



Eco Logical Australia Pty Ltd
Lynwood Quarry Soil Investigation

March 2025

SESL_5404_865_2025



DOCUMENT RECORD

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Site Owner:	Holcim (Australia) Pty Ltd
Site Address:	Marulan South Road, Marulan, NSW 2579
Lot & Deposited Plan	Lot 3 DP 1107232 & Lot 3 DP 1074107

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01 April 2025

Attn Chelsea Philip
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RE: 5404_865_2025 Lynwood Quarry Soil Investigation

1. INTRODUCTION

SESL Australia (SESL) has been engaged by Eco Logical Australia Pty Ltd (the Client) to conduct a soil investigation and provide professional soil science advice within the Lynwood Quarry rehabilitation project.

The scope of works focuses on the investigation of three (3) primary vegetation communities within two project areas spanning (approximately) 110.3 ha and 18.5 ha at Lot 3 DP 1107332 and Lot 3 DP 1074107, Marulan South Road, Marulan NSW 2579 (the Site).

SESL Australia Pty Ltd conducted a soil sampling investigation of the in-situ soils to characterise the soil conditions on site and guide landscape revegetation. This report outlines the findings and observations of the field assessment and laboratory analysis; characterises the soil conditions and identifies limitations; and provides professional advice on soil improvement for optimal vegetation rehabilitation and maintenance.

2. PROJECT SCOPE & SITE CONTEXT

The Lynwood Quarry rehabilitation project is located directly to the north of Hume Highway, between Munro Road and Marulan South Road. For the purpose of this investigation, the larger project area (> 100 ha) to the west will be referred to as Site A; and the smaller area (< 20 ha) to the west as Site B. The vegetation communities investigation area encompasses just over half of the regeneration site (approximately 80 ha).

Land use at site A is listed as E4 - environmental living due to its ecological value. Site B is listed as a RU1 - Primary Production zone. Surrounding land use includes RU2 - Rural landscape, and C3 - Environmental Management zone. Prior to the commencement of the quarry operations in 2008, the land was used primarily as agricultural land for grazing and pasture with some natural bushland and riparian zones along the waterways. Marulan creek tributaries run East to West across Site A and Lockyersleigh Creek tributaries run North-West to South-East in Site B with Jaormin Creek running adjacent to the East.

The three primary vegetation communities within this area are Goulburn Tableland Box-Gum Grassy Forest (PTC 3373), Wollondilly-Shoalhaven Slopes Grassy Open Forest (PTC 3486), and Bungonia Tableland Silvertop Ash-Stringybark Forest (PTC 3643). Much of the regeneration area is also classified as non-vegetated land.

The soil landscape is primarily Bindook Road soils (SI5512br) with the North-West corner of site B falling into the Garland soil landscape (SI5512ga). Bindook Road soils, located along the eastern boundary between Prarie Oak and Wombeyan caves; is characterised with acid yellow and red duplex soils similar to red and yellow podzolic soils (Dr2.21, Dy2.21); with whole coloured B horizons and sporadically bleached A2 horizons on crests and slopes. Other soil groups include red and yellow earths (Gn2) and yellow podzolic sils (Dy2.4) on footslopes. Most of the geology is porphyritic with quartz and feldspar. Soils have formed in-situ as well as from alluvial-colluvial material derived from parent rock. The landform is characterised by undulating rises of low relief and gentle sloped. Elevation ranges from 600-800 m. Surface conditions are hardsetting with moderate drainage, soil permeability, water holding capacity, fertility, and erosion hazard. This soil is known for being deficient in N, P, K, S and most micronutrients. The pH levels are slightly acidic with low salinity.

Garland soils, located between Tarago lagoon and Isabella River, are characterised by undulating rises and valleys formed from granitic parent material. These soils are commonly light red sandy duplex soils (Dr2.21) on upper slopes and mottled sandy yellow duplex soils with bleached A2 horizons (Dy3.41, Dy3.42) on mid to slower slopes. Deep siliceous sands are found along some drainage lines with acid granitic tors occasionally present. Rocks may vary from coarse to fine-grained and have been formed both in-situ and from alluvial-colluvial deposits. surface conditions are harsetting and drainage ranges from low to moderate. Fertility is moderate with know deficiencies including N, P, and S. Erodibility is moderate but erosion hazard is low. The pH level is most commonly acid with occasional soil salinity issues.

3. SOIL INVESTIGATION & SAMPLING

SESL attended the site over a one-day period on 06/03/2025 to conduct an escorted site walkover and sampling. A total of nine (9) boreholes were constructed across the site in strategic positions and varying depths agreed upon with Eco Logical Australia (The Client - hereon referred to as ELA). Sample locations were distributed equally into each of the vegetation community groupings present throughout the site. It was expected that each of these areas would determine varying soil characteristics that are representative of the larger site area. The borehole ID locations and field observations have been provided in table 1 below and a site sampling map is presented in Appendix B.

Each borehole was constructed to a minimum of 400 mm; or until subsoil was noted. Soil horizon changes and general field were noted in a recorded borelog (detailed in table 1 below) and accompanied by photographic record (Appendix C). Topsoil samples were collected from all nine (9) locations; with subsoil collected from three (3) locations (S6, S7, S9).

Table 1. Site assessment borelog

BH ID	SITE LOCATION	BH DEPTH	DESCRIPTION	SAMPLED
S1	Approximately 50 m east of the Marulan South Road access gate (site A)	0-120	grey brown sandy loam	Topsoil (0-300 mm)
		120-300	light yellow brown fine to coarse sand with slight orange mottling	
		300-400	yellow sandy clay with orange mottling	
		450+	grey yellow sandy clay with orange mottling	
S2	Approximately 325 m south of S1 Between two dams in a grassy clearing (site A)	0-450	white grey clay sand with minor clay content gradually increasing with depth	Topsoil (0-600 mm)
		450-600+	white grey clay coarse sand with orange mottling	
S3	20 m north of Hume Highway and 650 m west of Marulan South Road on a slight slope (site A)	0-100	dark earthy loam with minor sand	Topsoil (0-300 mm)
		100-300	brown black earthy clay	
		300-400+	light grey brown clay	
S4	Further west along Hume Highway, approximately 425 m west of S3 in thicker brush with surrounding trees (site A)	0-200	med grey brown sandy loam	Topsoil (0-200 mm)
		200-300	white grey coarse clay sand	
		300-400	light yellow grey gravelly sand with minor clay content	
		400-550+	light yellow clay sand with orange mottling	
S5	Between two distinct vegetation communities surrounded by larger trees. On a slight downward slope, approximately 300 m north of S4 (site A)	0-100	Light brown friable sandy loam	(Topsoil 0-300 mm)
		100-200	compacted light brown gravelly clay sand	
		200-300	Compacted gravelly clay sand. Refusal at 300 due to excess stone and rock	
S6	Approximately 850 m north along the site A western boundary, and 70 m east,	0-200	light grey brown silty loam	Topsoil (0-200 mm) Subsoil (200-500 mm)
		200-300	Yellow white compacted gravelly clay sand	

	near the track in a grassy clearing with a slight slope (site A)	300-500+	Grey white fine to medium grey crushed sandstone. Refusal at 500 due to sandstone interference	
S7	300 m north of the west boundary fence line, and 325 m west of Marulan South Road in an exotic veg location (site A)	0-250	grey fine sand	Topsoil (0-250 mm) Subsoil (250-700 mm)
		250-320	yellow orange clay sand	
		320-500	gravelly orange fine to coarse sand	
		500-700	white and yellow crushed sandstone	
S8	50 m north of the site B southern boundary bordering agricultural land and 150 west of the eastern boundary in thick shrub (site B)	0-100	med brown loam (sandy) with ironstone	Topsoil (0-300 mm)
		100-300	higher clay content with stones	
		300-400	grey brown sandy clay with red mottling	
		400+	orange red sandy clay with grey mottling	
S9	50 m north of the site B southern boundary bordering agricultural land, and 180 east of the western boundary in dense vegetation (site B)	0-250	fine to coarse white sand, stony (ironstone 2-20 mm)	Topsoil (0-300 mm) Subsoil (300-700 mm)
		250-350	yellow orange sandy clay	
		350-500	bright orange sandy clay with grey and red mottling	
		500-700+	yellow crushed sandstone	

4. SUITE OF ANALYSIS

The suite of analysis conducted on the samples collected by SESL Australia have been selected to provide adequate data for the determination of soil limitations, required amelioration for the generation of suitable landscape soil from on-site material.

Topsoil samples were analysed for texture, structure, organic matter, estimated permeability, pH (1:5 in H₂O and CaCl₂), Electrical Conductivity (1:5 in H₂O), nitrogen, phosphorus, potassium, exchangeable cations, sulfur, iron, manganese, zinc, copper and boron. Subsoil samples were analysed for texture, structure, sodium, chloride, and exchangeable cations. All analysis (Batch # 69617 - Appendix D) was carried out at SESLs NATA Accredited laboratory (NATA #15633).

5. ANALYTICAL RESULTS

Topsoil Sample 1

This sample is a gravelly Sandy Clay Loam with low organic matter at 2.2%. The structure is of fine size (1-10 mm) and is classified as a pedal-weak crumb. The estimated permeability is slow-moderate at 5-20 mm.

Soil pH is strongly acidic in H₂O and very strongly acidic in CaCl₂. Salinity is very low, sodium is very low and chloride is below detection. The exchangeable cations are dominant in free hydrogen and as a result,

aluminium has become available and is presenting at levels harmful for plant health. All other cations are imbalanced and low as a result of this. Cation exchange capacity is very low and poorly effective in nutrient retention and storage. Available nutrient levels are marginally to highly deficient.

Topsoil Sample 2

This sample is a Fine Sandy Clay Loam with low organic matter at 1.1%. The structure is of medium size (11-25 mm) and is classified as a pedal-moderate crumb. The estimated permeability is moderate at 20-60 mm.

Soil pH is slightly acidic in H₂O and very strongly acidic in CaCl₂. Salinity is very low, sodium is moderate and chloride is very low. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. This sample is also highly magnesian and moderately sodic with deficiencies in calcium and potassium. Cation exchange capacity is low and poorly effective in nutrient retention and storage. Available nutrient levels are marginally to highly deficient in all nutrients aside from magnesium which is excessive.

Topsoil Sample 3

This sample is a Sandy Clay with moderate organic matter at 3.2%. The structure is of medium size (11-25 mm) and is classified as a pedal-strong crumb. The estimated permeability is slow at 2-5 mm.

Soil pH is strongly acidic in H₂O and very strongly acidic in CaCl₂. Salinity is very low, sodium is very low and chloride is very low. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. Magnesium and sodium are normal, however calcium and potassium are deficient. Cation exchange capacity is low and poorly effective in nutrient retention and storage. Available nutrient levels are marginally to highly deficient in all nutrients aside from adequate iron, and magnesium which is excessive.

Topsoil Sample 4

This sample is a gravelly Sandy Clay Loam with high organic matter at 3.7%. The structure is of fine size (1-10 mm) and is classified as a pedal-weak crumb. The estimated permeability is slow-moderate at 5-20 mm.

Soil pH is strongly acidic in H₂O and extremely acidic in CaCl₂. Salinity is very low, sodium is very low and chloride is below detection. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. All other cations are imbalanced and low as a result of this. Cation exchange capacity is low and poorly effective in nutrient retention and storage. Available nutrient levels are marginally to highly deficient.

Topsoil Sample 5

This sample is a gravelly Fine Sandy Clay Loam with moderate organic matter at 2.7%. The structure is of fine size (1-10 mm) and is classified as a pedal-weak crumb. The estimated permeability is slow-moderate at 5-20 mm.

Soil pH is very strongly acidic in H₂O and extremely acidic in CaCl₂. Salinity is very low, sodium is very low and chloride is very low. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. All other cations are balanced aside from very low calcium. Cation exchange capacity is very low and poorly effective in nutrient retention and storage. Available nutrient levels are marginally to highly deficient.

Topsoil Sample 6

This sample is a gravelly Fine Sandy Clay Loam with moderate organic matter at 3.2%. The structure is of fine size (1-10 mm) and is classified as a pedal-weak crumb. The estimated permeability is slow-moderate at 5-20 mm.

Soil pH is strongly acidic in H₂O and extremely acidic in CaCl₂. Salinity is very low, sodium is low and chloride is very low. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. Magnesium and sodium are normal, however calcium and potassium are deficient. Cation exchange capacity is low and poorly effective in nutrient retention and storage. Available nutrient levels are marginally to highly deficient.

Topsoil Sample 7

This sample is a gravelly Sandy Clay Loam with low organic matter at 1.5%. The structure is of fine size (1-10 mm) and is classified as a pedal-weak crumb. The estimated permeability is slow-moderate at 5-20 mm.

Soil pH is very strongly acidic in H₂O and extremely acidic in CaCl₂. Salinity is very low, sodium is very low and chloride is very low. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. Sodium is normal, however magnesium, calcium and potassium are deficient. Cation exchange capacity is very low and poorly effective in nutrient retention and storage. Available nutrient levels are marginally to highly deficient.

Topsoil Sample 8

This sample is a gravelly Fine Sandy Clay Loam with low organic matter at 1.8%. The structure is of medium size (11-25 mm) and is classified as a pedal-weak crumb. The estimated permeability is slow-moderate at 5-20 mm.

Soil pH is strongly acidic in H₂O and very strongly acidic in CaCl₂. Salinity is very low, sodium is very low and chloride is below detection. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. Sodium is normal, however magnesium, calcium and potassium are deficient. Cation exchange capacity is very low and poorly effective in nutrient retention and storage. Available nutrient levels are marginally to highly deficient.

Topsoil Sample 9

This sample is a gravelly Fine Sandy Clay Loam with low organic matter at 1.1%. The structure is of fine size (1-10 mm) and is classified as a pedal-weak crumb. The estimated permeability is slow-moderate at 5-20 mm.

Soil pH is strongly acidic in H₂O and very strongly acidic in CaCl₂. Salinity is very low, sodium is very low and chloride is very low. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. All other cations are balanced aside from very low calcium. Cation exchange capacity is very low and poorly effective in nutrient retention and storage. Available nutrient levels are marginally to highly deficient.

Subsoil Sample 6

This sample is a Sandy Clay Loam with a structure of fine size (1-10 mm) and is classified as a pedal-weak crumb. The estimated permeability is slow-moderate at 5-20 mm.

Soil pH is moderately acidic in H₂O and extremely acidic in CaCl₂. Salinity is very low, sodium is low and chloride is very low. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. This sample is also highly magnesian and moderately sodic with deficiencies in calcium and potassium. Cation exchange capacity is very low and poorly effective in nutrient retention and storage. Available potassium and calcium are low and magnesium is excessive.

Subsoil Sample 7

This sample is a Sandy Clay Loam with a structure of medium size (11-25 mm) and is classified as a pedal-weak crumb. The estimated permeability is slow-moderate at 5-20 mm.

Soil pH is strongly acidic in H₂O and extremely acidic in CaCl₂. Salinity is very low, sodium is low and chloride is very low. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. This sample is also highly magnesian and moderately sodic with deficiencies in calcium and potassium. Cation exchange capacity is low and poorly effective in nutrient retention and storage. Available potassium and calcium are low and magnesium is excessive.

Subsoil Sample 9

This sample is a Sandy Clay with a structure of medium size (11-25 mm) and is classified as a pedal-strong crumb. The estimated permeability is slow at 5-20 mm.

Soil pH is strongly acidic in H₂O and extremely acidic in CaCl₂. Salinity is very low, sodium is high and chloride is very low. The exchangeable cations are dominant in free hydrogen and as a result, aluminium has become available and is presenting at levels harmful for plant health. This sample is also highly magnesian and moderately sodic with deficiencies in calcium and potassium. Cation exchange capacity is moderately effective in nutrient retention and storage. Available potassium and calcium are low and magnesium is excessive.

6. DISCUSSION

The results of the site survey and laboratory analysis show the distribution of soil characteristics across the Lynwood Quarry site. Whilst there are some similarities within certain areas of the site, across the whole site footprint; there is considerable variability. The topsoil is primarily fine to gravelly Sandy Clay Loam with a pedal-weak crumb structure with fine to medium grain size and slow-moderate estimated permeability. All samples are similar in colour and texture aside from sample 3. The organic matter ranges from low to medium aside from sample 3 which is high. A higher organic matter is favourable for the vegetation communities present at the site and will need to be addressed within the amelioration strategy.

The electrical conductivity (EC) is low to very low in most samples however is moderate in sample 2. All pH levels are strongly acidic in H₂O and very strongly to extremely acidic in CaCl₂. This leads to a drop in other cations; which is observed in most samples; and increase in free hydrogen within the soil. Aluminium is naturally present in the soil in an insoluble form, however the interaction between the hydrogen and acidic pH releases the aluminium into the soil, allowing it to become available for plant uptake. An acidic pH is a known characteristic of these soils and the native Australian vegetation communities of this region are well adapted to these conditions. Therefore, exchangeable aluminium in minor concentrations will generally be harmless; however in excess, it will eventually become toxic to the plants. Overtime, this can lead to stunted growth, damage to plant roots, interference with other nutrient uptake, and a reduction in microbial activity. This limitation is addressed within the amelioration strategy below.

The low pH and poor cation exchange has led to deficiencies in most available nutrients in almost all samples. The cation exchange capacity is low to very low in most samples, indicating the soil has a diminished capacity to retain and supply nutrients to the plants. Almost all available nutrients (aside from magnesium in samples 2 & 3) are marginally to highly deficient. Native Australian vegetation often thrive in low nutrient conditions, and are notably sensitive to phosphorus levels in the soil. The addition of nutrient fertilisers is recommended; particularly in the box-gum grassy forest areas; however the plants will require a low phosphorus fertiliser.

High magnesium levels are not typically observed within the Marulan soil landscape and are not commonly favourable within the vegetation communities naturally present within this region. Excessive magnesium can be balanced out with the addition of other nutrients specified within the amelioration strategy.

In general, there was little observable change between the topsoil and subsoil profiles with a gradual boundary shift at approximately 300 mm. The laboratory analysis also determined the subsoil samples to be physically and chemically similar to the topsoil. Subsoils are primarily Sandy Clay Loam or Sandy Clay, with slow to moderate permeability. The structure is generally fine to medium, classified as pedal-weak crumb and pedal-strong crumb at sample 9, indicating limited aggregation and poor soil structure for water infiltration. Soil pH across all samples is strongly to extremely acidic, with high aluminium levels due to dominance of free hydrogen ions. Magnesium is present in excessive amounts, whilst potassium and calcium are low.

7. AMELIORATION STRATEGY

As the amelioration will occur in-situ, it is important to consider the site topography when applying additional nutrients. Samples 1-4 are situated on the flatter regions of the site, sample 7, 8, and 9 are at a moderate elevation, with the highest elevation samples occurring at sample 5 and 6 locations (Appendix A).

For general site maintenance and regeneration;

- Lightly clear weed species & apply spot herbicides in applicable areas
- Ensure erosion control practices are implemented, particularly in areas with sloping and use deep rooted natives where possible.
- Where practical, decompact the surface 150 mm prior to the application of ameliorants. Ameliorants should be lightly mixed into the top 100mm prior to planting
- Topsoil amelioration should be conducted at a radius of 0.5 m around the expected mature trunk calliper size for the selected species. The topsoil amelioration plan is detailed in table 2 below.
- As the regeneration involves non-invasive localised planting, tube stocking and direct sowing, ameliorants will be applied to the soils using of hand tools in most areas. SESL note that the subsoil can only be treated if large tree stock (< 25 L) are being placed. Subsoil amelioration should be conducted in any instance that subsoil is required to be excavated and re-instated. As there is limited subsoil data; amelioration application rates have been estimated on a conservative basis. The subsoil amelioration plan is detailed in table 3 below.
- Heavily irrigate on installation to wash the excess salts down the profile. Monitor for signs of leaf burning, wilting or browning and salt crusting on surface.

Table 2. Topsoil amelioration strategy

Limitation	Amelioration Strategy	Application Rate	Unit	Applicable Areas
Low OM%	Mulch in selective areas. Use coarse, chunky mulch such as, leaf litter, or bush mulch from local species.	10	v/v	1, 5
		15	v/v	2, 7, 8, 9
Imbalanced Cation Exchange	Gypsum for calcium deficiency.	100	g/m ²	9
		400	g/m ²	2
	Sulfate of potash for potassium deficiency.	20	g/m ²	2, 4, 8
		30	g/m ²	1, 3, 6
pH levels	Lime to reduce acidity. Selection of acid tolerant and acid loving plants.	100	g/m ²	9
		250	g/m ²	1, 3, 8
		400	g/m ²	4, 5, 6, 7
Nitrogen deficiency	Urea for nitrogen deficiency	10	g/m ²	All areas
Macro and micronutrients	P-sensitive fertiliser (Bushtucker or similar)	50	g/m ²	All areas

Table 3. Subsoil amelioration strategy

Limitation	Amelioration Strategy	Application Rate	Unit	Applicable Areas
Imbalanced Cation Exchange	Gypsum for calcium deficiency.	100	g/m ²	All areas
	Sulfate of potash for potassium deficiency.	20	g/m ²	1, 2, 3, 4, 6, 7, 9
pH levels	Lime to reduce acidity. Selection of acid tolerant and acid loving plants.	200	g/m ²	1, 2, 3, 8, 9
		400	g/m ²	4, 5, 6, 7

8. DISCUSSION ON RECOMMENDED AMELIORATION

The above amelioration plan has been developed based on soil samples collected by SESL and the assumption that the regeneration areas will be localised rather than broad-scale. Site observations indicated that the revegetation will occur in ‘pockets’ and will primarily be conducted by hand. This process allows for small areas to be treated to provide initial nutrients and desirable establishment conditions (ie, available nutrient, improved water holding capacity and improvement of structure. Decompaction is critical to the soil treatment process and should be conducted prior to the application of ameliorants. Failure to properly decompact soil may lead to plant failure or poor establishment.

It is an assumption of the amelioration plan that native plant communities from the area will be used for regeneration purposes. A target pH of 6.0 has been applied for the liming application rate, which assumes that the species to be planted will be tolerant of slightly to moderately acidic conditions. Local horticultural advice with consultants who have close experience with the establishment of these local plant communities should be sought after.

Where soil treatment is to be conducted around existing trees, minimal disturbance is recommended. An assessment of the overall tree health should be made, and treatments / amelioration conducted on a case-by-case basis. Only light scratching of the top 50-100 mm should be conducted to reduce the impact on existing roots. The application of fertiliser (Neutrog’s Bush Tucker) is generally safe around existing trees, granted fertiliser does not come in contact with the tree trunks.

9. CONCLUSION

This report presents an understanding of the soil conditions and limitations on the surrounding landscapes currently undergoing bush regeneration near Lynwood Quarry (Lot 3 DP 1107332 and Lot 3 DP 1074107, Marulan South Road, Marulan NSW 2579). SESL have provided an amelioration plan to improve the soil conditions and guide the revegetation process. Granted that these recommendations are followed, improvements in both areas can be expected to occur.

Please feel free to contact the undersigned if you have any questions regarding this report.

A handwritten signature in black ink, appearing to read 'Annalise Grieve'.

Annalise Grieve
Environmental Scientist
B Env

A handwritten signature in black ink, appearing to read 'Owen Guy'.

Owen Guy
Soil Science Manager
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A handwritten signature in black ink, appearing to read 'Simon Leake'.

Simon Leake
Director of Science
B Sc (Ag) Hons, ASSSI, CPSS

APPENDIX

- Appendix A - Site Contextual Maps
- Appendix B - Borehole Sampling Map
- Appendix C - Photographic Log
- Appendix D - Profile Summary Data

LIMITATIONS OF THIS REPORT:

SESL has performed an investigation and consulting services for this project as outlined in our discussions and in accordance with current professional and industry standards for Soil Science site assessment. The findings of this report are the result of discrete/specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of this site and do not represent the actual state of the site at all points. Should materials or conditions be encountered other than those which have been described these will require additional assessment.

SESL assessment is based on the result of limited site investigation. SESL cannot provide unqualified warranties nor assume any liability for site conditions not observed, accessible during the time of the investigations.

Despite all reasonable care and diligence, the ground conditions encountered and the concentrations of contaminants measured may not be representative of conditions between the locations samples and investigated. In addition, site characteristics may change as a result of soil heterogeneity, chemical reactions and other events. These changes may occur subsequent to SESL investigation and assessment.

This report and associated documentation and the information herein have been prepared solely for the use of the client and any relevant authority. Any reliance assumed by third parties on this report shall be at such parties own risk. Any ensuring liability resulting from use of the report by third parties cannot be transferred to SESL.

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Appendix A

Appendix A: Contextual Site Maps - Plant Community Type



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Appendix A: Contextual Site Maps
Plant Community Type
Prepared: AG 2025



Appendix A: Contextual Site Maps - Soil Landscapes

Soil Landscapes - published 100K - 250K

Salis Code: SI5512br

Name: Bindook Road

Version: 2.1



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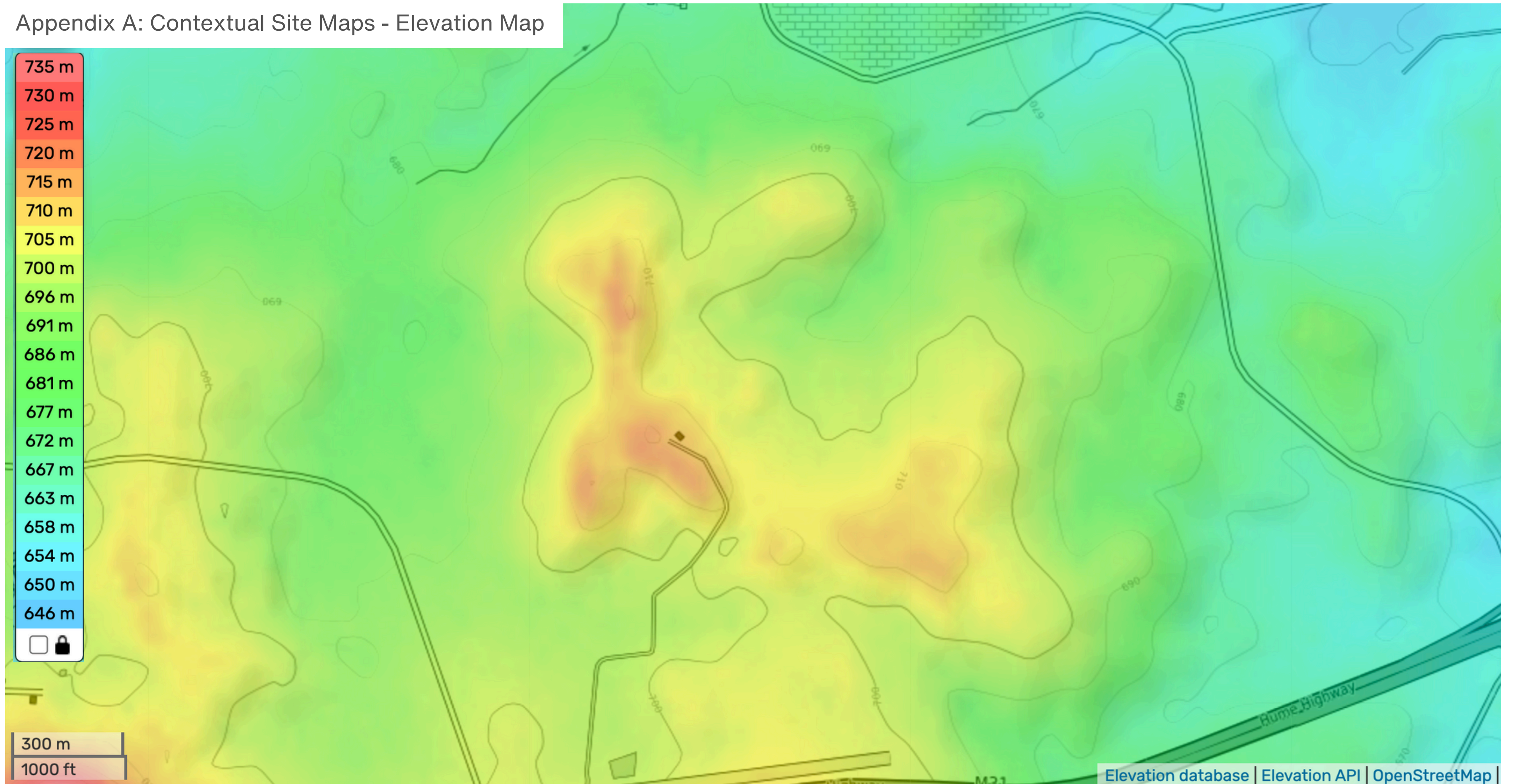
ABN: 70 106 810 108
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Appendix A: Contextual Site Maps
Soil Landscapes
Prepared: AG 2025



Appendix A: Contextual Site Maps - Elevation Map



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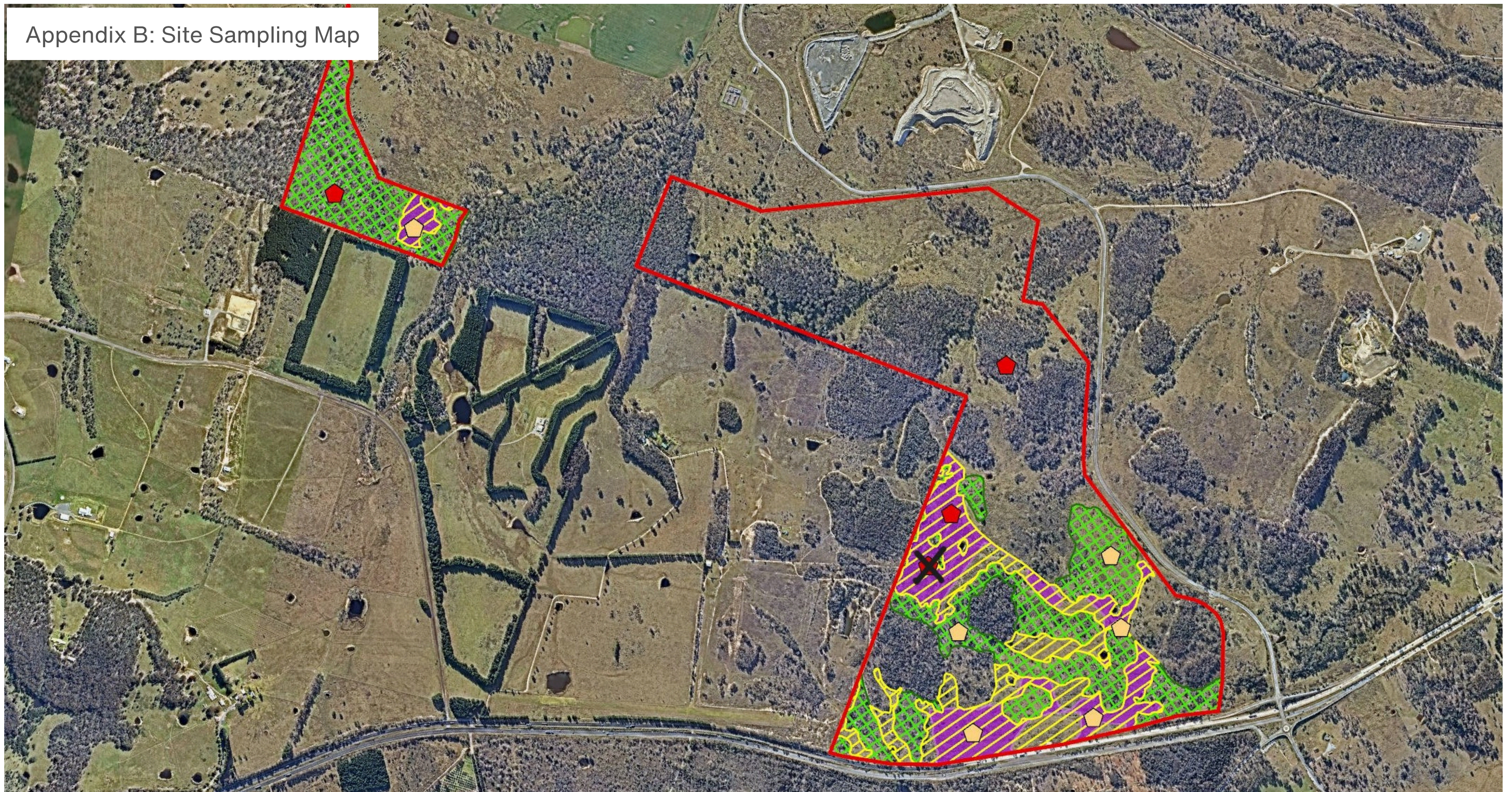
Appendix A: Contextual Site Maps
Elevation Map
Prepared: AG 2025





Appendix B

Appendix B: Site Sampling Map



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Appendix B: Borehole Locations
Site Sampling Map (client supplied)
Prepared: AG 2025





Appendix C

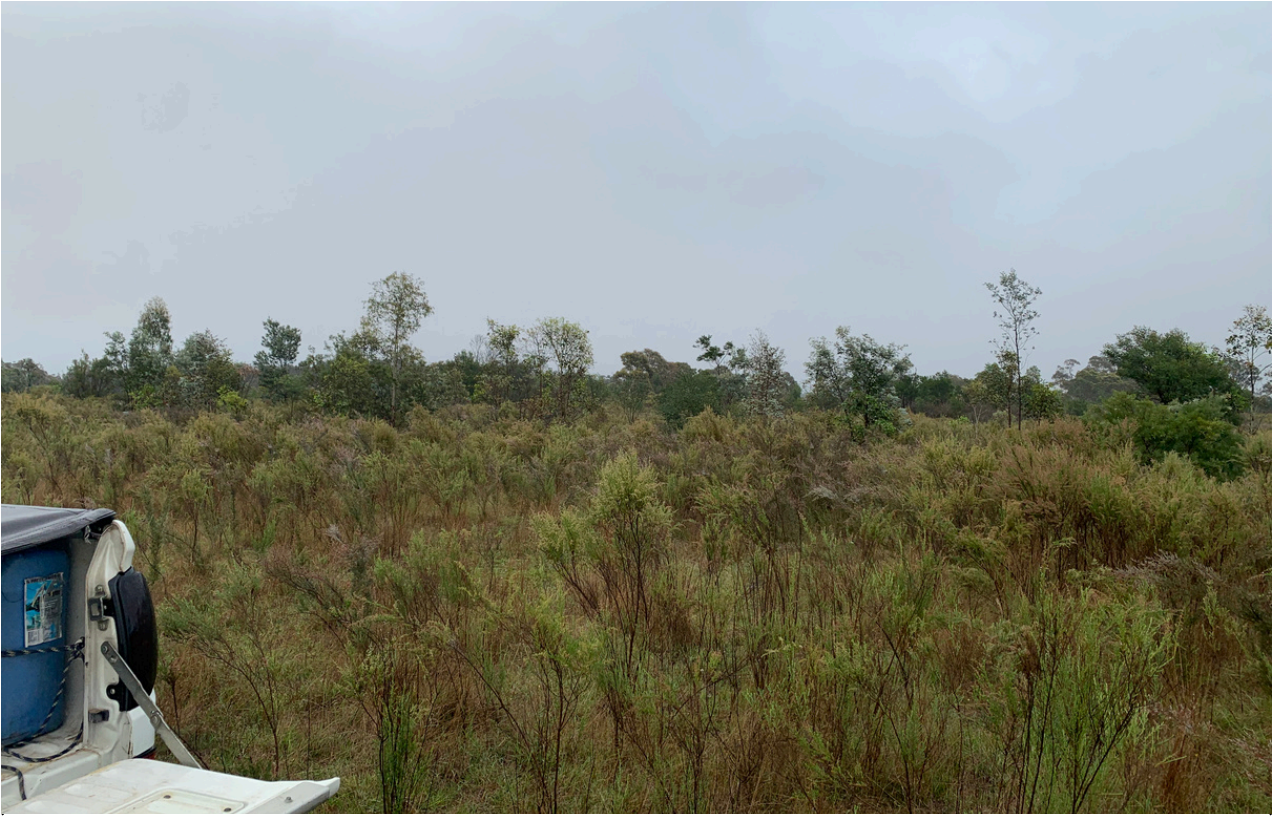


IMAGE 1

Sample 1 borehole location facing west



IMAGE 2

Sample 1 borehole location facing east toward Marulan South Rd



IMAGE 3

Sample 1 soil profile



IMAGE 4

Sample 2 borehole location facing south toward the lower dam



IMAGE 5

Sample 2 borehole location taken within the clearing



IMAGE 6

Sample 2 soil profile - minor changes from 0 - 600 mm



IMAGE 7

Sample 3 borehole location facing south toward Hume Highway to the south



IMAGE 8

Sample 3 borehole location facing east



IMAGE 9

Sample 3 soil profile - compacted and moist with high clay content



IMAGE 10

Sample 4 borehole location facing south toward Hume Highway

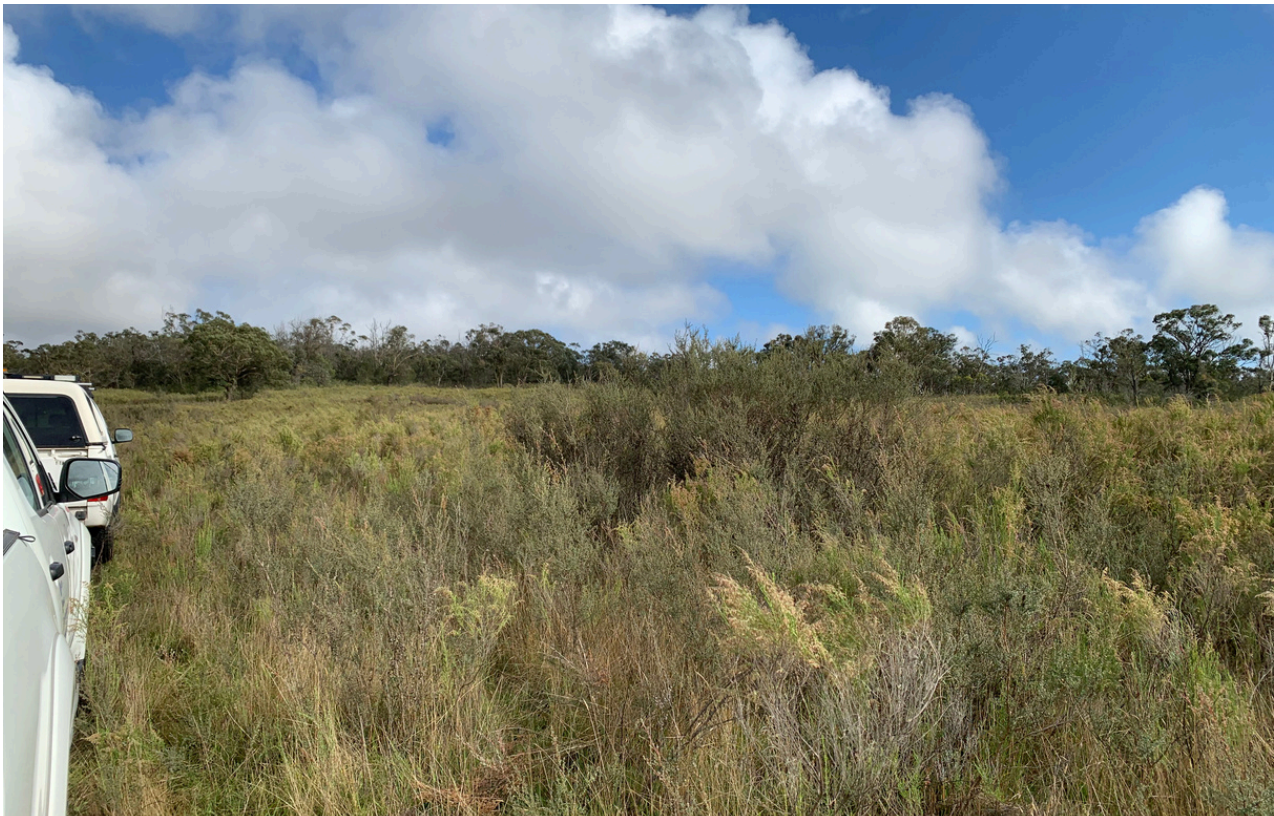


IMAGE 11

Sample 4 borehole location within the thicker vegetation area



IMAGE 12

Sample 4 soil profile



IMAGE 13

Sample 5 borehole location within the box gum forest area facing south



IMAGE 14

Sample 5 borehole location within the box gum forest area facing north



IMAGE 15

Sample 5 soil profile - compacted refusal at 300 mm



IMAGE 16

Sample 6 initial borehole location - location moved due to ground refusal



IMAGE 17

Refusal at 300 due to excess compaction.



IMAGE 18

Relocated sample 6 borehole location



IMAGE 19

Relocated sample 6 borehole location bordering a larger tree community



IMAGE 20

Sample 6 soil profile - increasingly bleached sands at depth



IMAGE 21

Borehole 7 sampling location in box gum vegetation community.



IMAGE 22

Borehole 7 sampling location in box gum vegetation community.



IMAGE 23

Borehole 7 sampling location in box gum vegetation community.



IMAGE 24

Borehole 8 sampling location.



IMAGE 25

Borehole 8 soil profile



IMAGE 26

Borehole 9 sampling location



IMAGE 27

Borehole 9 sampling location



IMAGE 28

Sample 9 soil profile



Appendix D



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

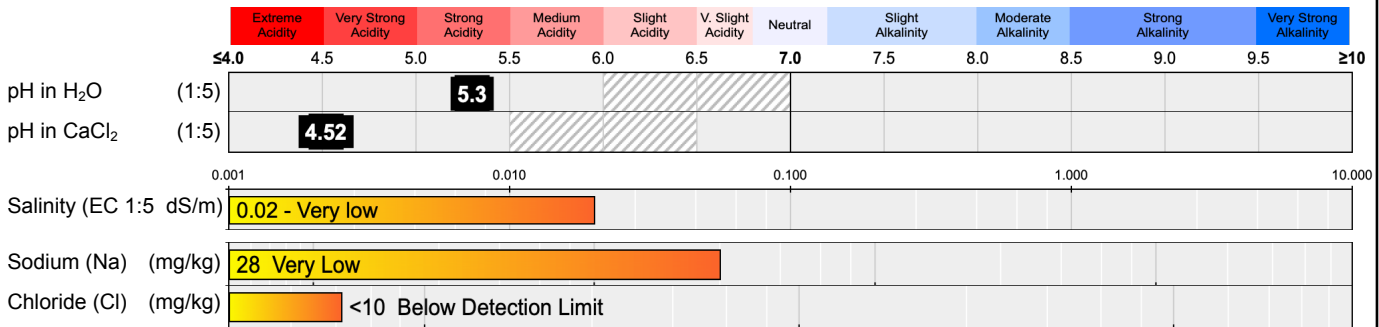
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 1	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S1 Topsoil (0-300) - Composite		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

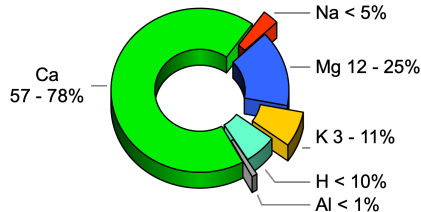
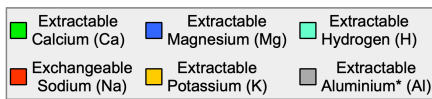
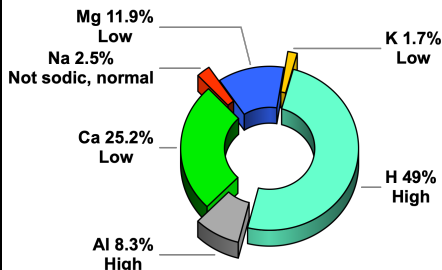
pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2



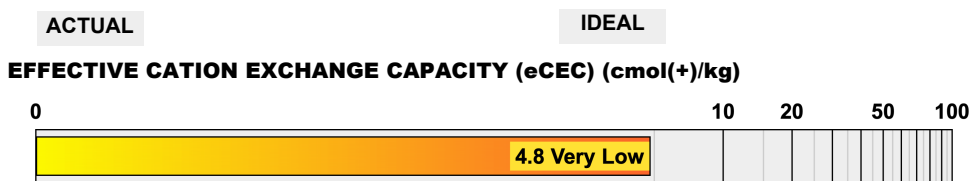
CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	2.1	3 - 6
Comment: Calcium low		
Mg:K	7	2.6 - 5.0
Comment: Potassium low		
K/(Ca+Mg)	0.04	< 0.07
Comment: Acceptable		
K:Na	0.67	N/A

EXCHANGEABLE CATIONS (cmol(+)/kg)

Na:	K:	Ca:	Mg:	H:	Al:
0.12	0.08	1.21	0.57	2.35	0.4

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC. The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.



Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 1	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SES L Quote N°:		
Client Order N°:	Sample Name: S1 Topsoil (0-300) - Composite		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

PLANT AVAILABLE NUTRIENTS										
EFFECTIVE AMELIORATION DEPTH (mm): <input type="radio"/> 100 <input checked="" type="radio"/> 150 <input type="radio"/> 200 DESIRED FERTILITY CLASS: <input type="radio"/> Low <input checked="" type="radio"/> Moderate <input type="radio"/> High										
Major Nutrients	Unit	Result	<input type="checkbox"/> Very Low <input type="checkbox"/> Low <input type="checkbox"/> Marginal <input type="checkbox"/> Adequate <input type="checkbox"/> High					Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	0.18						0	6	6
Phosphorus (P)	mg P/kg	<5						1	12.6	11.6
Potassium (K)	mg/kg	32						6.4	35.5	29.1
Sulfur (S)	mg S/kg	5.9						1.2	13.6	12.4
Calcium (Ca)	mg/kg	240						47.9	252.8	204.9
Magnesium (Mg)	mg/kg	69						13.8	26.7	12.9
Iron (Fe)	mg/kg	260						51.9	110.1	58.2
Manganese (Mn)	mg/kg	1.7						0.3	8.8	8.5
Zinc (Zn)	mg/kg	<0.65						0.1	1	0.9
Copper (Cu)	mg/kg	<0.64						0.1	1.3	1.2
Boron (B)	mg/kg	<0.1						0	0.5	0.5
Explanation of graph ranges: <input type="checkbox"/> Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.							NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adequate band, which maximises growth/yield, and economic efficiency, and minimises impact on the environment. Drawdown: The objective nutrient management is to utilise residual soil nutrients. There is no agronomic reason to apply fertiliser when soil test levels exceed Adequate. * g/sqm measurements are based on soil bulk density of 1.33 tonne/m ³ and effective amelioration depth.			
Phosphorus Saturation Index <p>Low. Plant response to applied P is likely.</p>			Exchangeable Acidity Adams-Evans Buffer pH (BpH): 7.6 Sum of Base Cations (cmol(+)/kg): 2 Eff. Cation Exch. Capacity (eCEC): 4.8 Base Saturation (%): 41.67 Exchangeable Acidity (cmol(+)/kg): 2.35 Exchangeable Acidity (%): 48.96			Lime Application Rate (g/sqm) – to achieve pH 6.0: 256 – to neutralise Al: 58 Calculated Gypsum Application Rate (CGAR) (g/sqm) to achieve 67.5 % exch. Ca: 0 <i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>				
PHYSICAL DESCRIPTION										
Texture: Sandy Clay Loam	Munsell Colour: -	Organic Carbon (OC %): Low - 1.3								
Estimated clay content: 20 - 30%	Structure Size: Fine (1 - 10mm)	Organic Matter (OM %): 2.2								
Tactually gravelly: Gravelly	Structural Organisation: Pedal - Weak	Est. Field Capacity (% water): 26								
Tactually organic: Not Organic	Structural Unit: Crumb	Est. Permanent Wilting Point (% water): 15								
Calculated EC _{SE} (dS/m): 0.2	Potential infiltration rate: Moderate	Est. Plant Available Water (% water): 11								
– Non-saline. Salinity effects on plants are mostly negligible.	Est. Permeability Class (mm/hr): 5 - 20	Est. Plant Available Water (mm/m): 110								

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

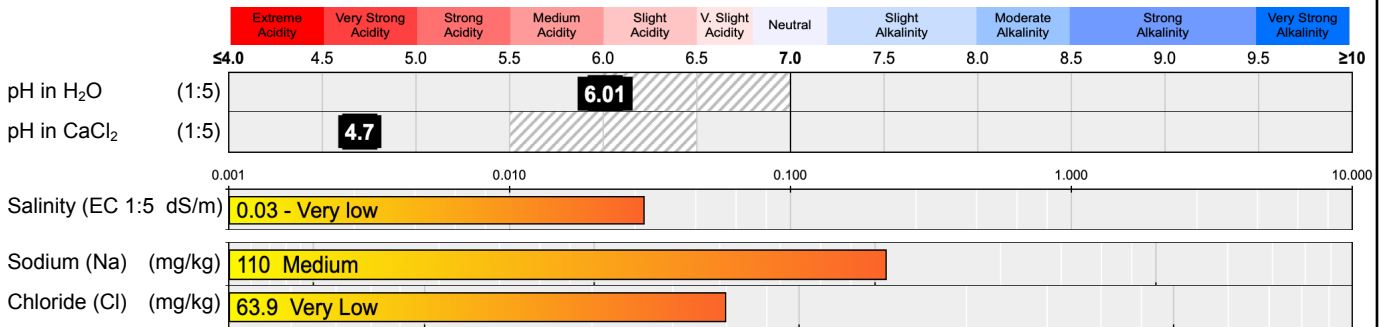
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 2	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S2 Topsoil (0-600)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2

Element	Percentage	Category
Na	8.8%	Moderate sodicity
Mg	42.1%	High, magnesian
Ca	12.3%	Low
Al	2.1%	High
H	31.5%	pH in H ₂ O ≥ 6.0
K	2.5%	Low

ACTUAL

CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	0.3	3 – 6
Comment: Potential Calcium deficiency		
Mg:K	20	2.6 – 5.0
Comment: Potential Potassium		
K/(Ca+Mg)	0.05	< 0.07
Comment: Acceptable		
K:Na	0.28	N/A

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)

Na	K	Ca	Mg	H	Al
0.46	0.13	0.64	2.19	1.64	0.11

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC.
The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 2	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SES L Quote N°:		
Client Order N°:	Sample Name: S2 Topsoil (0-600)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

PLANT AVAILABLE NUTRIENTS										
EFFECTIVE AMELIORATION DEPTH (mm): <input type="radio"/> 100 <input checked="" type="radio"/> 150 <input type="radio"/> 200 DESIRED FERTILITY CLASS: <input type="radio"/> Low <input checked="" type="radio"/> Moderate <input type="radio"/> High										
Major Nutrients	Unit	Result	Very Low	Low	Marginal	Adequate	High	Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	0.18						0	6	6
Phosphorus (P)	mg P/kg	<5						1	12.6	11.6
Potassium (K)	mg/kg	50						10	43.9	33.9
Sulfur (S)	mg S/kg	3.8						0.8	13.6	12.8
Calcium (Ca)	mg/kg	130						25.9	312.4	286.5
Magnesium (Mg)	mg/kg	270						53.9	32.5	Drawdown
Iron (Fe)	mg/kg	160						31.9	110.1	78.2
Manganese (Mn)	mg/kg	6.2						1.2	8.8	7.6
Zinc (Zn)	mg/kg	<0.65						0.1	1	0.9
Copper (Cu)	mg/kg	<0.64						0.1	1.3	1.2
Boron (B)	mg/kg	<0.1						0	0.5	0.5

Explanation of graph ranges:

Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.	Low Potential "hidden hunger", or sub-clinical deficiency. Potential response to nutrient addition is 60 to 90 %.	Marginal Supply of this nutrient is barely adequate for the plant, and build-up is still recommended. Potential response to nutrient addition is 30 to 60 %.	Adequate Supply of this nutrient is adequate for the plant, and only maintenance application rates are recommended. Potential response to nutrient addition is 5 to 30 %.	High The level is excessive and may be detrimental to plant growth (i.e. phytotoxic) and may contribute to pollution of ground and surface waters. Drawdown is recommended. Potential response to nutrient addition is <2 %.
--	---	--	---	--

NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adequate band, which maximises growth/yield, and economic efficiency, and minimises impact on the environment.
Drawdown: The objective nutrient management is to utilise residual soil nutrients. There is no agronomic reason to apply fertiliser when soil test levels exceed Adequate.
* g/sqm measurements are based on soil bulk density of 1.33 tonne/m³ and effective amelioration depth.

Phosphorus Saturation Index 	Exchangeable Acidity Adams-Evans Buffer pH (BpH): 7.7 Sum of Base Cations (cmol(+)/kg): 3.4 Eff. Cation Exch. Capacity (eCEC): 5.2 Base Saturation (%): 65.38 Exchangeable Acidity (cmol(+)/kg): - Exchangeable Acidity (%): -	Lime Application Rate (g/sqm) – to achieve pH 6.0: 0 – to neutralise Al: 16 Calculated Gypsum Application Rate (CGAR) (g/sqm) to achieve 67.5 % exch. Ca: 493 <i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>
--	---	--

PHYSICAL DESCRIPTION			
Texture: Fine Sandy Clay Loam	Munsell Colour: -	Organic Carbon (OC %): Low - 0.7	
Estimated clay content: 20 - 30%	Structure Size: Medium (11 - 25mm)	Organic Matter (OM %): 1.1	
Tactually gravelly: Not gravelly	Structural Organisation: Pedal - Moderate	Est. Field Capacity (% water): 28	
Tactually organic: Not Organic	Structural Unit: Crumb	Est. Permanent Wilting Point (% water): 15	
Calculated EC _{SE} (dS/m): 0.3	Potential infiltration rate: Moderate	Est. Plant Available Water (% water): 13	
– Non-saline. Salinity effects on plants are mostly negligible.	Est. Permeability Class (mm/hr): 20 - 60	Est. Plant Available Water (mm/m): 130	

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

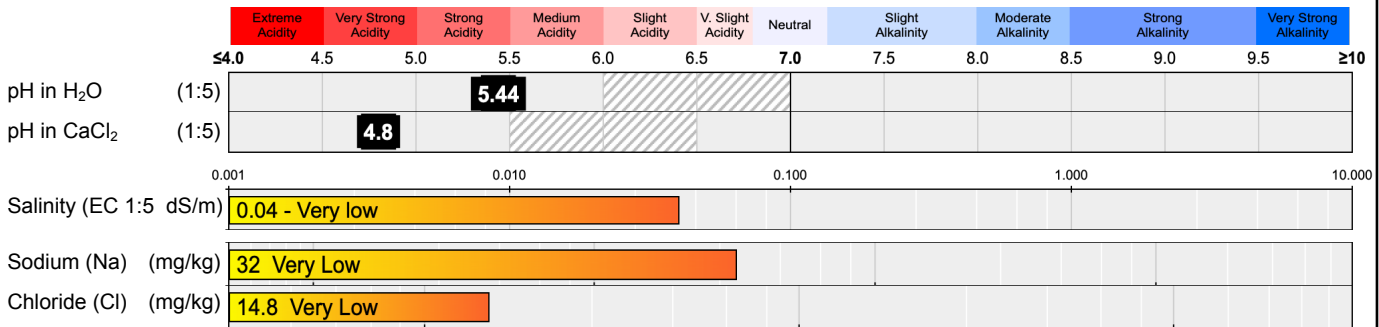
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 3	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S3 Topsoil (0-300)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2

ACTUAL

IDEAL

CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	1.5	3 – 6
Comment: Calcium low		
Mg:K	10	2.6 – 5.0
Comment: Potassium low		
K/(Ca+Mg)	0.04	< 0.07
Comment: Acceptable		
K:Na	1.1	N/A

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC.
The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 3	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SES L Quote N°:		
Client Order N°:	Sample Name: S3 Topsoil (0-300)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

PLANT AVAILABLE NUTRIENTS										
EFFECTIVE AMELIORATION DEPTH (mm): <input type="radio"/> 100 <input checked="" type="radio"/> 150 <input type="radio"/> 200 DESIRED FERTILITY CLASS: <input type="radio"/> Low <input checked="" type="radio"/> Moderate <input type="radio"/> High										
Major Nutrients	Unit	Result	Very Low	Low	Marginal	Adequate	High	Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	0.71						0.1	6	5.9
Phosphorus (P)	mg P/kg	<5						1	12.6	11.6
Potassium (K)	mg/kg	60						12	43.9	31.9
Sulfur (S)	mg S/kg	16						3.2	13.6	10.4
Calcium (Ca)	mg/kg	480						95.8	312.4	216.6
Magnesium (Mg)	mg/kg	200						39.9	32.5	Drawdown
Iron (Fe)	mg/kg	340						67.8	110.1	42.3
Manganese (Mn)	mg/kg	2.2						0.4	8.8	8.4
Zinc (Zn)	mg/kg	1.6						0.3	1	0.7
Copper (Cu)	mg/kg	<0.64						0.1	1.3	1.2
Boron (B)	mg/kg	<0.1						0	0.5	0.5

Explanation of graph ranges:

Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.	Low Potential "hidden hunger", or sub-clinical deficiency. Potential response to nutrient addition is 60 to 90 %.	Marginal Supply of this nutrient is barely adequate for the plant, and build-up is still recommended. Potential response to nutrient addition is 30 to 60 %.	Adequate Supply of this nutrient is adequate for the plant, and only maintenance application rates are recommended. Potential response to nutrient addition is 5 to 30 %.	High The level is excessive and may be detrimental to plant growth (i.e. phytotoxic) and may contribute to pollution of ground and surface waters. Drawdown is recommended. Potential response to nutrient addition is <2 %.
--	---	--	---	--

NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adequate band, which maximises growth/yield, and economic efficiency, and minimises impact on the environment.
Drawdown: The objective nutrient management is to utilise residual soil nutrients. There is no agronomic reason to apply fertiliser when soil test levels exceed Adequate.
* g/sqm measurements are based on soil bulk density of 1.33 tonne/m³ and effective amelioration depth.

Phosphorus Saturation Index 	Exchangeable Acidity Adams-Evans Buffer pH (BpH): 7.5 Sum of Base Cations (cmol(+)/kg): 4.3 Eff. Cation Exch. Capacity (eCEC): 7.3 Base Saturation (%): 58.9 Exchangeable Acidity (cmol(+)/kg): 2.91 Exchangeable Acidity (%): 39.86	Lime Application Rate (g/sqm) – to achieve pH 6.0: 294 – to neutralise Al: 13 Calculated Gypsum Application Rate (CGAR) (g/sqm) to achieve 67.5 % exch. Ca: 0 <i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>
--	---	--

PHYSICAL DESCRIPTION			
Texture: Sandy Clay	Munsell Colour: -	Organic Carbon (OC %): Moderate - 1.9	
Estimated clay content: 35 - 45%	Structure Size: Medium (11 - 25mm)	Organic Matter (OM %): 3.2	
Tactually gravelly: Not gravelly	Structural Organisation: Pedal - Strong	Est. Field Capacity (% water): 29	
Tactually organic: Not Organic	Structural Unit: Crumb	Est. Permanent Wilting Point (% water): 19	
Calculated EC _{SE} (dS/m): 0.3	Potential infiltration rate: Slow	Est. Plant Available Water (% water): 10	
- Non-saline. Salinity effects on plants are mostly negligible.	Est. Permeability Class (mm/hr): 5 - 20	Est. Plant Available Water (mm/m): 100	

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

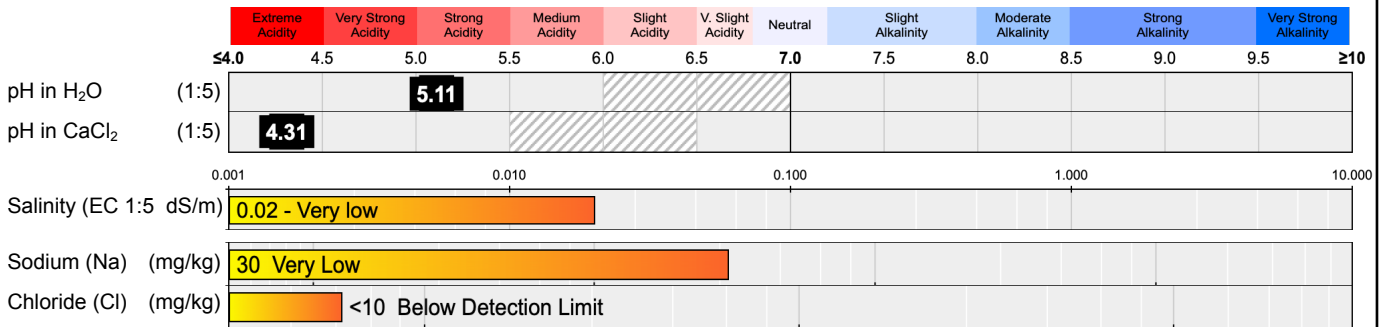
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 4	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S4 Topsoil (0-200)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

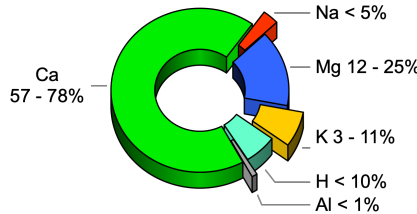
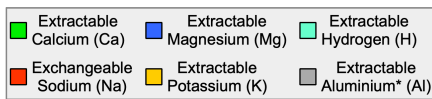
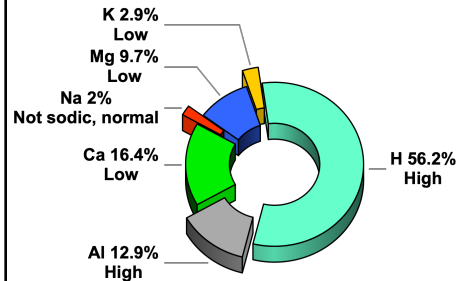
pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

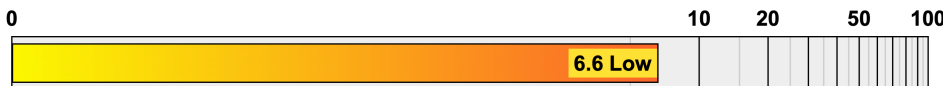
Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2



ACTUAL

IDEAL

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)



CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	1.7	3 - 6
Comment: Calcium low		
Mg:K	3	2.6 - 5.0
Comment: Balanced		
K/(Ca+Mg)	0.11	< 0.07
Comment: High		
K:Na	1.5	N/A

EXCHANGEABLE CATIONS (cmol(+)/kg)

Na:	K:	Ca:	Mg:	H:	Al:
0.13	0.19	1.08	0.64	3.71	0.85

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC. The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 4	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SES L Quote N°:		
Client Order N°:	Sample Name: S4 Topsoil (0-200)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

PLANT AVAILABLE NUTRIENTS										
EFFECTIVE AMELIORATION DEPTH (mm): <input type="radio"/> 100 <input checked="" type="radio"/> 150 <input type="radio"/> 200 DESIRED FERTILITY CLASS: <input type="radio"/> Low <input checked="" type="radio"/> Moderate <input type="radio"/> High										
Major Nutrients	Unit	Result	<input type="checkbox"/> Very Low <input type="checkbox"/> Low <input type="checkbox"/> Marginal <input type="checkbox"/> Adequate <input type="checkbox"/> High					Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	0.23						0	6	6
Phosphorus (P)	mg P/kg	7.8						1.6	12.6	11
Potassium (K)	mg/kg	76						15.2	43.9	28.7
Sulfur (S)	mg S/kg	6.8						1.4	13.6	12.2
Calcium (Ca)	mg/kg	220						43.9	312.4	268.5
Magnesium (Mg)	mg/kg	77						15.4	32.5	17.1
Iron (Fe)	mg/kg	260						51.9	110.1	58.2
Manganese (Mn)	mg/kg	1.8						0.4	8.8	8.4
Zinc (Zn)	mg/kg	1.1						0.2	1	0.8
Copper (Cu)	mg/kg	<0.64						0.1	1.3	1.2
Boron (B)	mg/kg	<0.1						0	0.5	0.5
Explanation of graph ranges: <input type="checkbox"/> Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.							NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adequate band, which maximises growth/yield, and economic efficiency, and minimises impact on the environment. Drawdown: The objective nutrient management is to utilise residual soil nutrients. There is no agronomic reason to apply fertiliser when soil test levels exceed Adequate. * g/sqm measurements are based on soil bulk density of 1.33 tonne/m ³ and effective amelioration depth.			
Phosphorus Saturation Index Low. Plant response to applied P is likely.			Exchangeable Acidity Adams-Evans Buffer pH (BpH): 7.3 Sum of Base Cations (cmol(+)/kg): 2 Eff. Cation Exch. Capacity (eCEC): 6.6 Base Saturation (%): 30.3 Exchangeable Acidity (cmol(+)/kg): 3.71 Exchangeable Acidity (%): 56.21			Lime Application Rate (g/sqm) – to achieve pH 6.0: 479 – to neutralise Al: 124 Calculated Gypsum Application Rate (CGAR) (g/sqm) to achieve 67.5 % exch. Ca: 0 <i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>				
PHYSICAL DESCRIPTION										
Texture: Sandy Clay Loam	Munsell Colour: -	Organic Carbon (OC %): High - 2.2								
Estimated clay content: 20 - 30%	Structure Size: Fine (1 - 10mm)	Organic Matter (OM %): 3.7								
Tactually gravelly: Gravelly	Structural Organisation: Pedal - Weak	Est. Field Capacity (% water): 26								
Tactually organic: Not Organic	Structural Unit: Crumb	Est. Permanent Wilting Point (% water): 15								
Calculated EC _{SE} (dS/m): 0.2	Potential infiltration rate: Moderate	Est. Plant Available Water (% water): 11								
- Non-saline. Salinity effects on plants are mostly negligible.	Est. Permeability Class (mm/hr): 5 - 20	Est. Plant Available Water (mm/m): 110								

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

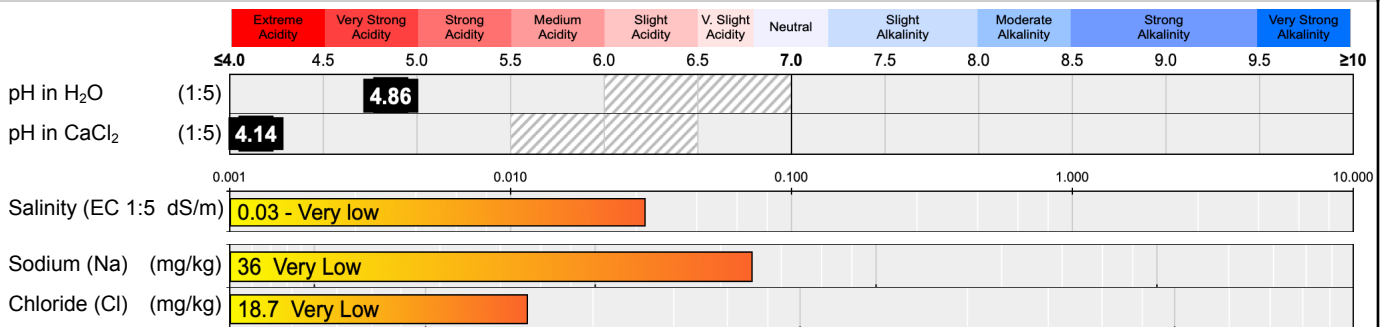
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 5	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S5 Topsoil (0-300)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

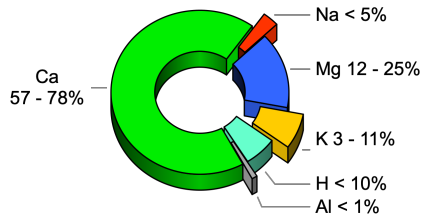
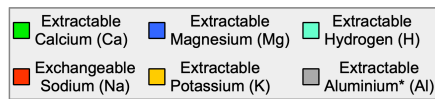
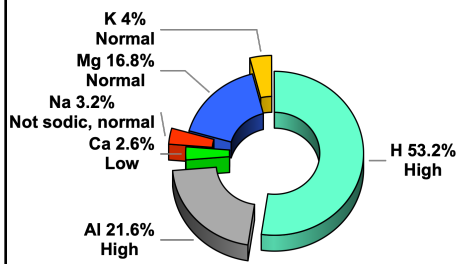
pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2



ACTUAL

IDEAL

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)



CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	0.2	3 - 6
Comment: Potential Calcium deficiency		
Mg:K	4	2.6 - 5.0
Comment: Balanced		
K/(Ca+Mg)	0.21	< 0.07
Comment: High		
K:Na	1.3	N/A

EXCHANGEABLE CATIONS (cmol(+)/kg)

Na:	K:	Ca:	Mg:	H:	Al:
0.16	0.2	0.13	0.84	2.66	1.08

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC.
The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 5	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SES L Quote N°:		
Client Order N°:	Sample Name: S5 Topsoil (0-300)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

PLANT AVAILABLE NUTRIENTS										
EFFECTIVE AMELIORATION DEPTH (mm): <input type="radio"/> 100 <input checked="" type="radio"/> 150 <input type="radio"/> 200 DESIRED FERTILITY CLASS: <input type="radio"/> Low <input checked="" type="radio"/> Moderate <input type="radio"/> High										
Major Nutrients	Unit	Result	Very Low	Low	Marginal	Adequate	High	Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	0.52						0.1	6	5.9
Phosphorus (P)	mg P/kg	<5						1	12.6	11.6
Potassium (K)	mg/kg	80						16	43.9	27.9
Sulfur (S)	mg S/kg	6.2						1.2	13.6	12.4
Calcium (Ca)	mg/kg	27						5.4	312.4	307
Magnesium (Mg)	mg/kg	100						20	32.5	12.5
Iron (Fe)	mg/kg	260						51.9	110.1	58.2
Manganese (Mn)	mg/kg	1.6						0.3	8.8	8.5
Zinc (Zn)	mg/kg	0.97						0.2	1	0.8
Copper (Cu)	mg/kg	<0.64						0.1	1.3	1.2
Boron (B)	mg/kg	<0.1						0	0.5	0.5

Explanation of graph ranges:

Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.	Low Potential "hidden hunger", or sub-clinical deficiency. Potential response to nutrient addition is 60 to 90 %.	Marginal Supply of this nutrient is barely adequate for the plant, and build-up is still recommended. Potential response to nutrient addition is 30 to 60 %.	Adequate Supply of this nutrient is adequate for the plant, and only maintenance application rates are recommended. Potential response to nutrient addition is 5 to 30 %.	High The level is excessive and may be detrimental to plant growth (i.e. phytotoxic) and may contribute to pollution of ground and surface waters. Drawdown is recommended. Potential response to nutrient addition is <2 %.
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NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adequate band, which maximises growth/yield, and economic efficiency, and minimises impact on the environment.
Drawdown: The objective nutrient management is to utilise residual soil nutrients. There is no agronomic reason to apply fertiliser when soil test levels exceed Adequate.
* g/sqm measurements are based on soil bulk density of 1.33 tonne/m³ and effective amelioration depth.

Phosphorus Saturation Index 	Exchangeable Acidity Adams-Evans Buffer pH (BpH): 7.4 Sum of Base Cations (cmol(+)/kg): 1.3 Eff. Cation Exch. Capacity (eCEC): 5 Base Saturation (%): 26 Exchangeable Acidity (cmol(+)/kg): 2.66 Exchangeable Acidity (%): 53.2	Lime Application Rate (g/sqm) – to achieve pH 6.0: 509 – to neutralise Al: 158 Calculated Gypsum Application Rate (CGAR) (g/sqm) to achieve 67.5 % exch. Ca: 0 <i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>
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PHYSICAL DESCRIPTION			
Texture: Fine Sandy Clay Loam	Munsell Colour: -	Organic Carbon (OC %): Moderate - 1.6	
Estimated clay content: 20 - 30%	Structure Size: Fine (1 - 10mm)	Organic Matter (OM %): 2.7	
Tactually gravelly: Gravelly	Structural Organisation: Pedal - Weak	Est. Field Capacity (% water): 28	
Tactually organic: Not Organic	Structural Unit: Crumb	Est. Permanent Wilting Point (% water): 15	
Calculated EC _{SE} (dS/m): 0.3	Potential infiltration rate: Moderate	Est. Plant Available Water (% water): 13	
- Non-saline. Salinity effects on plants are mostly negligible.	Est. Permeability Class (mm/hr): 5 - 20	Est. Plant Available Water (mm/m): 130	

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

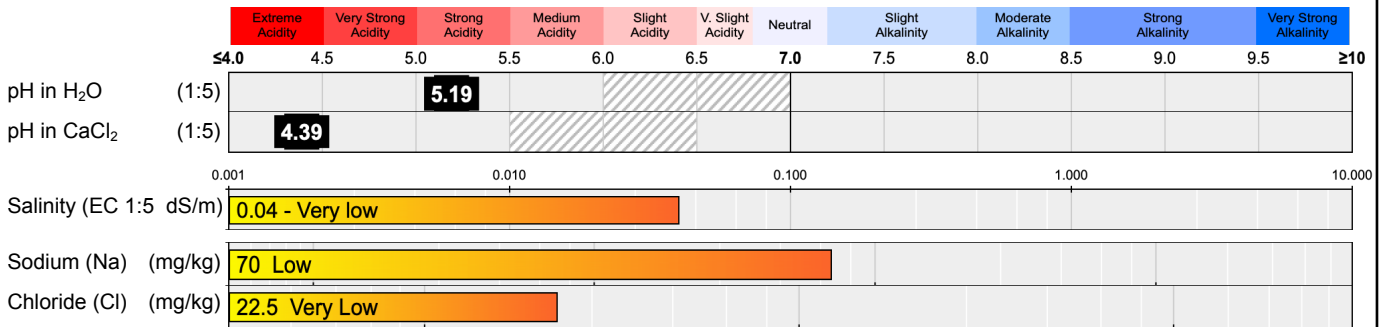
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 6	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S6 Topsoil (0-200)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

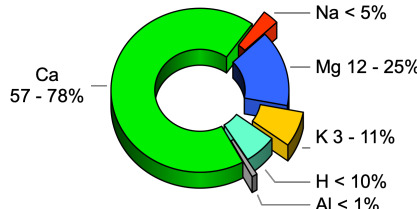
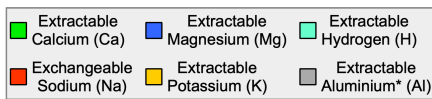
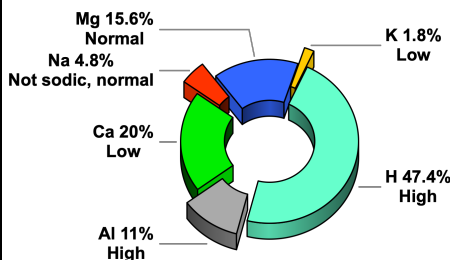
pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

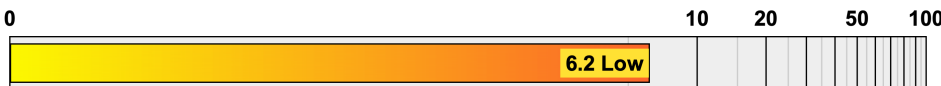
Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2



ACTUAL

IDEAL

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)



CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	1.3	3 - 6
Comment: Calcium low		
Mg:K	9	2.6 - 5.0
Comment: Potassium low		
K/(Ca+Mg)	0.05	< 0.07
Comment: Acceptable		
K:Na	0.37	N/A

EXCHANGEABLE CATIONS (cmol(+)/kg)

Na:	K:	Ca:	Mg:	H:	Al:
0.3	0.11	1.24	0.97	2.94	0.68

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC. The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 6	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S6 Topsoil (0-200)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

PLANT AVAILABLE NUTRIENTS										
EFFECTIVE AMELIORATION DEPTH (mm): <input type="radio"/> 100 <input checked="" type="radio"/> 150 <input type="radio"/> 200 DESIRED FERTILITY CLASS: <input type="radio"/> Low <input checked="" type="radio"/> Moderate <input type="radio"/> High										
Major Nutrients	Unit	Result	Very Low	Low	Marginal	Adequate	High	Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	<0.05						0	6	6
Phosphorus (P)	mg P/kg	11						2.2	12.6	10.4
Potassium (K)	mg/kg	42						8.4	43.9	35.5
Sulfur (S)	mg S/kg	8.9						1.8	13.6	11.8
Calcium (Ca)	mg/kg	250						49.9	312.4	262.5
Magnesium (Mg)	mg/kg	120						23.9	32.5	8.6
Iron (Fe)	mg/kg	230						45.9	110.1	64.2
Manganese (Mn)	mg/kg	1.7						0.3	8.8	8.5
Zinc (Zn)	mg/kg	0.75						0.1	1	0.9
Copper (Cu)	mg/kg	<0.64						0.1	1.3	1.2
Boron (B)	mg/kg	<0.1						0	0.5	0.5

Explanation of graph ranges:

Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.	Low Potential "hidden hunger", or sub-clinical deficiency. Potential response to nutrient addition is 60 to 90 %.	Marginal Supply of this nutrient is barely adequate for the plant, and build-up is still recommended. Potential response to nutrient addition is 30 to 60 %.	Adequate Supply of this nutrient is adequate for the plant, and only maintenance application rates are recommended. Potential response to nutrient addition is 5 to 30 %.	High The level is excessive and may be detrimental to plant growth (i.e. phytotoxic) and may contribute to pollution of ground and surface waters. Drawdown is recommended. Potential response to nutrient addition is <2 %.
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NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adequate band, which maximises growth/yield, and economic efficiency, and minimises impact on the environment.
Drawdown: The objective nutrient management is to utilise residual soil nutrients. There is no agronomic reason to apply fertiliser when soil test levels exceed Adequate.
* g/sqm measurements are based on soil bulk density of 1.33 tonne/m³ and effective amelioration depth.

Phosphorus Saturation Index <p>Low. Plant response to applied P is likely.</p>	Exchangeable Acidity Adams-Evans Buffer pH (BpH): 7.4 Sum of Base Cations (cmol(+)/kg): 2.6 Eff. Cation Exch. Capacity (eCEC): 6.2 Base Saturation (%): 41.94 Exchangeable Acidity (cmol(+)/kg): 2.94 Exchangeable Acidity (%): 47.42	Lime Application Rate (g/sqm) – to achieve pH 6.0: 414 – to neutralise Al: 99 Calculated Gypsum Application Rate (CGAR) (g/sqm) to achieve 67.5 % exch. Ca: 0 <i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>
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PHYSICAL DESCRIPTION			
Texture: Fine Sandy Clay Loam	Munsell Colour: -	Organic Carbon (OC %): Moderate - 1.9	
Estimated clay content: 20 - 30%	Structure Size: Fine (1 - 10mm)	Organic Matter (OM %): 3.2	
Tactually gravelly: Gravelly	Structural Organisation: Pedal - Weak	Est. Field Capacity (% water): 28	
Tactually organic: Not Organic	Structural Unit: Crumb	Est. Permanent Wilting Point (% water): 15	
Calculated EC _{SE} (dS/m): 0.3	Potential infiltration rate: Moderate	Est. Plant Available Water (% water): 13	
- Non-saline. Salinity effects on plants are mostly negligible.	Est. Permeability Class (mm/hr): 5 - 20	Est. Plant Available Water (mm/m): 130	

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

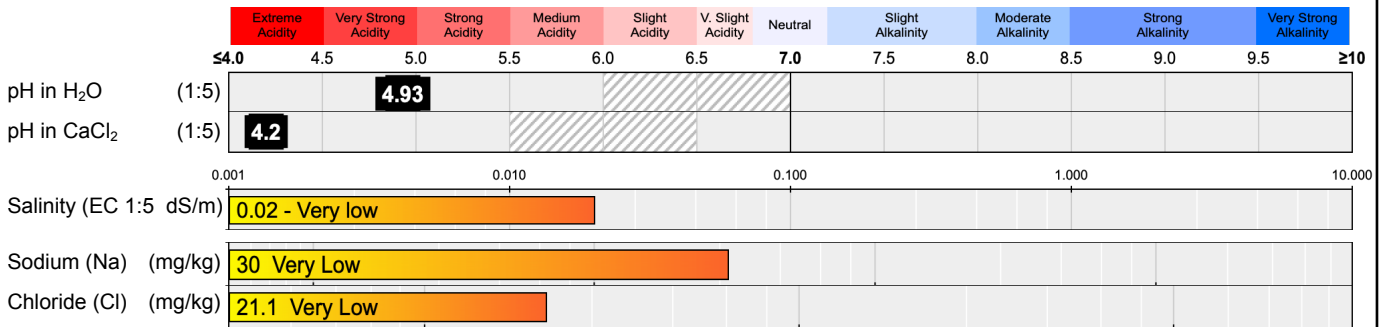
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 8	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S7 Topsoil (0-250)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2

ACTUAL

CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	0.2	3 – 6
Comment: Potential Calcium deficiency		
Mg:K	3	2.6 – 5.0
Comment: Balanced		
K/(Ca+Mg)	0.31	< 0.07
Comment: High		
K:Na	1.2	N/A

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)

4.4 Very Low

EXCHANGEABLE CATIONS (cmol(+)/kg)

Na:	K:	Ca:	Mg:	H:	Al:
0.13	0.15	0.07	0.42	2.36	1.2

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC.
The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 8	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S7 Topsoil (0-250)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

PLANT AVAILABLE NUTRIENTS										
EFFECTIVE AMELIORATION DEPTH (mm): <input type="radio"/> 100 <input checked="" type="radio"/> 150 <input type="radio"/> 200 DESIRED FERTILITY CLASS: <input type="radio"/> Low <input checked="" type="radio"/> Moderate <input type="radio"/> High										
Major Nutrients	Unit	Result	<input type="checkbox"/> Very Low <input type="checkbox"/> Low <input type="checkbox"/> Marginal <input type="checkbox"/> Adequate <input type="checkbox"/> High					Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	0.19						0	6	6
Phosphorus (P)	mg P/kg	<5						1	12.6	11.6
Potassium (K)	mg/kg	59						11.8	35.5	23.7
Sulfur (S)	mg S/kg	5.4						1.1	13.6	12.5
Calcium (Ca)	mg/kg	14						2.8	252.8	250
Magnesium (Mg)	mg/kg	51						10.2	26.7	16.5
Iron (Fe)	mg/kg	240						47.9	110.1	62.2
Manganese (Mn)	mg/kg	0.59						0.1	8.8	8.7
Zinc (Zn)	mg/kg	<0.65						0.1	1	0.9
Copper (Cu)	mg/kg	<0.64						0.1	1.3	1.2
Boron (B)	mg/kg	<0.1						0	0.5	0.5
Explanation of graph ranges: <input type="checkbox"/> Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.							NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adequate band, which maximises growth/yield, and economic efficiency, and minimises impact on the environment. Drawdown: The objective nutrient management is to utilise residual soil nutrients. There is no agronomic reason to apply fertiliser when soil test levels exceed Adequate. * g/sqm measurements are based on soil bulk density of 1.33 tonne/m ³ and effective amelioration depth.			
Phosphorus Saturation Index Low. Plant response to applied P is likely.			Exchangeable Acidity Adams-Evans Buffer pH (BpH): 7.4 Sum of Base Cations (cmol(+)/kg): 0.8 Eff. Cation Exch. Capacity (eCEC): 4.4 Base Saturation (%): 18.18 Exchangeable Acidity (cmol(+)/kg): 2.36 Exchangeable Acidity (%): 53.64			Lime Application Rate (g/sqm) – to achieve pH 6.0: 487 – to neutralise Al: 175 Calculated Gypsum Application Rate (CGAR) (g/sqm) to achieve 67.5 % exch. Ca: 0 <i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>				
PHYSICAL DESCRIPTION										
Texture: Sandy Clay Loam	Munsell Colour: -	Organic Carbon (OC %): Low - 0.9								
Estimated clay content: 20 - 30%	Structure Size: Fine (1 - 10mm)	Organic Matter (OM %): 1.5								
Tactually gravelly: Gravelly	Structural Organisation: Pedal - Weak	Est. Field Capacity (% water): 26								
Tactually organic: Not Organic	Structural Unit: Crumb	Est. Permanent Wilting Point (% water): 15								
Calculated EC _{SE} (dS/m): 0.2	Potential infiltration rate: Moderate	Est. Plant Available Water (% water): 11								
– Non-saline. Salinity effects on plants are mostly negligible.	Est. Permeability Class (mm/hr): 5 - 20	Est. Plant Available Water (mm/m): 110								

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

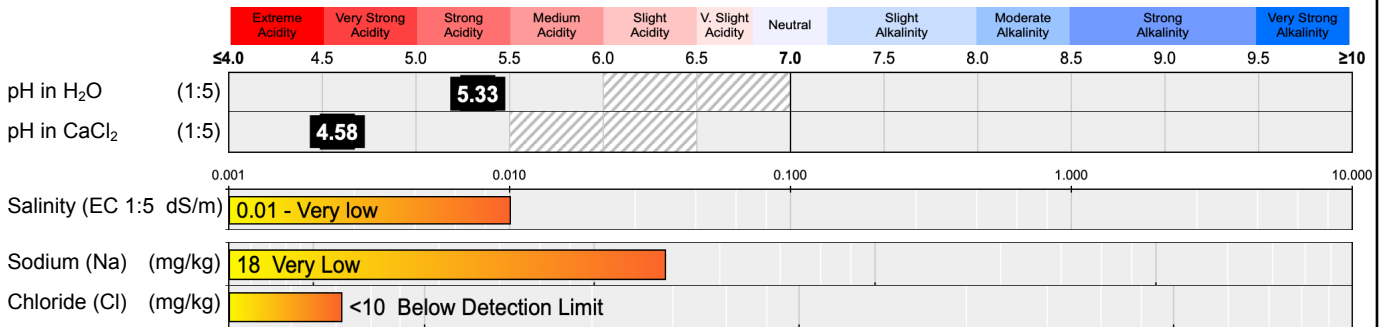
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 10	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S8 Topsoil (0-300)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

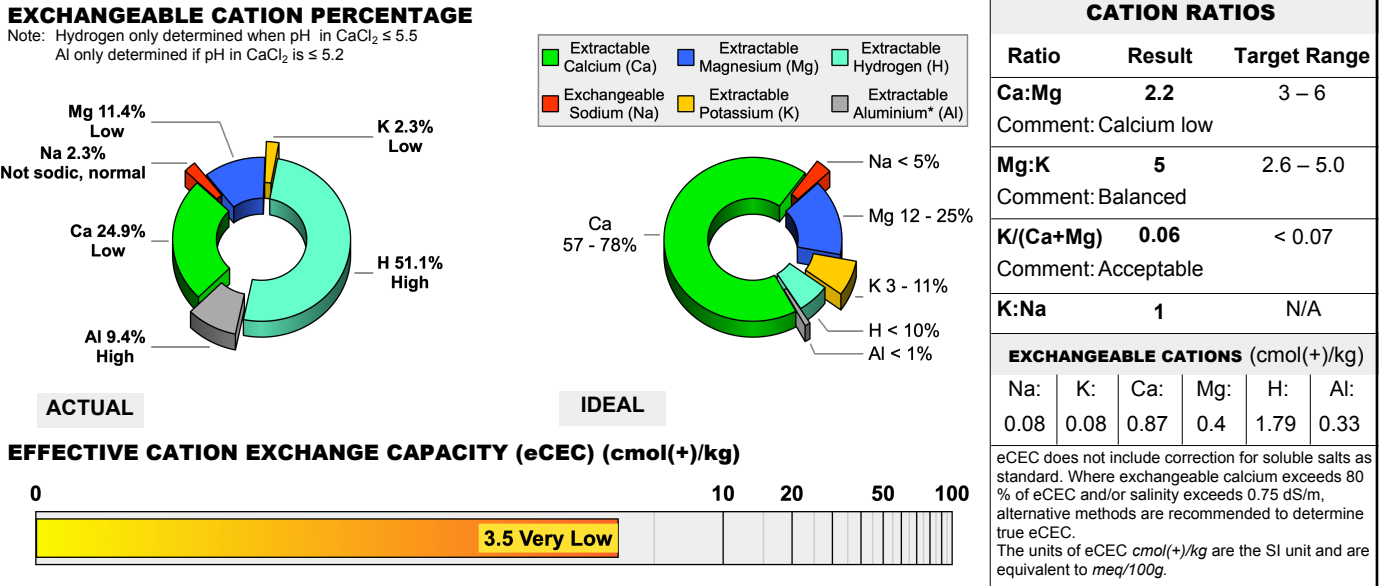
RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE



Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 10	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S8 Topsoil (0-300)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

PLANT AVAILABLE NUTRIENTS										
EFFECTIVE AMELIORATION DEPTH (mm): <input type="radio"/> 100 <input checked="" type="radio"/> 150 <input type="radio"/> 200 DESIRED FERTILITY CLASS: <input type="radio"/> Low <input checked="" type="radio"/> Moderate <input type="radio"/> High										
Major Nutrients	Unit	Result	<input type="checkbox"/> Very Low <input type="checkbox"/> Low <input type="checkbox"/> Marginal <input type="checkbox"/> Adequate <input type="checkbox"/> High					Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	0.19						0	6	6
Phosphorus (P)	mg P/kg	11						2.2	12.6	10.4
Potassium (K)	mg/kg	32						6.4	35.5	29.1
Sulfur (S)	mg S/kg	5.4						1.1	13.6	12.5
Calcium (Ca)	mg/kg	170						33.9	252.8	218.9
Magnesium (Mg)	mg/kg	48						9.6	26.7	17.1
Iron (Fe)	mg/kg	260						51.9	110.1	58.2
Manganese (Mn)	mg/kg	1.3						0.3	8.8	8.5
Zinc (Zn)	mg/kg	<0.65						0.1	1	0.9
Copper (Cu)	mg/kg	<0.64						0.1	1.3	1.2
Boron (B)	mg/kg	<0.1						0	0.5	0.5
Explanation of graph ranges: <input type="checkbox"/> Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.							NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adequate band, which maximises growth/yield, and economic efficiency, and minimises impact on the environment. Drawdown: The objective nutrient management is to utilise residual soil nutrients. There is no agronomic reason to apply fertiliser when soil test levels exceed Adequate. * g/sqm measurements are based on soil bulk density of 1.33 tonne/m ³ and effective amelioration depth.			
Phosphorus Saturation Index Low. Plant response to applied P is likely.			Exchangeable Acidity Adams-Evans Buffer pH (BpH): 7.7 Sum of Base Cations (cmol(+)/kg): 1.4 Eff. Cation Exch. Capacity (eCEC): 3.5 Base Saturation (%): 40 Exchangeable Acidity (cmol(+)/kg): 1.79 Exchangeable Acidity (%): 51.14			Lime Application Rate (g/sqm) – to achieve pH 6.0: 190 – to neutralise Al: 48 Calculated Gypsum Application Rate (CGAR) (g/sqm) to achieve 67.5 % exch. Ca: 0 <i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>				
PHYSICAL DESCRIPTION										
Texture: Fine Sandy Clay Loam Estimated clay content: 20 - 30% Tactually gravelly: Gravelly Tactually organic: Not Organic Calculated EC _{SE} (dS/m): 0.1 – Non-saline. Salinity effects on plants are mostly negligible.			Munsell Colour: - Structure Size: Medium (11 - 25mm) Structural Organisation: Pedal - Weak Structural Unit: Crumb Potential infiltration rate: Moderate Est. Permeability Class (mm/hr): 5 - 20			Organic Carbon (OC %): Low - 1.1 Organic Matter (OM %): 1.8 Est. Field Capacity (% water): 28 Est. Permanent Wilting Point (% water): 15 Est. Plant Available Water (% water): 13 Est. Plant Available Water (mm/m): 130				

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

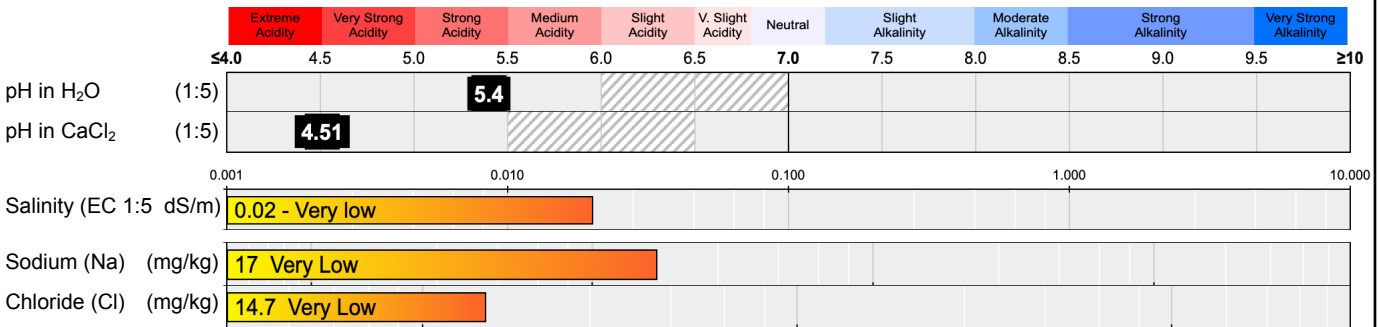
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 11	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S9 Topsoil (0-300)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

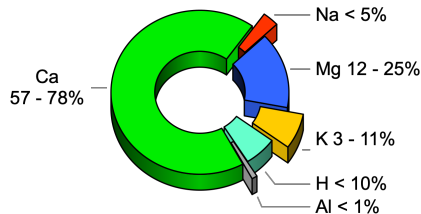
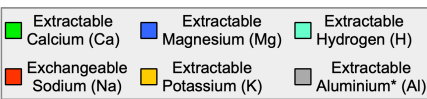
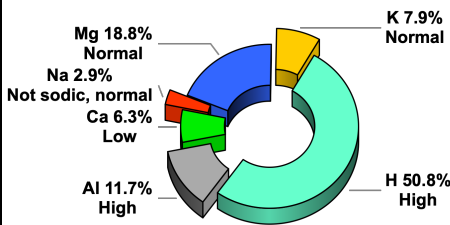
pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

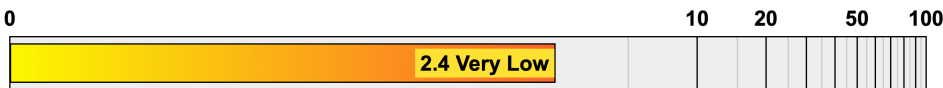
Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2



ACTUAL

IDEAL

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)



CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	0.3	3 – 6
Comment: Potential Calcium deficiency		
Mg:K	2	2.6 – 5.0
Comment: Magnesium low		
K/(Ca+Mg)	0.32	< 0.07
Comment: High		
K:Na	2.7	N/A

EXCHANGEABLE CATIONS (cmol(+)/kg)

Na:	K:	Ca:	Mg:	H:	Al:
0.07	0.19	0.15	0.45	1.22	0.28

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC. The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 11	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S9 Topsoil (0-300)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: FSC_Plus		

PLANT AVAILABLE NUTRIENTS										
EFFECTIVE AMELIORATION DEPTH (mm): <input type="radio"/> 100 <input checked="" type="radio"/> 150 <input type="radio"/> 200 DESIRED FERTILITY CLASS: <input type="radio"/> Low <input checked="" type="radio"/> Moderate <input type="radio"/> High										
Major Nutrients	Unit	Result	<input type="checkbox"/> Very Low <input type="checkbox"/> Low <input type="checkbox"/> Marginal <input type="checkbox"/> Adequate <input type="checkbox"/> High					Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	0.22						0	6	6
Phosphorus (P)	mg P/kg	<5						1	12.6	11.6
Potassium (K)	mg/kg	73						14.6	35.5	20.9
Sulfur (S)	mg S/kg	5.3						1.1	13.6	12.5
Calcium (Ca)	mg/kg	30						6	252.8	246.8
Magnesium (Mg)	mg/kg	55						11	26.7	15.7
Iron (Fe)	mg/kg	170						33.9	110.1	76.2
Manganese (Mn)	mg/kg	2						0.4	8.8	8.4
Zinc (Zn)	mg/kg	<0.65						0.1	1	0.9
Copper (Cu)	mg/kg	<0.64						0.1	1.3	1.2
Boron (B)	mg/kg	<0.1						0	0.5	0.5
Explanation of graph ranges: <input type="checkbox"/> Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.							NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adequate band, which maximises growth/yield, and economic efficiency, and minimises impact on the environment. Drawdown: The objective nutrient management is to utilise residual soil nutrients. There is no agronomic reason to apply fertiliser when soil test levels exceed Adequate. * g/sqm measurements are based on soil bulk density of 1.33 tonne/m ³ and effective amelioration depth.			
Phosphorus Saturation Index Low. Plant response to applied P is likely.			Exchangeable Acidity Adams-Evans Buffer pH (BpH): 7.8 Sum of Base Cations (cmol(+)/kg): 0.9 Eff. Cation Exch. Capacity (eCEC): 2.4 Base Saturation (%): 37.5 Exchangeable Acidity (cmol(+)/kg): 1.22 Exchangeable Acidity (%): 50.83			Lime Application Rate (g/sqm) – to achieve pH 6.0: 122 – to neutralise Al: 41 Calculated Gypsum Application Rate (CGAR) (g/sqm) to achieve 67.5 % exch. Ca: 43 <i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>				
PHYSICAL DESCRIPTION										
Texture: Fine Sandy Clay Loam Estimated clay content: 20 - 30% Tactually gravelly: Gravelly Tactually organic: Not Organic Calculated EC _{SE} (dS/m): 0.2 – Non-saline. Salinity effects on plants are mostly negligible.			Munsell Colour: - Structure Size: Fine (1 - 10mm) Structural Organisation: Pedal - Weak Structural Unit: Crumb Potential infiltration rate: Moderate Est. Permeability Class (mm/hr): 5 - 20			Organic Carbon (OC %): Very low - 0.6 Organic Matter (OM %): 1.1 Est. Field Capacity (% water): 28 Est. Permanent Wilting Point (% water): 15 Est. Plant Available Water (% water): 13 Est. Plant Available Water (mm/m): 130				

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile - Subsoil Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

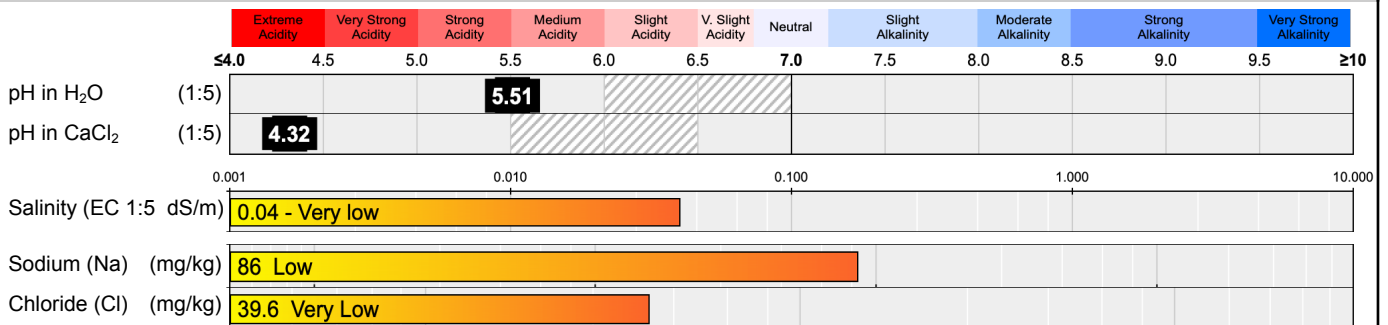
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 7	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S6 Subsoil (200-500)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: SSCP		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

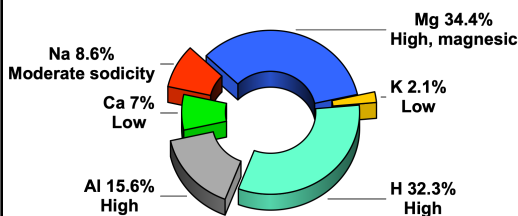
pH and ELECTRICAL CONDUCTIVITY



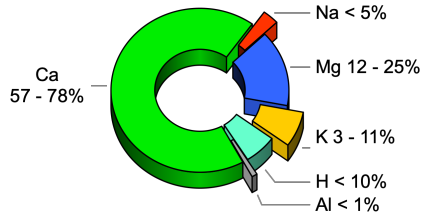
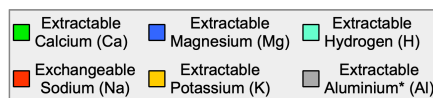
CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2

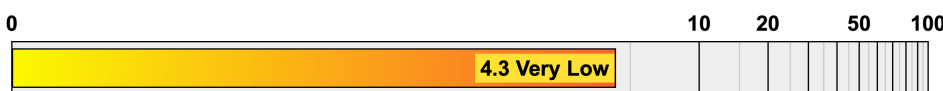


ACTUAL



IDEAL

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)



CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	0.2	3 – 6
Comment: Potential Calcium deficiency		
Mg:K	20	2.6 – 5.0
Comment: Potential Potassium		
K/(Ca+Mg)	0.05	< 0.07
Comment: Acceptable		
K:Na	0.24	N/A

EXCHANGEABLE CATIONS (cmol(+)/kg)

Na:	K:	Ca:	Mg:	H:	Al:
0.37	0.09	0.3	1.48	1.39	0.67

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC.
The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile - Subsoil Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 7	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S6 Subsoil (200-500)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: SSCP		

EFFECTIVE AMELIORATION DEPTH (mm): ○ 100 ● 150 ○ 200

PLANT AVAILABLE NUTRIENTS

Major Nutrients	Result (mg/kg)	Result (g/sqm)	Very Low	Low	Marginal	Adequate	High	
Potassium (K)	35	7	[Bar chart showing Potassium levels across categories]					
Calcium (Ca)	60	12	[Bar chart showing Calcium levels across categories]					
Magnesium (Mg)	180	35.9	[Bar chart showing Magnesium levels across categories]					

Subsoil nutrients are only able to be effectively amended where the subsoil is exposed (through stripping of topsoil) or in stockpile form for profile reconstruction. For in-situ profiles analysis enables insight for management considerations.

Explanation of graph ranges:

Very Low

Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.

Low

Potential "hidden hunger", or sub-clinical deficiency. Potential response to nutrient addition is 60 to 90 %.

Marginal

Supply of this nutrient is barely adequate for the plant; and build-up is still recommended. Potential response to nutrient addition is 30 to 60 %.

Adequate

Supply of this nutrient is adequate for the plant, and only maintenance application rates are recommended. Potential response to nutrient addition is 5 to 30 %.

High

The level is excessive and may be detrimental to plant growth (i.e. phytotoxic) and may contribute to pollution of ground and surface waters. Drawdown is recommended. Potential response to nutrient addition is <2 %.

EXCHANGEABLE ACIDITY

Adams-Evans Buffer pH (BpH):	7.7
Sum of Base Cations (cmol(+)/kg):	2.2
Eff. Cation Exch. Capacity (eCEC):	4.3
Base Saturation (%):	51.16
Exchangeable Acidity (cmol(+)/kg):	1.39
Exchangeable Acidity (%):	32.33

LIME APPLICATION RATE

– to achieve pH 6.0 (g/sqm):	169
– to neutralise Al (g/sqm):	98

CALCULATED GYPSUM APPLICATION RATE

– to achieve 67.5% exchangeable Calcium (g/sqm):	157
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The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.

PHYSICAL DESCRIPTION

Texture: Sandy Clay Loam	Munsell Colour: -	Est. Field Capacity (% water): 26
Estimated clay content: 20 - 30%	Structure Size: Fine (1 - 10mm)	Est. Permanent Wilting Point (% water): 15
Tactually gravelly: Not gravelly	Structural Organisation: Pedal - Weak	Est. Plant Available Water (% water): 11
Tactually organic: Not Organic	Structural Unit: Crumb	Est. Plant Available Water (mm/m): 110
Calculated EC _{SE} (dS/m): 0.4	Potential infiltration rate: Moderate	
– Non-saline. Salinity effects on plants are mostly negligible.	Est. Permeability Class (mm/hr): 5 - 20	

Consultant: **Annalise Grieve**

Authorised Signatory: **Owen Guy**

METHOD REFERENCES:

pH (1:5 H₂O) - SESL CM0002; Rayment & Lyons 4A1-2011
pH (1:5 CaCl₂) - SESL CM0002; Rayment & Lyons 4B4-2011
EC (1:5) - SESL CM0001; Rayment & Lyons 3A1-2011
Aluminium - SESL CM0007; Rayment & Lyons 15A1-2011
K, Ca, Mg, Na - SESL CM0007; Rayment & Lyons 18F1-2011
Buffer pH and Hydrogen - SSSA Methods of Soil Analysis 2007, Pt 3, Ch 17; Adams-Evans (1962)
Texture/Structure/Colour - PM0003 (Texture - "Northcote" (1992), Structure - "Murphy" (1991), Colour - "Munsell" (2000))

*Structure analysed in the laboratory is conducted on a disturbed sample, therefore is only a representation of the macro-structures that may be present in the field, which provide an indication of the soil physical characteristics and behaviours that may exist.



Soil Chemistry Profile - Subsoil Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

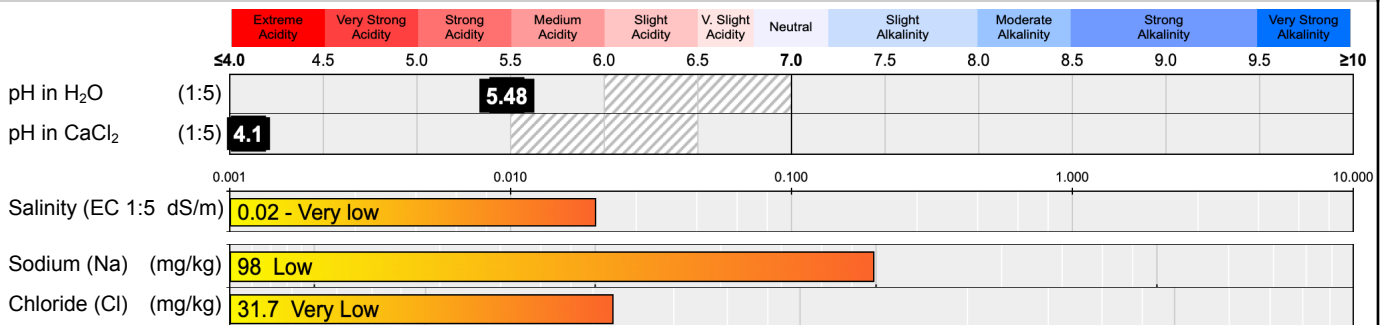
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 9	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S7 Subsoil (250-700)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: SSCP		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

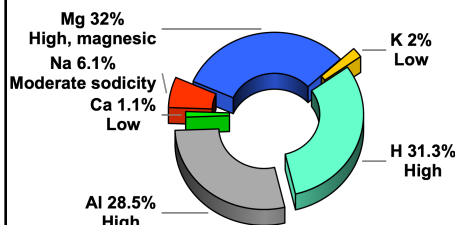
pH and ELECTRICAL CONDUCTIVITY



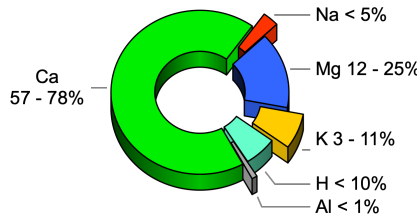
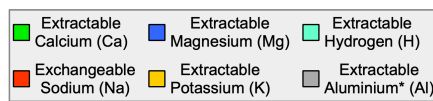
CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2



ACTUAL



IDEAL

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)



CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	0	3 – 6
Comment: Potential Calcium deficiency		
Mg:K	20	2.6 – 5.0
Comment: Potential Potassium		
K/(Ca+Mg)	0.06	< 0.07
Comment: Acceptable		
K:Na	0.33	N/A

EXCHANGEABLE CATIONS (cmol(+)/kg)

Na:	K:	Ca:	Mg:	H:	Al:
0.43	0.14	0.08	2.27	2.22	2.02

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC.
The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile - Subsoil Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 9	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S7 Subsoil (250-700)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: SSCP		

EFFECTIVE AMELIORATION DEPTH (mm): ○ 100 ● 150 ○ 200

PLANT AVAILABLE NUTRIENTS			
Major Nutrients	Result (mg/kg)	Result (g/sqm)	<input type="checkbox"/> Very Low <input checked="" type="checkbox"/> Low <input type="checkbox"/> Marginal <input checked="" type="checkbox"/> Adequate <input type="checkbox"/> High
Potassium (K)	53	10.6	
Calcium (Ca)	16	3.2	
Magnesium (Mg)	280	55.9	

Subsoil nutrients are only able to be effectively amended where the subsoil is exposed (through stripping of topsoil) or in stockpile form for profile reconstruction. For in-situ profiles analysis enables insight for management considerations.

Explanation of graph ranges:

<input type="checkbox"/> Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.	<input checked="" type="checkbox"/> Low Potential "hidden hunger", or sub-clinical deficiency. Potential response to nutrient addition is 60 to 90 %.	<input type="checkbox"/> Marginal Supply of this nutrient is barely adequate for the plant; and build-up is still recommended. Potential response to nutrient addition is 30 to 60 %.	<input checked="" type="checkbox"/> Adequate Supply of this nutrient is adequate for the plant, and only maintenance application rates are recommended. Potential response to nutrient addition is 5 to 30 %.	<input type="checkbox"/> High The level is excessive and may be detrimental to plant growth (i.e. phytotoxic) and may contribute to pollution of ground and surface waters. Drawdown is recommended. Potential response to nutrient addition is <2 %.
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EXCHANGEABLE ACIDITY	
Adams-Evans Buffer pH (BpH):	7.3
Sum of Base Cations (cmol(+)/kg):	2.9
Eff. Cation Exch. Capacity (eCEC):	7.1
Base Saturation (%):	40.85
Exchangeable Acidity (cmol(+)/kg):	2.22
Exchangeable Acidity (%):	31.27

LIME APPLICATION RATE	
– to achieve pH 6.0 (g/sqm):	406
– to neutralise Al (g/sqm):	295

CALCULATED GYPSUM APPLICATION RATE	
– to achieve 67.5% exchangeable Calcium (g/sqm):	112
<i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>	

PHYSICAL DESCRIPTION			
Texture: Sandy Clay Loam	Munsell Colour: -	Est. Field Capacity (% water):	26
Estimated clay content: 20 - 30%	Structure Size: Medium (11 - 25mm)	Est. Permanent Wilting Point (% water):	15
Tactually gravelly: Gravelly	Structural Organisation: Pedal - Weak	Est. Plant Available Water (% water):	11
Tactually organic: Not Organic	Structural Unit: Crumb	Est. Plant Available Water (mm/m):	110
Calculated EC _{SE} (dS/m): 0.2	Potential infiltration rate: Moderate		
– Non-saline. Salinity effects on plants are mostly negligible.	Est. Permeability Class (mm/hr): 5 - 20		

Consultant: **Annalise Grieve**

Authorised Signatory: **Owen Guy**

METHOD REFERENCES:
pH (1:5 H₂O) - SESL CM0002; Rayment & Lyons 4A1-2011
pH (1:5 CaCl₂) - SESL CM0002; Rayment & Lyons 4B4-2011
EC (1:5) - SESL CM0001; Rayment & Lyons 3A1-2011
Aluminium - SESL CM0007; Rayment & Lyons 15A1-2011
K, Ca, Mg, Na - SESL CM0007; Rayment & Lyons 18F1-2011
Buffer pH and Hydrogen - SSSA Methods of Soil Analysis 2007, Pt 3, Ch 17; Adams-Evans (1962)
Texture/Structure/Colour - PM0003 (Texture - "Northcote" (1992), Structure - "Murphy" (1991), Colour - "Munsell" (2000))

*Structure analysed in the laboratory is conducted on a disturbed sample, therefore is only a representation of the macro-structures that may be present in the field, which provide an indication of the soil physical characteristics and behaviours that may exist.



Soil Chemistry Profile - Subsoil Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

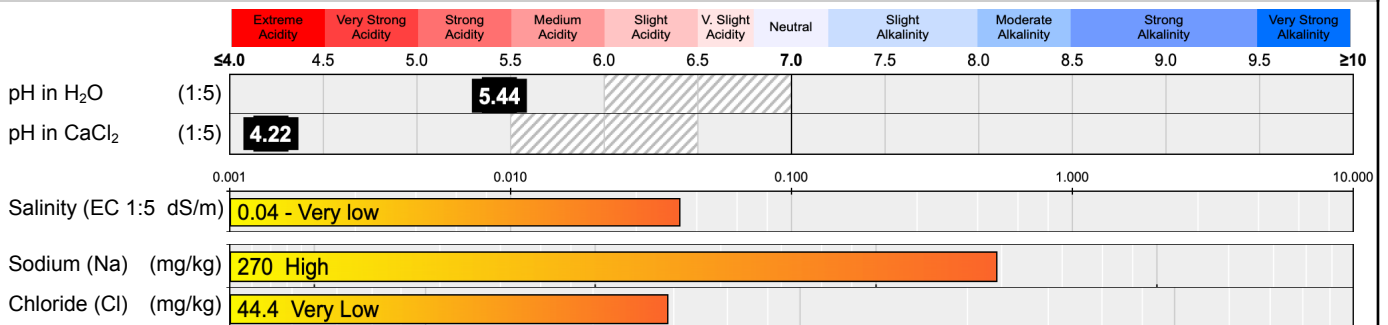
Tel: 1300 30 40 80
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 69617	Sample N°: 12	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S9 Subsoil (300-700)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: SSCP		

RECOMMENDATIONS

Preliminary results for Eco Logical Australia - Please refer to full report for details and recommendations

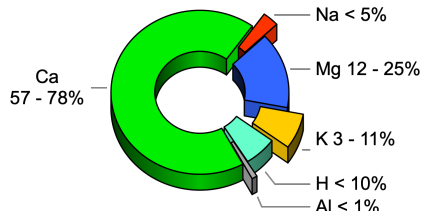
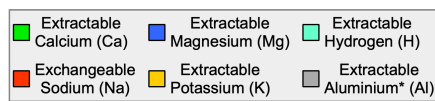
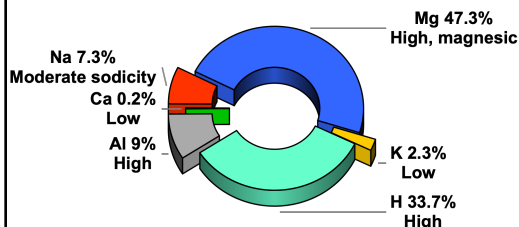
pH and ELECTRICAL CONDUCTIVITY



CATION BALANCE

EXCHANGEABLE CATION PERCENTAGE

Note: Hydrogen only determined when pH in CaCl₂ ≤ 5.5
Al only determined if pH in CaCl₂ is ≤ 5.2



ACTUAL

IDEAL

EFFECTIVE CATION EXCHANGE CAPACITY (eCEC) (cmol(+)/kg)



CATION RATIOS

Ratio	Result	Target Range
Ca:Mg	0	3 – 6
Comment: Potential Calcium deficiency		
Mg:K	20	2.6 – 5.0
Comment: Potential Potassium		
K/(Ca+Mg)	0.05	< 0.07
Comment: Acceptable		
K:Na	0.32	N/A

EXCHANGEABLE CATIONS (cmol(+)/kg)

Na:	K:	Ca:	Mg:	H:	Al:
1.19	0.38	0.03	7.76	5.52	1.47

eCEC does not include correction for soluble salts as standard. Where exchangeable calcium exceeds 80 % of eCEC and/or salinity exceeds 0.75 dS/m, alternative methods are recommended to determine true eCEC. The units of eCEC *cmol(+)/kg* are the SI unit and are equivalent to *meq/100g*.

Consultant:
Annalise Grieve

Authorised Signatory:
Owen Guy



Soil Chemistry Profile - Subsoil Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road
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Batch N°: 69617	Sample N°: 12	Date Report Generated: 19/03/2025	Report Status: Draft
Client Name: Eco Logical Australia	Project Name: Lynwood Quarry Soil Investigation		
Client Contact: Chelsea Philip	SESL Quote N°:		
Client Order N°:	Sample Name: S9 Subsoil (300-700)		
Address: 11A Level 2 London Circuit Canberra ACT 2601	Description: Soil		
	Test Type: SSCP		

EFFECTIVE AMELIORATION DEPTH (mm): ○ 100 ● 150 ○ 200

PLANT AVAILABLE NUTRIENTS			
Major Nutrients	Result (mg/kg)	Result (g/sqm)	<input type="checkbox"/> Very Low <input checked="" type="checkbox"/> Low <input type="checkbox"/> Marginal <input checked="" type="checkbox"/> Adequate <input type="checkbox"/> High
Potassium (K)	150	29.9	
Calcium (Ca)	6.9	1.4	
Magnesium (Mg)	940	187.5	

Subsoil nutrients are only able to be effectively amended where the subsoil is exposed (through stripping of topsoil) or in stockpile form for profile reconstruction. For in-situ profiles analysis enables insight for management considerations.

Explanation of graph ranges:

<input type="checkbox"/> Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Potential response to nutrient addition is >90 %.	<input checked="" type="checkbox"/> Low Potential "hidden hunger", or sub-clinical deficiency. Potential response to nutrient addition is 60 to 90 %.	<input type="checkbox"/> Marginal Supply of this nutrient is barely adequate for the plant; and build-up is still recommended. Potential response to nutrient addition is 30 to 60 %.	<input checked="" type="checkbox"/> Adequate Supply of this nutrient is adequate for the plant, and only maintenance application rates are recommended. Potential response to nutrient addition is 5 to 30 %.	<input type="checkbox"/> High The level is excessive and may be detrimental to plant growth (i.e. phytotoxic) and may contribute to pollution of ground and surface waters. Drawdown is recommended. Potential response to nutrient addition is <2 %.
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EXCHANGEABLE ACIDITY	
Adams-Evans Buffer pH (BpH):	6.9
Sum of Base Cations (cmol(+)/kg):	9.4
Eff. Cation Exch. Capacity (eCEC):	16.4
Base Saturation (%):	57.32
Exchangeable Acidity (cmol(+)/kg):	5.52
Exchangeable Acidity (%):	33.66

LIME APPLICATION RATE	
– to achieve pH 6.0 (g/sqm):	592
– to neutralise Al (g/sqm):	215

CALCULATED GYPSUM APPLICATION RATE	
– to achieve 67.5% exchangeable Calcium (g/sqm):	879
<i>The CGAR is corrected for the selected effective amelioration depth (150 mm) and any Lime addition to achieve pH 6.0.</i>	

PHYSICAL DESCRIPTION			
Texture:	Sandy Clay	Munsell Colour:	-
Estimated clay content:	35 - 45%	Structure Size:	Medium (11 - 25mm)
Tactually gravelly:	Not gravelly	Structural Organisation:	Pedal - Strong
Tactually organic:	Not Organic	Structural Unit:	Crumb
Calculated EC _{SE} (dS/m):	0.3	Potential infiltration rate:	Slow
– Non-saline. Salinity effects on plants are mostly negligible.		Est. Permeability Class (mm/hr):	5 - 20
		Est. Field Capacity (% water):	29
		Est. Permanent Wilting Point (% water):	19
		Est. Plant Available Water (% water):	10
		Est. Plant Available Water (mm/m):	100

Consultant: **Annalise Grieve**

Authorised Signatory: **Owen Guy**

METHOD REFERENCES:

pH (1:5 H₂O) - SESL CM0002; Rayment & Lyons 4A1-2011
pH (1:5 CaCl₂) - SESL CM0002; Rayment & Lyons 4B4-2011
EC (1:5) - SESL CM0001; Rayment & Lyons 3A1-2011
Aluminium - SESL CM0007; Rayment & Lyons 15A1-2011
K, Ca, Mg, Na - SESL CM0007; Rayment & Lyons 18F1-2011
Buffer pH and Hydrogen - SSSA Methods of Soil Analysis 2007, Pt 3, Ch 17; Adams-Evans (1962)
Texture/Structure/Colour - PM0003 (Texture - "Northcote" (1992), Structure - "Murphy" (1991), Colour - "Munsell" (2000))

*Structure analysed in the laboratory is conducted on a disturbed sample, therefore is only a representation of the macro-structures that may be present in the field, which provide an indication of the soil physical characteristics and behaviours that may exist.