

ACID SULPHATE SOIL (ASS) INVESTIGATION AND MANAGEMENT PLAN REPORT

Client – Jonathan Odisho

Project Title – 1 & 3 Careel Head Road, Avalon Beach

Project Type – Mixed-Use Development

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1. Introduction

1.1 Background

CEC (Geotechnical) has undertaken an Acid Sulphate Soils Assessment and Management Plan for the proposed mixed-use development, including a 1-level basement to be constructed at 1 & 3 Careel Head Road, AVALON BEACH. Acid Sulphate Soil (ASS) investigation is required where soil types contain iron sulphides and/or their oxidation by-product (Sulphuric acid). Acid Sulphate waters can corrode engineering works and infrastructure such as culverts, bridges and weirs, which are in contact with these waters/soil. The precipitation of iron hydroxide/oxide flocs from acidic, iron-rich waters can cause the blocking of drains, and wells and the reduction of aquifer recharge.

1.2 Proposed Development

Information provided by the client indicates the proposed development comprises the construction of a mixed-use development, including 1-level basement and childcare centre.

As there was no information provided in the architectural drawings related to the type of foundation. And for this type of development, screw pile is commonly practised, which disturbs very less soil.

1.3 Scope of Works

The geotechnical site investigation for Acid Sulphate Soils (ASS) was carried out on 19/06/2024 and included the drilling of four boreholes and Soil sampling in accordance with Australian Standards AS 1289, 'Methods of Testing Soil for Engineering Purposes'. The soil encountered during drilling was classified according to Australian Standards AS 1726-2017. The soil sampling was carried out as per the Acid Sulphate Soil Manual, August 1998, NSW.

- A site walk-over inspection by a Geotechnical Engineer in order to determine the overall surface conditions and to identify relevant site features.
- A review of DBYD plans and service locations carried out on the site using a specialised subcontractor to ensure that the investigation area is free from underground services.
- Machine Drilling of four boreholes BH1-BH4 to a maximum depth of 4.0m below the ground.
- Soil samples collected from the boreholes were tested by Eurofins, a NATA-accredited laboratory for Acid Sulphate Tests.

This report is based only on the information provided prior to the preparation of this report and may not be valid if the site conditions change and/or after earthworks are undertaken.

2. Desktop Assessment

This spatial dataset identifies areas of land showing the extent of acid sulphate soils. Acid Sulphate soils have been classified into five classes based on the likelihood of the acid sulphate soils being present in particular areas and at specific depths.

- Class 1: Acid Sulphate soils in a class 1 area are likely to be found on and below the natural ground surface.
- Class 2: Acid Sulphate soils in a class 2 area are likely to be found below the natural ground surface.
- Class 3: Acid Sulphate soils in a class 3 area are likely to be found beyond 1 metre below the natural ground surface.
- Class 4: Acid Sulphate soils in a class 4 area are likely to be found beyond 2 metres below the natural ground surface.
- Class 5: Acid Sulphate soils are not typically found in Class 5 areas. Areas classified as Class 5 are located within 500 metres on adjacent Class 1, 2, 3, or 4 land.

Reference made to the NSW Planning Portal indicates the site is situated within an area of general ASS occurrences, identified as a Class 2 and 5 region, as shown in **Figure 1 in Appendix A**.

It is noted that the NSW Planning Portal classifies ASS into five (5) different classes based on the likelihood of the ASS being present in particular areas and at specific depths. Where ASS is not typically found in Class 5 regions and is likely to be found 1-3m below the natural ground surface in Class 5 regions.

The pointed location in **Figure 2 in Appendix A** shows the construction location is likely to be found below the natural soil, and the western end of the site is located within X2 (Disturbed terrain, elevation 2-4 m AHD).

ASSMAC recommends the following geomorphic or site criteria be used to determine if acid Sulphate soils (ASS) are likely to be present:

- a) Sediments of recent geological age (Holocene).
- b) Soil horizons less than 5m AHD.
- c) Marine or estuarine sediments and tidal lakes.
- d) In coastal wetlands or back swamp areas; waterlogged or scalded areas; interdunal swales or coastal sand dunes (if deep excavation or drainage is proposed).
- e) In areas where the dominant vegetation is mangroves, reeds, rushes and other swamp-tolerant or marine vegetation.
- f) In areas identified in geological descriptions or in maps as bearing acid sulphide minerals, coal deposits or former marine shales/sediments.
- g) Deep older estuarine sediments >10 metres below the ground surface, Holocene, or Pleistocene age (only an issue if deep drainage is proposed).

As mentioned above, the Acid Sulphate soil map included in the Site Contamination Assessment indicates that the development area is within Class 2 and 5 Land, **Figure 1 in Appendix A**. Therefore, it is considered that there is a likely risk of ASS being present within the proposed development area.

3. Investigation of Acid Sulphate Soils

3.1 Assessment Criteria for Acid Sulphate Soil

The assessment criteria normally applied to assist in the preliminary identification of Actual Acid Sulphate Soils (AASS) and Potential Acid Sulphate Soils (PASS), in accordance with Acid Sulphate Soils Planning Guidelines (AASMAC), are as follows:

- pHF < 4 shows the occurrence of oxidation in the past and that AASS is likely to be present.
- pHFOX < 3, plus a pHFOX reading at least one pH unit below the corresponding pHF, plus a strong reaction with peroxide, strongly indicates the presence of PASS.

3.2 Methodology and Preliminary Laboratory Analyses

A preliminary soil sampling programme was undertaken following the Acid Sulphate Soil Guidelines. Four (4) boreholes (BH1, BH2, BH3 and BH4) were drilled utilising a truck mount solid flight auger drill rig in the area of the proposed development (**Figure 3, Appendix A** – for the borehole locations).

The samples were submitted to the laboratory (Eurofins Laboratories) for the recommended preliminary testing. The detailed laboratory analysis results are presented in **Appendix C** – Laboratory Reports. The Table below summarises laboratory testing results to determine the pH for the tests mentioned above as carried out by NATA accredited laboratory on the recovered samples from boreholes (BH1, BH2, BH3 and BH4) inclusive, with laboratory testing results certificates presented in **Appendix C**.

3.3 Results

3.3.1 Preliminary Laboratory Results

The field pH and pHFOX results obtained from Eurofins Environment Testing (1110580-S-V3) are summarised in **Table 1**. Following ASSMAC (1998), the results indicate that Field pH (pH-F) readings are greater than 4, therefore actual ASS is not present. Furthermore, only one condition after monitoring the Field pH peroxide test (pH-FOX) is verified (lowering of the soil pH by at least one unit). The reaction rate generally indicates the level of risk present but also depends on the texture and other soil constituents. From **Table 1**, sample BH4-0.3 was the only one with pHFOX <3 and pH drop of 3.2. However, the reaction rate was observed as moderate. Therefore, soil testing indicated the potential presence of acid sulphate soil (PASS) for the samples. For verification, 4 samples (BH1-0.5m BH2-1.0, BH2-2.0 and BH1-3.0) were selected and tested for detailed laboratory analyses.

Table 1: Summary of Preliminary Laboratory Results

Location	Field Test				
	Field pH (pHf)	Actual ASS	pH FOX	pH Drop	Reaction Rate
BH1-0.5	7.8	No	6.3	1.5	1 (Slight reaction)
BH1-3.0	6.3	No	5.1	1.2	1 (Slight reaction)
BH-2-1.0	7.8	No	4.8	1.2	3 (Extreme reaction)
BH2-2.0	6.5	No	4.5	2	4 (Extreme reaction)
BH2-3.0	6.3	No	4	2.3	1 (Slight reaction)
BH3-0.4	6.4	No	3.2	3.2	2 (Moderate reaction)
BH3-4.0	6.1	No	3.9	2.2	1 (Slight reaction)
BH4-0.3	6.1	No	2.9	3.2	2 (Moderate reaction)
BH4-1.5	6.2	No	3	3.2	1 (Slight reaction)

3.3.2 Detailed Laboratory Results

Samples BH1-0.5m BH2-1.0, BH2-2.0 and BH1-3.0 were considered representative of the subsurface soil profile and were submitted for Suspension Peroxide Combined Acidity and Sulphate (SPOCAS) testing to confirm the presence or absence of AASS and PASS in the soil. Test results obtained from Eurofins Environment Testing (1116222-S) are summarised in Table 2. The results of analysis for the soils are compared with a summary of the ASSMAC assessment criteria, also included in Table 2. It is assumed that <1,000 tonnes of material would be disturbed hence the action criteria for less than 1,000 tonnes have been applied.

Table 2: Summary of Detailed Laboratory Results

Location		TPA moles H+/tonne	Spos %w/w
BH1-0.5		<2	0.014
BH2-1.0		20	0.035
BH2-2.0		2.5	0.021
BH1-3.0		<2	0.018
NSW AAMAC Action Criteria			
Type of Material Texture	Approx Clay Content (%<0.002mm)	Action Criteria < 1000 t Acid Trail TPA mole H+/t	Action Criteria <1000 tonnes Sulphur Trail Spos %
Sandy Loam to Light Clay	5-40	36	0.06

The laboratory results indicate a high acid trail in all soil profile (0.5-3.0m). An exceedance of the TPA threshold indicates the presence of actual acid sulphate soil (AASS). From the above findings, it can be stated ASS management plan is required for the above site subject to the foundations may comprise screw pile. As this type of construction will pass through where acid sulphate soil is present (depth of 0.5m).

4. Conclusion

The above discussion provides preliminary- and detailed- assessment of the potential/actual for ASS across the site area and addresses the Department of Planning, Industry and Environment requirements. Soil samples tested indicated the absence of AASS at all soil profile (0.5-3.0m). Upon completion of our onsite investigation and laboratory analysis the following conclusions/discussions are made:

- Ground water was not encountered during our investigation which concluded at a depth 3.0m.
- Field pH tests conducted on the soil indicated that the potential for AASS and / or PASS soils.
- Laboratory tests (SPOCAS suite) have been analysed and no indication of high acid trails in all soil profile (0.5-3.0m) of soil samples was observed. The results confirm the absence of AASS within these soils. However, as site is overlapping Class 2 ASS, therefore it is recommended to adopt acid sulphate management plan.

5. Acid Sulphate Management Plan

Neutralisation of ASS materials should be undertaken in accordance with the ASSMAC guidelines, as discussed below.

The excavated ASS / acid generating materials material should be contained within a suitable bunded area with an impermeable base and appropriately neutralised prior to stockpiling. The design of the treatment area should also consider the construction methodology and staging to ensure that sufficient area is available for staged excavation, treatment and stockpiling.

It is recommended that Grade 1 agricultural lime (CaCO₃) be used for the neutralisation of potential acid sulphate soils excavated during the construction. The following liming / monitoring procedures for the treatment of ASS / acid generating materials are recommended:

- All excavated soil should be contained within a suitably designed and bunded area and kept moist to minimise oxidation, prior to treatment and neutralisation with lime. Progressive neutralisation will be required to manage the staged construction programme which will minimise the area required for treatment.
- Stockpiled soil should be limed with average dose of 1kg lime/tonne for soil profile (0-0.5m and >3m) and average dose of 2.2kg lime/tonne for soil profile (0.5-3.0m) of soil for neutralisation as soon as practicable following excavation.
- The neutralising agent and ASS should be thoroughly mixed and aerated using, for example, an agricultural lime spreader and excavator. The soil should be treated in layers up to 300 mm thick to encourage aeration.
- It should be noted that the actual lime rate required will also depend on the results of monitoring during neutralisation. Additional lime will be required if monitoring results indicate that appropriate neutralisation has not been achieved. Conversely the liming rate may decrease if monitoring suggests over-liming is occurring.
- Sampling and testing after lime treatment of soil pH and pH_{fox} should be taken at a frequency of at least one sample per 25m³ excavated soil, to verify the neutralisation treatment and confirm oxidation of acid generating soils is not occurring. The frequency of testing would be reviewed during treatment and could be reduced subject to achievement of consistent monitoring results.
- Upon verification of treatment, the neutralised ASS could be re-used on-site for construction (subject to geotechnical suitability) or sent to a suitable landfill after classification as per Part 1: Classifying Waste, Waste Classification Guidelines published by the DECCW NSW (2014).

6. General Recommendations

6.1 Construction Implications / Management & Monitoring Strategies

It is recommended that all excavations and construction activities are to be conducted to ensure that any ASS are not encountered during construction. Signs that may indicate the presence of ASS may include:

- Lowering of the soil pH by at least one unit.
- Soils change colour into a greyish and/or darker tone.
- Noticeable sulphur-smelling gases (similar to rotten egg) such as sulphur dioxide or hydrogen sulphide into the atmosphere.
- Effervescence.

Should any of the above indicators be present during construction, excavation work on the site is to stop, and CEC (Geotechnical) should be contacted to determine what actions are required to be taken before work may recommence.

As acidity is transported by water, excavations should be conducted during dry periods as much as possible. This will minimise the risk associated with sudden or heavy rain, allow better control of treated waters for discharge, and provide some safety margin for unattended weekend or holiday periods.

It should be noted that ground conditions and the actual extent of any ASS which may be present within the site are expected to differ from those encountered and inferred in this report since no geotechnical or geological exploration programme, no matter how comprehensive, can reveal and identify all subsurface conditions and the actual extent of any ASS underlying and present within the site.

Based on laboratory testing, it is therefore recommended that the proposed foundation system be designed in accordance with AS 2870-2011 and other appropriate standards and guidelines, based on

the laboratory testing results, in particular for (not limited to) the minimum exposure classification for concrete, minimum concrete strength and curing requirements, and minimum reinforcement cover.

CEC Geotechnical also recommends that following demolition of the existing dwellings and infrastructures within the site, preliminary aggressivity and salinity assessment be carried out by a suitably qualified geotechnical engineer in order to determine pH, chloride and Sulphate content, and electrical conductivity of the underlying soils.

6.2 Acid Sulphate Soil Treatment (if required)

Our investigation and laboratory results on soil samples do not indicate the presence of AASS soil deeper than 1.5. Also, there is not enough strong evidence to indicate the presence of PASS in the soils. However, if the conditions change and on-site treatment is required, the following guidelines should be considered.

In general, if on-site neutralisation treatment of any PASS material were to be adopted and that material remains stockpiled for over one week, material containing PASS should ideally be stockpiled separately on a liming pad/stockpiling site and mixed with lime. Appropriate monitoring and leachate control are to be adopted. Once PASS material has been placed in the treatment areas, it should be dosed with aglime in accordance with the calculated dosing rate (to be calculated if needed). This will be followed by thoroughly mixing the soil/aglime mixture with site machinery to treat the soil. Additional quantities of aglime above the potential calculated dosing rate may be required to allow for difficulties in mixing. The effectiveness of the adopted dosing rate should be confirmed by the regular screening of the treated material using pH and peroxide pH field tests. It should be noted that as a precautionary measure, treatment works involving aglime should not be conducted during windy conditions unless the material can be appropriately conditioned to prevent dust generation.

6.3 Monitoring Frequencies & Target Levels

Monitoring of ASS and PASS and neutralisation effectiveness may be undertaken as prescribed in the Table 2.

Table 3: Monitoring of ASS and PASS and neutralisation effectiveness

Material	Test	Frequency	Target Level
Ponded leachate Water (both leachate and groundwater ponded in the excavation)	pH	Daily, following rain events and non-work periods	pH 6.5 - 8.5, but not < 5.5
Discharged leachate (Irrigation into subsoil)	pH	Daily checks of pH during discharge period.	pH 6.5 - 8.5
	TSS	Daily visual checks (with measurements taken if turbidity is observed) and weekly monitoring	TSS <50 NTU
Soils to be disposed of	Field pH H ₂ O ₂ pH	During and after treatment (prior to disposal).	<ul style="list-style-type: none"> - pH 6.0 - 12.0 - No change in colour - No effervescence - No release of sulphurous odour - No depression in pH below field pH

6.4 'Acid' Soil vs 'Acid Sulphate' Soil

Not all acid soil materials are ASS materials. The acidity hazard of soil materials that are strongly acidic due to processes other than RIS oxidation is not considered an ASS acidity hazard.

Naturally occurring acidic soils are not considered an environmental hazard and indeed are usually part of acidophilic ecosystems whose health depends on maintaining an acidic environment. As an example, many soil materials in naturally acidic landscapes, such as acidic peatlands and coastal heaths, often have low pH values and high acidities.

If it can be demonstrated that the majority of the acidity of acidic soil materials is not or could not be derived from the oxidation of RIS, then these materials should not be treated as if they were ASS materials. To do so may result in the liming of naturally acidic ecosystems. This could lead to unnaturally alkaline environments resulting in severe ecological damage to the acidophilic organisms that rely on the acidic nature of these ecosystems.

Field investigation can help determine whether acidic soil materials are ASS materials or not. The presence of jarosite in a soil material, or adjacent soil material, is strong evidence of prior oxidation of RIS. Documented jarosite, along with field pHs less than 4, can be used to identify these soil materials as AASS materials rather than just acid soil materials. Further information is provided in the National Acid Sulphate Soils Identification and Laboratory Methods Manual (Sullivan et al., 2018b) to help distinguish naturally occurring acidic soil materials from AASS materials.

6.5 Disposal Off-Site

Any materials proposed to be excavated and disposed of off-site during proposed remediation/development works must be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines prior to off-site disposal to an appropriately licenced waste management/landfill facility. If the waste generator does not undertake a chemical assessment of the waste, it must be classified as hazardous waste. Waste classified as hazardous waste cannot be disposed of in NSW and must be treated prior to disposal.

7. Limitations

This report and its associated recommendations have been prepared exclusively for our client, who is named on the front page of this report and is the only intended entity to benefit from this report. CEC Geotechnical notes that any reliance on the information provided in this report by any third party will be at their own risk. It should be noted that the analysis and conclusions made in this report are based on documents and investigations prepared by other consultants and entities, and hence, should these documents and investigations be incorrect, CEC Geotechnical must be made aware, and the results of this report may be void.

For and on behalf of CEC Geotechnical Pty Ltd.

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References

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- NSW Department of Mineral Resources (1983) Sydney 1:100,000 Geological Series Sheet 9130 (Edition 1)
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- NSW Planning Portal.
- <https://www.planningportal.nsw.gov.au/spatialviewer>
- Geocortex Viewer for HTML5 (nsw.gov.au), <https://geo.seed.nsw.gov.au>
- Methods Manual. Department of Agriculture and Water Resources (2018).
- NSW Planning Portal.
- <https://www.planningportal.nsw.gov.au/spatialviewer>
- Geocortex Viewer for HTML5 (nsw.gov.au), <https://geo.seed.nsw.gov.au>

APPENDIX A – Figures

Figure 1: NSW Planning portal, Site is subject to ASS Class 2 and 5

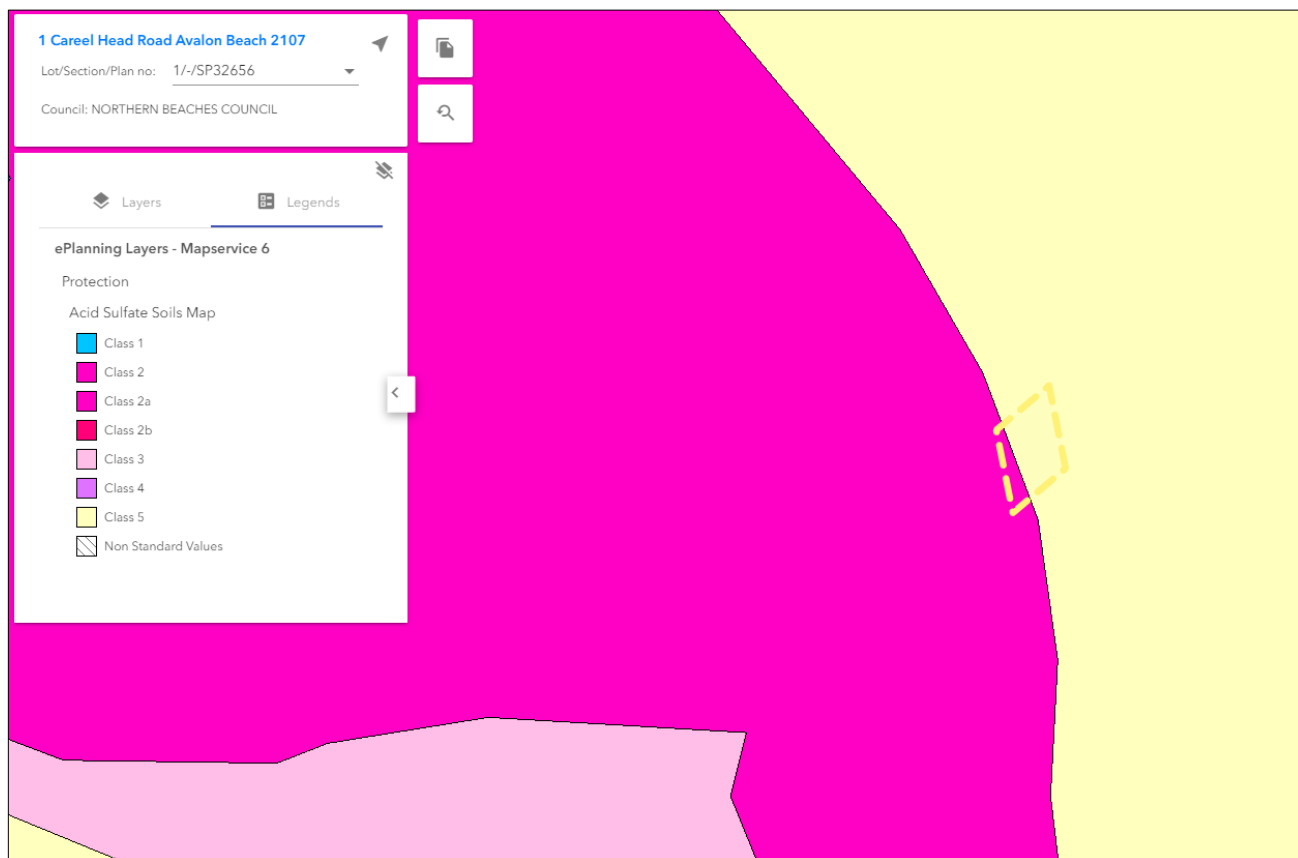


Figure 2: ASS potential for the Site Location

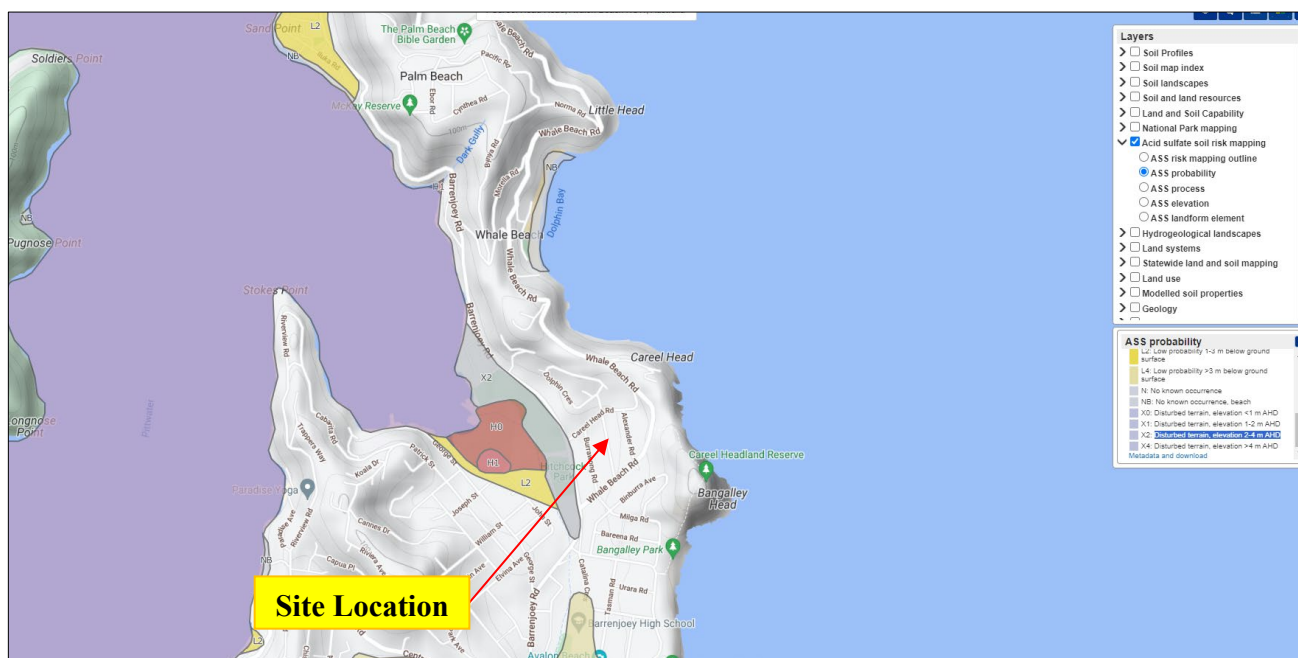


Figure 3: Site Plan



APPENDIX B – Architectural Drawings

DRAWING LIST			
	DRAWING No.	DRAWING NAME	REVISION
DA	1001	DRAWING LIST	P2
DA	1002	COMPLIANCE TABLE	
DA	1005	SITE PLAN	
DA	1006	DEMOLITION PLAN	
DA	1100	BASEMENT 1 FLOOR PLAN	P3
DA	1101	GROUND FLOOR PLAN	P3
DA	1102	LEVEL 01 FLOOR PLAN	P3
DA	1103	ROOF PLAN	P3
DA	2001	BUILDING ELEVATION NORTH, EAST	P1
DA	2002	BUILDING ELEVATION - SOUTH, WEST	P1
DA	2003	BUILDING ELEVATION SOUTH, EAST	P1
DA	3001	SECTION A	P1
DA	3002	SECTION B	P1
DA	4001	RAMP SECTION	
DA	6001	SHADOW DIAGRAMS	
DA	6011	SOLAR ACCESS STUDY	
DA	6028	SOLAR SCHEDULE	
DA	7001	GFA CALCULATION	
DA	7011	SOLAR ACCESS PLAN	
DA	7021	VENTILATION DIAGRAMS	
DA	7031	3D VIEW 1	
DA	7032	3D VIEW 2	
DA	7033	3D VIEW 3 - CAREEL HEAD ROAD	
DA	7041	FINISHES SCHEDULE	
DA	7042	SCHEMATIC	
DA	7043	WINDOW SCHEDULE	
DA	7051	DEEP SOIL ZONE	
DA	7061	COMMUNUAL OPEN SPACE DIAGRAM	
DA	7062	EVACUATION DIAGRAM	P1
DA	7071	INTERNAL UNIT STORAGE	
DA	7081	CUT & FILL DIAGRAM	
DA	7091	LEP HEIGHT BLANKET	
DA	8001	DETAIL SECTION - SETBACK	
DA	8003	DETAIL SECTION - FIRE STAIRS	
DA	x5001	PRE + POST ADAPTABLE UNIT LAYOUT	

DESIGN INTENT STATEMENT

Situated in the picturesque locale of Avalon Beach, our mixed-use development endeavors to redefine coastal living by seamlessly integrating community-centric amenities with modern design sensibilities. At its heart, the project features a dynamic blend of outdoor and indoor childcare facilities, alongside retail spaces and Dan Murphy’s occupying the ground floor.

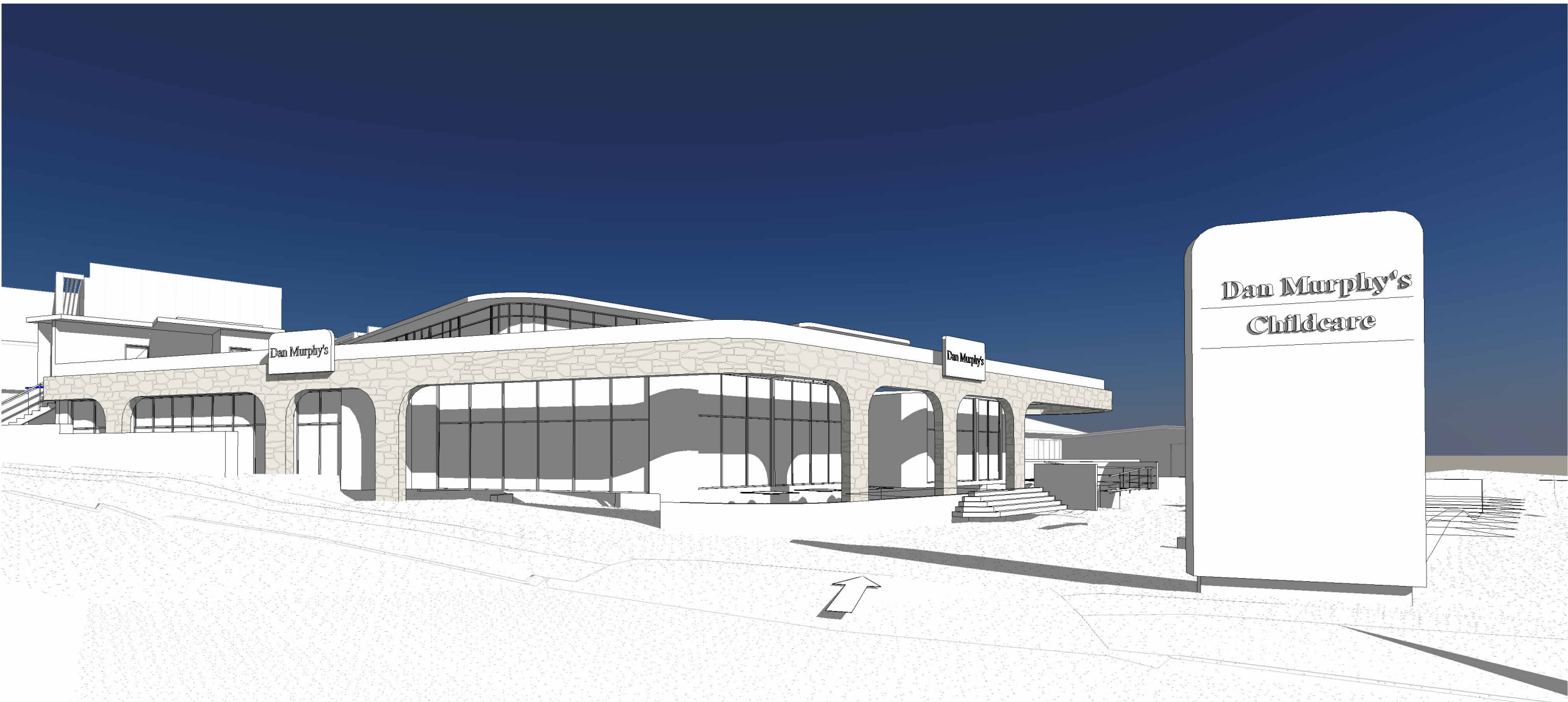
To address parking needs efficiently, the development encompasses both basement and ground-level parking facilities, ensuring convenience for residents and visitors alike.

Architecturally, the project embraces a distinctive aesthetic characterized by a harmonious blend of curved facades, sweeping arches, and angular features. Contemporary tones and carefully curated color palettes imbue the structure with a sense of sophistication, while materials such as white brick and concrete contribute to its timeless appeal.

The design ethos of the development extends beyond mere aesthetics to prioritize functionality and sustainability. Each aspect of the design is meticulously crafted to optimize natural light, ventilation, and spatial efficiency, enhancing the overall living experience for residents.

Landscaping elements play a pivotal role in softening the built environment and fostering a connection with nature. Green spaces are strategically integrated throughout the development, providing residents with serene outdoor retreats and contributing to the overall ecological sensitivity of the project.

Our vision for the Avalon Beach Mixed-Use Development is to create a vibrant and inclusive community hub that not only meets the needs of its residents but also enriches the fabric of the surrounding neighborhood. By blending innovative design with a commitment to sustainability, we aim to set a new benchmark for contemporary coastal living in this idyllic setting.



References

Any variations or deviations from approved construction drawings must be reviewed and approved by PCA or nominated certifying authority.

Drawings to be read in conjunction with, but not limited to, all structural engineers, stormwater engineers, landscape architects, fire protection, essential electrical services and mechanical services plans & other associated plans & reports.

Refer to current Basix report for additional requirements to ones noted on plans.

Notes

All dimensions and setbacks are to be verified on site and all omissions or any discrepancies to be notified to the architect. Figured dimensions to be used at all times. DO NOT SCALE measurements off drawings.

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P2 28.06.2024 Revision 3

P1 28.05.2024 Revision 1

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 Australian Institute of Architects

Project

PROPOSED MIXED USE DEVELOPMENT

1 & 3 Careel Head Road Avalon Beach

Drawing Title

DRAWING LIST

Project Stage

DA Submission

Job no.

Drawing no.

Rev.

J23587D

DA1001

P2

Drawn by

Checked by

Approved by

Date

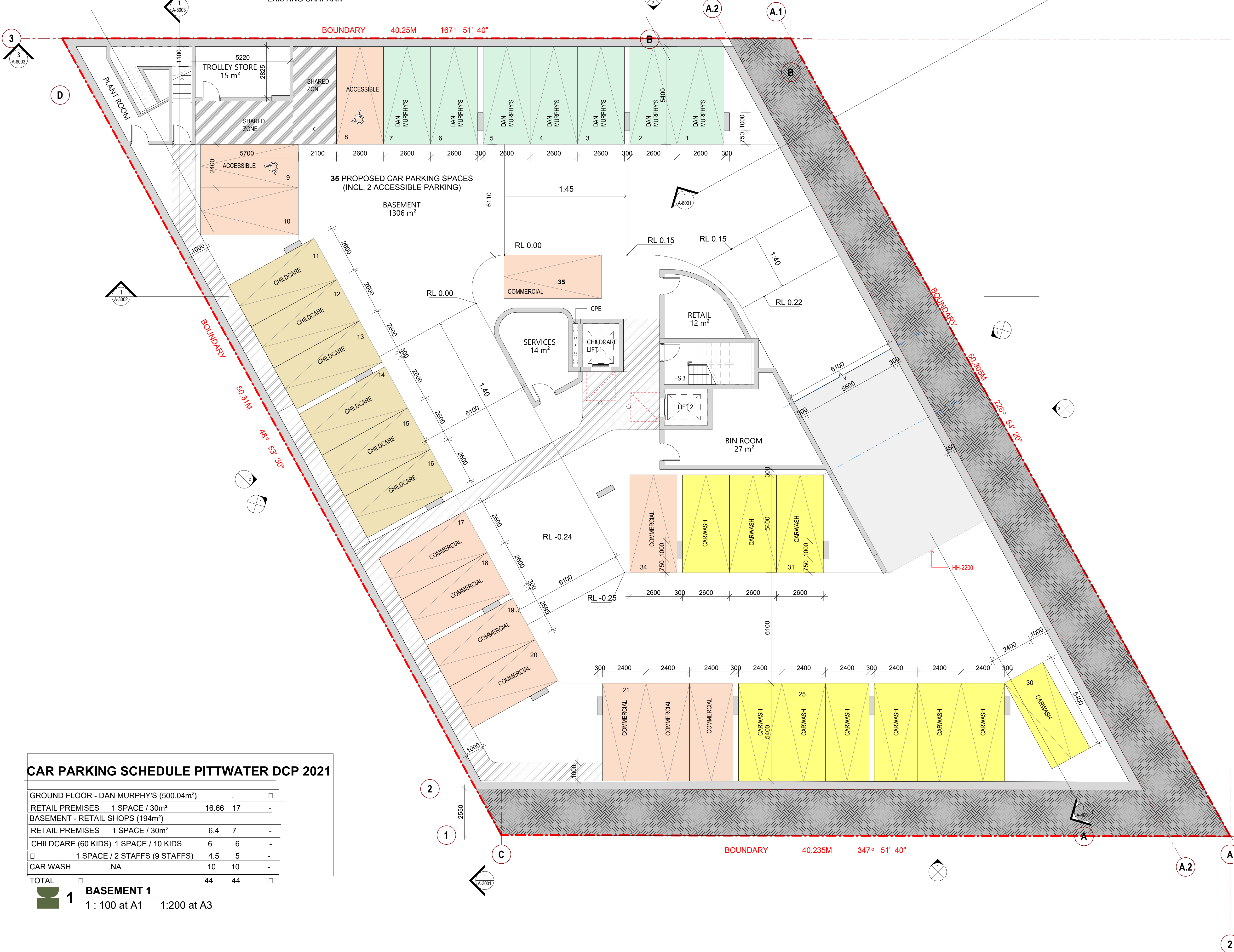
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JUN. 2024

NEIGHBOURING PROPERTIES
5-7 CAREEL HEAD ROAD
EXISTING CARPARK



CAR PARKING SCHEDULE PITTWATER DCP 2021

GROUND FLOOR - DAN MURPHY'S (500.04m ²)					
RETAIL PREMISES	1 SPACE / 30m ²	16.66	17	-	
BASEMENT - RETAIL SHOPS (194m ²)					
RETAIL PREMISES	1 SPACE / 30m ²	6.4	7	-	
CHILDCARE (60 KIDS)	1 SPACE / 10 KIDS	6	6	-	
1 SPACE / 2 STAFFS (9 STAFFS)		4.5	5	-	
CAR WASH	NA	10	10	-	
TOTAL		44	44		

BASEMENT 1
1 : 100 at A1 1 : 200 at A3

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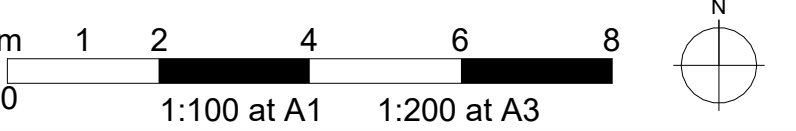
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PARKING LEGEND

	CHILDCARE
	COMMERCIAL
	DAN MURPHY'S
	CAR WASH

P3	28.06.2024	Revision 3
P2	05.06.2024	Revision 2
P1	28.05.2024	Revision 1



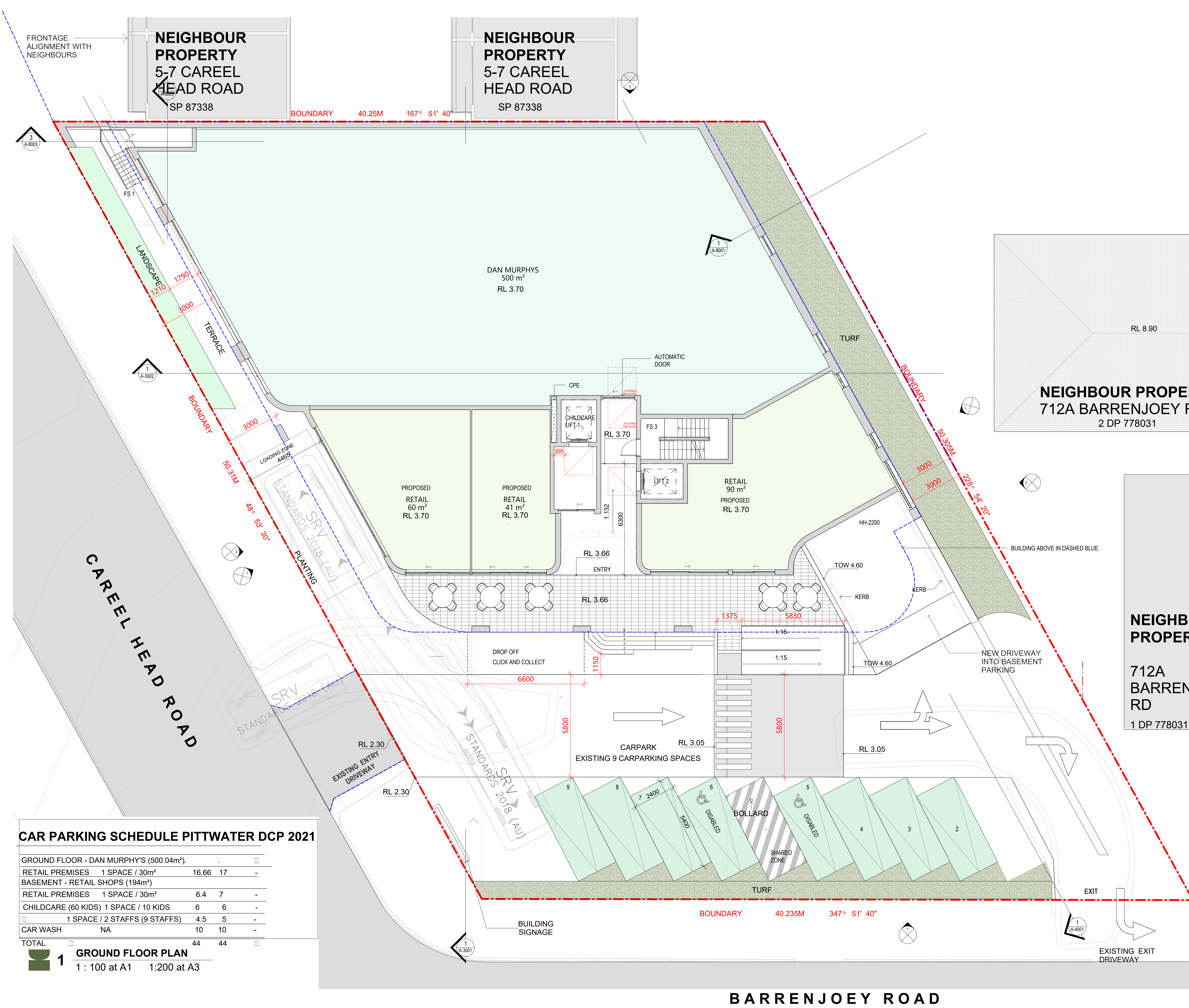
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Project
PROPOSED MIXED USE DEVELOPMENT

1 & 3 Careel Head Road Avalon Beach
Drawing Title
BASEMENT 1 FLOOR PLAN

Project Stage
DA Submission
Job no. Drawing no. Rev.
J23587D DA1100 P3
Drawn by Checked by Approved by Date
GH RJ - JUN. 2024



CAR PARKING SCHEDULE PITTWATER DCP 2021

GROUND FLOOR - DAN MURPHY'S (500.04m ²)					
RETAIL PREMISES	1 SPACE / 30m ²	16.66	17	-	
BASEMENT - RETAIL SHOPS (194m ²)					
RETAIL PREMISES	1 SPACE / 30m ²	6.4	7	-	
CHILDCARE (60 KIDS)	1 SPACE / 10 KIDS	6	6	-	
1 SPACE / 2 STAFFS (9 STAFFS)					
		4.5	5	-	
CAR WASH	NA	10	10	-	
TOTAL		44	44		

1 GROUND FLOOR PLAN
1 : 100 at A1 1:200 at A3

References
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Notes
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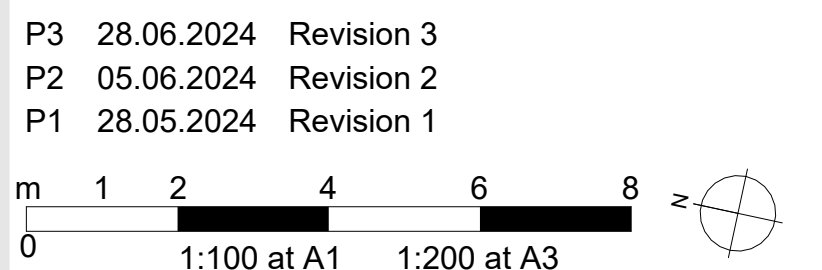
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PARKING LEGEND

	CHILDCARE
	COMMERCIAL
	DAN MURPHY'S
	CAR WASH



NEIGHBOUR PROPERTY
712A BARRENJOEY RD
1 DP 778031

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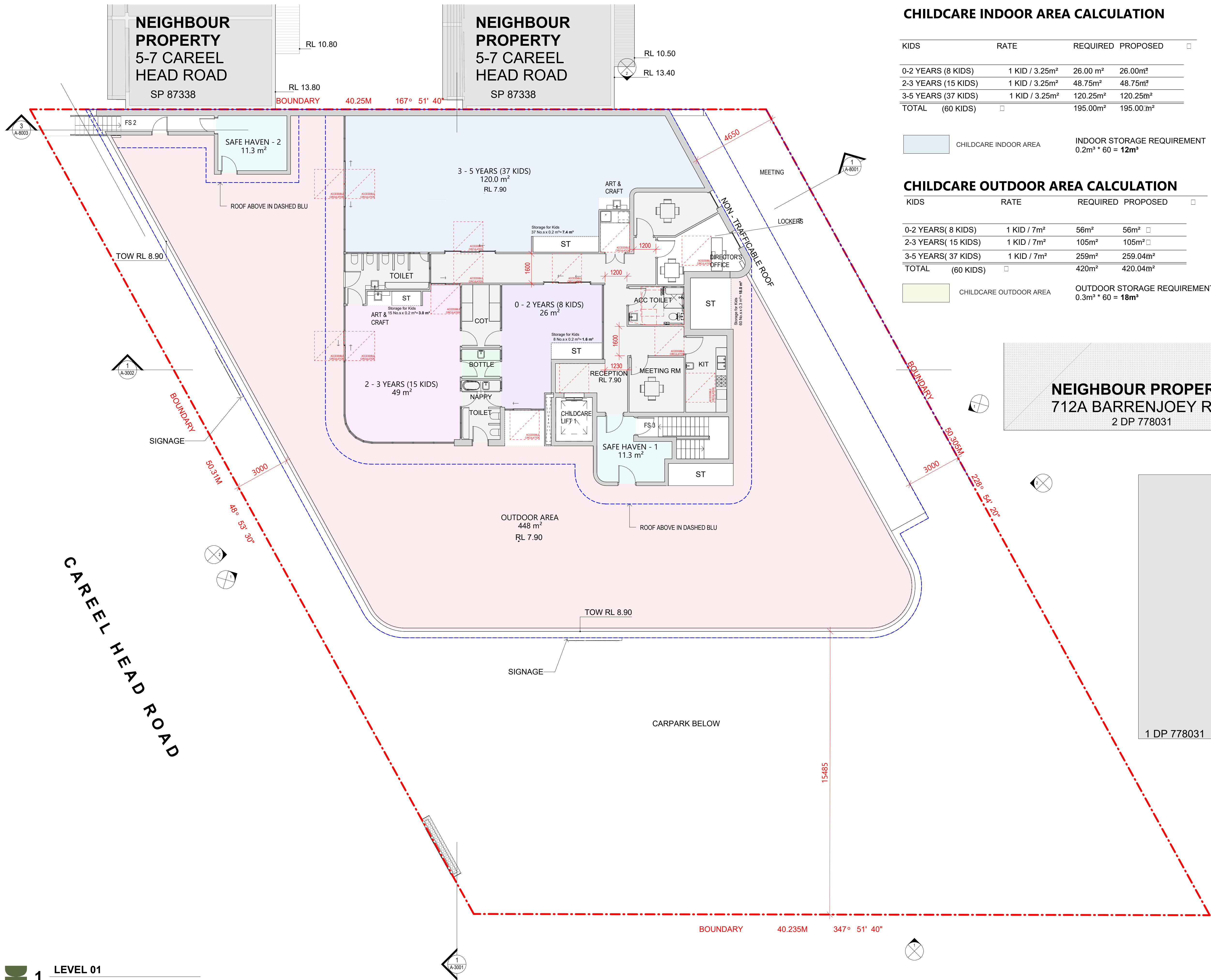
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Project
PROPOSED MIXED USE DEVELOPMENT
1 & 3 Careel Head Road Avalon Beach
Drawing Title
GROUND FLOOR PLAN

Project Stage
DA Submission
Job no. Drawing no. Rev.
J23587D DA1101 P3
Drawn by Checked by Approved by Date
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CHILDCARE INDOOR AREA CALCULATION

KIDS	RATE	REQUIRED	PROPOSED	
0-2 YEARS (8 KIDS)	1 KID / 3.25m²	26.00 m²	26.00m²	
2-3 YEARS (15 KIDS)	1 KID / 3.25m²	48.75m²	48.75m²	
3-5 YEARS (37 KIDS)	1 KID / 3.25m²	120.25m²	120.25m²	
TOTAL (60 KIDS)		195.00m²	195.00m²	

CHILDCARE INDOOR AREA INDOOR STORAGE REQUIREMENT
0.2m³ * 60 = 12m³

CHILDCARE OUTDOOR AREA CALCULATION

KIDS	RATE	REQUIRED	PROPOSED	
0-2 YEARS(8 KIDS)	1 KID / 7m²	56m²	56m²	
2-3 YEARS(15 KIDS)	1 KID / 7m²	105m²	105m²	
3-5 YEARS(37 KIDS)	1 KID / 7m²	259m²	259.04m²	
TOTAL (60 KIDS)		420m²	420.04m²	

CHILDCARE OUTDOOR AREA OUTDOOR STORAGE REQUIREMENT
0.3m³ * 60 = 18m³

References

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712A BARRENJOEY RD
2 DP 778031

P3 28.06.2024 Revision 3
P2 05.06.2024 Revision 2
P1 28.05.2024 Revision 1

m 1 2 4 6 8
0 1:100 at A1 1:200 at A3



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Project

PROPOSED MIXED USE
DEVELOPMENT

1 & 3 Careel Head Road Avalon Beach

Drawing Title

LEVEL 01 FLOOR PLAN

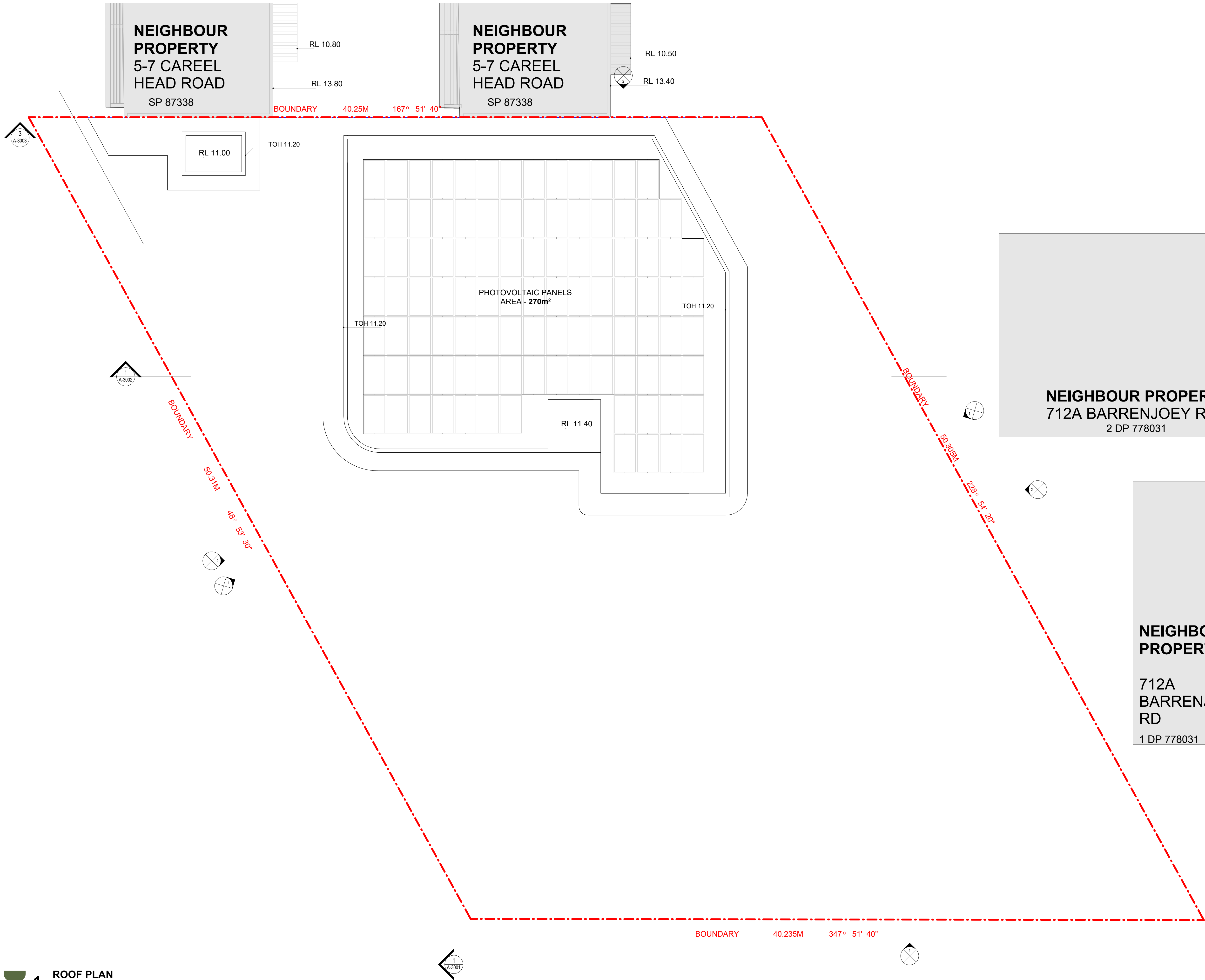
Project Stage

DA Submission

Job no. Drawing no. Rev.

J23587D DA1102 P3

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GH RJ - JUN. 2024



References

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Notes

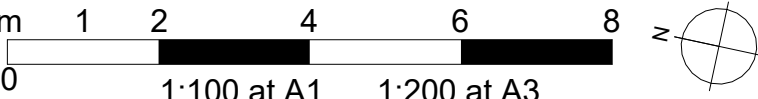
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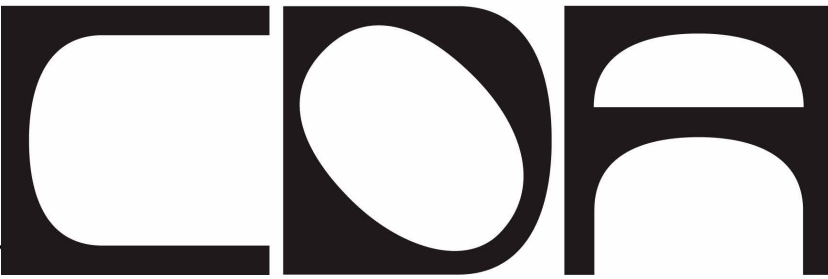
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P3	28.06.2024	Revision 3
P2	05.06.2024	Revision 2
P1	28.05.2024	Revision 1



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Project

PROPOSED MIXED USE DEVELOPMENT

1 & 3 Careel Head Road Avalon Beach

Drawing Title

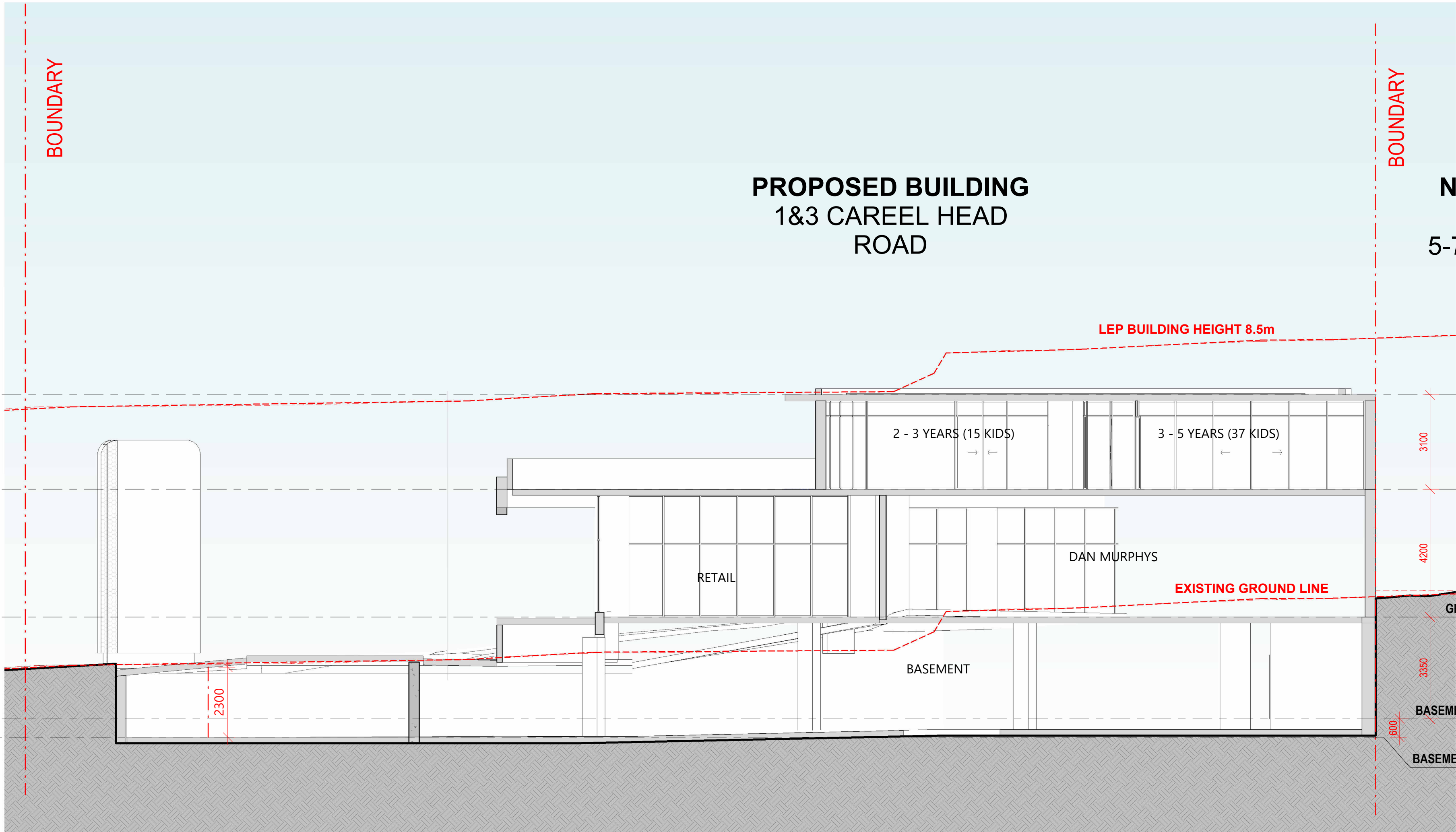
ROOF PLAN

Project Stage

DA Submission

Job no.	Drawing no.	Rev.
J23587D	DA1103	P3
Drawn by	Checked by	Approved by Date
GH	RJ	- JUN. 2024

BARRENJOEY ROAD



1 SECTION A
1 : 100 at A1 1:200 at A3

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P1 28.06.2024 Revision 3
m 1 2 4 6 8
0 1:100 at A1 1:200 at A3



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Project
PROPOSED MIXED USE DEVELOPMENT
1 & 3 Careel Head Road Avalon Beach
Drawing Title
SECTION A
Project Stage
DA Submission
Job no. Drawing no. Rev.
J23587D DA3001 P1
Drawn by Checked by Approved by Date
GH RJ - JUN. 2024

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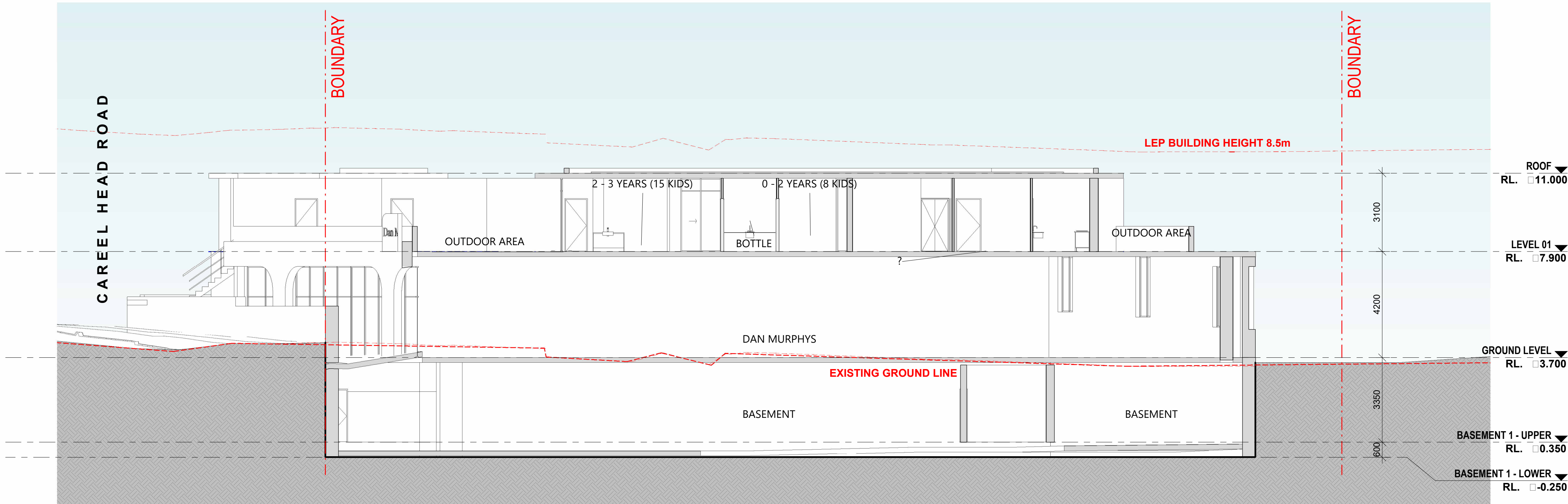
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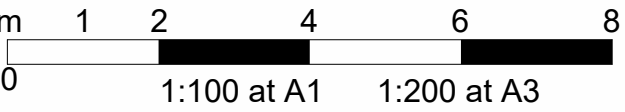
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1 SECTION B
1 : 100 at A1 1:200 at A3

P1 28.06.2024 Revision 3



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Project
**PROPOSED MIXED USE
DEVELOPMENT**

1 & 3 Careel Head Road Avalon Beach

Drawing Title

SECTION B

Project Stage
DA Submission

Job no.	Drawing no.	Rev.
J23587D	DA3002	P1
Drawn by	Checked by	Approved by Date
GH	RJ	- JUN. 2024

APPENDIX C – Laboratory Test Results

CEC Geotechnical
Unit 4 83 Grose Street
North Paramatta
NSW 2151



NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention: **Diego**

Report **1110580-S**
Project name **ASS**
Project ID **ER24020A**
Received Date **Jun 20, 2024**

Client Sample ID			BH1-3.0	BH2-2.0	BH2-3.0	BH3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Jn0057476	S24-Jn0057477	S24-Jn0057478	S24-Jn0057479
Date Sampled			Jun 19, 2024	Jun 19, 2024	Jun 19, 2024	Jun 19, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.5	6.3	6.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.1	4.5	4.0	3.2
Reaction Ratings* ^{S05}	0	comment	1.0	4.0	1.0	2.0

Client Sample ID			BH3-4.0	BH4-0.3	BH4-1.5
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S24-Jn0057480	S24-Jn0057481	S24-Jn0057482
Date Sampled			Jun 19, 2024	Jun 19, 2024	Jun 19, 2024
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	6.1	6.1	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	2.9	3.0
Reaction Ratings* ^{S05}	0	comment	1.0	2.0	1.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description

Acid Sulfate Soils Field pH Test

Testing Site

Sydney

Extracted

Jun 27, 2024

Holding Time

7 Days

- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests



web: www.eurofins.com.au
email: EnviroSales@eurofins.com

ABN: 50 005 085 521

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ABN: 47 009 120 549

Perth ProMicro 46-48 Banksia Road Welshpool WA 6106 +61 8 6253 4444 NATA# 2561 Site# 2554
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Company Name: CEC Geotechnical
Address: Unit 4 83 Grose Street
North Paramatta
NSW 2151

Project Name: ASS
Project ID: ER24020A

Order No.: ER24020A
Report #: 1110580
Phone: 02 9630 0121
Fax:

Received: Jun 20, 2024 12:50 PM
Due: Jun 27, 2024
Priority: 5 Day
Contact Name: Diego

Eurofins Analytical Services Manager : Adam Bateup

Sample Detail						Acid Sulfate Soils Field pH Test
Sydney Laboratory - NATA # 1261 Site # 18217						X
External Laboratory						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	BH1-3.0	Jun 19, 2024		Soil	S24-Jn0057476	X
2	BH2-2.0	Jun 19, 2024		Soil	S24-Jn0057477	X
3	BH2-3.0	Jun 19, 2024		Soil	S24-Jn0057478	X
4	BH3-0.4	Jun 19, 2024		Soil	S24-Jn0057479	X
5	BH3-4.0	Jun 19, 2024		Soil	S24-Jn0057480	X
6	BH4-0.3	Jun 19, 2024		Soil	S24-Jn0057481	X
7	BH4-1.5	Jun 19, 2024		Soil	S24-Jn0057482	X
Test Counts						7

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	ppm: parts per million
µg/L: micrograms per litre	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	Colour: Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S24-Jn0057482	CP	pH Units	6.2	6.2	pass	20%	Pass	
pH-FOX (Field pH Peroxide test)*	S24-Jn0057482	CP	pH Units	3.0	3.0	pass	0%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Ursula Long

Analytical Services Manager



Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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+61 3 8564 5000 EnviroSampleVic@eurofins.com

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

1110580

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Unit 4 83 Grose Street
North Paramatta
NSW 2151



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Accreditation Number 1261
Site Number 20794 & 2780

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 Arrangement for the mutual recognition of the
 equivalence of testing, medical testing, calibration,
 inspection, proficiency testing scheme providers and
 reference materials producers reports and certificates.

Attention: **Diego**

Report **1116222-S-V3**

Project name

Project ID **ADDITIONAL: ER24020A/GR241118**

Received Date **Jul 09, 2024**

Client Sample ID			BH01-0.5	BH02-1.0	BH02-2.0	BH1-3.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-JI0024008	S24-JI0024009	S24-JI0024010	S24-JI0024011
Date Sampled			Jun 19, 2024	Jun 19, 2024	Jun 19, 2024	Jun 19, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	8.8	5.8	5.6	8.7
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	< 2	13	10	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	< 0.003	0.020	0.016	< 0.003
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	8.0	4.9	4.9	8.1
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	0.03	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	< 2	20	2.5	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.007	< 0.005	< 0.005	0.017
Peroxide Extractable Sulfur	0.005	% S	0.021	0.035	0.021	0.035
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.014	0.035	0.021	0.018
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	8.7	22	13	11
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.22	0.16	0.098	0.26
Calcium - Peroxide	0.005	% Ca	0.31	0.13	0.11	0.38
Calcium - Acid Reacted	0.005	% Ca	0.095	< 0.005	0.012	0.12
Calcium - Acid Reacted (s-aCa)	0.005	% S	0.076	< 0.005	0.010	0.096
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	47	< 0.005	6.1	60
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.023	0.032	0.031	0.050
Magnesium - Peroxide	0.005	% Mg	0.038	0.037	0.033	0.065
Magnesium - Acid Reacted	0.005	% Mg	0.015	0.006	< 0.005	0.015
Magnesium - Acid Reacted (s-aCa)	0.005	% S	0.020	0.007	< 0.005	0.020
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	12	4.6	< 0.005	12
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	0.67	N/A	N/A	0.70
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	0.22	N/A	N/A	0.22
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	130	n/a	n/a	140

Client Sample ID			BH01-0.5	BH02-1.0	BH02-2.0	BH1-3.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-JI0024008	S24-JI0024009	S24-JI0024010	S24-JI0024011
Date Sampled			Jun 19, 2024	Jun 19, 2024	Jun 19, 2024	Jun 19, 2024
Test/Reference	LOR	Unit				
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	< 10	34	23	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	< 0.02	0.06	0.04	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO ₃ /t	< 1	2.6	1.8	< 1
Extraneous Material						
<2mm Fraction	0.005	g	30	29	28	28
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	1.6
Analysed Material	0.1	%	100	100	100	95
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	5.5
Sample Properties						
% Moisture	1	%	20	23	16	18

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
SPOCAS Suite			
SPOCAS Suite	Brisbane	Jul 25, 2024	6 Week
- Method: LTM-GEN-7050			
Extraneous Material	Brisbane	Jul 15, 2024	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Sydney	Jul 10, 2024	14 Days
- Method: LTM-GEN-7080 Moisture			



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Melbourne 6 Monterey Road Dandenong South VIC 3175 +61 3 8564 5000 NATA# 1261 Site# 1254	Geelong 19/8 Lewalan Street Grovedale VIC 3216 +61 3 8564 5000 NATA# 1261 Site# 25403	Sydney 179 Magowar Road Girraween NSW 2145 +61 2 9900 8400 NATA# 1261 Site# 18217	Canberra Unit 1,2 Dacre Street Mitchell ACT 2911 +61 2 6113 8091 NATA# 1261 Site# 25466	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 T: +61 7 3902 4600 NATA# 1261 Site# 20794 & 2780	Newcastle 1/2 Frost Drive Mayfield West NSW 2304 +61 2 4968 8448 NATA# 1261 Site# 25079
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ABN: 91 05 0159 898

Perth 46-48 Banksia Road Welshpool WA 6106 +61 8 6253 4444 NATA# 2377 Site# 2370

ABN: 47 009 120 549

Perth ProMicro 46-48 Banksia Road Welshpool WA 6106 +61 8 6253 4444 NATA# 2561 Site# 2554
--

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Company Name: CEC Geotechnical
Address: Unit 4 83 Grose Street
North Paramatta
NSW 2151

Order No.:
Report #: 1116222
Phone: 02 9630 0121
Fax:

Received: Jul 9, 2024 4:38 PM
Due: Jul 16, 2024
Priority: 5 Day
Contact Name: Diego

Project Name:
Project ID: ADDITIONAL: ER24020A/GR241118

Eurofins Analytical Services Manager : Adam Bateup

Sample Detail						SPOCAS Suite	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217							X
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780						X	
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	BH01-0.5	Jun 19, 2024		Soil	S24-JI0024008	X	X
2	BH02-1.0	Jun 19, 2024		Soil	S24-JI0024009	X	X
3	BH02-2.0	Jun 19, 2024		Soil	S24-JI0024010	X	X
4	BH1-3.0	Jun 19, 2024		Soil	S24-JI0024011	X	X
Test Counts						4	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	ppm: parts per million
µg/L: micrograms per litre	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	Colour: Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery										
Actual Acidity (NLM-3.2)										
pH-KCL (NLM-3.1)				%	99			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)				%	100			80-120	Pass	
LCS - % Recovery										
Extractable Sulfur										
HCl Extractable Sulfur				%	105			80-120	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate										
Extractable Sulfur					Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-JI0014536	NCP	% S		N/A	N/A	N/A	30%	Pass	
HCl Extractable Sulfur	L24-JI0014536	NCP	% S		N/A	N/A	N/A	20%	Pass	
Duplicate										
Retained Acidity (S-NAS)					Result 1	Result 2	RPD			
Net Acid soluble sulfur (s-SNAS) NLM-4.1	L24-JI0014536	NCP	% S		N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (a-SNAS) NLM-4.1	L24-JI0014536	NCP	mol H+/t		N/A	N/A	N/A	30%	Pass	
Duplicate										
Sample Properties					Result 1	Result 2	RPD			
% Moisture	S24-JI0024008	CP	%		20	18	7.7	30%	Pass	

Comments

This report has been revised (V2) to correct analysis from CRS to SPOCAS as per COC, for all samples.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5

Authorised by:

Adam Bateup	Analytical Services Manager
Jonathon Angell	Senior Analyst-SPOCAS
Roopesh Rangarajan	Senior Analyst-Sample Properties



Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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RE: Eurofins Test Results, Invoice - Report 1110580 : Site ASS (ER24020A)

Diego Espinosa <diego@cec-au.com>

Tue 2024-07-09 4:37 PM

To: Adam Bateup <Adam.Bateup@eurofinsanz.com>

Cc: CEC Admin <admin@cec-au.com>; Shyam Ghimire <shyam@cec-au.com>; Zuhaib Siddiqui <zuhaib@cec-au.com>

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Hi Adam,

As discussed over the phone,

Can you kindly do pHf and pHfox for BH01-0.5, BH02-1.0 samples from GR24118 (ES1110583) and combine the results with ER24020A (ES1110580) and also do SPOCAS for the following set of samples:

1. BH01-0.5 from GR24118 (ES1110583)
2. BH02-1.0 from GR24118 (ES1110583)
3. BH2-2.0 from ER24020A ((ES1110580)
4. BH1-3.0 from ER24020A ((ES1110580)

Kind Regards,

Diego Espinosa

Environmental Engineer – Geotechnical

☎ 9630 0121 - 0432 522 998

📍 8 Buller Street, North Parramatta, NSW 2151

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From: UrsulaLong@eurofins.com <UrsulaLong@eurofins.com>

Sent: Friday, June 28, 2024 9:22 PM

To: Diego Espinosa <diego@cec-au.com>

Cc: CEC Admin <admin@cec-au.com>; Ali Selman <ali.s@cec-au.com>; Daniella Touma <daniella@cec-au.com>; Shyam Ghimire <shyam@cec-au.com>; Zuhaib Siddiqui <zuhaib@cec-au.com>

Subject: Eurofins Test Results, Invoice - Report 1110580 : Site ASS (ER24020A)

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Please find attached results and invoice for your project in the subject header.

Kind regards

Ursula Long

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AUSTRALIA

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