25/07/2024** Checked By: **Stephen McCormack** Date: **19/08/2024**

Borehole Log Report

Geo Environmental Engineering
82 Bridge Street
Lane Cove NSW 2066
T +61 2 9420 3361

Hole ID.	**BH101**
Hole Depth:	**10.23 m**
Sheet:	**3 of 4**

Project Name:	**PSI / Geotechnical Investigation**	Project Number:	**E24016FOR**
Location / Site:	**22 Melwood Avenue, Forestville NSW**	Client:	**Forestville RSL**

Drilling Company:	**Geo Environmental Engineering**	Date Started:	**25/07/2024**	Ground Level:	**RL127.6m** approx
Drill Method:	**SFA / NMLC**	Date Completed:	**25/07/2024**	Easting:	----------
Equipment:	**Hanjin D&B 8D**			Northing:	----------

Method	Depth (m)	RL (m)	Material Description	Weathering	Estimated Strength (MPa)	$Is_{(50)}$ MPa	U.C.S. (Mpa)	Rock Mass Defects: RQD %	Core Photo	Defect Spacing (mm)	Defect Description: type, inclination, thickness, shape, roughness, coating (Specific / General)	Depth (m)	Casing & Core Lifts
	0.5	127.5										0.5	
	1.0	127.0										1.0	
	1.5	126.5										1.5	
NMLC	2.0	126.0	**SANDSTONE** - red/orange/grey, fine to coarse grained.	HW-MW		A=0.29 D=0.2		92			DB; SM, CLAY; SM, CLAY; SM, CLAY	2.0	
	2.5	125.5									DB; JT, 35, RG, FE; BD, 1, RG, FE	2.5	2.7
	3.0	125.0				A=0.12 D=0.05					SM, CLAY; BD, 3, RG, FE; SM, CLAY; SM, CLAY	3.0	
	3.5	124.5									BD, 4, RG, FE; BD, 2, RG, FE; SM, CLAY; HB	3.5	
	4.0	124.0		FR		A=0.34 D=0.21		90				4.0	
	4.5	123.5									DB	4.5	
	5.0	123.0	**SHALE** - dark grey.			A=0.1 D=0.03					BD, 1, SMTH	5.0	
	5.5	122.5	**SANDSTONE** - grey, fine to coarse grained.								BD/SM (2-5mm spacing, clay infill); BD, 2, RG; SM, CLAY	5.5	5.83
	6.0	122.0						100				6.0	

Bedrock

Additional Comments

Logged By:	**Zachary Ziesel**	Date:	**25/07/2024**	Checked By:	**Stephen McCormack** Date: **19/08/2024**

Borehole Log Report

Geo Environmental Engineering
82 Bridge Street
Lane Cove NSW 2066
T +61 2 9420 3361

Hole ID. **BH101**
Hole Depth: **10.23 m**
Sheet: **4 of 4**

Project Name: **PSI / Geotechnical Investigation**
Project Number: **E24016FOR**
Location / Site: **22 Melwood Avenue, Forestville NSW**
Client: **Forestville RSL**

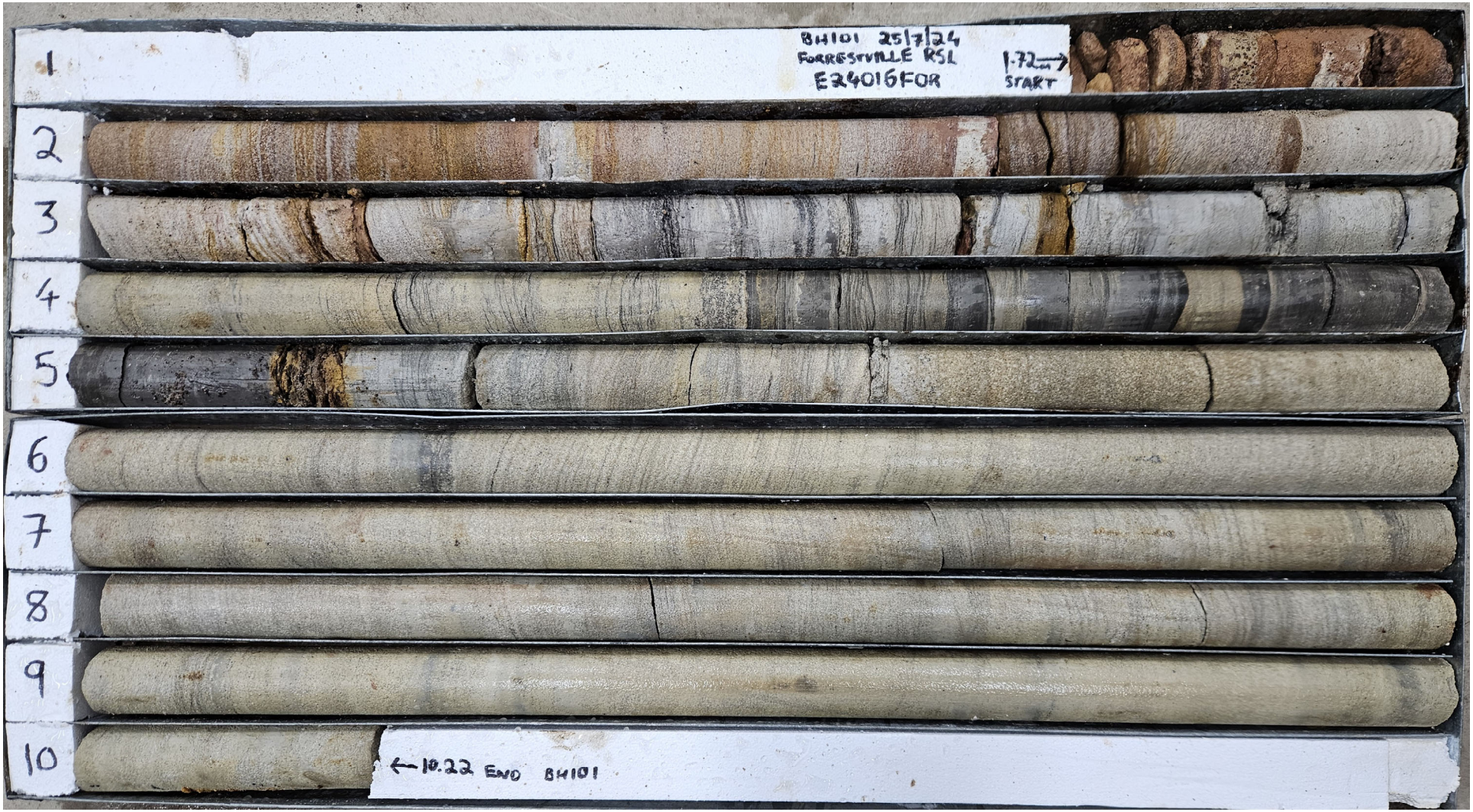
Drilling Company: **Geo Environmental Engineering**
Date Started: **25/07/2024**
Ground Level: **RL127.6m** approx
Drill Method: **SFA / NMLC**
Date Completed: **25/07/2024**
Easting: ----------
Equipment: **Hanjin D&B 8D**
Northing: ----------

Method	Depth (m)	RL (m)	Material Type	Material Description	Weathering	Estimated Strength (MPa)	$Is_{(50)}$ MPa	U.C.S. (Mpa)	RQD %	Core Photo	Defect Spacing (mm)	Defect Description (type, inclination, thickness, shape, roughness, coating)	Well Details	Depth (m)	Casing & Core Lifts
NMLC	6.5	121.5	Bedrock	**SANDSTONE** - grey, fine to coarse grained.	FR		A=1.05 D=0.67		100					6.5	
	7.0	121.0					A=1.19 D=1.37							7.0	
	7.5	120.5										BD, 10, RG		7.5	
	8.0	120.0					A=1.11 D=1.26							8.0	
	8.5	119.5										BD, 10, RG		8.5	
	9.0	119.0					A=1.22 D=0.91		100					9.0	8.8
	9.5	118.5												9.5	
	10.0	118.0					A=1.08 D=0.87							10.0	10.23
	10.5	117.5		**Hole Terminated at 10.23 m** target depth reached										10.5	
	11.0	117.0												11.0	
	11.5	116.5												11.5	
	12.0	116.0												12.0	

Additional Comments

Logged By: **Zachary Ziesel** Date: **25/07/2024**
Checked By: **Stephen McCormack** Date: **19/08/2024**

drawn by: laurie.white@reumad.com.au
GEE CORE LOG E24016FOR.GPJ GEE.GDT 19/8/24 9:01:32 PM


BH101 25/7/24
FORRESTVILLE RSL
E24016FOR
1.72 START
1
2
3
4
5
6
7
8
9
10
← 10.22 END BH101

Borehole Log Report

Geo Environmental Engineering
2 / 5-7 Malta Street
Fairfield East NSW 2165
T +61 2 9420 3361

Hole ID. **BH102**
Hole Depth: **5.70 m**
Sheet: **1 of**

Project Name: **PSI / Geotechnical Investigation** Project Number: **E24016FOR**
Location / Site: **20 - 22 Melwood Avenue, Forestville NSW** Client: **Forestville RSL Club Ltd**

Drilling Company: **Geo Environmental Engineering** Date Started: **25/07/2024** Ground Level: **RL127.5m** (approx)
Drill Method: **SFA / NMLC** Date Completed: **25/07/2024** Easting: ----------
Equipment: **Hanjin D&B 8D** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Samples / Tests SPT	Observations / Comments	Well Details	Well Construction
Solid Flight Auger		0	127.5		SP	Fill	**ASPHALT (80mm).**						0.00 0.05 0.15	
							FILL- Gravelly Sand, dark grey/grey, fine to coarse grained, fine to coarse sand and gravel, with silt.	loose	m	ZZ250724-02/ 100 0.1 -0.2m			
			127.0					medium dense to dense	m	ZZ250724-03 0.4 -0.5m	6 5 15 N=20			
		1	126.5		SP		**SAND**- red/grey, fine to medium grained, trace clay/silt. bands of extremely weathered to highly weathered sandstone with depth. predominately grey from 1.0m.			BH102-0.5 0.5 -0.6m			
			126.0							ZZ250724-04 1.0 -1.1m			1.00	Bentonite
		2	125.5				**SANDSTONE**- grey/red, fine to coarse grained, extremely to highly weathered.							
			125.0											
		3	124.5			Natural	*BH102 continued as cored hole from 2.58m*							
			124.0											
		4	123.5											
			123.0											
		5	122.5											
			122.0											
		6	121.5											

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Zachary Ziesel** Date: **25/07/2024** Checked By: **Stephen McCormack** Date: **19/08/2024**

drawn by: laurie.white@reumad.com.au
GEE BH LOG 2 E24016FOR.GPJ GEE.GDT 20/8/24 7:19:09 PM

Borehole Log Report

Geo Environmental Engineering
82 Bridge Street
Lane Cove NSW 2066
T +61 2 9420 3361

Hole ID. **BH102**
Hole Depth: **5.70 m**
Sheet: **3 of 3**

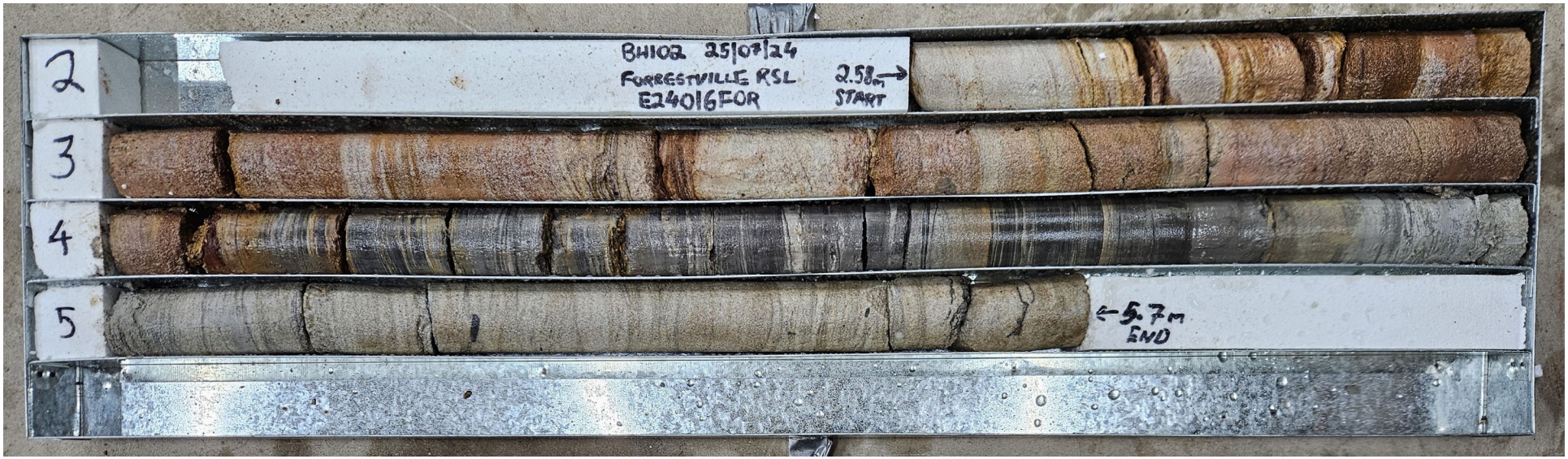
Project Name: **PSI / Geotechnical Investigation**
Project Number: **E24016FOR**
Location / Site: **22 Melwood Avenue, Forestville NSW**
Client: **Forestville RSL**

Drilling Company: **Geo Environmental Engineering**
Date Started: **25/07/2024**
Ground Level: **RL127.5m** approx
Drill Method: **SFA / NMLC**
Date Completed: **25/07/2024**
Easting: ----------
Equipment: **Hanjin D&B 8D**
Northing: ----------

Method	Depth (m)	RL (m)	Material Description	Weathering	Estimated Strength (MPa)	$Is_{(50)}$ MPa	U.C.S. (Mpa)	RQD %	Defect Spacing (mm)	Defect Description (type, inclination, thickness, shape, roughness, coating)	Well Details	Depth (m)
NMLC	0.5	127.0	**SANDSTONE** - grey some red, orange, fine to coarse grained.	HW-MW		A=0.08 D=0.04		83		BD, 10, RG SM, CLAY BD, 10, RG, FE JT, 20, RG, FE		0.5
	1.0	126.5				A=0.13 D=0.03				SM, CLAY		1.0
	1.5	126.0										1.5
	2.0	125.5								SM, CLAY BD, 3, RG, FE		2.0
	2.5	125.0								SM, CLAY		2.5
	3.0	124.5				A=0.17				BD, 15, RG, FE BD, 1, RG		3.0
	3.5	124.0	**SHALE** - dark grey, grey, with interbedded sandstone.	FR						SM, CLAY BD, 1,SMTH		3.5
	4.0	123.5								BD, 1,SMTH BD, 1,SMTH BD, 1,SMTH		4.0
	4.5	123.0				A=0.54 D=0.14				DB BD, 3, SMTH		4.5
	5.0	122.5	**SANDSTONE** - grey, fine to coarse grained.			A=0.71 D=0.57				BD, 1, SMTH SM, CLAY SM, CLAY BD, 3, RG BD, 3, RG		5.0
	5.5	122.0				A=2.3 D=0.92				BD, 10. RG		5.5
	6.0	121.5	**Hole Terminated at 5.70 m** target depth reached									6.0

Additional Comments

Logged By: **Zachary Ziesel** Date: **25/07/2024**
Checked By: **Stephen McCormack** Date: **19/08/2024**


2
3
4
5
BH102 25/07/24
FORRESTVILLE RSL
E24016FOR
2.58m
START
5.7m
END

Geo Environmental Engineering
82 Bridge Street
Lane Cove NSW 2066
E info@geoenvironmental.com.au

Log Report Legend

MATERIAL SYMBOL

FILL	CONCRETE	ASPHALT	TOPSOIL
ORGANICS	ESTUARINE MUD		

CLAY	SAND	SILT	GRAVEL
Sandy CLAY	Clayey SAND	Clayey SILT	Clayey GRAVEL
Silty CLAY	Silty SAND	Sandy SILT	Sandy GRAVEL
Gravelly CLAY	Gravelly SAND	Gravelly SILT	Silty GRAVEL
CLAY & SAND	SAND & CLAY	SILT & CLAY	GRAVEL & CLAY
CLAY & SILT	SAND & SILT	SILT & SAND	GRAVEL & SAND
CLAY & GRAVEL	SAND & GRAVEL	SILT & GRAVEL	GRAVEL & SILT
Sandy Silty CLAY	Clayey Silty SAND	Sandy Clayey SILT	Sandy Clayey GRAVEL
Silty Sandy CLAY	Silty Clayey SAND	Clayey Sandy SILT	Clayey Sandy GRAVEL
Sandy Gravelly CLAY	Clayey Gravelly SAND	Sandy Gravelly SILT	Silty Clayey GRAVEL
Silty Gravelly CLAY	Silty Gravelly SAND	Clayey Gravelly SILT	Clayey Silty GRAVEL
Gravelly Silty CLAY	Gravelly Silty SAND	Gravelly Clayey SILT	Sandy Silty GRAVEL
Gravelly Sandy CLAY	Gravelly Clayey SAND	Gravelly Sandy SILT	Silty Sandy GRAVEL

SANDSTONE	SHALE	GRANITE	BASALT	SHALE / SANDSTONE
PORCELLANITE	GNEISS	SHALE / CLAYSTONE	MUDSTONE	
CLAYSTONE	MUDSTONE / CLAYSTONE	SHALE / SILTSTONE	IRONSTONE	

WATER LEVELS

Encountered Water

Standing Water

ABBREVIATIONS

PT	Pushtube
SFA	Solid Flight Auger
PWS	Percussion Window Sampler
HA	Hand Auger
HFA	Hollow Flight Auger

WELL GRAPHICS

Cuttings	Bentonite	Screen
Gravel Pack	Grout	Cave-in

GEE LEGEND * * 29/10/09 5:04:07 PM

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 1
1 / 2

BOREHOLE LOG

Client: FORESTVILLE RSL CLUB LTD
Project: PROPOSED PRIVATE MEDICAL CENTRE
Location: 22 MELWOOD AVENUE, FORESTVILLE, NSW

Job No.: 31993BM **Method:** SPIRAL AUGER **R.L. Surface:** ~126.5 m
Date: 16/11/18 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** J.B.J/M.P.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
										CONCRETE: 100mm.t				5mm.t DIAMETER REINFORCMENT 50mm TOP COVER
									-	FILL: Silty sand, fine to medium grained, dark brown.	M			APPEARS POORLY COMPACTED
					N > 0 2,0/ 150mm REFUSAL	126								
							1		-	Extremely Weathered sandstone: silty SAND, fine to medium grained, purple grey, trace of ironstone gravel and clay.	XW	VD		HAWKESBURY SANDSTONE
						125				SANDSTONE: fine to medium grained, light grey with dark grey bands.	DW	VL		VERY LOW 'TC' BIT RESISTANCE
							2					VL - L		VERY LOW TO LOW RESISTANCE
						124						L		LOW RESISTANCE
										REFER TO CORED BOREHOLE LOG				Groundwater monitoring well installed to 9.0m. Class 18 machine slotted PVC standpipe 9.0m to 3.0m. Casing 3.0m to 0.15m. 2mm sand filter pack 9.0m to 1.4m. Bentonite seal 1.4m to 0.1m. Completed with a concreted gatic cover
						123	3							
							4							
						122								
							5							
						121								
							6							
						120								

JK 9.01.2 LIB:GLB Log JK AUGERHOLE - MASTER 31993BM FORESTVILLE.GPJ <<DrawingFile>> 30/11/2018 15:55 10.0.000 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.01.2 2018-04-02 Prj: JK 9.01.0 2018-03-20

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 1 2 / 2

CORED BOREHOLE LOG

Client: FORESTVILLE RSL CLUB LTD
Project: PROPOSED PRIVATE MEDICAL CENTRE
Location: 22 MELWOOD AVENUE, FORESTVILLE, NSW

Job No.: 31993BM | **Core Size:** NMLC | **R.L. Surface:** ~126.5 m
Date: 16/11/18 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK205 | **Bearing:** N/A | **Logged/Checked By:** J.B.J/M.P.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Specific / General)	Formation
		124			START CORING AT 2.88m						
100% RETURN		123	3		SANDSTONE: fine to medium grained, light grey with dark grey banding, orange and purple staining, bedding at 5-15°.	HW	L - M	0.40		(2.95m) XWS, 0°, 50 mm.t (3.08m) J, 15°, St, R, Fe Sn (3.36m) Be, 0°, P, Fe Sn	
					NO CORE 0.10m						
		122	4		SANDSTONE: fine to medium grained, light grey with orange and purple staining, and a very high strength iron indurated band.	HW	L - M	0.30 0.20		(3.78m) Be, 10°, P, R, Fe Sn (3.82m) J, 30°, P, R, Fe Sn, 1cm IN FILL (4.44m) CS, 100 mm.t (4.51m) XWS, 150 mm.t	
						MW	VH	3.0			
		121	5		as above, but light grey with dark grey bands, bedding at 5-15°.	FR	M	1.9 6.8 0.30 0.50		(4.90m) J, 0°, Ir, R, Fe Sn (5.56m) Be, 2°, C, R, XWS 1mm.t	Hawkesbury Sandstone
		120	6					0.90			
							M - H	1.2		(6.78m) CS, 1 mm.t	
		119	7					1.0 0.90		(7.09m) CS, 1 mm.t	
		118	8					1.0 1.2		(7.95m) Be, 0°, Ir, R, Cb, 1 mm.t (8.88m) Be, 0°, P, R, Qz Vn	

END OF BOREHOLE AT 9.00 m

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 2
1 / 2

BOREHOLE LOG

Client: FORESTVILLE RSL CLUB LTD
Project: PROPOSED PRIVATE MEDICAL CENTRE
Location: 22 MELWOOD AVENUE, FORESTVILLE, NSW

Job No.: 31993BM **Method:** SPIRAL AUGER **R.L. Surface:** ~126.2 m
Date: 12/11/18 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** J.B.J/M.P.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION										CONCRETE: 140mm.t.				REINFORCEMENT 10mm.t. TOP COVER 100mm.t
						126			-	FILL: Silty sand, fine to medium grained, dark brown.	M			
					N = 5 2,2,3		1			FILL: Silty sand, fine to medium grained, light brown.				APPEARS POORLY COMPACTED
						125								
					N=SPT 18/ 150mm REFUSAL									
1HR AFTER CORING						124	2		-	Extremely Weathered sandstone: Silty SAND, fine to medium grained, light grey mottled pink, trace of clay bands.	XW	VD		HAWKESBURY SANDSTONE
							3							
						123				SANDSTONE: fine to medium grained, light orange grey.	DW	L		LOW 'TC' BIT RESISTANCE
										REFER TO CORED BOREHOLE LOG				
						122	4							
							5							
						121								
							6							
						120								

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 2
2 / 2

CORED BOREHOLE LOG

Client: FORESTVILLE RSL CLUB LTD
Project: PROPOSED PRIVATE MEDICAL CENTRE
Location: 22 MELWOOD AVENUE, FORESTVILLE, NSW

Job No.: 31993BM | **Core Size:** NMLC | **R.L. Surface:** ~126.2 m
Date: 12/11/18 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK205 | **Bearing:** N/A | **Logged/Checked By:** J.B.J/M.P.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Specific / General)	Formation
		123			START CORING AT 3.55m						
100% RETURN					NO CORE 0.24m						
		122	4		SANDSTONE: fine to medium grained, light grey with dark grey banding, bedding at 0°, trace of iron indurated bands.	HW	VL - L	0.050 0.060 0.30 0.20		(3.79m) XWS, 0°, 5 mm.t (3.88m) CS, 0°, 10 mm.t (4.22m) XWS, 0°, 90 mm.t (4.44m) CS, 0°, 10 mm.t (4.56m) Be, 0°, C, R, Fe Sn, 1 mm.t (4.92m) J, 5°, C, R, Cn	Hawkesbury Sandstone
		121	5			SW	M	0.70		(5.67m) CS, 0°, 10 mm.t	
		120	6		SANDSTONE: fine to medium grained, light grey with dark grey, bedding at 5-30°, trace of fine to coarse grained bands.		H	0.90 1.8		(6.27m) CS, 0°, 10 mm.t (6.76m) J, 10°, P, S, Cn	
		119	7			FR		1.2		(7.10m) Be, 0°, P, Cb Cn, 1 mm.t	
		118	8					0.80 1.2 1.1		(8.09m) Be, 1°, St, R, Cn	
		117	9		END OF BOREHOLE AT 8.92 m						

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 3
1 / 2

BOREHOLE LOG

Client: FORESTVILLE RSL CLUB LTD
Project: PROPOSED PRIVATE MEDICAL CENTRE
Location: 22 MELWOOD AVENUE, FORESTVILLE, NSW

Job No.: 31993BM **Method:** SPIRAL AUGER **R.L. Surface:** ~126.2 m
Date: 12/11/18 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** J.B.J/M.P.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
										CONCRETE: 140mm.t				REINFORCEMENT: 10mm.t TOP COVER 100mm.t
						126			-	FILL: Silty sand, fine to medium grained, dark brown, trace clay and brick fragments.	M			APPEARS POORLY COMPACTED
					N = 12 2,2,10					FILL: Silty sand, fine to medium grained, light brown.				
							1		-	Extremely Weathered sandstone: Silty SAND, fine to medium grained, light grey.	XW	VD		HAWKESBURY SANDSTONE
						125								
							2			SANDSTONE: fine to medium grained, light grey with extremely weathered bands.	DW	VL		VERY LOW 'TC' BIT RESISTANCE
						124								
							3							
						123				SANDSTONE: fine to medium grained. light grey with dark grey bands, trace o fextremely weathered bands.		VL - L		VERY LOW RESISTANCE WITH LOW BANDS
										REFER TO CORED BOREHOLE LOG				
							4							
						122								
							5							
						121								
							6							
						120								

JK 9.01.2 LIB:GLB Log JK AUGERHOLE - MASTER 31993BM FORESTVILLE.GPJ <<DrawingFile>> 30/11/2018 15:56 10.0.000 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.01.2 2018-04-02 Prj: JK 9.01.0 2018-03-20

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 3
2 / 2

CORED BOREHOLE LOG

Client: FORESTVILLE RSL CLUB LTD
Project: PROPOSED PRIVATE MEDICAL CENTRE
Location: 22 MELWOOD AVENUE, FORESTVILLE, NSW

Job No.: 31993BM | **Core Size:** NMLC | **R.L. Surface:** ~126.2 m
Date: 12/11/18 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK205 | **Bearing:** N/A | **Logged/Checked By:** J.B.J/M.P.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Specific / General)	Formation
		123			START CORING AT 3.72m						
100% RETURN		122	4		NO CORE 0.07m SANDSTONE: fine to medium grained, light grey mottled pink/orange, bedding at 1-3°.	HW MW	VL L - M	0.10 0.10 0.60 0.060 0.40		(3.79m) XWS, 0°, 140 mm.t (4.13m) Be, 3°, Ir, R, Clay, 1 mm.t (4.18m) Be, 3°, Ir, R, Cn (4.45m) CS, 0°, 10 mm.t (5.24m) XWS, 0°, 5 mm.t (5.48m) Be, 5°, P, R, Fe Sn (5.60m) XWS, 0°, 10 mm.t	
		121	5								
		120	6		SANDSTONE: fine to medium grained, light grey with dark grey banding, bedding at 5-10°.	FR	M - H	0.70 1.6 0.60 1.1 0.70 0.50		(5.92m) Be, 0°, P, R, Cn (7.85m) Be, 2°, P, R, Cb Vn (8.07m) Be, 0°, P, R, Cb Cn, 1 mm.t (8.92m) Be, 2°, P, R, Cb Cn, 1 mm.t	Hawkesbury Sandstone
		119	7								
		118	8								
		117	9		END OF BOREHOLE AT 8.98 m						

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

APPENDIX C

Testing Reports (11 Sheets)

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 357617

Client Details

Client	Geo-Environmental Engineering
Attention	Stephen McCormack
Address	82 Bridge St, Lane Cove, NSW, 2066

Sample Details

Your Reference	**E24016FOR**
Number of Samples	2 Soil
Date samples received	26/07/2024
Date completed instructions received	26/07/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	02/08/2024
Date of Issue	30/07/2024

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Diego Bigolin, Inorganics Supervisor

Authorised By
Nancy Zhang, Laboratory Manager

Misc Inorg - Soil			
Our Reference		357617-1	357617-2
Your Reference	UNITS	BH101 SPT-0.5m	BH102 SPT-0.5m
Date Sampled		25/07/2024	25/07/2024
Type of sample		Soil	Soil
Date prepared	-	29/07/2024	29/07/2024
Date analysed	-	29/07/2024	29/07/2024
pH 1:5 soil:water	pH Units	4.3	4.8
Electrical Conductivity 1:5 soil:water	µS/cm	83	37
Chloride, Cl 1:5 soil:water	mg/kg	29	10
Sulphate, SO4 1:5 soil:water	mg/kg	59	50

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			29/07/2024	[NT]	[NT]	[NT]	[NT]	29/07/2024	[NT]
Date analysed	-			29/07/2024	[NT]	[NT]	[NT]	[NT]	29/07/2024	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	104	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	106	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

COC 26/7 14:07

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Geo-Environmental Engineering Pty Ltd	**Client Project Name and Number:**	**Envirolab Services**
Project Mgr:	S. McCormack	E24016FOR	**12 Ashley St, Chatswood, NSW, 2067**
Sampler:	Z.Ziesel	**PO No.:**	
Address:	2 / 5-6 Malta Street, Fairfield East NSW	**Envirolab Services Quote No. :**	**Phone: 02 9910 6200**
		Date results required:	**Fax: 02 9910 6201**
Email:	stephen@geoenvironmental.com.au zachary@geoenvironmental.com.au	Or choose: standard / 1 day / 2 day / 3 day/ **5 day** ☐	**E-mail: ahie@envirolabservices.com.au**
		Note: Inform lab in advance if urgent turnaround is required - applies surcharge	**Contact: Aileen Hie**
Phone:	0431 480 980		

Sample information				Tests Required												Comments
Envirolab Sample ID	**Client Sample ID**	**Date sampled**	**Type of sample**	**Combination 5b**	**Combination 5a**	**Combination 5**	**Combination 3**	**Combination 3a**	**Metals**	**TRH (vol)/BTEXN**	**Combination 4 (incl. specialted phenols)**	**BTEXN**	**VOCs**	**Hardness**	**Combination 1M**	**Aggressivity**			**Provide as much information about the sample as you can**
1	BH101 SPT-0.5m	25/07/2024	Soil													X			
2	BH102 SPT-0.5m	25/07/2024	Soil													X			

ENVIROLAB GROUP

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 357617
Date Received: 25/7/24
Time Received: 1300
Received By: CC
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (company):	Geo-Environmental Engineering	**Received by (company):**	**Samples Received: Cool or Ambient (circle one)**
Print Name:		**Print Name:** CC	**Temperature Recieved at:** 2°C **(if applicable)**
Date & Time:		**Date & Time:** 25/7/24 1300	**Transported by: Hand delivered / courier**
Signature:		**Signature:**	**Page No: 1 of 1**

POINT LOAD STRENGTH INDEX

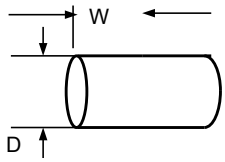
Project No.	G24016FOR

Client:	Forrestville RSL	Date:	30-Jul-24
Project:	Geotechnical Investigation	Tested by:	ZZ
Location:	22 Melwood Avenue, Forestville NSW	Data checked:	SM

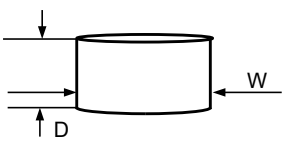
Test Machine:	GSA	Test Locality:	GEE				Core Size:	52	mm	

Bore/TP	Depth (m)	Rock Type	Moisture Condition	Test Type	W (mm)	D (mm)	Load kN (P)	Failure Type	Point Load Strength Index $I_{S(50)}$ (MPa)	Strength Classification
BH101	2.05	SANDSTONE	F	D	53.0	52.0	0.54	2	0.20	L
BH101	2.05	SANDSTONE	F	A	52.0	53.0	0.94	1	0.29	L
BH101	3.05	SANDSTONE	F	D	52.0	52.0	0.14	2	0.05	VL
BH101	3.05	SANDSTONE	F	A	52.0	52.0	0.37	1	0.12	L
BH101	4.05	SANDSTONE	F	D	50.0	52.0	0.55	2	0.21	L
BH101	4.05	SANDSTONE	F	A	52.0	50.0	1.05	1	0.34	M
BH101	5.05	SHALE	F	D	52.0	52.0	0.07	2	0.03	EL
BH101	5.05	SHALE	F	A	52.0	52.0	0.33	1	0.10	L
BH101	6.05	SANDSTONE	F	D	50.0	52.0	1.79	2	0.67	M
BH101	6.05	SANDSTONE	F	A	52.0	50.0	3.26	1	1.05	H
BH101	7.05	SANDSTONE	F	D	50.0	52.0	3.65	2	1.37	H
BH101	7.05	SANDSTONE	F	A	52.0	50.0	3.69	1	1.19	H
BH101	8.05	SANDSTONE	F	D	50.0	52.0	3.36	2	1.26	H
BH101	8.05	SANDSTONE	F	A	52.0	50.0	3.44	1	1.11	H
BH101	9.05	SANDSTONE	F	D	50.0	52.0	2.43	2	0.91	M
BH101	9.05	SANDSTONE	F	A	52.0	50.0	3.79	1	1.22	H
BH101	10.05	SANDSTONE	F	D	50.0	52.0	2.31	2	0.87	M
BH101	10.05	SANDSTONE	F	A	52.0	50.0	3.35	1	1.08	H
BH102	2.63	SANDSTONE	F	D	45.0	52.0	0.11	2	0.04	VL
BH102	2.63	SANDSTONE	F	A	52.0	45.0	0.23	1	0.08	VL
BH102	3.05	SANDSTONE	F	D	50.0	52.0	0.07	2	0.03	EL
BH102	3.05	SANDSTONE	F	A	52.0	50.0	0.41	1	0.13	L
BH102	4.05	SANDSTONE	F	A	52.0	50.0	0.52	1	0.17	L
BH102	4.65	SHALE	F	D	57.0	52.0	0.36	2	0.14	L
BH102	4.65	SHALE	F	A	52.0	57.0	1.86	1	0.54	M
BH102	5.09	SANDSTONE	F	D	51.0	52.0	1.52	2	0.57	M
BH102	5.09	SANDSTONE	F	A	52.0	51.0	2.24	1	0.71	M
BH102	5.65	SANDSTONE	F	D	52.0	52.0	2.44	2	0.92	M
BH102	5.65	SANDSTONE	F	A	52.0	52.0	7.38	1	2.30	H

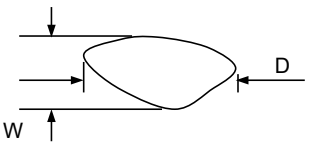
TEST TYPE :



W/D > 0.5
DIAMETRAL (D)



D/W = 0.3 - 1.0
AXIAL (A)



D/W = 0.3 - 1.0
IRREGULAR LUMP (I)

MOISTURE CONDITION :
Field (F), Saturated (S), Dry (D)

FAILURE TYPE :
1. Fracture through fabric of specimen oblique to bedding, not influenced by weak planes.
2. Fracture along bedding.
3. Fracture influenced by pre-existing joint plane (J), microfracture (M), vein (V), chemical alteration (C).
4. Chip or partial fracture.

NOTES For specimens tested parallel to plane of weakness $D_e^2 = D^2$
For specimens tested perpendicular to plane of weakness $D_e^2 = 4WD/$□

Uniaxial Compressive Strength

Client	Geo-Environmental Engineering	**Sample Source**	BH101 4.06-4.23m
Address	82 Bridge Street Lane Cove 2066	**Sample Description**	Sandstone
Project	Forestville (E24016)	**Report #**	S99545-UCS
Job #	S24439-1	**Sample #**	S99545

Test Procedure	AS 4133.4.2.2 Determination of uniaxial compressive strength-Rock strength less than 50 MPa		
Sampling	Sampled by Client - results apply to the sample as received	**Date Sampled**	Unknown
Storage History	Sealed	**Storage Environment**	Sealed at as received moisture condition
Sample Curing	-	**Testing Machine**	Matest 2000 kN Compression Machine

Uniaxial Compressive Strength 9.8 MPa

Date Tested:	26/08/2024		Moisture Content:	6.3	%
Specimen Height:	144.9	mm	Duration of Test:	667	seconds
Average Specimen Diameter:	51.9	mm	Rate of Displacement:	< 0.1	mm/min

Failure Type: Mixed mode

Other Pertinent Observations:

Accredited for compliance with ISO/IEC 17025 - Testing.

Authorised Signatory:

Chris Lloyd

Date: 27/08/2024

NATA Accredited Laboratory Number: 14874

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

Uniaxial Compressive Strength

Client	Geo-Environmental Engineering	**Sample Source**	BH101 7.05-7.29m
Address	82 Bridge Street Lane Cove 2066	**Sample Description**	Sandstone
Project	Forestville (E24016)	**Report #**	S99546-UCS
Job #	S24439-1	**Sample #**	S99546

Test Procedure	AS 4133.4.2.2 Determination of uniaxial compressive strength-Rock strength less than 50 MPa		
Sampling	Sampled by Client - results apply to the sample as received	**Date Sampled**	Unknown
Storage History	Sealed	**Storage Environment**	Sealed at as received moisture condition
Sample Curing	-	**Testing Machine**	Matest 2000 kN Compression Machine

Uniaxial Compressive Strength 22 MPa

Date Tested:	26/08/2024		Moisture Content:	5.4	%
Specimen Height:	146.5	mm	Duration of Test:	697	seconds
Average Specimen Diameter:	51.9	mm	Rate of Displacement:	< 0.1	mm/min
Failure Type:	Mixed mode				
Other Pertinent Observations:					

Accredited for compliance with ISO/IEC 17025 - Testing.

Authorised Signatory:

Chris Lloyd

NATA Accredited Laboratory Number: 14874

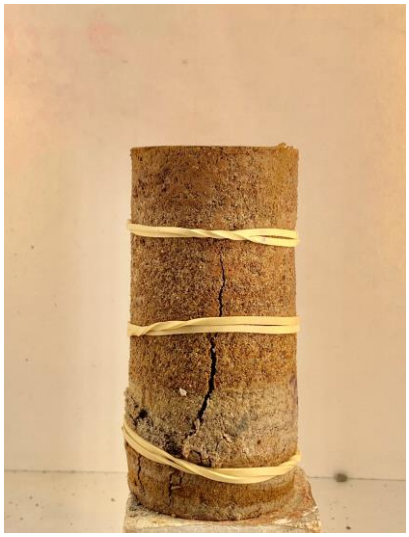
Date: 27/08/2024

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

Uniaxial Compressive Strength

Client	Geo-Environmental Engineering	**Sample Source**	BH102 3.08-3.20m
Address	82 Bridge Street Lane Cove 2066	**Sample Description**	Sandstone
Project	Forestville (E24016)	**Report #**	S99547-UCS
Job #	S24439-1	**Sample #**	S99547

Test Procedure	AS 4133.4.2.2 Determination of uniaxial compressive strength-Rock strength less than 50 MPa		
Sampling	Sampled by Client - results apply to the sample as received	**Date Sampled**	Unknown
Storage History	Sealed	**Storage Environment**	Sealed at as received moisture condition
Sample Curing	-	**Testing Machine**	Matest 2000 kN Compression Machine



Uniaxial Compressive Strength 3.4 MPa

Date Tested:	26/08/2024		Moisture Content:	8.8	%
Specimen Height:	111.9	mm	Duration of Test:	632	seconds
Average Specimen Diameter:	51.6	mm	Rate of Displacement:	< 0.1	mm/min

Failure Type:	Mixed mode
Other Pertinent Observations:	
Deviation from Standard:	Test specimen length to diameter ratio falls outside of standard limitations of 2.5-3.0.

NATA

Accredited for compliance with ISO/IEC 17025 - Testing.

Authorised Signatory:

Chris Lloyd

NATA Accredited Laboratory Number: 14874

Date: 27/08/2024

MACQUARIE GEOTECH

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