

FINAL Soil Assessment for Replacement of Lombardy Poplars at National Library of Australia

> Prepared for: CIA Landscape and Colour August 2018



Document Record

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Our Ref:J000781 NLA Tree Replacement 1.0.docx

10/08/2018

CIA Landscapes and Colour, 36 Mildura Street, Fyshwick ACT 2609

Attention: Catherine Barrow

Via email: Catherine@cialanddscapes.com

Dear Catherine,

Re: Soil Assessment for Replacement of Lombardy Poplars at National Library of Australia

1. Introduction and Objectives

SESL Australia Pty Ltd (SESL) has been commissioned by CIA Landscapes and Colour (CIA) to conduct a soil assessment for the replacement of Lombardy Poplar trees at the National Library of Australia (NLA – the site) located at Barton (parliamentary triangle) for the National Capital Authority (NCA). The forecourt of the NLA contains 44 Lombardy Poplars that contribute to a significant cultural landscape within the parliamentary zone in Canberra. In recent years, the deteriorating conditions of the poplars has created concerns for the NCA, and therefore has engaged CIA to design and manage the replacement.

As part of the tree replacement program, a soil assessment is required to complement the removal and replacement of the trees. The objectives of this assessment are:

- Characterise the chemical and physical properties of site soil;
- Determine the soil resource available on-site in the existing forecourts that can be reused on-site for the tree replacement program.
- Identify the potential constraints from the existing trees and soil condition that may impact the tree replacement program.
- Prescribe planting and soil improvement strategies to address the constraints identified, and to ensure successful replacement of the trees.
- Develop a site-specific soil specification for the importation of topsoil as topsoil backfill for the new trees as a quality control measure.

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This report outlines the findings of the limited soil assessment conducted by SESL. Site assessment was conducted by Douglas Partners on 24th July 2018, with site inspection and soil sampling undertaken by Douglas Partners, and soil samples provided to SESL for laboratory assessment.

2. Proposed Tree Replacement Program

The proposed tree replacement program on-site will involve:

- Removing the existing trees;
- Strip existing grass and topsoil on-site, up to 400 mm below ground.
- Treat subgrade material with gypsum, followed by ripping the subgrade or imported fill.
- Planting of new trees on the two terraces of the forecourt (approximately 11 trees per row, with two rows on each terrace). Each terrace covers an area of approximately 1,500m².
- Reinstatement of turf on the terraces, with proposed species of tall fescues and Kentucky blue grass (irrigated turf).

The current tree species on-site are Lombardy Poplar. At the time of assessment, the replacement tree species is not finalised. SESL was advised by NCA that the proposed species shall reinstate the cultural landscape in the area, and emphasise the NLA and its east-west axis.

NCA advised that the selected species shall resemble similar features to the site, with advanced trees of columnar shape. At this stage the species under consideration as advised by NCA and CIA are:

- Lombardy Poplar (*Populus nigra 'Italica'*)
- English Oak (*Quercus robur 'Fastigiata'*)

SESL notes Lombardy Poplar is currently listed as a pest plant under the *Pest Plants and Animals (Pest Plants) Declaration 2015 (ACT)*, and the planting of Lombardy Poplars in the ACT is prohibited.

NCA advised that due to presence of Lombardy Poplars roots and rootless across the site and within site topsoil, the topsoil on-site will not be used as topsoil backfill for the new trees due to concern of remaining rootlets establishing on-site. Topsoil for the new trees will either be imported, or reuse of A2 horizon materials on-site (if suitable), with site-won topsoil either reused on-site for turf establishment, or disposed off-site.

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3. Soil Landscape

The soil in this area is within the Williamsdale soil landscape groups according to the Soil Landscape of the Canberra 1:100 000 Sheet Report (Jenkins 2000). The description of the soil landscape group and its associated documented soil limitation is shown in Table 1. SESL notes however the forecourt of the NLA where the existing Lombardy Poplars are currently located, is planted on raised grounds (terraces), with topsoil likely consisting of imported materials.

Table 1 – Soil Landscape Type

Soil Landscape Type	Soil Description & Limitation
Williamsdale	 Soils: Topsoil consists of brownish black to brown to black loam to sandy loam (A1 horizon), with underlying dull yellowish brown sandy clay to clay loam subsoil (A2 horizon). Limitations: Low fertility and acidic topsoil. Low fertility and strongly acidic subsoils. High erodibility subsoil. Low permeability subsoil. Seasonal waterlogging.

4. Analysis Plan

Site assessment was undertaken by Douglas Partners on 24th July 2018, with eight locations (boreholes) inspected (see Appendix B: Site Map). SESL attended site to review the soil samples collected by Douglas Partners, and selected topsoil and subsoil samples for analysis.

The samples selected for analysis are:

Table 2 – Stockpile and sample detai	ls
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Forecourt	Boreholes	Samples for	Analysis	
	Constructed	Analysis		
Northern	BH1	BH1 0 – 0.15 m	Topsoil chemical and physical properties	
Forecourt	BH2	BH1 0.35 – 0.5 m	Subsoil chemical properties	
	BH3	BH3 0 – 0.1 m	Topsoil chemical and physical properties	
	BH4	BH4 0 – 0.1m	Topsoil chemical and physical properties	
		BH4 0.3 – 0.5 m	Subsoil chemical properties	
Southern	BH5	BH7 0 – 0.1m	Topsoil chemical and physical properties	
Forecourt	BH6	BH7 0.8 – 1.0 m	Limited physical properties	
	BH7	BH8 0.1 – 0.2 m	Topsoil chemical and physical properties	
	BH8			

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The samples above were analysed for chemical properties and basic physical analysis at SESL's NATA (NATA #15633) accredited analytical laboratory for the following:

- Topsoil chemical properties pH in water (H₂O), pH in calcium chloride (CaCl₂), electrical conductivity, nutrients: nitrate, phosphate, potassium, sulfate, calcium, magnesium, cation exchange properties; trace elements: iron, manganese, zinc, copper, boron; organic carbon, organic matter content.
- Subsoil chemical properties pH in water (H₂O), pH in calcium chloride (CaCl₂), electrical conductivity, nutrients: nitrate, phosphate, potassium, calcium, magnesium, cation exchange properties:
- Topsoil physical properties soil texture, structure, estimated infiltration rate, aggregate strength, estimated clay content and estimated permeability.
- Limited physical properties pH in water (H₂O), pH in calcium chloride (CaCl₂), electrical conductivity and saturated hydraulic conductivity.

In addition to the analysis above, all topsoil and subsoil samples were composited respectively and analysed for saturated hydraulic conductivity to determine the soils' permeability under compaction.

5. Soil Profile

Based on the site assessment conducted by Douglas Partners, the borehole logs indicated the following soil profile observations on-site (see Appendix B: Borelogs):

- Topsoil depths range from 0.15 m to 0.3 m, comprising of dark brown sandy silty clay and gravelly sandy clay, with abundant grass and tree rootlets.
- Subsoil underlying topsoil range from 0.15 m to 0.85 m, comprising of grey brown sandy clayey materials, with pale yellow brown silty clayey gravel materials, with siltstone fragments.
- Horizon C comprised of yellow grey brown siltstone materials, starting from 0.55 m to 0.8 m, with varying degree of weathered stone.

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6. Laboratory Results Summary

Table 3 – Summary of Laboratory Results (see Appendix C)

Borehole Location	Laboratory Results
BH1 Topsoil (0 – 0.15 m)	 Soil is slightly alkaline in water and neutral in CaCl₂, with low salinity; Cation exchange is relatively balanced, with slightly low potassium, and high cation exchange capacity; Low nutrient levels of nitrate and sulfate; Elevated levels of phosphorus, potassium, calcium, magnesium and zinc; Very high organic carbon and organic matter content; Soil is a fine sandy loam material; and Saturated hydraulic conductivity data showed good permeability under low and light compaction, with acceptable permeability under heavy compaction.
Subsoil (0.35 – 0.5 m)	 Soil is moderately alkaline in water and slightly alkaline in CaCl₂, with moderate salinity; Cation exchange is moderately sodic, with low potassium, and moderate cation exchange capacity; Low nutrient levels of nitrate and potassium; Elevated levels of magnesium; Soil is a sandy clay loam material; and Saturated hydraulic conductivity data showed good permeability under low and light compaction, with significantly reduced permeability (poor drainage) under heavy compaction.
BH3 Topsoil (0 – 0.1 m)	 Soil is neutral in water and very slightly acidic in CaCl₂, with low salinity; Cation exchange is calcic, with high cation exchange capacity; Low nutrient levels of nitrate, sulfur and copper; Elevated levels of phosphate, potassium, calcium, manganese and zinc; Very high organic carbon and organic matter content; Soil is a fine sandy loam; and Saturated hydraulic conductivity data showed that good permeability under low and light compaction, with acceptable permeability under heavy compaction.
BH4 Topsoil (0 – 0.1 m)	 Soil is very slightly acidic in water and slightly acidic in CaCl₂, with low salinity; Cation exchange is calcic, with moderate cation exchange capacity; Low nutrient levels of nitrate, potassium, sulfur, copper and boron; Elevated levels of phosphate, calcium, magnesium and zinc; Very high organic carbon and organic matter content; Soil is a fine sandy clay loam; and Saturated hydraulic conductivity data showed good permeability under low and light compaction, with acceptable permeability under heavy compaction.

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Borehole Location	Laboratory Results
Subsoil (0.3 – 0.5 m)	 Soil is neutral in water and very slightly acidic in CaCl₂, with very low salinity; Cation exchange is relatively balance, with low potassium, and low cation exchange capacity; Low nutrient levels of nitrate, phosphate, potassium and calcium; Elevated levels of magnesium; Soil is a light sandy clay loam material; and Saturated hydraulic conductivity data showed good permeability under low and light compaction, with significantly reduced permeability (poor drainage) under heavy compaction.
BH7 Topsoil (0 – 0.1 m)	 Soil is slightly alkaline in water and neutral in CaCl₂, with moderate salinity; Cation exchange is relatively balance, with moderate cation exchange capacity; Elevated levels nutrients for nitrate, phosphate, potassium, sulfur, calcium, magnesium, manganese and zinc; Moderate organic carbon and organic matter content; Soil is a fine sandy clay loam; and Saturated hydraulic conductivity data showed good permeability under low and light compaction, with acceptable permeability under heavy compaction. Materials is strongly alkaline in water and moderately alkaline in CaCl₂ with moderate
siltstone (0.8 – 1.0 m)	 Materials is strongly alkaline in water and moderately alkaline in OdOl₂, with moderate salinity; and Saturated hydraulic conductivity data showed very good permeability under low compaction, with significantly reduced permeability (poor drainage) under light and heavy compaction.
BH8 Topsoil (0.1 – 0.2 m)	 Soil is moderately alkaline in water and slightly alkaline in CaCl₂, with low salinity; Cation exchange is calcic, with moderate cation exchange capacity; Low nutrient levels of nitrate and copper; Elevated levels of potassium, calcium, magnesium, manganese and zinc; Very high organic carbon and organic matter content; Soil is a fine sandy clay loam; and Saturated hydraulic conductivity data showed good permeability under low and light compaction, with acceptable permeability under heavy compaction.

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7. Discussion

Based on the results above, SESL notes the following:

- Topsoil materials from both sites were generally calcic and alkaline, uncharacteristic of the typical Canberra topsoil of acidic and magnesic soils (see Table 1). This indicates the topsoil may have been amended with lime (based on soil pH).
- Topsoils are predominantly low in nitrate except for one location (BH7). This suggests the site topsoils • are likely suffering from nitrogen deficiency.
- The high organic carbon and phosphate indicates composted organics are likely to have been applied to site topsoil.
- Some topsoils showed elevated manganese, indicating a possibility of seasonal waterlogging, likely during colder dry months.
- Topsoils and subsoils primarily show moderate to high cation exchange capacity, except for subsoil of • BH4, indicating generally good nutrient retention capacity.
- Topsoils show reasonable draining under heavy compaction.
- The elevated zinc content may be due to the addition of organic materials. However, the zinc concentration is not considered to pose plant growth concerns for the proposed landscape development.

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8. Soil Improvement Program

Based on the soil results and proposed planting, recommendations on soil treatment and planting for the site are shown in Table 4.

Table 4 – Soil Improvement Program

Planting	Soil treatment / Planting Advice			
1. Advanced tree planting	 The topsoil on-site can be can be made suitable to be used as topsoil backfill for the advanced tree planting with amelioration. However, SESL notes NCA is concerned about residual rootlets in the topsoil which may pose a risk of regrowth of the former Lombardy Poplars. A soil specification to guide the importation of topsoil to site is provided in Appendix A. Based on limited data of subsoil analysed (2 samples), SESL does not consider the A2 horizon materials to be suitable for reuse as topsoil backfill for the trees, due to increased clay content and low permeability of the subsoil. In the event the topsoil is to be considered for reuse on-site, SESL necemmends the following: Screen the topsoil to remove roots (i.e. 25 mm trommel); this can be conducted concurrently with incorporation of fertiliser into topsoil. SESL notes the cost for screening the materials may be significant, due to small volume of material (approximately 900 m³ of topsoil). However, in comparison to cost associated with importing topsoil and removing site-won topsoil off-site for disposal, this option should be considered. Apply 20 g/m³ of sulfate of ammonia to improve nitrogen and sulfur concentration. Apply 20 mm of composted green waste fines to surface soil, prior to mulching. Mulch layer should be no more than 75 mm thick, and shall be at least 100 mm away from the collar of the tree trunk. Apply multi-purpose slow release fertiliser 6 months after planting at 50 g/m² as a long term maintenance. SESL notes subgrade treatment with gypsum will be undertaken, including ripping of subgrade to 300 mm depth, prior to backfilling with topsoil. Based on the limited subsoil data obtained (2 samples analysed from depth of 0.35 – 0.5 m), gypsum application is not required due to sufficient exchangeable calcium content. Excess gypsum will cause an influx of salt, in			

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Planting		Soil treatment / Planting Advice
2.	Irrigated Turf	 The topsoil on-site can be can be made suitable to be used as topsoil backfill for the reinstatement of turf on-site. However, SESL notes NCA is concern of the residual rootlets in the topsoil, posing risk for regrowth of the former Lombardy Poplar on-site and may not be using the topsoil on-site. In the event the topsoil is to be considered for reuse on-site, SESL recommends the following: Screen the topsoil to remove rootlets (i.e. 25 mm trommel). Apply 200 g/m³ of sulfate of ammonia to improve nitrogen and sulfur concentration.

Please note the following overall site recommendations:

- Attention to subsoil drainage and aeration of the tree transplant material is recommended. Advanced trees, with their deep roots, are vulnerable to transplant shock due to anoxia in the deep subsoil. Anoxia can be caused by planting into low permeability top- or sub-soils. Planting techniques and strategies must be adapted to ensure good aeration is maintained and to ensure rapid establishment of newly planted stock. SESL notes subsoil drainage will be installed at the border of the terraces, however we recommend that drainage be extended throughout the treesscape to connect with the border drainage. The low permeability of the subsoil indicates a risk of waterlogging in wet conditions and given the significance of the planting, in-ground drainage will constitute a valuable investment.
- Both Lombardy Poplars and English Oak prefer humus rich and moist soils, therefore sufficient irrigation is important, particularly during early establishment stage.
- The screening of site-won topsoil can be conducted concurrently doing treatment, removing large residual roots of the Lombardy Poplars. Residual rootlets can be treated in-situ where observed on spread topsoil via herbicide application (localised / spot application). This option may be considered, factoring costs associated with importing topsoil and disposing site-won topsoil, and for sustainability purposes.z
- Adequate soil quality validation to ensure the quality of topsoil to be supplied to site is required. Proposed imported topsoil shall be analysed for compliance against the specification provided (Appendix A), and certified compliant by a suitably qualified professional prior to site installation. Validation shall also be conducted on ameliorated site-won topsoil. Validation requirements are set out in the soil specifications (see Appendix A).

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- Amelioration of topsoil and subsoil should be undertaken at a time appropriate to the development works of the site a minimum of 3 weeks prior to plant installation.
- SESL notes that subsoils may be subjected to poor permeability under compaction, and the proposed work involve ripping of subsoils prior to topsoil backfill. To prevent heavy compaction and potential permeability and drainage issues following spreading of topsoil, SESL recommends the following:
 - Conduct spreading of topsoil near the end of the works on-site, to avoid unnecessary compaction whilst the rest of the works on site are being carried out;
 - It is vital that no compaction should be allowed on the terrace, otherwise the soil treatment undertaken will fail, particularly on the newly installed turf.
 - o Avoid driving on spread topsoil material especially if wet;
 - If trafficking of the site is unavoidable, provision should be made to de-compact the site subsoil and / or topsoil before seeding of the turf.

9. Conclusion

Based on information provided by the CIA and NCA, and results obtained, soil improvement is vital to the tree replacement at the NLA, while preserving the significant cultural landscape in the parliamentary triangle. SESL is pleased to present this report and recommendations. Please do not hesitate to contact us with any questions or clarifications.

SESL AUSTRALIA

& de Dourld.

Declan McDonald Senior Soil Scientist & Certified Professional Soil Scientist #S01444

Kelly Lee Soil Scientist

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Appendices

Appendix A: Soil Specification for Topsoil Backfill for Advanced Tree Planting Appendix B: Sampling Map and Borelogs provided by Douglas Partners Appendix C: SESL Soil Laboratory Reports

References

- SESL Australia, Report #48921
- Douglas Partners (2018) Borehole Logs and Borehole Investigation Sampling Map for National Library Poplar Replacement Project (Ref: 94037)
- NCA (2018) Draft Landscape Final Sketch Plan for Removal and Replacement of Lombardy Poplars at National Library of Australia
- Pest Plants and Animals (Pest Plants) Declaration 2015 (ACT)
- Standard Specification for Urban Infrastructure Works Section 9 Landscape (2009 ACT Government)
- Soil Landscape of the Canberra 1:100 000 Sheet Report (Jenkins 2000)

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Limitations

SESL has provided consulting services for this project based on information provided by CIA Landscapes and Colour, Douglas Partners and National Capital Authority, and as outlined in our discussions. SESL Australia Pty Limited (SESL) does not make any representation or warranty that the conclusions in this report will be applicable in the future as there may be changes in the condition of the materials covered in this assessment, applicable legislation or other factors that would affect the conclusions contained in this report.

SESL has used a degree of skill and care ordinarily exercised by reputable members of our profession practicing in the same or similar locality. SESL's assessment is based on the result of samples provided to SESL, and information provided. Neither SESL, nor any other reputable consultant, can provide unqualified warranties.

This report and associated documentation and the information herein have been prepared solely for the use of the CIA Landscapes and Colour, and National Capital 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

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Specification 1: Standard Topsoil Backfill for Advanced Trees (Exotic species)

Part A. 'Fit-for-purpose' performance description

A suitable topsoil backfill for mass planting of advanced exotic trees should comprise of sandy loam or clay loam and sandy clay loam materials. Soil material shall have a good nutrient concentration and is not subject to compaction by pedestrian or other traffic.

This specification is designed based on utilising amended site-won topsoil, or for imported topsoil.

Part B. Product specification (technical parameters)

The soil shall be free of foreign contaminants (eg. plastics, glass, metal etc) and meet all the performance criteria listed in Table 1. Where variations from these target ranges occur (i.e. non-compliance) refer to Specification 7.

Table 1 – Physical and Chemical Properties Performance Criteria for Topsoil Backfill for Advanced Tree Planting

Physical properties	Units	Performance Criteria
Texture, preferred range	n/a	Sandy loam to clay loam to sandy
		clay loam
Hydraulic conductivity / Permeability (@ 16 drops by	mm/hr	> 20
McIntyre Jakobsen)		
Wettability	minutes	> 5
Organic matter content	% dry weight	3 – 6
	basis	
Chemical properties	Units	Target Range
pH in water (1:5) standard range	pH units	5.8 – 7.0
pH in CaCl ₂ (1:5) standard range	pH units	5.5 – 6.5
Electrical conductivity (1:5)	dS/m	< 0.5
Phosphorus	mg/kg	30 – 75
Available Nitrogen (Nitrate – N + Ammonium – N)	mg/kg	25 – 75
Sodium (Na)	% of ECEC	< 6
Potassium (K)	% of ECEC	3 – 10
Calcium (Ca)	% of ECEC	60 – 80
Exchangeable Magnesium (Mg)	% of ECEC	15 – 25
Exchangeable Aluminium (Al)	% of ECEC	< 2
Exchangeable Ca/Mg ratio	Ratio	3 – 7

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Part C. Example components for the soil supplier

The following table outlines the fertiliser treatment designed to meet the performance criterial of this soil specification. Note: this is <u>not</u> part of the product specification. This treatment is based on using site-won topsoil. <u>Imported materials shall require a different fertiliser treatment</u> to comply with the specification.

Soil specifications	Soil type composition	Fertiliser treatment
Standard	 100% by volume 	At mixing:
topsoil backfill	site-won topsoil	 Add 200 g/m³ of sulfate of ammonia, or equivalent.
for advanced	or sandy loam	Apply 20 mm of composted green waste fines to surface soil,
trees – exotic	soil.	prior to mulching.
species		 Apply multi-purpose slow release fertiliser 50 g/m² 6 months
		after planting.

Table 2 – Example Soil Type Composition and Soil Treatment

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For the purposes of tendering, the contractor shall allow for the inclusion of the above soil amendments. However, the specific amendments required shall be verified by laboratory testing and soil scientist's recommendations (see Specification 2).

HOLD POINT 1	
Process Held:	Completion of <i>Topsoil Backfill for Advanced Tree Planting</i> initial compliance certification.
Submission	Initial soil analysis with sample provided by supplier or contractor demonstrated soil analysis
Details:	results compliant with Topsoil Backfill for Advanced Tree Planting. Sample analysed shall
	include topsoil improvement as recommended in specification.
Release of Hold	Submission of laboratory test certificates to superintendent together with suppliers, contractors
Point:	or independent soil scientist report certifying compliance or fit for purpose including acceptance
	of any non-compliance with or without conditions.

HOLD POINT 2	
Process Held:	Supply of Topsoil Backfill for Advanced Tree Planting.
Submission Details:	At least (3) working days prior to supply of <u>Topsoil Backfill for Advanced Tree Planting</u> the Contractor shall provide certificate(s) from a NATA registered or approved non NATA laboratory for physical and chemical analysis. Certificates are to be certified compliant or fit for purpose by a soil scientist, including acceptance of any non-compliance with or without conditions.
Release of Hold Point:	The superintendent shall examine the submitted documentation prior to authorising the release of the Hold Point.

HOLD POINT 3	
Process held:	Compliance failure of <i>Topsoil Backfill for Advanced Tree Planting</i> during ongoing compliance
	certification.
Submission	A corrective procedures specification from a qualified soil scientist for soil corrective
Details:	amendments to enable compliance with Topsoil Backfill for Advanced Tree Planting.
Release of Hold	Submission of laboratory test certificates to superintendent together with an independent soil
Point:	scientist report certifying the corrective procedure has resulted in compliance or fit for purpose
	including acceptance of any non-compliance with or without conditions. The superintendent
	shall examine the submitted documentation prior to authorising the release of the Hold Point.

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Specification 2: Quality Assurance and Control

The contractor shall use analytical testing to verify compliance with the Product Specification.

Part A. Initial compliance certification

Before any soil installation, the contractor or soil manufacturer shall submit samples of trial blends to an accredited testing laboratory to determine compliance with specifications (see Table 1). The trial blend shall be based on available test information on components and, if necessary, employ a soil scientist for advice.

Submit trial samples to the testing laboratory, allowing sufficient time for testing and re-formulation in the case of failure to satisfy the performance criteria. Once compliant, a test certificate clearly stating compliance with the applicable criteria shall be presented to the site supervisor or quality officer.

Note: Alternative test methodologies shall be accepted if certified as compliant by an independent expert agronomist or soil scientist.

Non-compliance shall automatically generate the first **Hold point 1**. No soil shall be installed until initial compliance certification has been demonstrated.

Manufacturer's product representation: For imported soils from manufacturers, a 'product representation' document produced by the supplier may be accepted as a compliance certificate if:

- It is an off-the-shelf product line, not a custom mix;
- A representative test certificate is available and is acceptably recent (within 6 months);
- The testing covers all the criteria in the performance specification; and
- The manufacturer's quality assurance system is certified by an external certifying organisation.

Part B. Record keeping (initial compliance)

Growing media initial compliance certification records shall be kept in a readily available format that provides for traceability of purchase and location on site. Each compliance certification for all the product specifications used on site shall be identified by date, quantity to be supplied and a copy of the formulation used to reach compliance.





The contractor shall submit samples of blended soils or imported soil mixes at regular intervals (based on volume of materials as shown in Table 9) during construction for the purposes of demonstrating continued compliance as part of quality control.

Part C. Test Submissions

For Hold Point 1, contractor or supplier shall submit representative samples of ~5 kg of each product specification, packed and labelled to indicate the source and the specification to be met. The samples shall be taken in a representative manner.

For Hold Point 2 and 3, representative samples shall be collected by a qualified soil scientist in accordance to *Section 9 Landscape: Standard Specification for Urban Infrastructure Works (TAMS 2002).*

The contractor shall refer to the testing frequencies indicated in Table 3.

Table 3 – Outline of the required testing frequency to achieve compliance testing. Samples shall be tested to the performance criteria indicated in the product specification.

Soil Types Specification	Material	Minimum quality control test frequency
Topsoil Backfill for	Standard topsoil backfill for advanced tree planting	
Advanced Tree	Standard topson backlin for advanced tree planting.	1 per 500 m ³
Planting		

Note: A minimum of three samples shall be certified for compliance for each type of material. Where the delivery is less than the stated quality control testing frequency, the initial compliance certification certificate shall be deemed to demonstrate compliance.

Part D. Analysis

All testing as required by the product specifications shall be arranged by the contractor, and carried out by an accredited soil testing laboratory. All test results records shall be made available to the superintendent or quality officer.

Hold point 1. The test certificate shall be accompanied by a statement of compliance from a qualified soil scientist.

Compliance certificates shall state the material is compliant, with laboratory results attached confirming the compliance. In the case of minor non-compliance, a clear statement shall be obtained from a qualified soil scientist waiving the non-compliance, and certifying the sample is compliant or fit for purpose, with or without conditions.

Page 6 of 8
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Part E. Non-compliance

In the case of significant non-compliance, Hold Point 3 shall occur.

Hold point 3. In the event that quality control samples show substantial non-compliance from the approved performance target ranges, the supplier shall demonstrate compliance for any future loads. This may require reformulation or alteration to existing formulations and shall require the advice of a soil scientist, making adjustments to mixing ratios, additives and procedures to achieve compliance.

Part F. Record keeping

Growing media construction and quality control compliance records shall be kept in a readily available format that provides traceability of purchase and placement on site. Each batch of soil shall be identified by date of manufacture, quantity and a corresponding test result and shall match the date of materials delivery, and where the material was placed.

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SESL AUSTRALIA PTY LIMITED

Dole Dourld.

Declan McDonald Senior Soil Scientist & CPSS #S01444

Kelly Lee Soil Scientist

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Appendix B

WATER MINING SPORTS & RECREATION HORTICULTURE & AGRICULTURE ENVIRONMENTAL ROMANNES & GEOTECH URBAN HORTICULTURE & LANDSCAPING

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SURFACE LEVEL:563.4 AHD EASTING: 693736.4 NORTHING: 6091963.3 DIP/AZIMUTH: 90°/-- BORE No: 1 PROJECT No: 94037.00 DATE: 24/7/2018 SHEET 1 OF 1

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ľ		(m)		Strata	Gra	Type	Dept	amp	Results & Comments	Ň	Details	
-	-			TOPSOIL FILLING-hard, dark brown sandy silty clay, low plasticity, numerous grass rootlets and trace tree roots up to 40mm thick, dry to moist		D	0.0	ŭ			-	
-	563	0	55-	FILLING-dense, grey brown sandy clayey gravel, siltstone fragments to 60mm size, low plasticity , fine to coarse grained, dry to moist		D	0.35				-	
	-	0.		SILTSTONE-medium strength, highly to moderately weathered, yellow grey brown, fine grained siltstone, dry		· · ·	0.8				-	
	-	· 1	0.5	-from 1.0m, medium to high strength, moderately weathered	· _ · · · · · · · · · · · · · · · · · ·	D	1.0				- - 1 -	
	562	1.	25-	Bore discontinued at 1.25m -refusal							-	
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RIG: Kubota KX057-4 mini-excavator DRILLER: Muddy's Contracting LOGGED: APH/GER CASING: TYPE OF BORING: 300mm auger

WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cia Landscapes + Colour

LOCATION: Parkes Place, West Barton

PROJECT: National Library Poplar Replacement Project

SAMPLING & IN SITU TESTING LEGEND										
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	Ι.					
B Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)						
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)						
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)						
D Disturbed sample	⊳	Water seep	S	Standard penetration test						
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)						



SURFACE LEVEL:563.2 AHD EASTING: 693749.1 NORTHING: 6091951.9 DIP/AZIMUTH: 90°/-- BORE No: 2 PROJECT No: 94037.00 DATE: 24/7/2018 SHEET 1 OF 1

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		()		Strata	Ū	Ţ	De	Sam	Comments	>	Details	
-	563	().3-	TOPSOIL FILLING-hard, dark brown sandy silty clay, low plasticity, numerous grass roots, dry to moist FILLING-dense, grey brown silty clayey gravel, angular		D	0.0				-	
ļ	ļ	_		siltstone/shale fragments to 50mm size, low plasticity, dry		D	0.4				-	
	-	0.	55-	SILTSTONE-medium strength, highly to moderately weathered, yellow brown, very fine grained, dry		D	0.55				-	
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ļ	Ţ	1	1.5-								-	
-	-			Bore discontinued at 1.5m -hard augering							-	
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RIG: Kubota KX057-4 mini-excavator DRILLER: Muddy's Contracting LOGGED: APH/GER CASING: TYPE OF BORING: 300mm auger

WATER OBSERVATIONS: No free groundwater observed REMARKS:

SAMPLING & IN SITU TESTING LEGEND										
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)						
B Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)						
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)						
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)						
D Disturbed sample	⊳	Water seep	S	Standard penetration test						
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)						



CLIENT: Cia Landscapes + Colour PROJECT: National Library Poplar Replacement Project

LOCATION: Parkes Place, West Barton

SURFACE LEVEL:563.1 AHD EASTING: 693761.6 NORTHING: 6091942.3 DIP/AZIMUTH: 90°/-- BORE No: 3 PROJECT No: 94037.00 DATE: 24/7/2018 SHEET 1 OF 1

Γ	Τ		Description	<u>.0</u>		Sam	pling &	In Situ Testing		Well
ā		epth (m)	of	raph Log	be	pth	aldr	Results &	Vater	Construction
		. ,	Strata	U U	Τy	ā	San	Comments		Details
- 2	200		TOPSOIL FILLING-hard, dark brown sandy silty clay, low plasticity, numerous grass roots, dry to moist		D	0.0				-
ŀ	t	0.3	-from 0.2m, tree roots	Ŵ	D	0.25				-
ŀ	ŀ	0.0	FILLING-medium dense to dense, pale yellow brown silty clayey gravel, angular siltstone fragments up to							-
t	ł		60mm in size, low plasticity, moist		D	0.5				
-	-					0.65				-
ŀ	ł	0.85	SILTSTONE low to modium atronath highly to							-
F	-1		moderately weathered, yellow brown, fine grained, dry			1.0				-1
- 2	700			· · _						-
F	ļ				В					-
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F	ļ	1.	Bore discontinued at 1.5m			-1.5-				-
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RIG: Kubota KX057-4 mini-excavator DRILLER: Muddy's Contracting LOGGED: APH/GER CASING: TYPE OF BORING: 300mm auger

WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cia Landscapes + Colour

LOCATION: Parkes Place, West Barton

PROJECT: National Library Poplar Replacement Project

I SAMP	LIN	G & IN SITU TESTING	à LE(GEND	
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	
B Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)	
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	1
D Disturbed sample	⊳	Water seep	S	Standard penetration test	
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)	



SURFACE LEVEL:563.3 AHD EASTING: 693743.7 NORTHING: 6091944.8 DIP/AZIMUTH: 90°/-- BORE No: 4 PROJECT No: 94037.00 DATE: 24/7/2018 SHEET 1 OF 1

Γ			Description	ji L		Sam	pling 8	In Situ Testing	-	Well	
ā		eptn m)	of Strata	Grapl Loç	Lype	Depth	ample	Results & Comments	Wate	Constructio Details	n
	- - - - - - - - - - - - -	0.3	TOPSOIL FILLING-hard, dark brown sandy silty clay with numerous rootlets and tree roots to 40mm size, dry to moist FILLING-dense, grey brown sandy clayey gravel with rounded to angular siltstone/shale/igneous gravel to 60mm size, low plasticity, fine to coarse grained sand with some tree roots, dry to moist SILTSTONE-low strength, highly weathered, yellow brown, very fine grained, dry to moist			0.0 0.1 0.15 0.25 0.3 0.5 0.65	Se				
		1.5	moderately weathered, dry		- - - - - -					-	
		1.5	Bore discontinued at 1.5m -limit of investigation							-2	

RIG: Kubota KX057-4 mini-excavator DRILLER: Muddy's Contracting LOGGED: APH/GER CASING: TYPE OF BORING: 300mm auger

WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cia Landscapes + Colour

LOCATION: Parkes Place, West Barton

PROJECT: National Library Poplar Replacement Project

I SAMF	PLIN	G & IN SITU TESTING	G LE(GEND	
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	Ι.
B Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)	
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	
D Disturbed sample	⊳	Water seep	S	Standard penetration test	
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)	



SURFACE LEVEL:563.3 AHD EASTING: 693714.3 NORTHING: 6091904.8 DIP/AZIMUTH: 90°/-- BORE No: 5 PROJECT No: 94037.00 DATE: 24/7/2018 SHEET 1 OF 1

Γ	Τ		Description	0		Sam	olina &	k In Situ Testing		Wall	
	Ļ	Depth	of	aphic		ے	<u>e</u>		ater	Constructio	n
ľ		(m)	Strata	Gra	Type	Dept	amp	Results & Comments	Š	Details	
-	563	0.2	TOPSOIL FILLING-hard, dark brown sandy silty clay with abundant rootlets and roots, dry to moist FILLING-dense, grey brown sandy clayey gravel, rounded to sub angular gravel to 60mm size including igneous/sandstone/shale, low plasticity, fine to coarse grained, dry to moist		D	0.1 0.2 0.25 0.4	S			-	
-		0.7	SILTSTONE-low to medium strength, highly to moderately weathered, yellow brown, dry -from 0.9m, medium strength, highly to moderately weathered, yellow grey							- - - 1 - -	
		2	Bore discontinued at 1.5m -limit of investigation	2						2 2 	
		3								- 3 	
	223 1 1 1 1 1 1 1 1	4								- 4 - 4 	

RIG: Kubota KX057-4 mini-excavator DRILLER: Muddy's Contracting LOGGED: APH/GER CASING: TYPE OF BORING: 300mm auger

WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cia Landscapes + Colour

LOCATION: Parkes Place, West Barton

PROJECT: National Library Poplar Replacement Project

SAMP	PLIN	G & IN SITU TESTIN	G LE(GEND	
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	Ι.
B Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)	
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa))
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	
D Disturbed sample	⊳	Water seep	S	Standard penetration test	
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)	



SURFACE LEVEL:563.5 AHD EASTING: 693691.6 NORTHING: 6091905.9 DIP/AZIMUTH: 90°/--

BORE No: 6 PROJECT No: 94037.00 DATE: 24/7/2018 SHEET 1 OF 1

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	Depth	Description	ghic	<u> </u>	Sam	hing &	k in situ Testing	ler –	Well	
	(m)	of	Srap Lo	/pe	pth	nple	Results &	Wat	Constructi	on
		Strata		ЃГ	L ä	Sar	Comments		Details	
-	ļ	TOPSOIL FILLING-hard, dark brown sandy silty clay,	ĮŇ	D	0.0				-	
ŀ	- 0.2	numerous grass and tree roots, dry to moist	KXX						ŀ	
ł	ŀ	FILLING-hard, grey brown yellow brown sandy clayey	\bigotimes		0.3				ŀ	
ŀ	ŀ	gravel, sub rounded to angular siltstone/snale/igneous gravel to 40mm size, low plasticity, fine to coarse	\bigotimes	D					-	
563		grained sand, some tree roots, moist]	0.5				-	
Į	[\bowtie						[
	0.7	SILTSTONE-very low to low strength, extremely to							-	
Ļ	-	mighly weathered, yellow brown, very fine grained, dry to moist		-					-	
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56	1.5	Bore discontinued at 1.5m							-	
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RIG: Kubota KX057-4 mini-excavator DRILLER: Muddy's Contracting LOGGED: APH/GER CASING: TYPE OF BORING: 300mm auger

WATER OBSERVATIONS: No free groundwater observed REMARKS:

I SAMP	LIN	G & IN SITU TESTING	i LE(GEND	
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	
B Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)	
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	
D Disturbed sample	⊳	Water seep	S	Standard penetration test	
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)	





LOCATION: Parkes Place, West Barton

SURFACE LEVEL:563.3 AHD EASTING: 693706 NORTHING: 6091894.1 DIP/AZIMUTH: 90°/-- BORE No: 7 PROJECT No: 94037.00 DATE: 24/7/2018 SHEET 1 OF 1

Γ		Description	υ		Sam	pling 8	In Situ Testing	Τ	Well
님	Depth	of	aphi -og	e	£	e	Deculta 9	ater	Construction
	(m)	Strata	ц В П	Typ	Dept	amp	Comments	≥	Details
-	- 0.15	TOPSOIL FILLING-hard, dark brown silty clay/sandy silty clay, low plasticity, some fine sand, numerous fine tree roots, dry to moist		D	0.0	<u> </u>			-
563	-	FILLING-dense,grey brown sandy clayey gravel with rounded siltstone/sandstone angular/sub angular to 50mm gravel, low plasticity, fine to coarse grained sand, dry		D					-
-	- 0.6 - -	SILTSTONE-very low strength, extremely to highly weathered, yellow brown, very fine grained, dry to moist		2 - - -	0.6				-
-	- 1 -		· _ · · ·	D	1.0				- 1 - 1
562	-	-from 1.2m, low strength, highly weathered, dry							-
	-		· _ · · ·						-
-	- -2 -		· · ·		~				-2
561	-								-
-	- 2.5	5 Bore discontinued at 2.5m -hard augering							-
-	- - - 3								-3
560	-								-
-	-								-
-	- - - 4								- 4
559	- -								
-	-								
-	-								-

RIG: Kubota KX057-4 mini-excavator DRILLER: Muddy's Contracting LOGGED: APH/GER CASING: TYPE OF BORING: 300mm auger

WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cia Landscapes + Colour

LOCATION: Parkes Place, West Barton

PROJECT: National Library Poplar Replacement Project

I SAMP	LIN	G & IN SITU TESTING	à LE(GEND	
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	
B Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)	
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	1
D Disturbed sample	⊳	Water seep	S	Standard penetration test	
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)	



SURFACE LEVEL:563.1 AHD EASTING: 693718.4 NORTHING: 6091885 DIP/AZIMUTH: 90°/-- BORE No: 8 PROJECT No: 94037.00 DATE: 24/7/2018 SHEET 1 OF 1

Г					Sam	nlina &	In Situ Testing		NA/- 11
یے	Depth	Description	phic			e la		ater	Construction
	(m)	01 Strata	Gra	lype	bept	Idma	Results & Comments	Na	Details
563	- 0.2 - 0.35 -	TOPSOIL FILLING-hard, dark brown gravelly sandy clay, low plasticity, fine to coarse grained sand, various gravel to 30mm in size, numerous fine tree rots, dry to moist FILLING-dense, grey brown sandy clayey gravel, siltstone/shale gravel to 40mm in size, low plasticity, fine to coarse grained with some fine tree roots, dry to moist		D	0.1 0.2 0.3	<u>s</u>			
562	- 0.8 - 1 - 1 1 	FILLING-dense, pale yellow brown silty clayey gravel, angular fragments to 75mm size, low plasticity, dry SILTSTONE-very low strength, extremely to highly weathered, pale yellow brown, very fine grained, dry to moist							1 1 1
561	- 1.5	Bore discontinued at 1.5m -limit of investigation							-2
560	- 								-3
559	- - - - - - - - -								- 4 - 4 - 4 - 4 - 4 - 4 - 4 4 4
-	-								

RIG: Kubota KX057-4 mini-excavator DRILLER: Muddy's Contracting LOGGED: APH/GER CASING: TYPE OF BORING: 300mm auger

WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cia Landscapes + Colour

LOCATION: Parkes Place, West Barton

PROJECT: National Library Poplar Replacement Project

SAMP	LIN	G & IN SITU TESTING	G LE(GEND	
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	
B Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)	
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test ls(50) (MPa)	
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	
D Disturbed sample	⊳	Water seep	S	Standard penetration test	
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)	





Appendix C

WATER MINING SPORTS & RECREATION HORTICULTURE & AGRICULTURE ENVIRONMENTAL ENGINEERING & GEOTECH URBAN HORTICULTURE & LANDSCAPING

ABN 70 106 810 708 T 1300 30 40 80 1300 64 46 89 F E info@sesl.com.au

W sesl.com.au

POST PO Box 357, Pennant Hills NSW 1715

LAB 16 Chilvers Rd, Thornleigh NSW 2120

ACT Level 6, 10 Hobart Place, Canberra ACT 2601

VIC Level 1, 21 Shields St, Flemington VIC 3031





Sample N°: 1

Batch N°: 48921

Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

					_
	Date Receiv	ed: 26/7/18		Report Status: O Drat	ft
es	Mailing Address:	PO Box 357 Pennant Hills NSW 1715	Em: Web:	info@sesl.com.au www.sesl.com.au	
~	Sample Drop Off:	16 Chilvers Road Thornleigh NSW 2120	Tel: Fax:	1300 30 40 80 1300 64 46 89	

Client Name:	Cia Landscape and Colour	Project Name:	Removal and Replacement of Lombardy Poplars at National
		SESL Quote N°	Q8187R02
Client Contact:	Briar Champness Lal	Sample Name:	BH1 (0-0.15m)
Client Order N°:		Description:	Soil
Address:		Test Type:	FSC_Plus
	Red Hill ACT 2603		-

RECOMMENDATIONS



27 High



CATION RATIOS

Ratio		Result	Target Rang		nge
Ca:Mg		3.7	4	.1 – 6.0)
Comr	ment: C	alcium	low		
Mg:K		4.4	2	2.6 – 5.0)
Comr	nent: B	alanced	l		
K/(Ca	K/(Ca+Mg) 0.05 < 0.07				
Comment: Acceptable					
K:Na	K:Na 8.9 N/A				
EXC	HANGEA	BLE CA	TIONS (cmol(+)	/kg)
Na:	K:	Ca:	Mg:	H:	AI:
0.14	1.24	20.17	5.49		
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 <i>cmol(+)/kg</i> are the SI unit and are equivalent to <i>meq/100g</i> .					



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Final



Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road

Mailing Address:

Thornleigh NSW 2120 PO Box 357

Tel: Fax: Em: Pennant Hills NSW 1715

1300 30 40 80 1300 64 46 89 info@sesl.com.au Web: www.sesl.com.au

Batch N°: 48921

Sample N°: 1

Date Received: 26/7/18

			PLANT AVAILABLE NUTRIENTS		
EFFECTIVE AME	LIORATIO	N DEPTH	(mm): O 100 O 150 O 200 DESIRED FERTILITY CLASS: O Low	Modera	te O High
Major Nutrients	Unit	Result	Very Low Marginal 🔀 Adequate High Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	3.4	0.9	8	7.1
Phosphorus (P)	mg P/kg	91.2	24.3	16.8	Drawdown
Potassium (K)	mg/kg	485	129	103.2	Drawdown
Sulphur (S)	mg S/kg	16	4.3	18.1	13.8
Calcium (Ca)	mg/kg	4040	1074.6	735	Drawdown
Magnesium (Mg)	mg/kg	667	177.4	76.9	Drawdown
Iron (Fe)	mg/kg	249	66.2	146.8	80.6
Manganese (Mn)	mg/kg	43	11.4	11.7	0.3
Zinc (Zn)	mg/kg	30	8	1.3	Drawdown
Copper (Cu)	mg/kg	2.3	0.6	1.7	1.1
Boron (B)	mg/kg	1.2	0.3	0.7	0.4
Growth is likely to be severely depressed and deficiency symptoms present. Large application: for soil building purposes are usually recommended Potential response to nutrient addition is >90 %.	Potential "I hunger", o deficiency. s response t addition is	hidden r sub-clinical Potential o nutrient 60 to 90 %.	Supply of this nutrient is barely adequate for the plant, and and only maintenance application growth (i.e. phytotoxic) and the plant, and and only growth (i.e. phytotoxic) and the plant, and and only growth (i.e. phytotoxic) and the plant, and and only growth (i.e. phytotoxic) and the plant, and and only growth (i.e. phytotoxic) and the plant, and	bjective nutrient ma nutrients. There is i tilliser when soil test ents are based on s effective amelioration	nagement is to no agronomic levels exceed soil bulk density of on depth.
Phosphorus Sat	turation In	dex	Exchangeable Acidity Lime Application Rate	(g/sqm)	
0.15			Adams-Evans Buffer pH (BpH): - – to achieve pH 6.0:		0
0.06 Adequate	xcessive	≥0.4	Sum of Base Cations (cmol(+)/kg): 27 - to neutralise Al: Eff. Cation Exch. Capacity (eCEC): 27 Calculated Gypsum A Base Saturation (%): 100 (g/sqm) to achieve 67.5 Exchangeable Acidity (cmol(+)/kg): - The CCAR is corrected by the	pplication F % exch. Ca	- Rate (CGAR) : 0
Excessive. Exceeds e Implement improved P potential for nor	22 environmental th management to npoint P pollution	reshold. o reduce n.	effective amelioration of Lime addition to achieve	epth (200 m pH 6.0.	nm) and any
			PHYSICAL DESCRIPTION		
Texture: Estimated clay con Tactually gravelly: Tactually organic: Calculated EC _{SE} (d – Non-saline. Salin are mostly negligi	Loam I tent: S/m): nity effects ible.	Fine Sandy 25% lot gravelly Organic 1.3 on plants	Munsell Colour:-Organic Carbon (OC %):Structure Size:Fine (1 - 10mm)Organic Matter (OM %):Structural Organisation:Pedal - WeakEst. Field Capacity (% w.Structural Unit:CrumbEst. Permanent Wilting FPotential infiltration rate:RapidEst. Plant Available WateEst. Permeability Class (mm/hr):20 - 60Est. Plant Available WateAdditional comments:Fine (1 - 10mm)Fine (1 - 10mm)	Ver point (% water): er (% water): er (mm/m):	ry High - 7.9 17.4 28 er): 12 16 160
ultant: Kelly Lee			Date Report Authorised Signatory: Declan McDonald METHOD REFERENCES: pH (15 CAC); SESL CM0002; Rayment & Lyon (15 CAC); SESL CM0002; Rayment & Lyon	t Generated	8/08/2018

Dole Dourld.

U[13] - Best-Lornet Vision 34262:2017 U[13] - Best-Lornet Vision 34262:2017 Juminium - SESL CM0007, Rayment & Lyons 15A1-2011 Juminium - SESL CM0007, Rayment & Lyons 15A1-2011 Uffer pH and Hydrogen - SSSA Methods of Soli Analysis 2007, P13, Ch 17, Adams-Evans (1962) exture/Structure/Colour - PM0003 (Texture-Vorthcote' (1992), Structure' - "Murphy" (1991), Colour- "Munsell' (2000))



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"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.

Disclaimer Tests are performed under a quality system complying with ISO 9001: 2008. Results are based on the analysis of the samples collected or received by SESL. Due to the spatial and temporal variability of soils within a given site, and the variability of sampling techniques, environmental conditions and managerial factors, SESL does not accept any liability for a lack of general compliance or performance based on the interpretation and recommendations given (where applicable). This document must not be reproduced except in full.



Batch N°: 48921

Client Name:

Client Order N°:

Address:

Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

				,
Date Receiv	ed: 26/7/18		Report Status: O Draft	 Final
Mailing Address:	PO Box 357 Pennant Hills NSW 1715	Em: Web:	info@sesl.com.au www.sesl.com.au	
Sample Drop Off:	16 Chilvers Road Thornleigh NSW 2120	Tel: Fax:	1300 30 40 80 1300 64 46 89	

		-
Project Name:	Removal and Replacement of Lombardy Poplars at National	

SESL Quote N°: Q8187R02 Client Contact: Briar Champness Lal

Sample Name: BH1 (0.35-0.5m) Description: Soil Test Type: SSCP, P_M3, NO3_Sol

Red Hill ACT 2603

Sample N°: 2

Cia Landscape and Colour

RECOMMENDATIONS





CATION RATIOS

Ratio		Result	t Target Range		nge
Ca:M	g	3.3	4	1.1 – 6.0)
Comr	nent: C	alcium	low		
Mg:K		13.2	2	2.6 – 5.0)
Comr	nent: P	otential	Potass	ium def	iciency
K/(Ca+Mg) 0.02 < 0.07					
Comment: Acceptable					
K:Na		0.2	N/A		
EXC	HANGEA	BLE CA	TIONS (cmol(+)	/kg)
Na:	K:	Ca:	Mg:	H:	AI:
1.30	0.21	9.01	2.77		
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 <i>cmol(+)/kg</i> are the SI unit and are equivalent to <i>meq/100g</i> .					



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Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

Mailing Address:

Sample Drop Off: 16 Chilvers Road Thornleigh NSW 2120 PO Box 357

Tel: 1300 30 40 80 Fax: Em: Pennant Hills NSW 1715 Web:

1300 64 46 89 info@sesl.com.au www.sesl.com.au

Batch N°: 48921

Sample N°: 2

Date Received: 26/7/18

PLANT AVAILABLE NUTRIENTS EFFECTIVE AMELIORATION DEPTH (mm): 0 100 0 150 0 200 DESIRED FERTILITY CLASS: O Low O Moderate O High Result Desirable Adjustment **Major Nutrients** Unit Result Marginal 💋 Adequate Very Low Low Hiah (g/sqm) (g/sqm) (g/sqm) 8 0.11 0 8 Nitrate-N (NO₃) mg N/kg 10.6 16.8 6.2 40 mg P/kg Phosphorus (P) 81.1 21.6 69.7 48.1 Potassium (K) mg/kg _ _ 18.1 18.1 mg S/kg Sulphur (S) 496.1 1810 481.5 14.6 mg/kg Calcium (Ca) 337 89.6 51.6 Drawdown Magnesium (Mg) mg/kg Did not test _ 146.8 mg/kg Iron (Fe) 117 Did not test mg/kg _ Manganese (Mn) mg/kg 1.3 Did not test Zinc (Zn) _ mg/kg 1.7 Did not test Copper (Cu) _ _ mg/kg Did not test 07 Boron (B) _ -Explanation of graph ranges: NOTES: Adjustment recommendation calculates the elemental application to shift the soil test level to within the Adeguate band, which maximises growth/yield, and economic efficiency, and minimises impact on the Very Low Low Marginal Adequate High Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Supply of this nutrient is barely adequate for the plant, and build-up is still recommended. Potential response to nutrient addition Supply of this nutrient is adequate for the plant, and and only maintenance application rates are recommended. Potential response to nutrient addition is 5 to 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 %. Potential "hidden hunger", or sub-clinical deficiency. Potential response to nutrient addition is 60 to 90 %. 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 Potential response to nutrient addition is 30 to 60 %. are usually recommended Potential response to nutrient addition is >90 %. recommended. g/sqm measurements are based on soil bulk density of 1.33 tonne/m³ and effective amelioration depth. nu 30 **Phosphorus Saturation Index Exchangeable Acidity** Lime Application Rate (g/sqm) - to achieve pH 6.0: Adams-Evans Buffer pH (BpH): 0.15 0 0.11 - to neutralise AI: Sum of Base Cations (cmol(+)/kg): 13.3 Eff. Cation Exch. Capacity (eCEC): 13.3 0.06 Excessive Calculated Gypsum Application Rate (CGAR) Base Saturation (%): 100 Adequ (g/sqm) to achieve 67.5 % exch. Ca: 0 LÓW Exchangeable Acidity (cmol(+)/kg): 0 >0.4 mmol/kg Exchangeable Acidity (%): The CGAR is corrected for the selected effective amelioration depth (200 mm) and any 0.12 High. Soil P will not limit plant growth. No P Lime addition to achieve pH 6.0. recommended this season **PHYSICAL DESCRIPTION** Sandy Clay Loam Munsell Colour: Organic Carbon (OC %): Texture: 20 - 30% Estimated clay content: Structure Size: Fine (1 - 10mm) Organic Matter (OM %): Gravelly Tactually gravelly: Structural Organisation: Pedal - Weak Est. Field Capacity (% water): 26 Not Organic Tactually organic: Structural Unit: Granular Est. Permanent Wilting Point (% water): 15 Moderate Calculated EC_{SE} (dS/m): 4.8 Potential infiltration rate: Est. Plant Available Water (% water): 11 Est. Permeability Class (mm/hr): 5 - 20 Est. Plant Available Water (mm/m): 110 - Moderate saline. Growth on many Additional comments: plant species is affected. Date Report Generated 8/08/2018 METHOD REFERENCES: Consultant: Kelly Lee Authorised Signatory: Declan McDonald

Dole Dourld.

pH (1:5 CaCl₂) - SESL CM0002; Rayment & Lyons 4B4-2011 EC (1:5) - SESL CM0001; Rayment & Lyons 3A1-2011 Chloride - Rayment & Lyons 5A2a-2011 Chloride / Rayment & Lyons 3-x-a-zu : 1 Nitrale - Rayment & Lyons 761-a-2011 (jons 15A1-2011 Aluminium - SESL CM0007; Rayment & Lyons 15A1-2011 P.K. S, Ca. Mg, Na, Fe, Mn, Zr. Ou, B. - SESL CM0007; Rayment & Lyons 18F1-2011 Buffer pH and Hydrogen - SSSA Methods of Soli Analysis 2007; P13, Ch 17, Adams-Evans (1962) Texture/StructureColour - PM0002 (Texture - Northcole' (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 indic the soil physical characteristics and behaviours that may exist.



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Sample N°: 3

Batch N°: 48921

Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

	Project Name	Bomoval and Bonlag	omont	of Lombardy Boplara at N
	Date Receiv	ed: 26/7/18		Report Status: O Draft
es	Mailing Address:	PO Box 357 Pennant Hills NSW 1715	Em: Web:	info@sesl.com.au www.sesl.com.au
~	Sample Drop Off:	16 Chilvers Road Thornleigh NSW 2120	Tel: Fax:	1300 30 40 80 1300 64 46 89

Client Name:	Cia Landscape and Colour	Project Name:	Removal and Replacement of Lombardy Poplars at National
		SESL Quote N°	2 Q8187R02
Client Contact:	Briar Champness Lal	Sample Name:	BH3 (0.0-0.1m)
Client Order N°:	:	Description:	Soil
Address:		Test Type:	FSC Plus
	Red Hill ACT 2603		-

RECOMMENDATIONS



33.2 High



Ratio		Result	Target Range		nge
Ca:M	g	4.7	4.1 – 6.0		
Comr	nent: B	alancec	I		
Mg:K		5.5	2	2.6 – 5.0)
Comment: Potassium low					
K/(Ca+Mg) 0.03 < 0.07					
Comment: Acceptable					
K:Na		7.9	N/A		
EXC	HANGEA	BLE CA	TIONS (cmol(+)	/kg)
Na:	K:	Ca:	Mg:	H:	AI:
0.13	1.03	26.43	5.63		
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 <i>cmol(+)/kg</i> are the SI unit and are equivalent to <i>meq/100g</i> .					



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Final



Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

Sample Drop Off: 16 Chilvers Road

Mailing Address:

Thornleigh NSW 2120 PO Box 357

Tel: 1300 30 40 80 1300 64 46 89 Fax: Em: info@sesl.com.au Pennant Hills NSW 1715 Web: www.sesl.com.au

Batch N°: 48921

Sample N°: 3

Date Received: 26/7/18

PLANT AVAILABLE NUTRIENTS DESIRED FERTILITY CLASS: O Low O Moderate EFFECTIVE AMELIORATION DEPTH (mm): 0 100 0 150 0 200 O Hiah Result Desirable Adjustment **Major Nutrients** Unit Result Very Low Marginal 🌠 Adequate Hiah (g/sqm) (g/sqm) (g/sqm) 8 3.7 1 7 Nitrate-N (NO₃) mg N/kg 71.2 16.8 18.9 Drawdown Phosphorus (P) mg P/kg 404 107.5 103.2 Drawdown Potassium (K) mg/kg 20 5.3 18.1 12.8 mg S/kg Sulphur (S) 1409.8 735 5300 Drawdown mg/kg Calcium (Ca) 685 182.2 76.9 Drawdown Magnesium (Mg) mg/kg mg/kg 295 78.5 146.8 68.3 Iron (Fe) 52 13.8 117 Drawdown mg/kg Manganese (Mn) mg/kg 34 9 1.3 Drawdown Zinc (Zn) mg/kg 2.2 0.6 1.7 1.1 Copper (Cu) mg/kg 04 1 1 0.3 07 Boron (B) Explanation of graph ranges: 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 Very Low Low Adequate High Marginal Growth is likely to be severely depressed and deficiency symptoms present. Large applications for soil building purposes are usually recommended. Supply of this nutrient is barely adequate for the plant, and build-up is still recommended. Potential response to nutrient addition Supply of this nutrient is adequate for the plant, and and only maintenance application rates are recommended. Potential response to nutrient addition is 5 to 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 %. Potential "hidden hunger", or sub-clinical deficiency. Potential response to nutrient addition is 60 to 90 %. 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 Potential response to nutrient addition is 30 to 60 %. are usually recommended Potential response to nutrient addition is >90 %. recommended. g/sqm measurements are based on soil bulk density of 1.33 tonne/m³ and effective amelioration depth. nu 30 **Phosphorus Saturation Index Exchangeable Acidity** Lime Application Rate (g/sqm) - to achieve pH 6.0: Adams-Evans Buffer pH (BpH): 0.15 0 0.11 - to neutralise AI: Sum of Base Cations (cmol(+)/kg): 33.2 Eff. Cation Exch. Capacity (eCEC): 33.2 0.06 Excessive Calculated Gypsum Application Rate (CGAR) Base Saturation (%): 100 Adequat (g/sqm) to achieve 67.5 % exch. Ca: 0 LÓW Exchangeable Acidity (cmol(+)/kg): 0 >0.4mmol/kg Exchangeable Acidity (%): The CGAR is corrected for the selected effective amelioration depth (200 mm) and any 0.15 Excessive. Exceeds environmental threshold Lime addition to achieve pH 6.0. Implement improved P management to reduce potential for nonpoint P pollution. **PHYSICAL DESCRIPTION** Texture: Loam Fine Sandy Munsell Colour: Organic Carbon (OC %): Very High - 5.3 25% Estimated clay content: Structure Size: Fine (1 - 10mm) Organic Matter (OM %): 11.6 Not gravelly Tactually gravelly: Structural Organisation: Pedal - Weak Est. Field Capacity (% water): 28 Not Organic Tactually organic: Structural Unit: Crumb Est. Permanent Wilting Point (% water): 12 16 Calculated EC_{SE} (dS/m): 1 Potential infiltration rate: Rapid Est. Plant Available Water (% water): - Non-saline. Salinity effects on plants Est. Permeability Class (mm/hr): 20 - 60 Est. Plant Available Water (mm/m): 160 Additional comments: are mostly negligible. Date Report Generated 8/08/2018 METHOD REFERENCES: Consultant: Kelly Lee Authorised Signatory: Declan McDonald

Dole Dourld.

pH (1:5 CaCl₂) - SESL CM0002; Rayment & Lyons 4B4-2011 EC (1:5) - SESL CM0001; Rayment & Lyons 3A1-2011 Chloride - Rayment & Lyons 5A2a-2011 Chloride / Rayment & Lyons 3-x-a-zu : 1 Nitrale - Rayment & Lyons 761-a-2011 (jons 15A1-2011 Aluminium - SESL CM0007; Rayment & Lyons 15A1-2011 P.K. S, Ca. Mg, Na, Fe, Mn, Zr. Ou, B. - SESL CM0007; Rayment & Lyons 18F1-2011 Buffer pH and Hydrogen - SSSA Methods of Soli Analysis 2007; P13, Ch 17, Adams-Evans (1962) Texture/StructureColour - PM0002 (Texture - Northcole' (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 indic the soil physical characteristics and behaviours that may exist.

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Sample N°: 4

Batch N°: 48921

Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

	Project Name	Bomoval and Bonlag	omont	of Lombardy Boplara at N
	Date Receiv	ed: 26/7/18		Report Status: O Draft
es	Mailing Address:	PO Box 357 Pennant Hills NSW 1715	Em: Web:	info@sesl.com.au www.sesl.com.au
~	Sample Drop Off:	16 Chilvers Road Thornleigh NSW 2120	Tel: Fax:	1300 30 40 80 1300 64 46 89

Client Name:	Cia Landscape and Colour	Project Name:	Removal and Replacement of Lombardy Poplars at National
		SESL Quote N°	: Q8187R02
Client Contact:	Briar Champness Lal	Sample Name:	BH4 (0.0-0.1m)
Client Order N°:		Description:	Soil
Address:		Test Type:	FSC Plus
	Red Hill ACT 2603		-

RECOMMENDATIONS





Ratio		Result	Target Range		nge
Ca:M	g	5.1	4	.1 – 6.0)
Comr	nent: B	alanced	ł		
Mg:K		5.1	2	2.6 – 5.0)
Comment: Potassium low					
K/(Ca+Mg) 0.03 < 0.07					
Comment: Acceptable					
K:Na		2.8	N/A		
EXC	HANGEA	BLE CA	TIONS (cmol(+)	/kg)
Na:	K:	Ca:	Mg:	H:	AI:
0.23	0.65	16.98	3.34		
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 <i>cmol(+)/kg</i> are the SI unit and are equivalent to <i>meq/100g</i> .					



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Final



Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

Mailing Address:

Sample Drop Off: 16 Chilvers Road Thornleigh NSW 2120 PO Box 357

Pennant Hills NSW 1715

Tel: 1300 30 40 80 Fax: 1300 64 46 89 Em: info@sesl.com.au Web: www.sesl.com.au

Batch N°: 48921

Sample N°: 4

Date Received: 26/7/18

EFFECTIVE AME	LIORATIO	N DEPTH	(mm): () 100	O 150	⊙ 200	DESIRED	FER1		ASS: O Lov	Modera	ate O High
Major Nutrients	Unit	Result	Very Low	Low	Margin	al <u> </u> Ade	quate	High	Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	5.9							1.6	8	6.4
Phosphorus (P)	mg P/kg	65.8					<u> </u>		17.5	16.8	Drawdown
Potassium (K)	mg/kg	255			/				67.8	92	24.2
Sulphur (S)	ma S/ka	25							6.7	18.1	11.4
Calcium (Ca)	mg/kg	3400							904.4	655.4	Drawdown
Magnesium (Mg)	mg/kg	405							107.7	68.4	Drawdown
Iron (Fe)	mg/kg	297							79	146.8	67.8
Manganese (Mn)	ma/ka	25							6.7	11.7	5
Zinc (Zn)	ma/ka	19							51	13	Drawdown
	ma/ka	25							0.7	1.0	1
	mg/kg	2.5		_					0.7	0.7	0.5
Boron (B)	iiig/kg	0.0							0.2	0.7	0.5
present. Large application: for soil building purposes are usually recommended Potential response to nutrient addition is >90 %.	s response t addition is	o nutrient 60 to 90 %.	build-up is still recommended. Potential response to nutrient addition is 30 to 60 %.	mainter rates a Potenti nutrient 30 %.	nancé application re recommende al response to addition is 5 to	on may contr ed. ground an Drawdow Potential addition is	ribute to nd surfa n is reco respons s <2 %.	pollútion of ce waters. ommended. se to nutrient	reason to apply fe Adequate. • g/sqm measurer 1.33 tonne/m ³ and	rtiliser when soil tes nents are based on d effective ameliorati	t levels exceed soil bulk density of ion depth.
Phosphorus Sat	uration In	dex	Exchangeable	Acidit	y			Lime Appl	ication Rate	ə (g/sqm)	
0.15			Adams-Evans Bu	utter pH ((BpH):	-		- to achiev	ерн 6.0: liso Al·		0
High	Execcive		Eff. Cation Exch.	Capacit	v (eCEC):	21.2					-
Adequat	Excessive		Base Saturation	(%):		100		Calculated	I Gypsum A	pplication F	
Low		>0.4	Exchangeable A	cidity (cn	nol(+)/kg):	-		(g/sqiii) to	achieve 07.3		a. U
mm 0 1	ol/kg		Exchangeable A	cidity (%)):	-		The CGA	R is corre	ected for the	he selected
High. Soil P will not I recommende	imit plant growth ed this season.	n. No P						Lime additi	on to achiev	те pH 6.0.	inn) and any
			PHY	'SICA	L DESC	RIPTION	J				
Texture:	Fine Sandy	Clay Loam	Munsell Colou	ır:			-	Organic Car	bon (OC %)	: Ve	ry High - 5.4
Estimated clay con	tent:	20 - 30%	Structure Size	:	Fine	e (1 - 10mm)	Organic Mat	tter (OM %):		12
Tactually gravelly:	IN N	ot Organic	Structural Org	anisatior	ו: P	edal - Wea	k	Est. Field Ca	apacity (% w	/ater):	28
Calculated EC (d	N S/m):	n o	Botontial infiltr	t: cation rat	0.	Crum		Est. Permar	ient wiiting i	Point (% water)	er): 15
- Non-saline, Sali	nitv effects	on plants	Fotermanning	ility Class	e. s (mm/hr) [.]	5 - 2	0	Est Plant A	vailable Wat	er (mm/m).	. 13
are mostly negligi	ble.		Additional con	nments:			-				
									Date Repo	ort Generated	1 8/08/2018

Dole Dourld.

pH (1:5 GaC), - SESL. CM0002; Rayment & Lyons 484-2011 EC (1:5) - SESL CM0001; Rayment & Lyons 34-2011 Chloride Rayment & Lyons 54/28-2011 Munnium - SESL CM0007; Rayment & Lyons 15A1-2011 Aumnium - SESL CM0007; Rayment & Lyons 15A1-2011 P, K. S. Ca, Mg, Na, Fe, Mn, Zn, Cu, B - SESL CM0007; Rayment & Lyons 18F1-2011 Buffer PH and Hydrogen - SSAK Methods of Sol Analysis 2007, Pt 3. Ch 17; Adams-Evans (1962) Testure/Shucture/Calour. - PM0003 (Testure Northcole (1952), Stucture - Munpy (1991), Colour- "Munself" (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.

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Sample N°: 5

Batch N°: 48921

Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

Date Receiv	ed: 26/7/18		Report Status: O Draft	Final
Mailing Address:	PO Box 357 Pennant Hills NSW 1715	Em: Web:	info@sesl.com.au www.sesl.com.au	
Sample Drop Off:	16 Chilvers Road Thornleigh NSW 2120	Tel: Fax:	1300 30 40 80 1300 64 46 89	

Client Name:	Cia Landscape and Colour	Project Name:	Removal and Replacement of Lombardy Poplars at National
		SESL Quote N°	2 Q8187R02
Client Contact:	Briar Champness Lal	Sample Name:	BH4 (0.3-0.5m)
Client Order N°:	:	Description:	Soil
Address:		Test Type:	SSCP, P_M3, NO3_Sol
	Red Hill ACT 2603		

RECOMMENDATIONS



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

0	10	20	50	100
10	.2 Low			

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.



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Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

Mailing Address:

Sample Drop Off: 16 Chilvers Road Thornleigh NSW 2120 PO Box 357

Tel: 1300 30 40 80 Fax: Em: Pennant Hills NSW 1715 Web: www.sesl.com.au

1300 64 46 89 info@sesl.com.au

Batch N°: 48921

Sample N°: 5

Date Received: 26/7/18

			PLANT AV	ILABLE	NUTRIENT	S			
EFFECTIVE AM	ELIORATIO	N DEPTH	(mm): () 100 () 150	0 @ 200	DESIRED FEF	TILITY CL	ASS: O Lov	v	ate O High
Major Nutrients	Unit	Result	Very Low Lo	w Margin	ıal <u> </u> Adequat	e 📕 High	Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	3.7					1	8	7
Phosphorus (P)	mg P/kg	14					3.7	16.8	13.1
Potassium (K)	mg/kg	91.2					24.3	69.7	45.4
Sulphur (S)	mg S/kg	-					-	18.1	18.1
Calcium (Ca)	mg/kg	1510					401.7	496.1	94.4
Magnesium (Mg)	mg/kg	280					74.5	51.6	Drawdown
Iron (Fe)	mg/kg	-					-	146.8	Did not test
Manganese (Mn)	mg/kg	-					-	11.7	Did not test
Zinc (Zn)	mg/kg	-					-	1.3	Did not test
Copper (Cu)	mg/kg	-					-	1.7	Did not test
Boron (B)	mg/kg	-					-	0.7	Did not test
Very Low Growth is likely to be severely depressed and deficiency symptoms present. Large application for soil building purpose are usually recommende Potential response to nutrient addition is >80 ° Phosphorus Sa 0.15 0.11 High 0.06 Adequate	Low Potential " hunger, o sd. 6. hturation In Excessive	w hidden r sub-clinical Potential to nutrient 60 to 90 %.	Marginal Supply of this nutrient is barely adequate for the plant, and Duild-up is still recommended. Potential response to nutrient addition is 30 b 60 %. Exchangeable Action Adams-Evans Buffer p Sum of Base Cations (Eff. Cation Exch. Capa Base Saturation (%): Exchangeable Acidity (Adequate ply of this nutrient quate for the plant and only ntenance applicati s are recommende antial response to w. dity H (BpH): cmol(+)/kg): licity (eCEC): (cmol(+)/kg):	 High The level is exc may be detrime growth (i.e. phy may contribute dround and sur Protential respon- addition is <2 % 10.2 10.2 100 	cessive and initial to plant to pollution of face waters. accommended. 	elemental applica the Adequate bal economic efficien environment. Drawdown: The - utilise residual so reason to apply fe Adequate. • g/sqm measurer 1.33 tonne/m ³ and ication Rate e pH 6.0: lise AI: I Gypsum A achieve 67.{	tion to shift the soil 1 d, which maximises cy, and minimises ir objective nutrient mi I nutrients. There is ritiliser when soil tes ments are based on d effective ameliorat e (g/sqm) application I 5 % exch. Ca	est level to within apact on the anagement is to no agronomic ti levels exceed soil bulk density of ion depth. 0 - Rate (CGAR) a: 0
0 mmol/kg 0.03 Low. Plant response to applied P is likely.			Exchangeable Acidity	(%):	-	The CGA effective a Lime additi	R is corre melioration o ion to achiev	ected for t depth (200 n re pH 6.0.	he selected nm) and any
			PHYSIC	AL DESC	RIPTION				
Texture: Estimated clay co Tactually gravelly Tactually organic: Calculated EC _{SE} (– Non-saline, Sa	Light Sandy ntent: : M dS/m): linity effects	Clay Loam 25% Gravelly lot Organic 0.8 on plants	Munsell Colour: Structure Size: Structural Organisat Structural Unit: Potential infiltration Est. Permeability Cl	Fin tion: F rate: ass (mm/hr):	- e (1 - 10mm) Vedal - Weak Crumb Rapid >120	Organic Car Organic Mat Est. Field Ca Est. Permar Est. Plant A Est. Plant A	bon (OC %) tter (OM %): apacity (% w hent Wilting I vailable Wat vailable Wat	: /ater): Point (% wat /er (% water) /er (mm/m):	- 26 er): 12 : 14 140

Consultant: Kelly Lee

Authorised Signatory: Declan McDonald

Dole Dourld.

 METHOD REFERENCES:

 pH (15 H,0.) - SESI. CM0002; Rayment & Lyons 4A1-2011

 pH (15 CaC). - SESI. CM0007; Rayment & Lyons 2A1-2011

 EC (15) - SESI. CM0007; Rayment & Lyons 3A1-2011

 Chorder - Rayment & Lyons 2A2-2011

 Nitrate - Rayment & Lyons 781a-2011

 Aurnitum - SesI. CM0007; Rayment & Lyons 15A1-2011

 Nitrate - Rayment & Lyons 781a-2011

 P, K. S., Ca, Mg, Na, Fe, Mn, Zr, Cu, B - SESI. CM0007; Rayment & Lyons 18F1-2011

 P, K. S., Ca, Mg, Na, Fe, Mn, Zr, Cu, B - SESI. CM0007; Anayise 2007; Pt 3, Ch 17; Adams-Evans (1962)

 TextureStructureColour - PM003 (Texture - "Murphy" (1991), Colour- "Munself" (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.



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Sample N°: 6

Batch N°: 48921

Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

	Date Receiv	ed: 26/7/18		Report Status: O	Draft
es	Mailing Address:	PO Box 357 Pennant Hills NSW 1715	Em: Web:	info@sesl.com.au www.sesl.com.au	
~	Sample Drop Off:	16 Chilvers Road Thornleigh NSW 2120	Tel: Fax:	1300 30 40 80 1300 64 46 89	

	Client Name:	Cia Landscape and Colour	Project Name:	Removal and Replacement of Lombardy Poplars at National
			SESL Quote N°	Q8187R02
	Client Contact:	Briar Champness Lal	Sample Name:	BH7 (0.0-0.1m)
	Client Order N°:		Description:	Soil
	Address:		Test Type:	FSC_Plus
		Red Hill ACT 2603		-
L				







CATION RATIOS

Ratio		Result	Tar	get Rar	nge	
Ca:M	g	4.4	4	1.1 – 6.0)	
Comment: Balanced						
Mg:K		3.1	2	2.6 - 5.0		
Comr	Comment: Balanced					
K/(Ca+Mg) 0.06 < 0.07						
Comment: Acceptable						
K:Na 10.4 N/A						
EXC	HANGEA	BLE CA	TIONS (cmol(+)	/kg)	
Na:	K:	Ca:	Mg:	H:	AI:	
0.11	1.14	15.80	3.57			
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 <i>cmol(+)/kg</i> are the SI unit and are equivalent to <i>meq/100g</i> .						



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Final



Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

Mailing Address:

Sample Drop Off: 16 Chilvers Road Thornleigh NSW 2120 PO Box 357

Tel: 1300 30 40 80 Fax: Em: Pennant Hills NSW 1715

1300 64 46 89 info@sesl.com.au Web: www.sesl.com.au

Batch N°: 48921

Sample N°: 6

Date Received: 26/7/18

			FLANT AVAILABLE NUTRIEN	10			
EFFECTIVE AME	LIORATIC	ON DEPTH	(mm): () 100 () 150 () 200 DESIRED FE	ERTILITY CL	ASS: O Lov	V	ate O High
Major Nutrients	Unit	Result	Very Low Low Marginal 💋 Adequ	ate 📕 High	Result (g/sqm)	Desirable (g/sqm)	Adjustment (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	130			34.6	8	Maintenance
Phosphorus (P)	mg P/kg	77.9			20.7	16.8	Drawdown
Potassium (K)	mg/kg	447			118.9	92	Drawdown
Sulphur (S)	mg S/kg	100			26.6	18.1	Drawdown
Calcium (Ca)	mg/kg	3170			843.2	655.4	Drawdown
Magnesium (Mg)	mg/kg	434			115.4	68.4	Drawdown
Iron (Fe)	mg/kg	202		//	53.7	146.8	93.1
Manganese (Mn)	mg/kg	74			19.7	11.7	Drawdown
Zinc (Zn)	mg/kg	15			4	1.3	Drawdown
Copper (Cu)	mg/kg	2.2		//	0.6	1.7	1.1
Boron (B)	mg/kg	0.8		//	0.2	0.7	0.5
Phosphorus Sat 0.15 0.06 Construction of the second state of th	turation In xcessive component to turation In xcessive	Potential to nutrient 60 to 90 %. dex ≥0.4 preshold.	Is balley adequate for build-up is still commended and adoly and and only maintenance application rates are recommended nutrient addition is 5 to 30 %. may be demi and and only maintenance application rates are recommended nutrient addition is 5 to 30 %. may be demi may be provential res addition is Exchangeable Acidity Exchangeable Acidity (cmol(+)/kg): - Exchangeable Acidity (%): - The provential may be demi may be provential res addition is	Lime Appl Calculated (g/sqm) to The CGA effective a Lime Appl - to achiev - to neutra Calculated (g/sqm) to The CGA effective a Lime additi	ication Rate g/sqm measurer isation Rate e pH 6.0: lise AI: dGypsum A achieve 67.5 R is corre melioration conto achieve	appletive nutrient minimum inutrients. There is rifliker when soil tess nents are based on deflective ameliorat deflective ameliorat e(g/sqm) application if 5 % exch. Ca bected for the depth (200 minimum e pH 6.0.	anagement is to no agronomic it levels exceed soil bulk density of fon depth. 0 - Rate (CGAR) a: 0 he selected nm) and any
potential for no	npoint P pollutio	n.					
			PHYSICAL DESCRIPTION				
Texture: Estimated clay con Tactually gravelly: Tactually organic: Calculated EC _{SE} (d – Slightly saline. plant species is a	Fine Sandy Itent: IS/m): Growth on s ffected.	Clay Loam 20 - 30% Gravelly lot Organic 3.3 sensitive	Munsell Colour:-Structure Size:Fine (1 - 10mm)Structural Organisation:Pedal - ModerateStructural Unit:CrumbPotential infiltration rate:ModerateEst. Permeability Class (mm/hr):20 - 60Additional comments:	Organic Car Organic Mar Est. Field C Est. Permar Est. Plant A Est. Plant A	bon (OC %) tter (OM %): apacity (% w nent Wilting I vailable Wat vailable Wat	: vater): Point (% wat er (% water) er (mm/m):	Moderate - 2 4.5 28 er): 15 : 13 130
					Date Repo	ort Generated	1 8/08/2018
ultant: Kelly Lee			Authorised Signatory: Declan McDonald	METHOD REF pH (1:5 H ₂ O) - SESL pH (1:5 CaCl ₂) - SESL EC (1:5) - SESL CMOU Chloride - Rayment & Nitrate - Rayment &	ERENCES: DM0002; Rayment & Lyc CM0002; Rayment & Lyons 3 U01; Rayment & Lyons 3 U01; Rayment & Lyons 32 U01; Rayment	ns 4A1-2011 yons 4B4-2011 A1-2011	

Dole Dourld.

Aluminium - SESL CM0007; Rayment & Lyons 15A1-2011 P., K.S., Ca. Mg, Na. Fe, Mn. Zr., Ou, B. - SESL CM0007; Rayment & Lyons 18F1-2011 Buffer pH and Hydrogen - SSSA Methods of Soil Analysis 2007, Pl 3, Ch 17; Adams-Evans (1962) TextureStructureColour - PM0003 (Texture-"Northcole" (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.



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Sample N°: 8

Batch N°: 48921

Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

Receive	. 20///10			
Receive				
Pacaiva	d: 26/7/18		Report Status: C	Draft
Mailing Address: PO Box 357 Pennant Hills NSW 1715		Em: Web:	info@sesl.com.au www.sesl.com.au	
rop Off:	16 Chilvers Road Thornleigh NSW 2120	Tel: Fax:	1300 30 40 80 1300 64 46 89	
	rop Off: ddress:	rop Off: 16 Chilvers Road Thornleigh NSW 2120 ddress: PO Box 357 Pennant Hills NSW 1715	rop Off: 16 Chilvers Road Tel: Thornleigh NSW 2120 Fax: ddress: PO Box 357 Em: Pennant Hills NSW 1715 Web: Received: 26/7/18	rop Off: 16 Chilvers Road Thornleigh NSW 2120 Tel: 1300 30 40 80 ddress: PO Box 357 Pennant Hills NSW 1715 Em: info@sesl.com.au Web: www.sesl.com.au Received: 26/7/18 Report Status:

Client Name:	Cia Landscape and Colour	Project Name:	Removal and Replacement of Lombardy Poplars at National
		SESL Quote N°	🗄 Q8187R02
Client Contact:	Briar Champness Lal	Sample Name:	BH8 (0.1-0.2m)
Client Order N°:		Description:	Soil
Address:		Test Type:	FSC Plus
	Red Hill ACT 2603	••	-

RECOMMENDATIONS





CATION RATIOS

Ratio		Result	Target Range		nge	
Ca:M	g	8	4.1 - 6.0			
Comment: Magnesium low						
Mg:K		2.2	2.6 – 5.0			
Comr	Comment: Magnesium low					
K/(Ca+Mg) 0.05 < 0.07						
Comment: Acceptable						
K:Na		11.6 N/A				
EXC	HANGEA	BLE CA	TIONS (cmol(+)	/kg)	
Na:	K:	Ca:	Mg:	H:	AI:	
0.10	1.16	20.43	2.56			
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 <i>cmol(+)/kg</i> are the SI unit and are equivalent to <i>meq/100g</i> .						



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Final



Soil Chemistry Profile

Mehlich 3 - Multi-nutrient Extractant

Mailing Address:

Sample Drop Off: 16 Chilvers Road Thornleigh NSW 2120

PO Box 357 Pennant Hills NSW 1715

Tel: 1300 30 40 80 Fax: 1300 64 46 89 Em: info@sesl.com.au Web: www.sesl.com.au

Batch N°: 48921

Sample N°: 8

Date Received: 26/7/18

EFFECTIVE AME	LIORATIO	ON DEPTH	(mm): () 100 () 150		DESIRED FE	RTILITY CL	ASS: O Lov	v 🗿 Modera	ate O High
Major Nutrients	Unit	Result	Very Low	Low	Margin	al <u> </u> Adequa	ate 📕 High	Result (g/sqm)	Desirable (g/sqm)	Adjustmer (g/sqm)
Nitrate-N (NO ₃)	mg N/kg	8.7						2.3	8	5.7
Phosphorus (P)	mg P/kg	45.3						12	16.8	4.8
Potassium (K)	mg/kg	453						120.5	92	Drawdowr
Sulphur (S)	mg S/kg	44						11.7	18.1	6.4
Calcium (Ca)	mg/kg	4090						1087.9	655.4	Drawdowr
Magnesium (Mg)	mg/kg	311						82.7	68.4	Drawdowr
Iron (Fe)	mg/kg	198						52.7	146.8	94.1
Manganese (Mn)	mg/kg	56						14.9	11.7	Drawdowr
Zinc (Zn)	mg/kg	12						3.2	1.3	Drawdowr
Copper (Cu)	mg/kg	2.5						0.7	1.7	1
Boron (B)	mg/kg	1						0.3	0.7	0.4
Severally depressed and deficiency symptoms present. Large application for soil building purposes are usually recommended Potential response to nutrient addition is >90 %.	deficiency. s response t addition is	r sub-clinical Potential to nutrient 60 to 90 %.	is barely adequate for the plant, and build-up is still recommended. Potential response to nutrient addition is 30 to 60 %.	and an mainte rates a Potenti nutrien 30 %.	are for the plant, d only nance application re recommende al response to t addition is 5 to	may be detrin growth (i.e. p on may contribut d. ground and si Drawdown is Potential resp addition is <2	versalve and nytotoxic) and e to pollution of urface waters. recommended. onse to nutrient %.	Drawdown: The utilise residual soi reason to apply fe Adequate. • g/sqm measurer 1.33 tonne/m ³ and	objective nutrient ma il nutrients. There is ertiliser when soil tes nents are based on d effective ameliorat	anagement is to no agronomic t levels exceed soil bulk density of ion depth.
Phosphorus Sat	Excessive nol/kg	≥0.4 Nlikely. P rent P level.	Exchangeable Adams-Evans But Sum of Base Cati Eff. Cation Exch. Base Saturation (Exchangeable Ac Exchangeable Ac	Acidit ffer pH ons (cn Capacit %): idity (cr idity (%	t y (BpH): nol(+)/kg): y (eCEC): nol(+)/kg):):	- 24.3 24.3 100 -	Lime Appl – to achiev – to neutra Calculated (g/sqm) to The CGA effective a Lime addit	ication Rate re pH 6.0: lise AI: d Gypsum A achieve 67. R is corre melioration o ion to achiev	e (g/sqm) Application I 5 % exch. Ca ected for t depth (200 r re pH 6.0.	0 - Rate (CGAR a: 0 he selected nm) and any
			PHY	SICA	L DESC	RIPTION				
Texture: Estimated clay con Tactually gravelly: Tactually organic: Calculated EC _{SE} (d – Non-saline. Sali are mostly negligi	Fine Sandy tent: N S/m): nity effects ible.	Clay Loam 20 - 30% Gravelly lot Organic 1.5 on plants	Munsell Colour Structure Size: Structural Orga Structural Unit: Potential infiltra Est. Permeabil Additional com	anisation ation rat ity Clas ments:	Fine n: P e: s (mm/hr):	e (1 - 10mm) edal - Weak Crumb Moderate 5 - 20	Organic Car Organic Ma Est. Field C Est. Permar Est. Plant A Est. Plant A	bon (OC %) tter (OM %): apacity (% w hent Wilting I vailable Wat vailable Wat	: Ve vater): Point (% wat er (% water) er (mm/m):	ry High - 5.2 11.4 28 er): 15 : 13 130
– Non-saline. Sali are mostly negligi	nity effects ble.	on plants	Est. Permeabil Additional com	ity Clas ments:	s (mm/hr):	5 - 20	Est. Plant A	vailable Wat	er (mm/m): ort Generated	1 8/08/20

Dole Dourld.

ph (1:5 GCig). - SESL CM0002: Rayment & Lyons 484-2011 EC (1:5) - SESL CM0001; Rayment & Lyons 3A1-2011 Chioride - Rayment & Lyons 5A2a-2011 Nitrate - Rayment & Lyons 5A2a-2011 Aluminium - SESL CM0007; Rayment & Lyons 15A1-2011 P, K. S, Ca, Mg, Na, Fe, Mn, Zr, Ou, B - SESL CM0007; Rayment & Lyons 18F1-2011 Buffer pH and Hydrogen - SSSA Methods of Soil Analysis 2007, Pt 3, Ch 17, Adams-Evans (1962) TextureSituctureColour - PM0003 (Texture - "Northcole" (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.



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6 Point Hydraulic Conductivity

Page 1

Mailing Address:

Sample Drop Off: 16 Chilvers Road Thornleigh NSW 2120 PO Box 357 Pennant Hills NSW 1715

Tel: 1300 30 40 80 1300 64 46 89 Fax: Em: info@sesl.com.au Web: www.sesl.com.au

Batch N°: 48921 Sample N°: 7		Date Receive	d: 26/7/18 Report Status: O Final
		Desis et Norres	Providencial Devidence of the standard Devidence of Matterial
Client Name:	Cia Landscape and Colour	Project Name:	Removal and Replacement of Lombardy Poplars at National
		SESL Quote N°	: Q8187R02
Client Contact:	Briar Champness Lal	Sample Name:	BH7 (0.8-1.0m)
Client Order N°:		Description:	Soil
Address:		Test Type:	Prep_All, HC3, pHEC_S
	Red Hill ACT 2603		



SUMMARY AND RECOMMENDATIONS METHOD REFERENCES: pH in water: 8.79 Saturated Hydraulic Conductivity and Bulk Density: SESL Laboratory Manual 4.15. derived from McIntyre, K, & Jakobsen, B, Drainage for Sportsturf and Horticulture (1998). pH in calcium chloride: 8.18 NOTES: This test method covers the standard procedures and related This test method covers the standard procedures and related calculations for determining the saturated hydraulic conductivity under conditions of a falling head of water, and bulk density of turf growing media for sportsfields, and other highly trafficked turf areas. Bulk density is defined as the mass of a unit volume of dry soil. Generally as a soil is compacted, bulk density increases because Electrical conductivity: 0.21 dS/m pore space is reduced. Typical bulk densities for clay and silt loam pole space is reduced. Typical out densities or cay and sin todar soils range from 1.0 g/cm³ to 1.5 g/cm³, while the bulk density of sand-based soils range from 1.3 g/cm³ to 1.8 g/cm³. At the upper end of these ranges, the bulk density may inhibit root penetration. In comparison, the USGA recommendation for bulk density of putting greens is 1.2 g/cm³ to 1.6 g/cm³. This sample was tested as received and comments pertain only to the cample shown. the sample shown. SESL is not responsible for the accuracy of this test methods and makes no claims about the ability to predict performance in actual DISCLAIMER OF ENDORSEMENT: The use of trade, firm or company names in this report is for the information and convenience of the reader. Such use does not necessarily constitute or imply an intervention of the second **Consultant:** Authorised Signatory: of the reader. Such use does not necessarily constitute or imply an official endorsement or approval by SESL of any product or service to the exclusion of others that may be suitable. This report shall not be used for advertising or product endorsement purposes. This test report contains confidential information and shall not be reproduced except in full, and with the express written approval of SESL. © Sydney Environmental & Soil Laboratory Pty Ltd, 2008. Dole Dour Col. Date Report Generated 8/08/2018 Kelly Lee Declan McDonald

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6 Point Hydraulic Conductivity

Page 1

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1300 30 40 80 Tel: 1300 64 46 89 Fax: info@sesl.com.au Em: Web: www.sesl.com.au

Batch N°: 48921 Sample N°: 9		Date Receive	d: 26/7/18	Report Status: Draft Final 		
Client Name:	Cia Landscape and Colour	Project Name:	Removal and Replaceme	nt of Lombardy Poplars at National		
Client Contact:	Briar Champness I al	SESL Quote N° Sample Name	: Q8187R02 Composite Topsosil (S1	S3 S4 S6 S8)		
Client Order N°:	Bhar onamphoss Ear	Description:	Soil	33,34,30,307		
Address:	Red Hill ACT 2603	Test Type:	HC3			





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6 Point Hydraulic Conductivity

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Batch N°: 48921 Sample N°: 10		Date Receive	d: 26/7/18 Report Status: O Final
Client Name:	Cia Landscape and Colour	Project Name:	Removal and Replacement of Lombardy Poplars at National
		SESL Quote N°	CQ8187R02
Client Contact:	Briar Champness Lal	Sample Name:	Composite Subsosil (S2, S5)
Client Order N°:		Description:	Soil
Address:		Test Type:	HC3
	Red Hill ACT 2603		





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