



ACID SULFATE SOIL MANAGEMENT PLAN

**262 Hakone Road
Warnervale NSW 2259**

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Document Approval		
Prepared by	Date	Signed
Simon Caples Principal Consultant	29.01.2025	

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1.0 INTRODUCTION

Environmental Consulting Services Pty Ltd (ECS) has prepared this Acid Sulfate Soil Management Plan (ASSMP) for the property known as 262 Hakone Road, Warnervale NSW (the Site). The purpose of this ASSMP is to address the approach and methodology of Acid Sulfate Soil (ASS) management at the Site during future development works.

ECS understands that it is proposed to develop the Site as a shopping centre with associated car parking. A development concept for the shopping centre is included in *Appendix 1*.

The Site has been the subject of various environmental investigation associated with the previous development application. The findings of these previous investigations are presented in the following reports:

- *Report on Stage 1 Environmental Site Assessment Proposed Warnervale Town Centre* (Douglas Partners Pty Ltd. Project No: 41118A dated March 2006);
- *Site Audit Report – Proposed Warnervale Town Centre, Sparkes and Hakone Road, Warnervale* (Environ Australia Pty Ltd. Reference 32-0012. Dated 28 March 2006);
- *Stage 2 Environmental Site Assessment, Wyong Shire Council, Warnervale Town Centre* (Coffey Geotechnics Pty Ltd. Report No:GEOTKARI02021AA-AL. Dated 31 March 2008);
- *Contamination Assessment Proposed Woolworths Development Warnervale Town Centre* (Coffey Environments Australia Pty Ltd. Report No: ENAUWARA04231AA-L01. Dated 28 November 2011);
- *Visual Clearance Inspection. Certificate Asbestos Containing Debris Fragments, Warnervale Town Centre Project, 111 Sparks Road, Warnervale NSW* (Coffey Services Australia Pty Ltd. Project Ref: 754-NEWC00390AA. Dated: 13 September 2018);
- *Surface Water and Soil Assessment of Dam 2, Proposed Warnervale Town Centre Project, 111 Sparks Road, Warnervale NSW* (Coffey Services Australia Pty Ltd. Project Ref: 754-NEWC00390AA-R02. Dated: 5 November 2018); and
- *Preliminary Environmental Site Investigation, 262 Hakone Road, Warnervale NSW 2259* (ECS revision 1 10 October 2024).

The ASSMP has been prepared in accordance with the Acid Sulfate Soil Manual (NSW Acid Sulfate Soil Management Advisory Committee August 1998).

2.0 SITE INFORMATION

2.1 Site Identification

The location of the Site is presented in *Figure 2.1 – Site Location Plan* with the Site identification details summarised in *Table 2.1 – Site Identification*.

Figure 2.1 – Site Location Plan

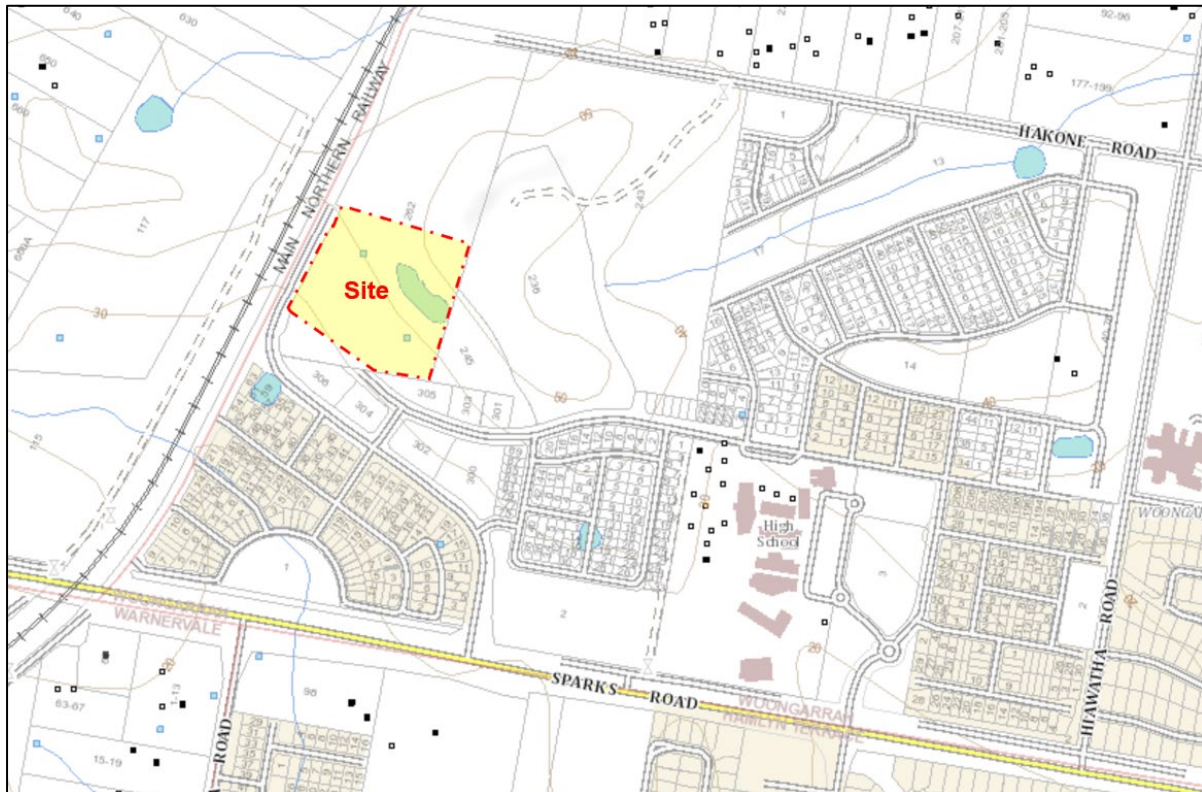


Table 2.1 – Site Identification

Attribute	Detail
Site Address	262 Hakone Road, Warnervale NSW 2259
Lot & Deposited Plan	Part Lot 5211 DP 1200804
Current Land Use	Vacant
Proposed Land Use	Commercial
Local Government Authority	Central Coast Council
Current Zoning	B2 – Local Centre
Site Area (approximate)	4 ha
Geographical Location (approximate centre)	Latitude: -33.238426141 Longitude: 151.461696463

The Site is outlined in red and surrounding properties are shown on Figure 2.2 – Site Layout.

Figure 2.2 – Site Layout



The natural gradient of the surrounding landscape around the Site slope downwards towards south west. The approximate ground level at the corners of the Site are:

- RL 42m Australian Height Datum (AHD) at the north west corner;
- RL 55m AHD at the north east corner;
- RL 37m AHD at the south east corner; and
- RL 31m AHD at the south west corner.

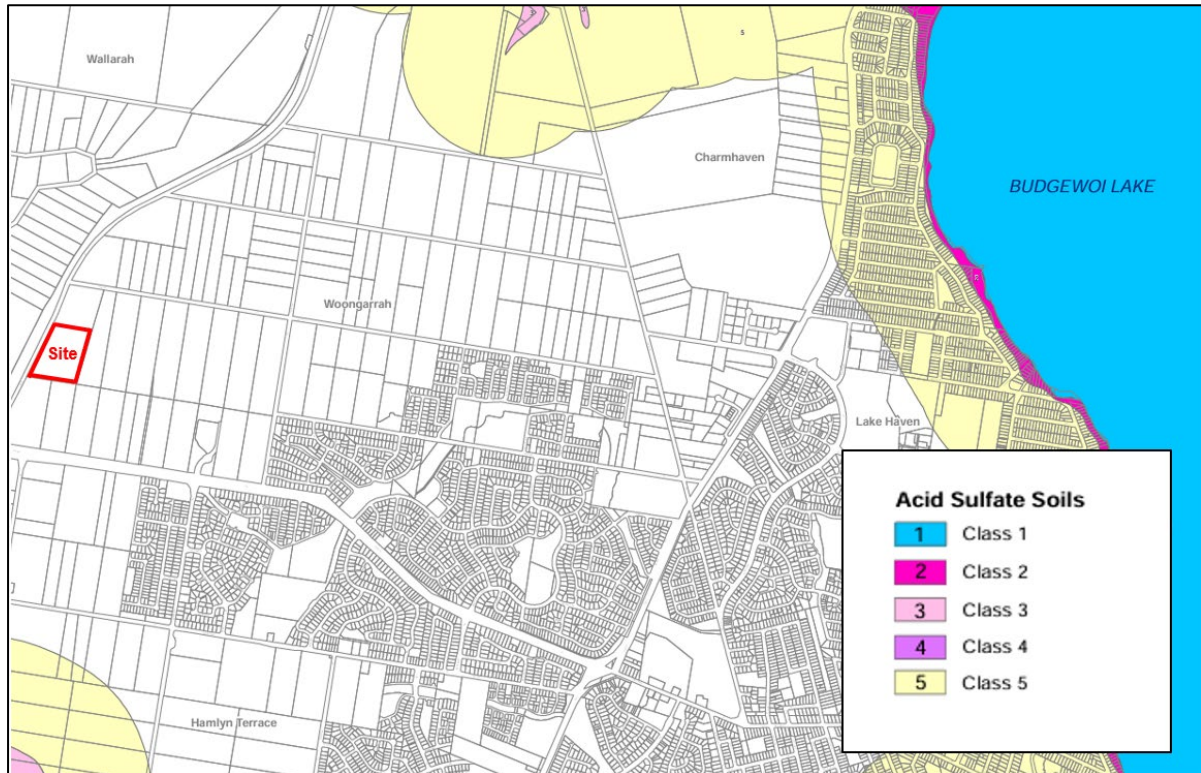
The finished ground level across the Site has previously been modified through the construction of a level area that encompasses the northern section of the Site and extended beyond the northern boundary. The construction of this level platform has required placement of up to approximately 4m of fill at this area on the Site. There has also been the construction of two dams on the Site.

3.0 ACID SULFATE SOILS

The Central Coast Local Environment Plan (LEP) 2022 includes Acid Sulfate Soil (ASS) risk maps showing that the Site is located in an area not classified for ASS. Areas that are not classified for ASS are considered to have a low potential for ASS to be encountered.

An extract from the ASS map is shown in Figure 3.1 – ASS Map with the approximate Site location marked in red.

Figure 3.1 – Acid Sulfate Soil Map



The LEP requires development consent whilst carrying out of works that are described in Table 3.1 for classification shown on the ASS map.

Table 3.1 – ASS Classifications

Class of land	Works
1	Any works.
2	Works below the natural ground surface. Works by which the watertable is likely to be lowered.
3	Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.
4	Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.
5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

Based on the LEP the proposed development on the Site will not trigger any of the requires summarised in Table 3.1.

4.0 ACID SULFATE SOIL INVESTIGATION

The intrusive investigations completed have not included testing for ASS as the Site is in an area classified as having no known occurrences of acid sulphate soil materials. Notwithstanding the published data, the Acid Sulfate Soil Manual recommends that the assessment for ASS should include an evaluation of the geomorphic character as well as a review of the ASS risk map for the area.

The manual establishes the geomorphic criteria that should be used to determine if ASS are likely to be present. These criteria and the Site characteristic are summarised in Table 4.1 – Geomorphic Criteria.

Table 4.1 – Geomorphic Criteria

Criteria/characteristic	Comment
Sediments of recent geological age (Holocene).	The geological map sheet shows the Site is underlain by Triassic Age, Narrabeen Group deposits described as quartz-lithic sandstone, conglomerate, mudstone, siltstone.
Soil horizons less than 5m AHD.	The elevation of the Site is approximately between 31 and 55m AHD with the proposed civil work to prepare a building platform at approximately 40m AHD. Therefore, excavation will not be in soil horizons less than 5m AHD.
Marine or estuarine sediments and tidal lakes.	The Site is not within a marine/tidal area.
In an area where the dominant vegetation is mangrove, reeds, rushes and other swamp tolerant or marine vegetation such as swamp mahogany, paperbark and swamp oak.	The vegetation on the Site and surrounding area is not characterised by mangrove, reeds, rushes and other swamp tolerant or marine vegetation such as swamp mahogany, paperbark and swamp oak.
In an area identified in geological descriptions or in maps as bearing sulfidic minerals, coal deposits or former marine shales/sediments.	The geological map does not show the Site and surrounding area as bearing sulfidic minerals, coal deposits or former marine shales/sediments.
Where there are deep older estuarine sediments > 10m below ground surface, Holocene or Pleistocene age.	The character of deeper sediments is unknown however based on regional information the mapped sandstone, conglomerate, mudstone, siltstone are likely to extend to below the base of the proposed excavation depth.

Based on the geomorphic characteristic, it is also unlikely that ASS will be present at the Site.

5.0 ASS MANAGEMENT

ASSMAC (1998) recommends assessment and management of ASS where works involve the disturbance of more than one tonne of soil in an area identified to potentially be impacted by ASS.

At this location, development is unlikely to result in the excavation of more than one tonne of ASS.

Excavated material may be retained on Site and used for backfill or may be disposed off-site. Where excavated spoil is shown to be ASS, management will involve the treatment of the material to neutralise the acid producing potential.

The following management procedures are considered applicable during the construction activities:

1. Appointment of an appropriately qualified person to manage the ASS issues during the earthwork activities that have the potential to disturb ASS;
2. Make regular observations and carry out field screening of excavated soil;
3. The onsite treatment of excavated ASS with a neutralising agent.

These management procedures are described in the following sections.

5.1 Visual Assessment

The preliminary visual assessment of ASS is based on material type, colour and consistency. ASS are typically described as grey, dark grey or black clays with density ranging from very soft to firm. However, ASS may also be clayey sands and sands.

All excavated soil considered to potentially be ASS based on inspection of material type, colour and consistency must be screened (refer to section 5.2).

5.2 Screening

All excavated soil considered to potentially be ASS based on inspection of material type, colour and consistency (that will be retained on the Site or disposed of off-site) should be stockpiled within a bunded area to inhibit potential drainage or runoff from leaving the work area on the Site. Field testing of such stockpiled material should be completed on the day of excavation, or as soon as practicable there-after.

Field testing of excavated natural soils for ASS needs to include pH measurement and the hydrogen peroxide (H₂O₂) screening test (pH_F and pH_{FOX} respectively) following the Assessment Guidelines: Appendix I of Acid Sulfate Soil Manual (NSW Acid Sulfate Soil Management Advisory Committee August 1998). Soils that record results below the screening criteria summarised in Table 5.1 must be managed as acid sulfate soils.

Table 5.1 – Acid Sulfate Soil Criteria

Screening Criteria	Threshold
Field Screening	
pH _F	≤ 4
pH _{FOX}	≤ 3.5
Change	> 1

5.3 Management of ASS

Excavated material considered to potentially be ASS based on inspection of material type, colour and consistency must be retained in a bunded area or immediately removed from the Site (following all required waste classification procedures) and disposed of at a facility permitted to accept the class of waste.

Where ASS are identified during field testing of stockpiled material, liming must be undertaken.

The proposed bunded area must be able to collect and isolate any leachate and inhibit impact to the surrounding environment. The bunded area should be sized to efficiently accommodate the volume of the excavated ASS being treated. The bunded area should have the following design features:

- Bunded areas should be located on stable ground and set back from Site boundaries by at least 3m. Consideration of the neighbouring waterway must be included in the siting and construction of the bunded area to minimise the potential for acid runoff into this watercourse;
- A guard layer of neutralising agent (lime) should be spread across the surface of the bunded area(s) before the placement of soils as a precaution to neutralise acidity that has not been adequately treated during the neutralisation process; and
- Runoff and leachates should be contained within the bund(s) and may be directed into a sump or retention pond.

5.4 Treatment

The neutralising agent (lime) must be applied to ASS to react with any acid that has been generated, or will be generated, following oxidation. Thorough mixing of the lime with the ASS should be undertaken and additional field testing undertaken to confirm the effectiveness of treatment. As there has been no testing for ASS a preliminary liming rate of 10kg per tonne of ASS should be used and then testing undertaken to confirm the adequacy of treatment.

The suitable liming rate will be further determined during field screening of excavated soil.

Following treatment, the ASS can be retained on Site or disposed of to a suitably licenced waste management facility. Treated ASS and any other spoil excavated from the Site must be classified in accordance with the Waste Classification Guidelines (EPA 2014) prior to off-site disposal.

5.5 Controls

Care must be taken to minimise impacts on the local environment. This requires good management of leachate to prevent acidification of nearby waterways (including stormwater drains).

To minimise potential impacts resulting from the disturbance of ASS the following measures need to be incorporated into the development work:

- Field testing of material excavated should be completed as soon as practicable but ideally on the day of excavation;
- Neutralisation of identified ASS should be conducted as soon as practicable after field testing but at least within two days of excavation;
- Disposal of treated ASS should be completed as soon as practicable but ideally within one week of excavation.

All stockpiled material must be banded to minimise the potential for runoff leaving the Site. Water is a significant mechanism by which acid and metals from oxidised ASS are mobilised and transported.

Careful management of Site water is required for management of potential adverse impacts to the nearby waterways. Groundwater and stormwater should not be discharged from the Site without testing for acid conditions or other contaminants. If Site water is found to be acidic, treatment through the addition of lime (or sodium hydroxide) should be undertaken.

Discharge water needs to comply with the Australian and New Zealand Environment Conservation Council (ANZECC) (2000) - Australian and New Zealand Guidelines for Fresh and Marine Water Quality. The pH of discharge water must be greater than 6.5 pH units and less than 8.5 pH units.

It is noted that in-situ soil potentially exposed to oxygen during excavation and dewatering activities could be aggressive to proposed below ground structures such as footings.

6.0 ACID SULFATE SOIL FIELD pH TESTS

The field pH (pH_F) and field pH peroxide (pH_{FOX}) tests provide for the assessment of the likelihood of acid sulfate soils. The field pH tests provide a useful indication of the existing and potential acidity levels in the soil. These field tests provide an indication of the presence of ASS but do not give any quantitative measure of the amount of acid that has been or could be produced through the oxidation process.

6.1 Field pH Test (pH_F)

The procedure for the field pH test (pH_F) requires the use of a calibrated field pH meter to measure the pH of a soil water (deionised water) mix.

Take approximately 5cm^3 of soil into a test tube and add enough deionised water (or demineralised water if deionised water is not available; never use tap water) to make a paste stirring the soil:water paste. Immediately place the electrode of the pH meter into the test tube and measure the pH.

6.2 Field pH Peroxide Test (pH_{FOX})

The procedure for the field pH peroxide test (pH_{FOX}) requires the use of a calibrated field pH meter to measure the pH of a soil:peroxide mix.

Take approximately 5cm^3 of soil into a test tube and add a few millilitres of peroxide to the soil (sufficient to cover the soil with peroxide) and stir the mixture. The pH of the hydrogen peroxide must be adjusted to pH 4.5–5.5 by adding a few drops of dilute NaOH and checking the pH.

Place the electrode of the pH meter into the test tube and measure the pH. Ideally, allow approximately 15 minutes for any reactions to occur.

Rate the reaction of soil and peroxide as:

1. Slight reaction
2. Moderate reaction
3. High reaction
4. Vigorous reaction.

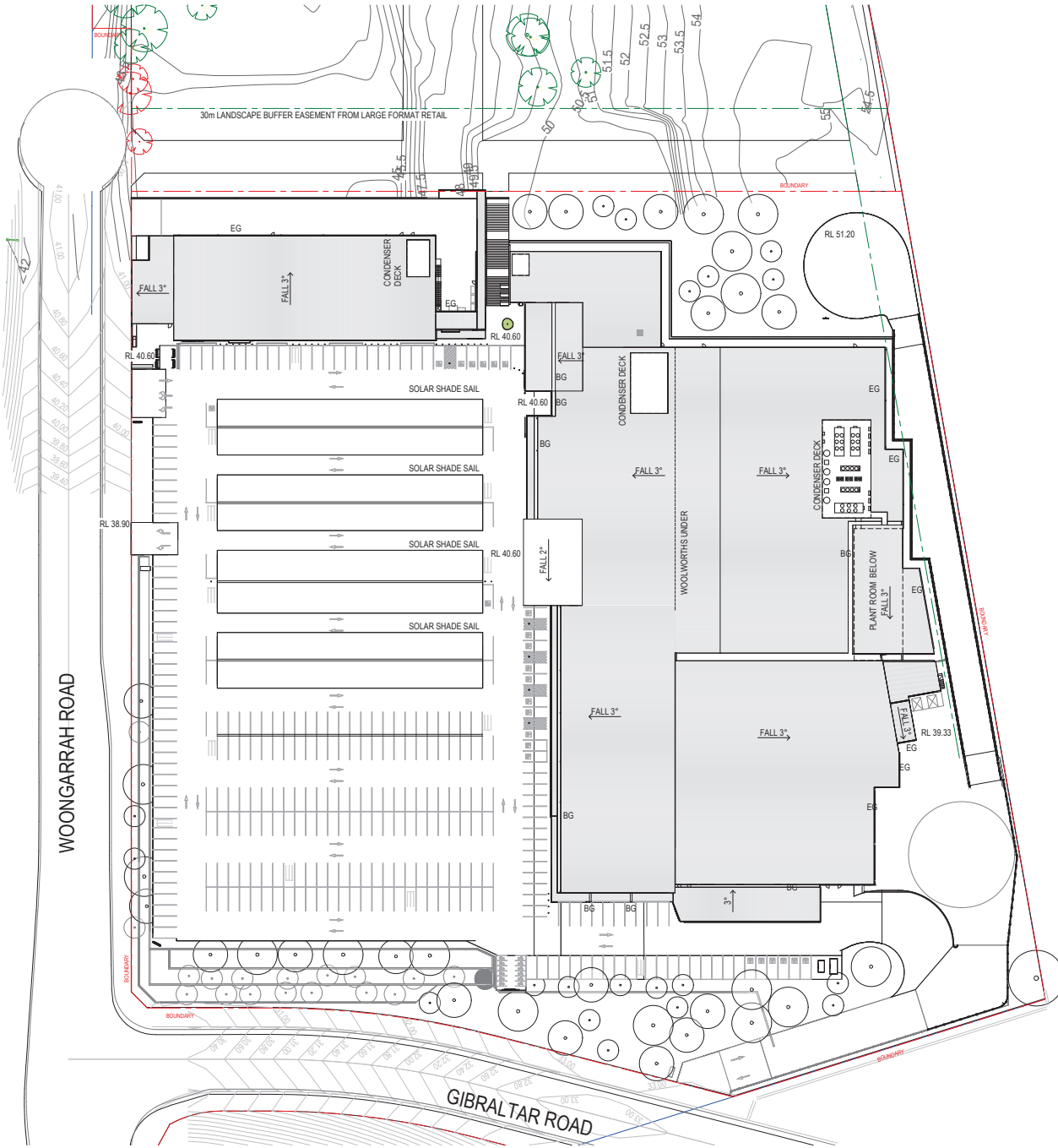
The field screening criteria to be used to assess for ASS are summarised on Table 5.1

6.3 Verification Analysis

It is recommended that verification analysis is undertaken to ensure that the field screening results are adequately characterising the excavated material. A sample should be collected weekly of excavated soil and submitted for laboratory analysis. This analysis should include pH measurement and the hydrogen peroxide (H_2O_2) screening test (pH_F and pH_{FOX} respectively) and Chromium Reducible Sulphur (CRS).

The results of laboratory analysis should be used to verify that the field screening results are accurately characterising the excavated soil and also to confirm the liming rate.

APPENDIX 1



1 SITE PLAN
Scale 1:500

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262 HAKONE ROAD, WOONGARRAH



S4.55
SITE PLAN

10.18.2024
DA2.2 A



GFA	
RETAIL	
BWS	155 m²
DTB	40 m²
FOOD	725 m²
LARGE FORMAT RETAIL	1170 m²
PHARMACY	350 m²
RETAIL	2525 m²
WOOLWORTHS	3795 m²
	8760 m²
AMENITIES	165 m²
COMMERCIAL	175 m²
E-COM	2530 m²
MALL	645 m²
MEDICAL	580 m²
	4090 m²
Grand total	12850 m²
PAVING/ OUTDOOR AREA	1595 m²

1 Ground Floor
Scale 1:500

Clarke Hopkins Clarke

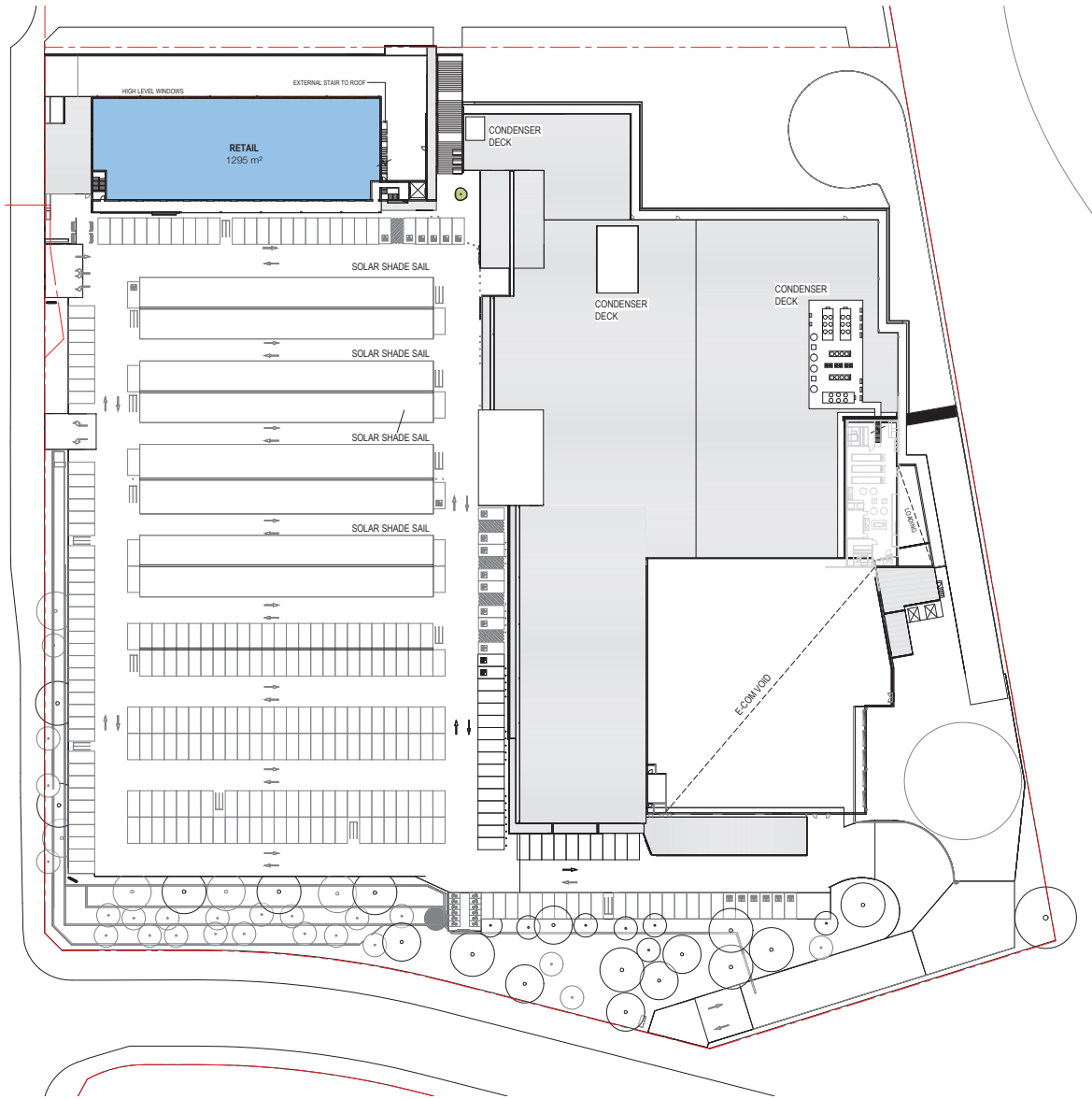
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\$4.55
GROUND FLOOR

10.18.2024

DA2.3 A



1 Level 1
Scale 1:500

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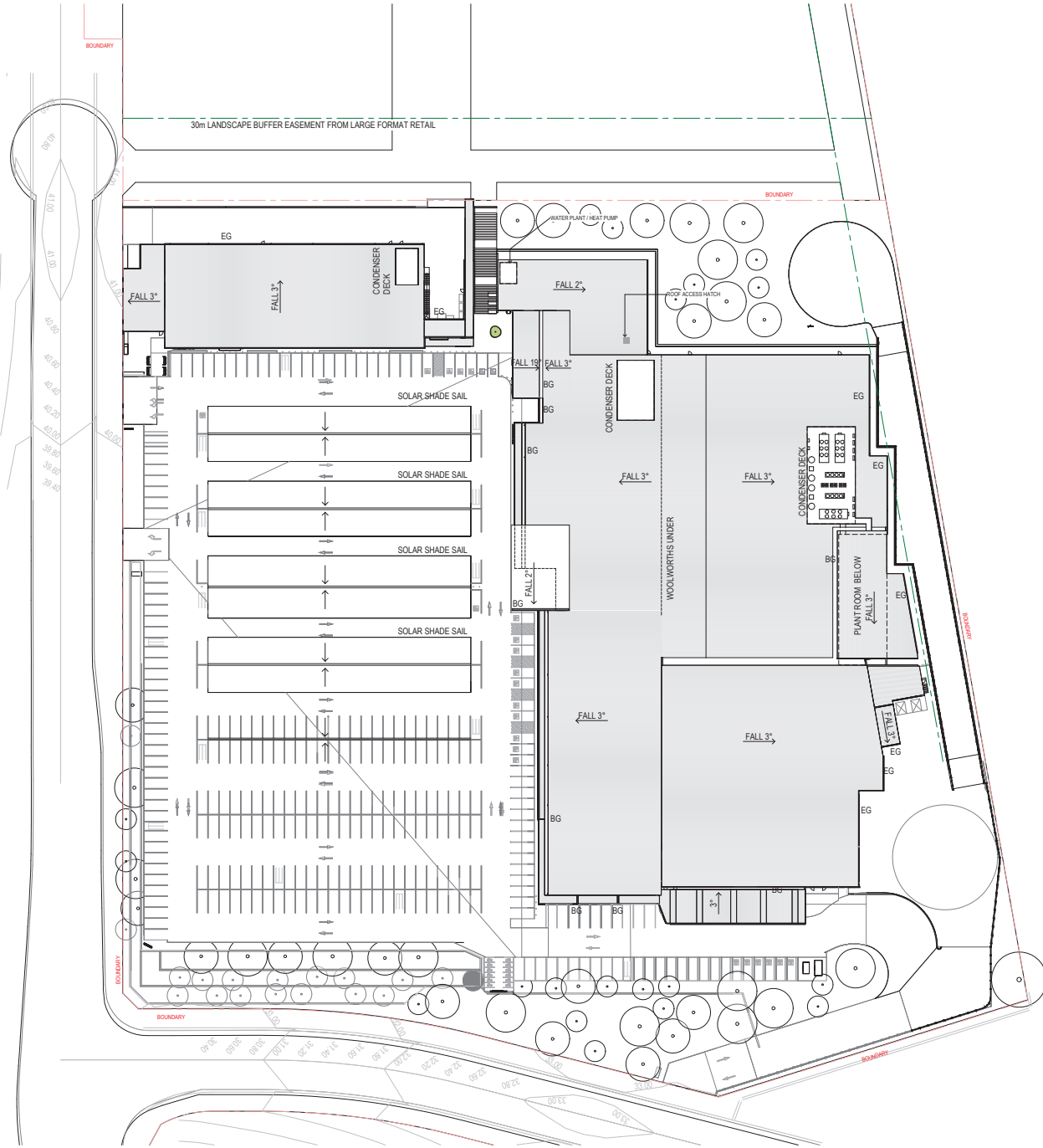


S4.55

LEVEL 1

10.18.2024

DA2.4 A



LEGEND	
EG	EAVES GUTTER
BG	BOX GUTTER

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S4.55
ROOF PLAN

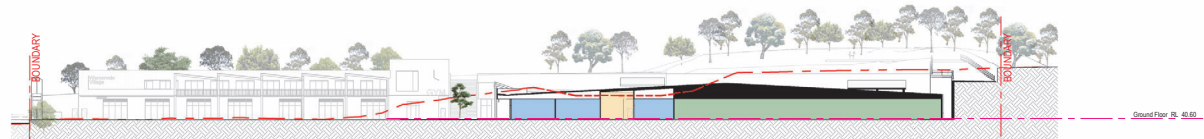
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DA2.5 A

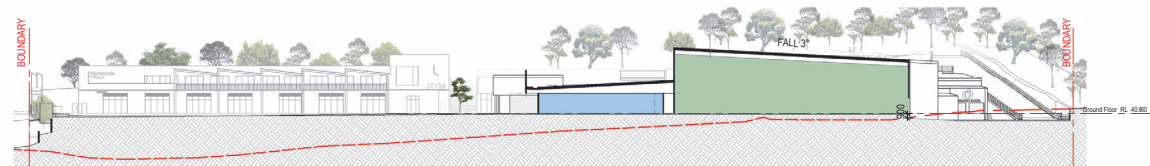
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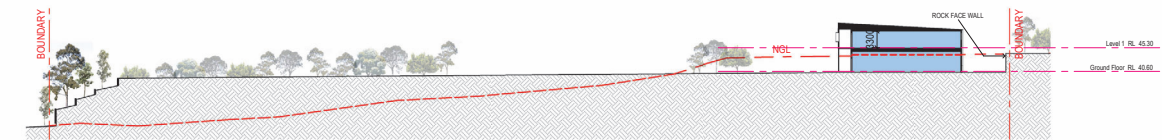
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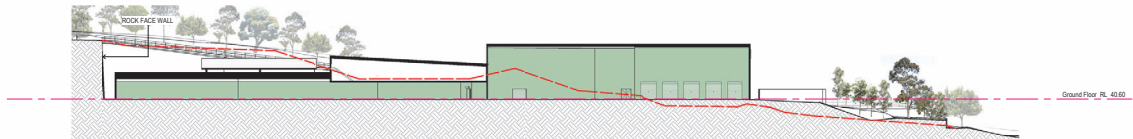
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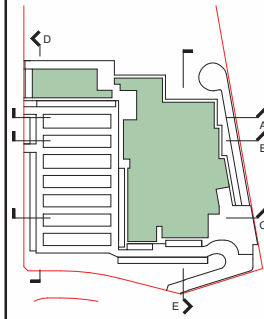
(C) SHORT SECTION C
Scale 1: 500



(D) SHORT SECTION D
Scale 1: 500



(E) LONG SECTION E
Scale 1: 500



REV	DESCRIPTION	DATE
P5	FOR INFORMATION	02.05.2024
P6	FOR INFORMATION	06.05.2024
P7	FOR INFORMATION	13.06.2024
P8	FOR SUBMISSION	28.06.2024

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S4.55
SECTIONS

28.06.2024