Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Acid Sulfate Soil Management Plan

Proposed Multi-Level Aged Care Facility
45 Hillview Street, Woy Woy, NSW

Prepared for
Doug Sneddon Planning Pty Ltd

Project 83565.00
February 2019

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	83565.00	Document No.	R.001.Rev1
Document title	Report on Acid Sulfate Soil Management Plan Proposed Multi-Level Aged Care Facility		
Site address	45 Hillview Street, Woy Woy, NSW		
Report prepared for	Doug Sneddon Planning Pty Ltd		
File name	83565.00.R.001.Rev1		

Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Jessica Paulsen	Brent Kerry	15 February 2019
Revision 1	Jessica Paulsen	Brent Kerry	21 February 2019

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	0	Doug Sneddon, Doug Sneddon Planning Pty Ltd
Revision 0	1	1	Douglas Partners Archive
Revision 1	1	0	Doug Sneddon, Doug Sneddon Planning Pty Ltd
Revision 1	1	1	Douglas Partners Archive

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		21 February 2019
Reviewer		21 February 2019

bsi. ISO 9001 Quality Management
FS 604853

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
Unit 5, 3 Teamster Close
Tuggerah NSW 2259
Phone (02) 4351 1422
Fax (02) 4351 1410

Table of Contents

Report on Acid Sulfate Soil Management Plan
Proposed Multi-Level Aged Care Facility
45 Hillview Street, Woy Woy, NSW

1. Introduction

This report presents an Acid Sulfate Soil Management Plan (ASSMP) for the excavation of acid sulfate soils in connection with the proposed multi-level aged care facility at 45 Hillview Street, Woy Woy. This assessment was undertaken with reference to the Douglas Partners Pty Ltd (DP)'s proposal CCT190033 dated 30 January 2019 and confirmation received from Doug Sneddon of Doug Sneddon Planning Pty Ltd on 4 February 2019.

It is understood that the proposed development will comprise construction of a three-storey building with one basement level for car parking, internal access roads and landscaping. The client indicated that the maximum depth of excavation is estimated to be 2.5 m below current surface level.

DP has previously prepared several reports for the site. The most recent report (DP, 2012) reviewed the acid sulfate soil test results from the previous reports and completed additional testing. Overall, the results indicated that acid sulfate soils were present at the site.

This ASSMP is required for development application (DA) purposes and is based on results from previous investigations. It is noted that the current DA (DA53784/2018) comprises a reduced area of excavation compared to the previous DA (DA30219/2006).

This management plan has been prepared with reference to the NSW Acid Sulfate Soil Management Advisory Committee: *Acid Sulfate Soil Manual* (Ref 1), *The Soil Management Guidelines 2014* (Ref 2) and *The Laboratory Methods Guidelines 2004* (Ref 3).

2. Site Description and Information

The site is located to the north-west of the intersection of Hillview Street and Veron Road, Woy Woy and comprises a roughly rectangular parcel of land of approximately 11,700 m^2. The site is bounded to the north by existing residential properties, to the east by Hillview Street, to the south by Veron Road and to the west by an existing drainage reserve.

At the time of the previous investigation (2012), the site had been partially cleared. Sand was exposed at the surface throughout the cleared area. The remainder of the site was covered by moderately thick vegetation comprising trees and shrubs. The topography at the site is essentially flat with surface levels ranging between 4.0 – 4.5 m AHD.

Reference to the Sydney 1:250 000 scale Geological Series Sheet indicates that the site is underlain by Quaternary Alluvium. Previous experience within the Woy Woy Peninsula suggests that the site

would be underlain by sand to an undefined depth. The previous geotechnical investigation (DP, 2007b) confirmed the geological mapping with sands encountered to depths greater than 12 m. Reference to the Soil Conservation Service of NSW acid sulfate soil risk map for Broken Bay indicates that the site is located within an area where there is a 'low probability' of acid sulfate soils at depths greater that 3 m below ground surface levels.

3. Results of Previous Investigations

DP previously prepared the following reports for the site:

- *Report on Podzol Assessment, Corner of Hillview Street and Vernon Road, Woy Woy*, prepared for Providence Projects Pty Ltd, dated August 2004 (DP Project No. 34986) (DP, 2004);
- *Proposed Residential Development for The Aged, Hillview Street, Woy Woy,* prepared for Cardno (NSW) Pty Ltd, dated November 2005 (DP Project No. 34986A) (DP, 2005);
- *Geotechnical Investigation, Proposed Gravity Sewer Main, Hillview Street, Woy Woy,* prepared for Providence Projects Pty Ltd, dated July 2007 (DP Project 41524) (DP, 2007a);
- *Report on Geotechnical Investigation, Proposed Retirement Village, Everglades Retirement Gardens, Lot 17 in DP833218 Hillview Street, Woy Woy*, prepared for Providence Projects Pty Ltd, dated December 2007 (DP Project 41561) (DP, 2007b); and
- *Report on Geo-Environmental Assessment, Proposed Retirement Village, Lot 20 DP1123934, 45 Hillview Street, Woy Woy*, prepared for Southern Cross Care (NSW & ACT), dated September 2012 (DP Project No. 41561.01) (DP, 2012).

The most recent report (DP, 2012) reviewed the acid sulfate soil results from the previous report (DP, 2007b) and then completed additional investigation, soil screening and laboratory analysis.

The ground conditions encountered in the previous investigations generally comprised grey and brown sand and silty sand to the depth of investigation (4 m). The only exception being a layer of filling which was encountered to a depth of 0.2 m in Bore 101 described as dark grey gravel filling (probably a gravel hardstand area).

Groundwater was observed at depths of between 1.7 m and 2.5 m in all bores during drilling. The stabilised groundwater was measured at depths of between 1.6 m and 2.0 m. It should be noted that groundwater levels at the site are likely to be influenced by the nearby creek and prevailing weather conditions and will therefore change over time.

It should be noted that, laboratory test methods and / or guidance documents have been updated since the acid sulfate soil investigations were completed in 2007 and 2012. An updated investigation may further refine acid sulfate conditions at the site. However, based on the information available, the following conclusions regarding acid sulfate soils are provided:

- The results of the sPOCAS and Scr testing indicated acid sulfate soil results were generally below the adopted action criteria; however, detectable concentrations of acidity and sulfidity were reported in soils within the proposed development area.

- Soil samples from Bore 102 at 3.0 m depth and Bore 104 at 3.0 m depth exceeded the action criteria (i.e. net acidity action criteria of 0.03%S). It should be noted that these exceedances are consistent with the acid sulfate soil risk mapping, which identified that the site had a low probably of occurrence of acid sulfate soils below depths of approximately 3 m. Furthermore, the risk mapping notes that acid sulfate soil materials, if present, are sporadic and may be buried by alluvium...

On this basis, the results suggest that sporadic acid soils are present within the proposed basement excavation. In the absence of an updated comprehensive data set, a precautionary approach should be adopted, and all soils encountered below the groundwater table (i.e. approximately 1.5 m depth) should be considered to be acid sulfate soils and will require management.

Hence, the proposed works should be undertaken in accordance with a site-specific acid sulfate soil management plan (ASSMP) to appropriately minimise and manage the acid sulfate impacts.

4. Proposed Development

It is understood that the proposed development will comprise construction of a three-storey building with one basement level for car parking, internal access roads and landscaping. The client indicated that the maximum depth of excavation is estimated to be 2.5 m below current surface level.

Based on the previous geotechnical report (DP, 2007b), the most suitable support system for the sides of the proposed basement excavation would be either contiguous or secant pile walls. Temporary dewatering would also be required. A tanked basement was recommended to eliminate the requirement for permanent dewatering. It is also assumed that groundwater monitoring during construction would be required during dewatering.

5. Acid Sulfate Management Plan

5.1 Overview

As described in Section 3, two soil samples from Bores 102 and 104 at 3.0 m depth described as light brown or grey silty sand exceeded the action criteria.

Overall, deeper excavations (more than approximately 1.5 m below current surface level) may disturb sporadic or isolated areas of ASS that will require management for acid sulfate soil conditions. These soils are likely to comprise light brown or grey silty sand. It is estimated that approximately 5,000 to 10,000 tonnes of acid sulfate soils will be disturbed as part construction of the proposed nursing home facility (basement level and lift shafts).

Disturbance of acid sulfate soils must be managed to avoid the release of acidity into the environment. It is essential that the acid sulfate soils be managed to ensure that there is no impact to the surrounding environment, including the nearby vegetation conservation area.

5.2 Risk Categorisation

The SMG (Ref 2) relates environmental risk from ASS by the treatment level and tonnage of disturbance of ASS. This document indicates that the proposed disturbance of the natural soils below approximately 1.5 m depth is likely to be considered “Category VH” or very high level of treatment.

The SMG (Ref 2) confirms that a formal ASS Management Plan is required as part of the propose works, and that the following practices are to be included:

- Soils are treated with an amount of neutralising agent that will counter their existing plus potential acidity;
- The neutralising agent is thoroughly mixed with the soil; and
- Management of site run-on, runoff and infiltration.

5.3 Excavation Procedure and Disposal / Reuse Options

It is understood that spoil generated from excavation of the proposed basement and lift shafts may be transported off-site for reuse or disposed of to a licenced landfill in accordance with the waste classification provided in the previous report (DP, 2012). It is recommended that soils excavated be initially segregated into the following stockpiles:

- Filling: Dark grey sandy gravel filling encountered to a depth of 0.2 m in Bore 101. These soils do not require management for acid sulfate soil conditions and were classified as General Solid Waste (non-putrescible) in the previous report (DP, 2012).
- Natural: Soils to a depth of approximately 1.5 m identified as non-acid sulfate soils do not require management for acid sulfate soil conditions and were classified as VENM in the previous report (DP, 2012); and
- Natural: Soils below a depth of approximately 1.5 m identified as acid sulfate soils and require management for acid sulfate soil conditions, described as light brown or grey silty sand. These soils require treatment in accordance with this ASSMP for re-use on-site or disposal to a licensed facility. These soils were classified as General Solid Waste (non-putrescible) in the previous report (DP, 2012).

Any filling or natural soils different to those describe above and in the previous report should be segregated to stockpile on-site for further assessment.

5.4 Liming Rates

Based on the assessment results (DP, 2012), natural soils from approximately 1.5 m depth and described as light brown silty sand that are to be disturbed during excavation are to be treated using lime prior to re-use or disposal. Table 1 below provides indicative liming rates for neutralisation of the acid sulfate soils likely to be disturbed.

Table 1: Indicative liming rate

Material	Highest Net Acidity %S)	'Ag' Lime Application Rate for Treatment	
		Guard Layers (kg/m^2 of excavation)	Soil* (kg/t)
Natural light brown or grey silty sand below 1.5 m depth	0.07	1	3

* Based on Laboratory Report in previous DP report (DP, 2012)

Management of the excavation process will be necessary to identify and segregate the various material types and to ensure that the appropriate lime neutralisation treatment is applied to the corresponding material.

5.5 Soil Treatment and Neutralisation Rates

Neutralisation of PASS should be carried out as follows:

- Excavation, stockpiling and/or off-site transport of material identified as non-acid sulfate soil as described in Section 5.3. Stockpiling of soils should be managed in accordance with the contractors Construction Environmental Management Plan (CEMP); however, appropriate management of site run-on, runoff and infiltration should be incorporated into the plan.
- Once excavation has exposed the light brown or grey silty sand at approximately 1.5 m depth Grade 1 Agricultural Lime should be placed at a rate of 3 kg/tonne to the exposed soil.
- *In situ* mixing and stripping of approximately 200 mm layers should occur with more lime being added at the aforementioned rate with each subsequent excavated layer. *In situ* mixing and stripping off the soil in layers will allow the lime to thoroughly mix throughout the soil. Alternatively, mixing could occur on-site within a sealed vessel, such as skip bins, although ensuring thorough mixing is essential.
- Placement of a guard layer at a rate of approximately 1 kg/m^2 on the exposed excavation base and walls (where appropriate) to counteract the generation of acidic leachate due to the soils being exposed to air.
- If the soil is to be reinstated into on-site excavations, then the excavated PASS can be temporarily stockpiled on-site and covered with a layer of 'ag' lime to neutralise any possible leachate migrating from the stockpiled material and then covered by plastic sheeting.
- If off-site disposal is required the treated ASS should be loaded directly into trucks for transport to the appropriately licensed facility for disposal as per the waste classification (see Section 4.2).
- If on-site reuse is proposed, then the treated ASS should be reinstated beneath impermeable pavement (e.g. building slab or driveway) or it can be buried a minimum of 0.3 m below the final site levels. If no impermeable capping is placed, then the treated ASS must be capped with a minimum 0.3 m of non-acid sulfate soil materials (e.g. other non-acid sulfate excavation spoil).

5.6 Placement of a Guard Layer

Following completion of excavation activities, and where there are exposed PASS remaining in the work area (i.e. not below the water level) then a guard layer of agricultural lime should be placed at a rate of 1 kg/m^2. This is to counteract the generation of acidic leachate due to the soils being exposed to air during the construction period.

5.7 Neutralising Materials

Agricultural lime ('ag' lime) should be used as the preferred neutralisation material for the management of ASS as it is usually the cheapest and most readily available product for soil neutralisation. This material is strongly alkaline (pH of 8.5 to 9.5), it is of low solubility, and does not present any handling problems. The 'ag' lime comprises calcium carbonate, typically made from limestone that has been finely ground and sieved to a fine powder.

The 'ag' lime purity should preferably be 95% or better, (i.e. NV >95, where NV is the neutralising value, a term used to rate the neutralising power of different forms of materials relative to pure, fine calcium carbonate which is designated NV = 100). 'Ag' lime is typically sold at an NV of 95% to 98%. There could be economic justification for using a less pure grade of ag lime; however, under these circumstances, the individual lime dosing rates should be increased by a factor of 100/NV.

Due to its low solubility in water, 'ag' lime is not suitable for the neutralisation of leachate, which requires a product with a very quick reaction and high solubility. The most suitable neutralising agent for leachate and retained drainage water is slaked lime or quicklime (calcium hydroxide). This is made by treating burnt lime (calcium oxide) with water (slaking) and comes as a fine white powder. It has a typical NV of about 135. Due to its very strong alkalinity (pH of about 12.5 to 13), slaked lime or quicklime should not be allowed to come into contact with the skin or be inhaled.

5.8 Dewatering

Stabilised groundwater was measured at depths of between 1.6 m and 2.0 m during previous investigations. As such, it is expected that groundwater would be encountered and require management during construction.

When groundwater is encountered during the construction works, then it should be managed using a water treatment system that enables management of water pH and turbidity levels. A number of propriety systems are available for use.

The following procedure is recommended in order to minimise potential adverse impacts resulting from excavation and dewatering of PASS during construction:

- Minimise the dewatering depth required for excavation;
- Minimise the time and volume of exposed PASS (i.e. staged dewatering and excavation over relatively short durations);
- Extracted groundwater should be discharged through a water treatment system that enables management of water pH and turbidity levels; and

- The pH of the extracted water should be monitored prior to discharge. Neutralisation should be undertaken if discharge water pH falls below natural groundwater levels or regulatory requirements.

The amount of neutraliser required to be added to the leachate or discharged groundwater can be calculated from the equation below:

$$\text{Alkali Material Required (kg)} = \frac{M_{Alkali} \times 10^{-pH\ initial}}{2 \times 10^{3}} \times V$$

Where: *pH initial = initial pH of leachate*
V = volume of leachate or collected water (litres)
M_{Alkali} *= molecular weight of alkali material (g/mole)*

Note: *molecular weight of calcined magnesia (M_{MgO}) = 40 g/mole.*

The alkali should be added to the leachate/discharged groundwater water as a slurry. Mixing of the slurry is best achieved using an agitator.

Whilst agricultural lime is well suited to the treatment of acid sulfate soils, it does not dissolve readily in water; hence it should not be used for adjusting the pH of water which requires a product with a very quick reaction and high solubility. The most suitable neutralising agent for leachate and retained water is slaked lime or quicklime (calcium hydroxide). This is made by treating burnt lime (calcium oxide) with water (slaking) and comes as a fine white powder. It has a typical NV of about 135.

Due to its very strong alkalinity (pH of about 12.5 to 13), slaked lime or quicklime should not be allowed to come into contact with the skin or be inhaled. Furthermore, it should be added incrementally with care and thoroughly mixed to prevent overshooting the desired pH.

As a guide, the approximate quantities of hydrated lime would be required to neutralise acidic water to pH 7 are provided in Table 2.

Table 2: Recommended Approximate Liming Rates for Water

Water pH	Water Extraction Rate		
	2 m^3/hr	5 m^3/hr	10 m^3/hr
2	0.74	1.85	3.7
3	0.074	0.185	0.37
4	0.0074	0.0185	0.037
5	0.00074	0.00185	0.0037
6	0.000074	0.000185	0.00037

Notes: Liming rates are for hydrated lime (kg of $Ca(OH)_2$)

It should be recognised that portable holding and treatment tanks will be required to allow on-site neutralisation of water generated by dewatering activities prior to on-site infiltration or discharge.

5.9 Verification Testing

Verification testing of the soil and any collected water to be disposed is required to be conducted after the addition of lime to test whether or not mixing has been adequate, and to reduce the risk of acidic water being returned to the environment.

Based on the intensity of testing during investigation, the net acidity of the soil prior to treatment and the quantity of soil to be treated, it is recommended that validation testing should comprise field pH screening and S_{CR} suite testing on at least five samples spread across the full depth of the proposed excavation.

The pH of all collected water around the confines of the managed stockpiles or during dewatering should be measured daily and results assessed against the criteria provided in Table 3. The soil and water contained within the bunded areas should not be removed until the target values presented in Table 3 below have been achieved.

Table 3: Target Levels of Neutralised Soil and Water

Test	Component	Target Level
Monitoring of water	pH	6.5 < pH < 8.5
	Turbidity	To comply with either values determined in consultation with the Authority (i.e. CCC) or less than local background levels (baseline monitoring required).
	Aluminium (Al) and Iron (Fe)	Establish local water quality data prior to site disturbance and ensure that these values are not exceeded.
	Dissolved Oxygen	To comply with either values determined in consultation with the Authority (i.e. CCC) or less than local background levels (baseline monitoring required).
Field screening of soil	pH_F	$5.5 < pH_F \leq 8.5$
Acid based accounting of soil (Chromium Suite test method)*	Net acidity (using appropriate fine factor)	Zero or negative
	pH_{KCL}	$pH_{KCL} \geq 6.5$
	TAA	Zero

* Based on Section 3.6 of Chapter A (Overview) of the LMG (Ref 3)

It should be noted that chromium suite tests will require at least four days turnaround, possibly longer, and hence sufficient time should be allowed in the treatment programme for such verification testing. Only appropriately skilled staff, such as available through DP, should collect and test verification samples. In addition to normal daily supervision of the soil management process, it is suggested that regular formal inspections be undertaken.

5.10 Emergency Response Procedures (Contingency Plan)

Construction activities which may cause potential environmental threats are summarised in Table 4 below together with recommendations for "Emergency Response Procedures".

Table 4: Emergency Response Procedures

Construction Activity	Potential Environmental Threat	Emergency Response
Excavations	Flooding of open excavation causing adjacent groundwater levels to rise, leading to potential acid leachate once the excavation is drained	• Inform site foreman and project manager/ environmental officer; • Determine pH of groundwater / floodwater in excavation; • Correct groundwater / floodwater pH by application of slaked lime to bring pH in range of 6.5 to 8.5; • Drain pit to tanks for water quality assessment prior to discharge.
Stockpiling / Neutralisation	Stockpile washes or slips outside of contained area	• Inform site foreman and project manager/ environmental officer; • Estimate volume of material breeching bund; • Conduct pH analysis of adjacent watercourses (if any); • Remove breeched soil into a bunded limed pad; • Over-excavate contaminated area to 0.2m depth, apply and mix lime at rate as for guard layers (1 kg lime per m^2 of surface).
	Breach in stockpile containment bund	• Inform site foreman and project manager/ environmental officer; • Close breach in bund; • Conduct pH analysis of adjacent watercourses (if any); • Correct pH in any adjacent watercourse (if required).

For all construction activity incidents which pose an environmental threat, an incident report must be completed in order that:

- The cause of the incident may be determined; determine how the incident occurred;
- Additional control measures may be implemented; and
- Work procedures may be modified to reduce the likelihood of the incident re-occurring.

5.11 Reporting

A record of treatment of acid sulfate soils should be maintained by the contractor and should include the following details:

- date;
- location / area;
- time of excavation;
- neutralisation process undertaken;
- lime rate utilised;
- results of monitoring;
- disposal location; and
- tonnages and landfill dockets (if applicable).

A record should also be maintained confirming contingency measures and additional treatment if undertaken. A final report should be issued upon completion of the works presenting the monitoring regime and results, and confirming that adverse environmental impact has not occurred during the works.

6. References

1. *Acid Sulfate Soil Manual*, NSW Acid Sulfate Soil Management Advisory Committee (ASSMAC), August 1998
2. Dear SW, Ahern CR, O'Brien LE, Dobos SK, McElnea AE, Moore NG and Watling KM Queensland Acid Sulfate Soil Technical Manual: *Soil Management Guidelines*. Department of Science, Information, Technology, Innovation and the Arts, Queensland Government, Version 4.0, 2014
3. Ahern CR, McElnea AE and Sullivan LA, *Acid Sulfate Soils Laboratory Methods Guidelines*, Department of Natural Resources, Mines and Energy, Indooroopilly, June 2004.

7. Limitations

Douglas Partners (DP) has prepared this ASSMP report for this project at 45 Hillview Road, Woy Woy with reference to DP's proposal CCT190033 dated 30 January 2019 and acceptance received from Doug Sneddon from Doug Sneddon Planning Pty Ltd dated 4 February 2019. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Doug Sneddon Planning Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without

recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and / or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and / or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during previous investigations. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and / or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix B

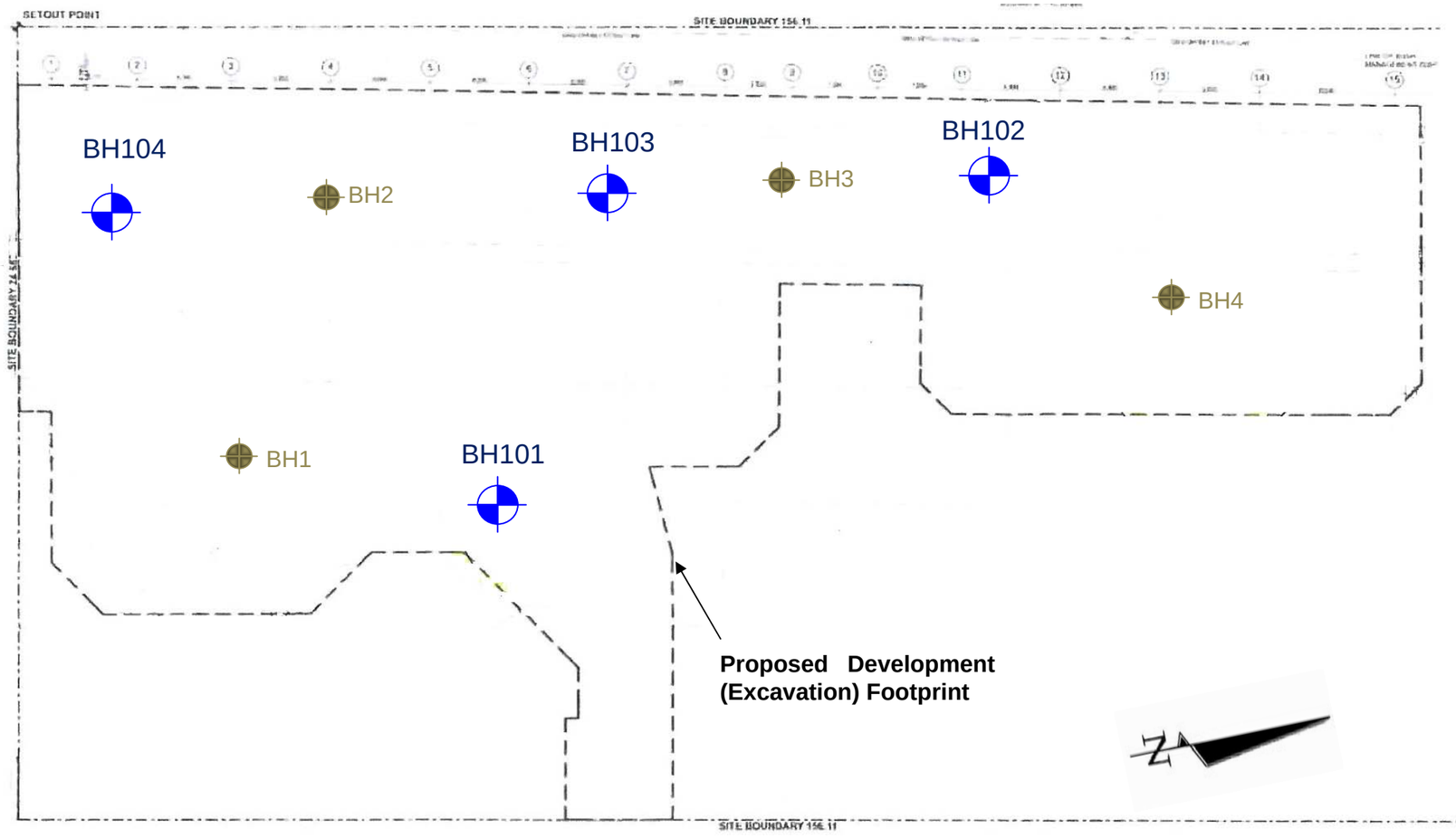
Drawing 1 from DP Report 41561.01

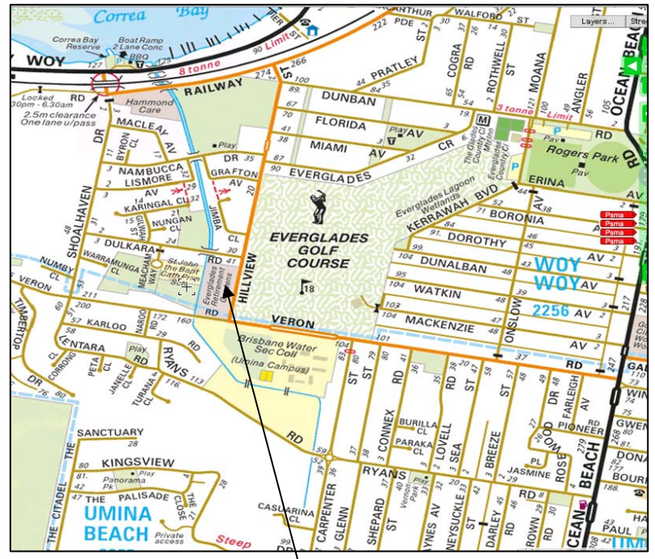
Development Plans

Legend:

1. Approximate location of test bores

2. Approximate location of previous investigation





Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Southern Cross Care (NSW & ACT)	TITLE:	**Test Location Plan**	PROJECT No: 41561.01
	OFFICE: Wyong	DRAWN BY: TJW		**Proposed Retirement Village**	DRAWING No: 1
	SCALE: N/A	DATE: Sept 2012		**45 Hillview Street, Woy Woy**	REVISION: A

DEVELOPMENT APPLICATION

'45 HILLVIEW STREET, WOY WOY'

PROPOSED MULTI - LEVEL NURSING HOME FACILITY

DRAWING LIST

ARCHITECTURAL DRAWINGS

DA-000	COVER SHEET
DA-001	SITE ANALYSIS PLAN
DA-002	SITE PLAN / LOCALITY PLAN
DA-003	BASEMENT FLOOR PLAN - SOUTH
DA-004	BASEMENT FLOOR PLAN - NORTH
DA-005	GROUND FLOOR PLAN - SOUTH
DA-006	GROUND FLOOR PLAN - NORTH
DA-007	LEVEL 1 FLOOR PLAN - SOUTH
DA-008	LEVEL 1 FLOOR PLAN - NORTH
DA-009	LEVEL 2 FLOOR PLAN - SOUTH
DA-010	LEVEL 2 FLOOR PLAN - NORTH
DA-011	ROOF PLAN - SOUTH
DA-012	ROOF PLAN - NORTH
DA-013	EAST & NORTH ELEVATIONS
DA-014	WEST & SOUTH ELEVATIONS
DA-015	SECTIONS AA & BB
DA-016	SECTIONS CC & DD
DA-017	SHADOWS DIAGRAMS
DA-018	PERSPECTIVES
DA-019	COMPARISION DA APPROVED DRAWINGS WITH NEW S96 DRAWINGS
DA-020	LONG SECTION
DA-021	BASEMENT FOOTPRINT COMPARISON
DA-022	RAISED BOARD WALK
DA-023	SHADOW DIAGRAMS (21 DEC)
DA-024	PHOTOS OF SITE AT 9M ALTITUDE
DA-025	SITE PERSPECTIVE RENDERS

SURVEY CHASE BURKE & HARVEY

BW 12010 - A / 1	SURVEY CONTOUR AND VEGETATION PLAN
BW 12010 - A / 2	SURVEY ROUTE FOR APPROVED BOARDWALK

AERIAL PHOTOGRAPH

(NOT FOR CONSTRUCTION)

Client: THOMPSON HEALTH CARE	**MULTI-LEVEL NURSING HOME FACILITY** 45 HILLVIEW STREET WOY WOY, NSW	COVER SHEET / CONTENTS / AERIAL PHOTOGRAPH	16017
		Scale: @ A1 — Wednesday, 3 October 2018	DA-000 rev B

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 95220
ABN 21 278 857 200 ACN 001 964 254

View from Intersection of Dulkara Rd and Hillview street, Looking South West.

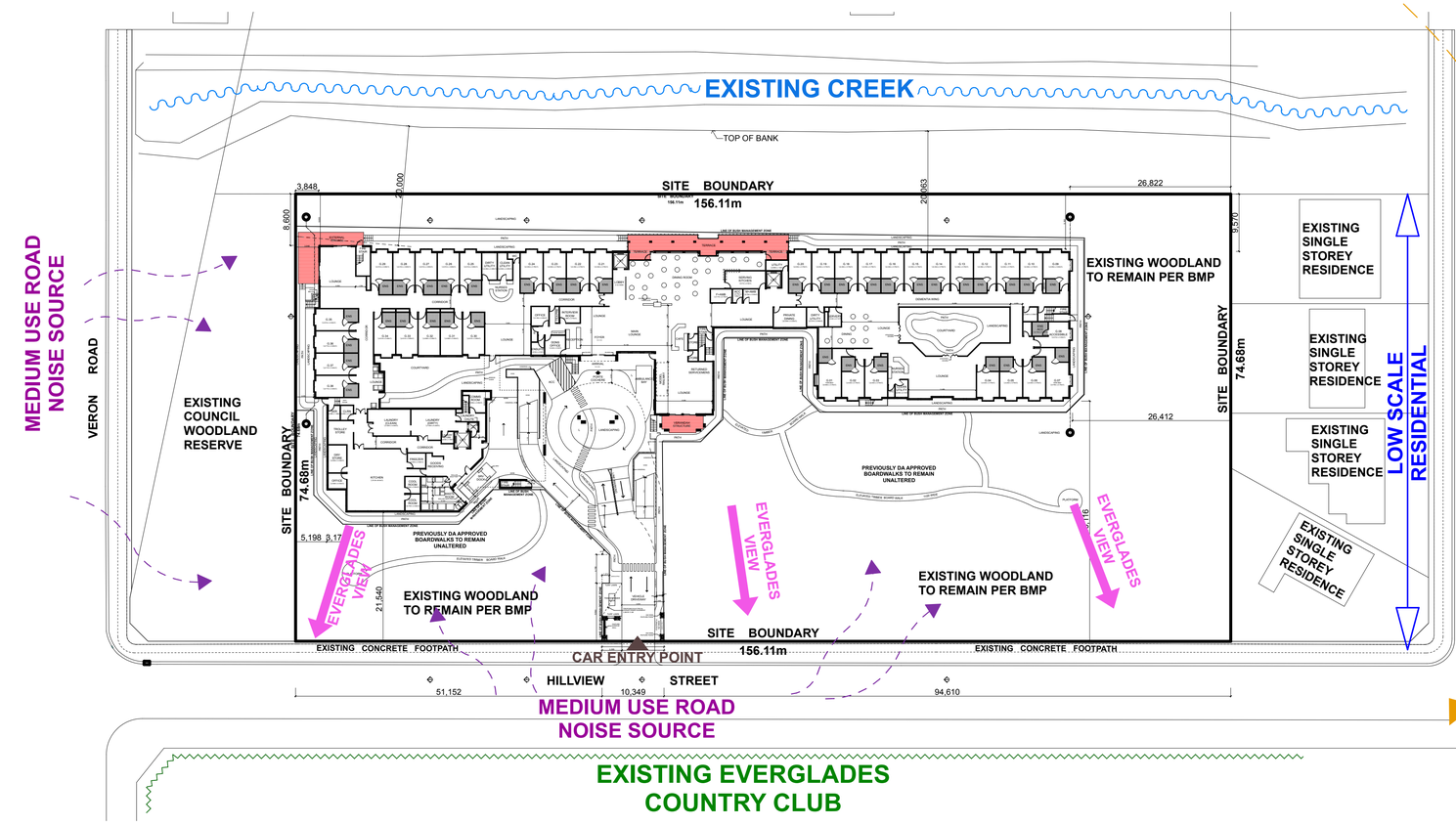
View Looking South East from Outside Entry Gate to Subject Site. Subject property is on right hand side of photo.


View from Dulkara Road, Looking South Toward the Council Creek Reserve, and in Looking Toward North End of the Subject Site in Background on the Left Side of Image

View of the Intersection of Veron Rd and Hillview St, Looking North West.


View Looking into the Central Cleared Area of the Site from the Entry Gate to the Site on Hillview Street

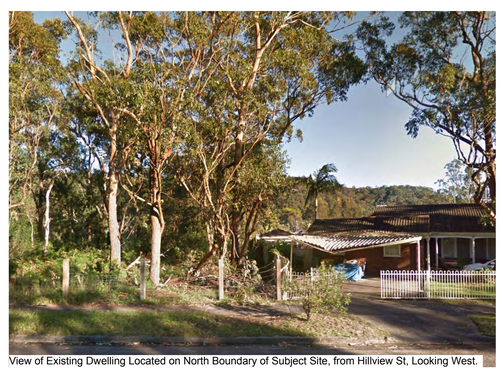
View Looking South West from Outside the Entry Gate to the Subject Site



View Looking North West at the South East Corner of the Subject Site, from Hillview Street


View Looking North East, Toward Golf Course Opposite, from Outside Enty Gate of Subject Site

View Looking North Along Hillview St from Veron Road


View of Existing Dwelling Located on North Boundary of Subject Site, from Hillview St, Looking West.


View from Dulkara Road, Looking South Toward the Council Creek Reserve, and in Looking Toward North End of the Subject Site in Background on the Left Side of Image

Rev B - 07/08/17 - AMENDMENT S96 ISSUE **Rev D - 11/12/17 - DA APPLICATION**

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

SITE ANALYSIS PLAN | **16017**

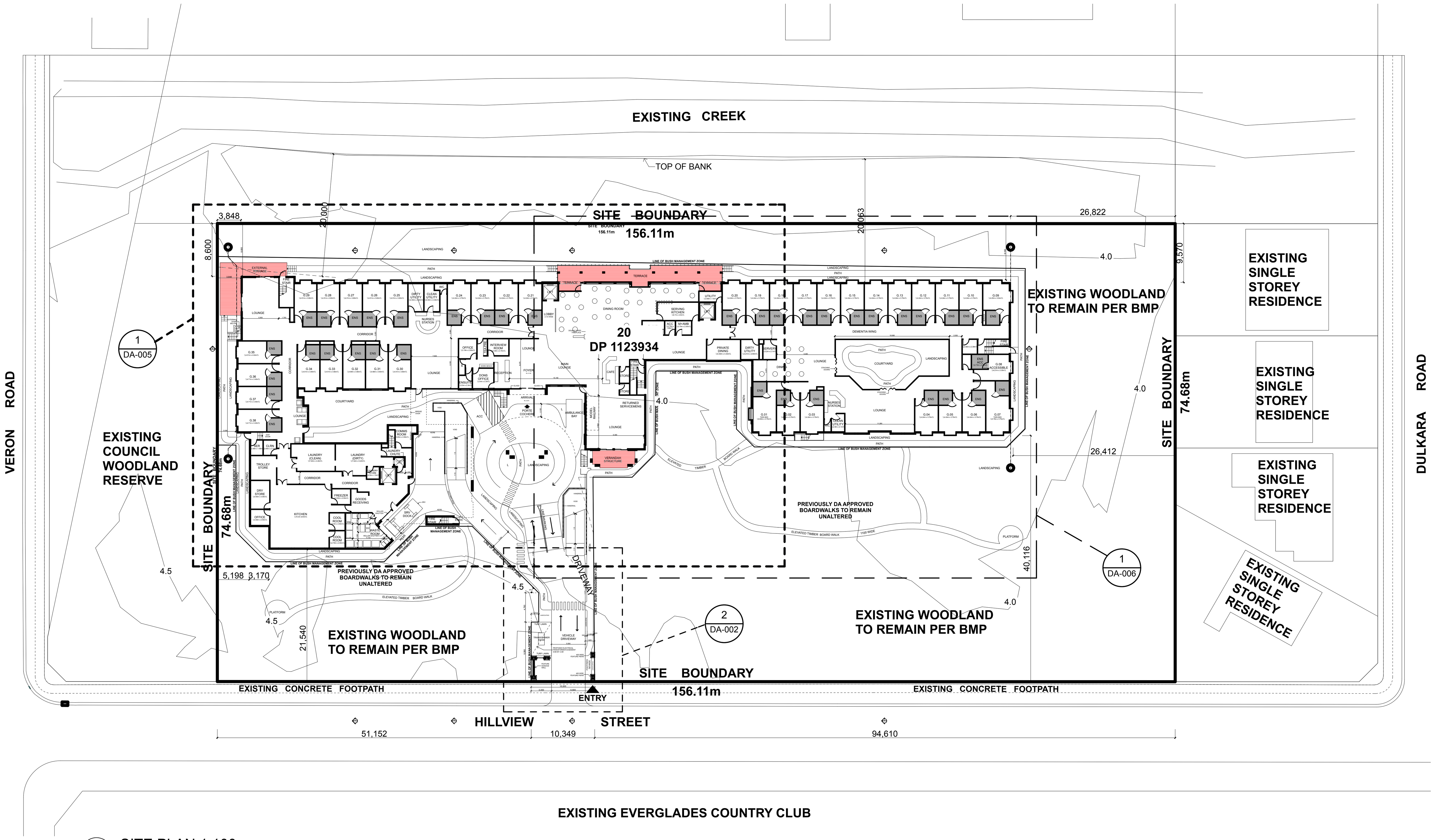
Scale: 1:500 @ A1 | Wednesday, 3 October 2018 | DA-001 rev D

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

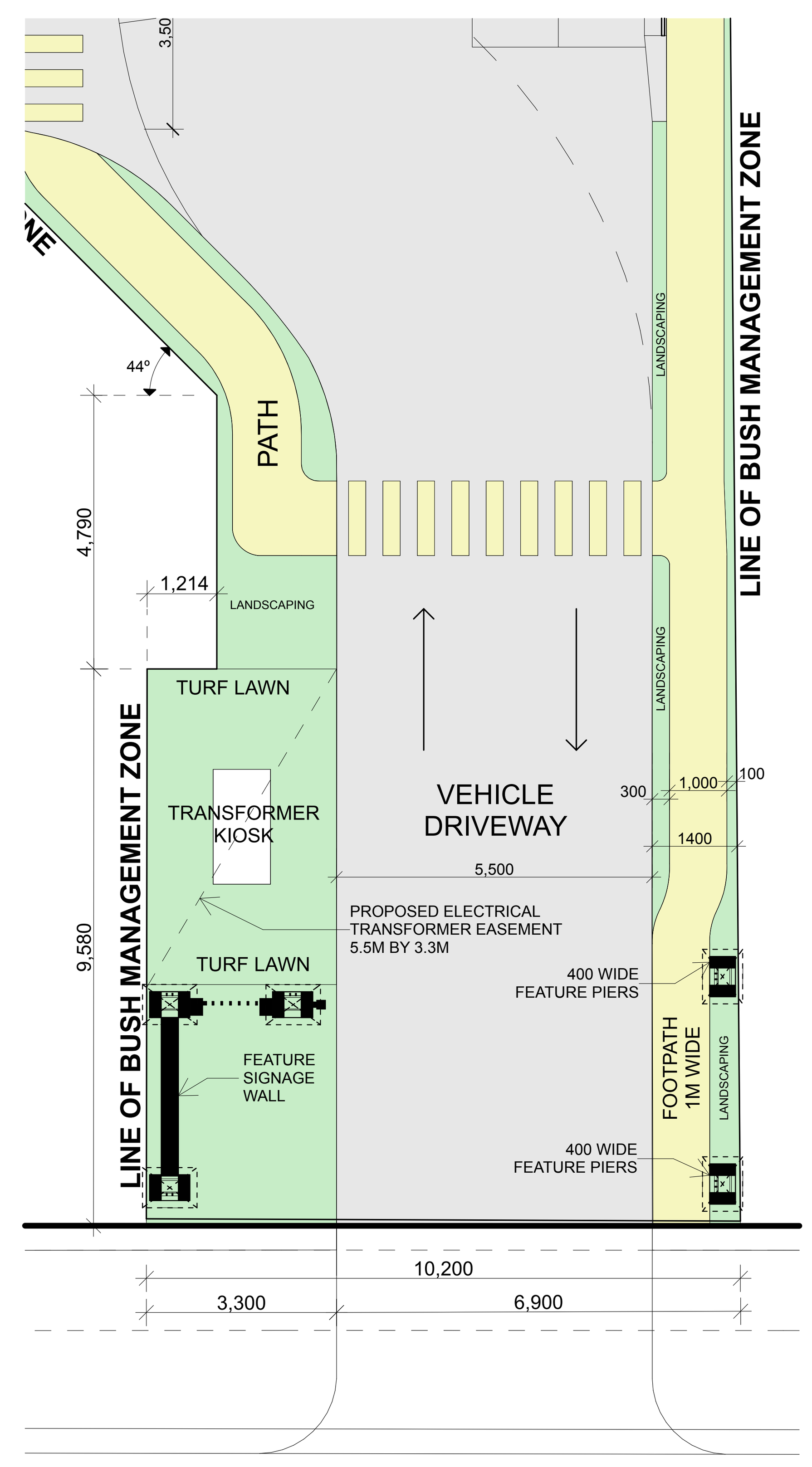
info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522
ABN 21 278 857 200 ACN 001 964 254



SITE PLAN 1:100

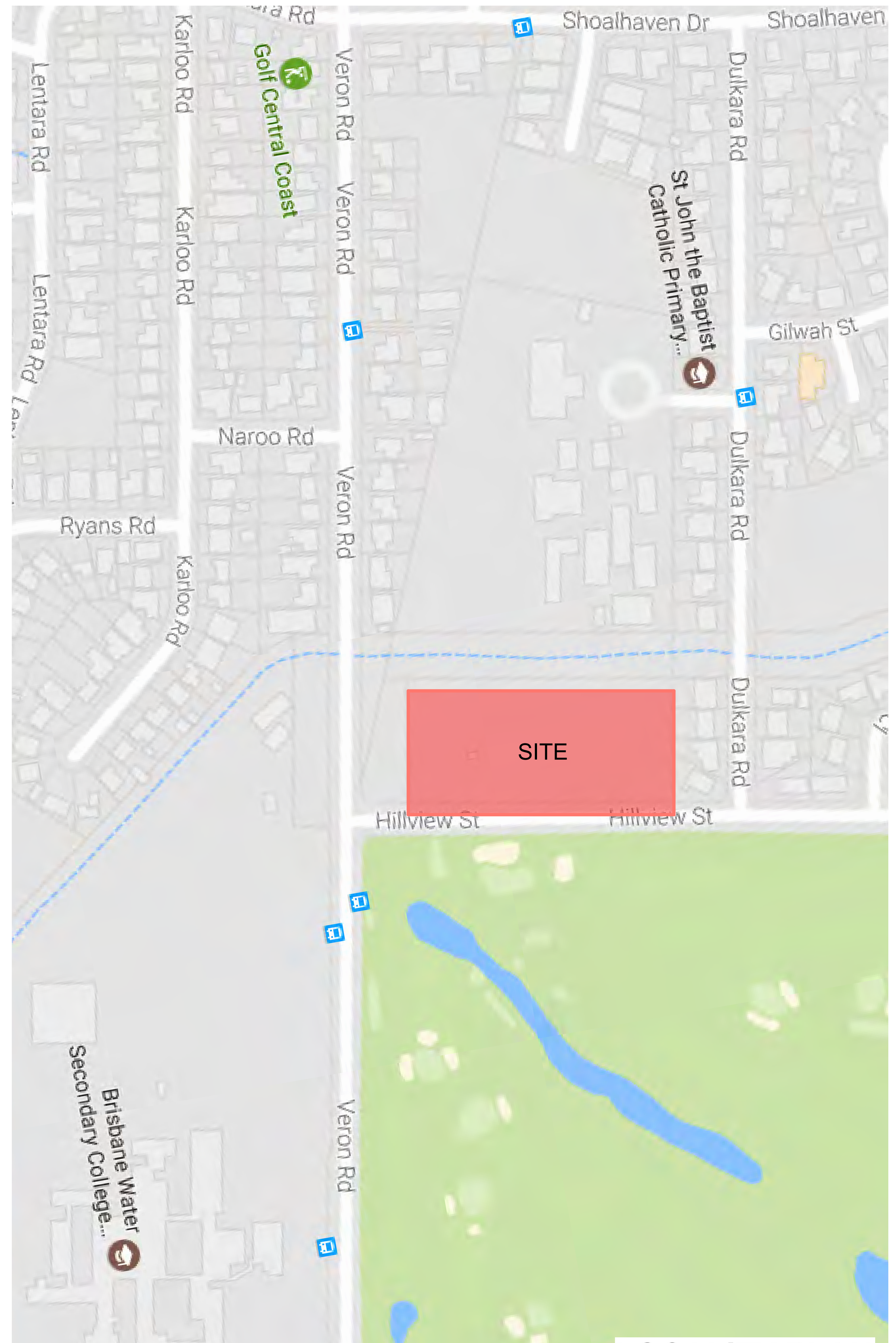
SCALE 1:500



INSERT OF FRONT ENTRANCE GATE & DRIVEWAY AREA

2

SCALE 1:100



LOCALITY PLAN

Rev B - 07/08/17 - AMENDMENT S96 ISSUE

Rev C - 11/12/17 - DA APPLICATION

(NOT FOR CONSTRUCTION)

Client: THOMPSON HEALTH CARE	**MULTI-LEVEL NURSING HOME FACILITY** 45 HILLVIEW STREET WOY WOY, NSW	SITE PLAN / LOCALITY PLAN	16017	
		Scale: @ A1	Wednesday, 3 October 2018	DA-002 rev D

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000
tel 02 9262 4455
fax 02 9299 1524
info@thrumarchitects.com.au
www.thrumarchitects.com.au
NSW Board of Architects: 95220

thrum ARCHITECTS

SITE BOUNDARY
156.11m

SOUTH SECTOR
24 CARS

CENTRAL SECTOR
11 CARS

LINE OF BUSH MANAGEMENT ZONE

SITE BOUNDARY
74.68m

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

PLANT
½5.50m x 4.36m¾

10200L TANK

10200L TANK

ROLLER SHUTTER 2700mm WIDE

ROLLER SHUTTER 2400mm WIDE

GARDENERS STORE
½4.75m x 3.24m¾

TURNING BAY

ROLLER SHUTTER 2300mm WIDE

PLANT
½7.8m x 5.3m¾

SOUTH CARPARK
(SECTOR 1)
24 CARS

ACC

ACC

SERVICES

LIFT

FOYER

GLAZING

BOLLARDS

SERVICES

ROLLER SHUTTER

CENTRAL CARPARK
(SECTOR 2)
11 CARS

SRV

ROLLER SHUTTER

WORKSHOP
½10.08m x 5.03m¾

ROLLER SHUTTER

SRV

MSB
½5.81m x 2.90m¾

FSR
½4.60m x 1.93m¾

STAFF PARKING

FURNITURE STORE
½9.61m x 3.10m¾

TERRACE
½5.12m x 3.60m¾

SCREEN

BALUSTRADE ABOVE

GLASS

1:10

VOID OVER

3,000

1:5

WINDOW

WINDOW

MALE STAFF AMENITIES
½5.40m x 3.94m¾

STAIR UP TO OPERATIONS SECTOR

CLEANER

SERVICE CORRIDOR

2,200

LOCKERS ROOM
½5.40m x 3.0m¾

STAFF ROOM
½12.47 x 7.32m¾

RAMP

LIFT LOBBY

FEMALE STAFF AMENITIES
½7.17m x 5.0m¾

LIFT

STAFF KITCHENETTE

SERVICES

RL 2.200

ROLLER SHUTTER

ROLLER SHUTTER 2100mm WIDE

STORE
½7.09m x 4.65m¾

3,000

BALUSTRADE ABOVE

1:5

VOID OVER

RAMP

3,848

2,648

9,600

5,400

6,215

5,400

2,800

3,150

1,505

4,200

11,360

5,800

Rev E - 25/07/18 - FOR INFORMATION
Rev D - 23/07/18 - FOR INFORMATION
Rev C - 11/12/17 - DA APPLICATION
Rev B - 07/08/17 - AMENDMENT S96 ISSUE

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

BASEMENT FLOOR PLAN - SOUTH

16017

Scale: 1:100 @ A1

Wednesday, 3 October 2018

DA-003 rev E

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522O
ABN 21 278 857 200 ACN 001 964 254

SITE BOUNDARY
156.11m

CENTRAL SECTOR
11 CARS

NORTH SECTOR
17 CARS

LINE OF BUSH MANAGEMENT ZONE

SERVICES
LIFT
FOYER
GLAZING
BOLLARDS
2,800
3,150
1,565
4,200
SERVICES
11,360
5,850
ROLLER SHUTTER
BOLLARDS
1,915
3,500
300
NORTH CARPARK
(SECTOR 3)
17 CARS
5,800
PLANT ROOM
½6.02m x 5.64m¾
10200L TANK
10200L TANK
ROLLER SHUTTER
2700mm WIDE
9,570
STAFF PARKING
5,800
SERVICES
5,400
7,400
5,400
1,000
LINE OF BUSH MANAGEMENT ZONE
LINE OF BUSH MANAGEMENT ZONE
LINE OF BUSH MANAGEMENT ZONE
LINE OF BUSH MANAGEMENT ZONE
RL 2.200
STORE
½7.09m x 4.65m¾
ROLLER SHUTTER
ROLLER SHUTTER
2100mm WIDE
3,000
BALUSTRADE ABOVE
1:5
VOID OVER
RAMP

Rev D - 25/07/18 - FOR INFORMATION
Rev C - 23/07/18 - FOR INFORMATION
Rev B - 11/12/17 - DA APPLICATION

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

BASEMENT FLOOR PLAN - NORTH

16017

Scale: 1:100 @ A1

Wednesday, 3 October 2018

DA-004 rev D

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522O
ABN 21 278 857 200 ACN 001 964 254

SITE BOUNDARY
156.11m

LINE OF BUSH MANAGEMENT ZONE

EXTERNAL TERRACE
PATH
LANDSCAPING
TERRACE
FIRE STAIR
LOUNGE
EXTERNAL STAIR BELOW
G.29 ¼4.51m x 3.60m¾
G.28 ¼4.51m x 3.60m¾
G.27 ¼4.51m x 3.60m¾
G.26 ¼4.51m x 3.60m¾
G.25 ¼4.51m x 3.60m¾
DIRTY UTILITY ¼4.50m x 2.49m¾
CLEAN UTILITY ¼4.50m x 2.49m¾
WC
NURSES STATION
G.24 ¼4.24m x 3.75m¾
G.23 ¼4.24m x 3.75m¾
G.22 ¼4.24m x 3.75m¾
G.21 ¼4.24m x 3.75m¾
ENS
LIFT
LOBBY 2.1m WIDE
DINING ROOM
DOUBLE SIDED FIREPLACE
SERVING KITCHEN ½6.7m x 2.9m¾
F+AMB ⅓3.17m x 2.75m¾
ACC ½2.75m x 1.65m¾
M+AMB ½2.75m x 2.54m¾
UTILI ⅓3.69m x 1
TERRA
CORRIDOR
OFFICE ⅓3.19m x 2.90m¾
TEA PRE
INTERVIEW ROOM ⅓3.39m x 2.70m¾
LOUNGE
S
WORK BENCH
DONS OFFICE ⅓3.4m x 3.3m¾
RECEPTION
ENSUITE ½2.5m x 2.3m¾
FOYER RL 5.100
MAIN LOUNGE
GLASS
CAFE
STORE
FIRE STAIR
PATH
LINE OF BUSH MANAGEMENT
G.35 ¼4.51m x 4.04m¾
G.36 ¼4.71m x 3.45m¾
G.37 ¼4.71m x 3.45m¾
G.38 ¼4.71m x 3.45m¾
G.34 ¼4.51m x 3.60m¾
G.33 ¼4.51m x 3.60m¾
G.32 ¼4.69m x 3.60m¾
G.31 ¼4.69m x 3.60m¾
G.30 ¼4.51m x 3.60m¾
COURTYARD
HANDRAIL
VOID
BRIDGE OVER
ARRIVAL RL 5.070
PORTE COCHERE
ACC
AMBULANCE BAY
MODEL RAILWAY
RETURNED SERVICEMENS
LOUNGE
EXIT DOOR
COMMS ROOM ⅓3.65m x 2.06m¾
SERVICES
KERB
SER ½2.48m x 1.96m
CLRN ½2.48m x 2.10m
LAUNDRY (CLEAN) ½7.20m x 4.40m¾
LAUNDRY (DIRTY) ½7.42m x 5.20m¾
LAUNDRY CHUTE
LAUNDRY STORE ½2.0m x 1.9m¾
TROLLEY STORE
DRY STORE ¼4.60m x 3.06m¾
OFFICE ⅓3.06m x 2.55m¾
KITCHEN ⅓10.3m x 9.6m¾
FREEZER ½3.00m x 2.50m¾
GOODS RECEIVING
ROLLER SHUTTER
COOL ROOM ½2.8m x 2.50m¾
COOL ROOM ½2.76m x 2.50m¾
WASTE ROOM
SRV
SRV DOCK
RECURVING KERB
L
PATH
LANDSCAPING
LINE MARKING
VERANDAH STRUCTURE
ELEVATED TIMBER
LINE OF BUSH MANAGEMENT ZONE
SITE BOUNDARY 74.68m

Rev D issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Client: THOMPSON HEALTH CARE	MULTI-LEVEL NURSING HOME FACILITY 45 HILLVIEW STREET WOY WOY, NSW	GROUND FLOOR PLAN - SOUTH	16017
		Scale: 1:100 @ A1	Wednesday, 3 October 2018
			DA-005 rev D

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000
tel 02 9262 4455
fax 02 9299 1524
info@thrumarchitects.com.au
www.thrumarchitects.com.au
NSW Board of Architects: 9522
ABN 21 278 857 200 ACN 001 964 254


SITE BOUNDARY
156.11m
LINE OF BUSH MANAGEMENT ZONE
LANDSCAPING
PATH
LANDSCAPING
TERRACE
TERRACE
TERRACE
LIFT
G.21
ENS
LOBBY
2.1m WIDE
DINING ROOM
SERVING KITCHEN
LIFT
UTILITY
F+AMB
ACC
M+AMB
DOUBLE SIDED FIREPLACE
G.20
G.19
G.18
G.17
G.16
G.15
G.14
G.13
G.12
G.11
G.10
G.09
ENS
SERVICE
DEMENTIA WING
18,680
2,000
PRIVATE DINING
DIRTY UTILITY
SERVERY
LOUNGE
MAIN LOUNGE
FOYER
15,180
FIRE STAIR
CAFE
STORE
STORE
PATH
LINE OF BUSH MANAGEMENT ZONE
9,480
DINING
LOUNGE
STACKING DOORS
PATH
COURTYARD
LANDSCAPING
PATH
STACKING DOORS
FIRE STAIR
ENS ACC
G.08 ACCESSIBLE
GLASS
ARRIVAL
PORTE COCHERE
AMBULANCE BAY
MODEL RAILWAY
RETURNED SERVICEMENS
LOUNGE
9,390
PATH
LINE OF BUSH MANAGEMENT ZONE
LINE OF BUSH MANAGEMENT ZONE
PATH
G.01
TWIN BED
G.02
G.03
NURSES STATION
WC
CLEAN UTILITY
LOUNGE
11,280
G.04
G.05
G.06
G.07
TWIN BED
LANDSCAPING
LANDSCAPING
PATH
LINE OF BUSH MANAGEMENT ZONE
PATH
LINE OF BUSH MANAGEMENT ZONE
VERANDAH STRUCTURE
LANDSCAPING
PATH
ELEVATED TIMBER BOARD WALK
HANDRAIL
VOID
HANDRAIL
LINE MARKING
PATH
LANDSCAPING
PREVIOUSLY DA APPROVED BOARDWALKS TO REMAIN UNALTERED
ELEVATED TIMBER BOARD WALK
1100 WIDE
PLATFORM

Rev D issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

GROUND FLOOR PLAN - NORTH

16017

Scale: 1:100 @ A1

Wednesday, 3 October 2018

DA-006 rev D

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000
tel 02 9262 4455
fax 02 9299 1524
info@thrumarchitects.com.au
www.thrumarchitects.com.au
NSW Board of Architects: 95220

thrum ARCHITECTS

SITE BOUNDARY
156.11m

LINE OF BUSH MANAGEMENT ZONE

SITE BOUNDARY
74.68m

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LOUNGE
1.30 ¼4.51m x 3.60m¾
1.29 ¼4.51m x 3.60m¾
1.28 ¼4.51m x 3.60m¾
1.27 ¼4.51m x 3.60m¾
1.26 ¼4.51m x 3.60m¾
DIRTY UTILITY ¼4.50m x 2.49m¾
CLEAN UTILITY ¼4.50m x 2.49m¾
WC
NURSES STATION
1.25 ¼4.24m x 3.75m¾
1.24 ¼4.24m x 3.75m¾
1.23 ¼4.24m x 3.75m¾
1.22 ¼4.24m x 3.75m¾
ENS
LIFT
TERRACE
LOBBY 2.1m WIDE
SOUTH DINING ROOM
SERVING KITCHEN ⅛5.79m x 3.30m¾
NORTH DINING ROOM
F+AMB ⅓3.34m x 2.25m¾
ACC ½2.25m x 1.65m¾
M+AMB ⅓3.06m x 2.25m¾
UTIL ⅓3.69m x
LOUNGE
RL 8.850
CORRIDOR
1.38 ¼4.51m x 3.60m¾
1.39 ¼4.51m x 3.60m¾
1.40 ¼4.51m x 3.60m¾
1.41 ¼4.51m x 3.60m¾
1.42 ACCESSIBLE ¼4.10m x 3.80m¾
STORE ½2.6m x 2.84m¾
1.43 LARGE TWIN SUITE ⅛8.23m x 3.80m¾
1.37 ¼4.51m x 3.60m¾
1.36 ¼4.51m x 3.60m¾
1.35 ¼4.51m x 3.60m¾
1.34 ¼4.51m x 3.60m¾
1.33 ¼4.51m x 3.60m¾
1.32 ¼4.65m x 3.60m¾
ENS ACC ½2.75m x 2.35m¾
1.31 ACCESSIBLE ⅛5.00m x 3.90m¾
½2.70m x 1.90m¾
½2.35m x 2.29m¾
⅓3.56m x 2.34m¾
THEATRE ⅛10.42m x 6.49m¾
FIRE STAIR
CRAFT ROOM ¼4.49m x 4.02m¾
LOUNGE
VERANDAH STRUCTURE
PORTE COCHERE ROOF
COURTYARD (BELOW)
BRIDGE
WINDOWS
LOUNGE
1.57 ¼4.51m x 3.60m¾
1.56 ¼4.51m x 3.60m¾
1.55 ¼4.51m x 3.60m¾
1.54 ¼4.97m x 3.60m¾
SERVICES
½1.55m x 1.4m¾
LAUNDRY CHUTE
LIFT
UTILITY ⅓3.49m x 2.70m¾
ENS ACC ½2.75m x 2.35m¾
UTILITY
SERVICE
1.53 ¼4.71m x 3.60m¾
1.52 ¼4.71m x 3.60m¾
1.51 ¼4.71m x 3.60m¾
1.50 ¼4.71m x 3.60m¾
1.49 ⅓3.90m x 3.70m¾
BAY WINDOW
FIRE STAIR
1.44 ¼4.51m x 4.34m¾
1.45 ¼4.51m x 3.60m¾
1.46 ¼4.51m x 3.60m¾
1.47 ¼4.51m x 3.60m¾
1.48 ¼4.51m x 3.60m¾

Rev C issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522
ABN 21 278 857 200 ACN 001 964 254

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

LEVEL 1 FLOOR PLAN - SOUTH

16017

Scale: 1:100 @ A1

Wednesday, 3 October 2018

DA-007 rev C

SITE BOUNDARY
156.11m

LINE OF BUSH MANAGEMENT ZONE

SCHEDULE OF RESIDENT ROOMS - LOCATIONS & QUANTITIES

	LOCATION	Typical Type Rooms	Twin Rooms	Accessible Rooms	Totals
1	GROUND - SOUTH	18			18
2	GROUND - NORTH (DIMENTIA WING)	17	2	1	20
3	LEVEL 1 - SOUTH	33	1	2	36
4	LEVEL 1 - NORTH	17	2	2	21
5	LEVEL 2 - SOUTH	33	1	2	36
6	LEVEL 2 - NORTH	17	2	2	21
	TOTALS	135	8	9	152
	No. of Beds:	135	8x2= 16	9	160 beds

THRUM ARCHITECTS PTY LTD

JOB 16017

Rev C issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

LEVEL 1 FLOOR PLAN - NORTH

16017

Scale: 1:100 @ A1

Wednesday, 3 October 2018

DA-008 rev C

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522
ABN 21 278 857 200 ACN 001 964 254

SITE BOUNDARY
156.11m

SITE BOUNDARY
74.68m

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LOUNGE

2.30 ¼4.51m x 3.60m¾
2.29 ¼4.51m x 3.60m¾
2.28 ¼4.51m x 3.60m¾
2.27 ¼4.51m x 3.60m¾
2.26 ¼4.51m x 3.60m¾
DIRTY UTILITY ⅓4.50m x 2.49m¾
CLEAN UTILITY ⅓4.50m x 2.49m¾
WC
2.25 ¼4.24m x 3.75m¾
2.24 ¼4.24m x 3.75m¾
2.23 ¼4.24m x 3.75m¾
2.22 ¼4.24m x 3.75m¾
ENS
NURSES STATION
CORRIDOR
LIFT
LOBBY 2.1m WIDE
TERRACE
SOUTH DINING ROOM
SERVING KITCHEN ⅓5.79m x 3.00m¾
NORTH DINING ROOM
F+AMB ⅓3.34m x 2.25m¾
ACC ½2.25m x 1.65m¾
M+AMB ⅓3.06m x 2.25m¾
RL 12.050
LOUNGE
FIRE STAIR

2.38 ¼4.51m x 3.60m¾
2.39 ¼4.51m x 3.60m¾
2.40 ¼4.51m x 3.60m¾
2.41 ¼4.51m x 3.60m¾
2.42 ACCESSIBLE ¼4.10m x 3.87m¾
STORE ½2.6m x 2.84m²
ENS ACC ½2.75m x 2.35m²
UTILITY ⅓3.49m x 2.70m¾
2.43 LARGE TWIN SUITE ⅓8.23m x 3.80m¾
SERVICE
UTILITY

2.37 ¼4.51m x 3.60m¾
2.36 ¼4.51m x 3.60m¾
2.35 ¼4.51m x 3.60m¾
2.34 ¼4.51m x 3.60m¾
2.33 ¼4.51m x 3.60m¾
2.32 ¼4.65m x 3.60m¾
ENS ACC ½2.75m x 2.35m²
2.31 ACCESSIBLE ½5.00m x 4.20m¾
½2.70m x 2.05m¾
½2.29m x 2.05m¾
⅓3.26m x 3.10m¾
STAFF TRAINING ½10.42m x 6.49m¾
CRAFT ROOM ¼4.49m x 4.02m¾

COURTYARD (BELOW)
BRIDGE
WINDOWS
2.54 ¼4.97m x 3.60m¾
2.53 ¼4.71m x 3.60m¾
2.52 ¼4.71m x 3.60m¾
2.51 ¼4.71m x 3.60m¾
2.50 TWIN BED ¼4.96m x 4.80m¾
2.49 ⅓3.98m x 3.70m¾
BAY WINDOW
2.57 ¼4.51m x 3.60m¾
2.56 ¼4.51m x 3.60m¾
2.55 ¼4.51m x 3.60m¾
SERVICES
½1.55m x 1.4m²
LAUNDRY CHUTE
2.44 ¼4.51m x 3.60m¾
2.45 ¼4.51m x 3.60m¾
2.46 ¼4.51m x 3.60m¾
2.47 ¼4.51m x 3.60m¾
2.48 ¼4.51m x 3.60m¾

PORTE COCHERE ROOF

LOUNGE
VERANDAH STRUCTURE

Rev C issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

LEVEL 2 FLOOR PLAN - SOUTH

16017

Scale: 1:100 @ A1

Wednesday, 3 October 2018

DA-009 rev C

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522
ABN 21 278 857 200 ACN 001 964 254

SITE BOUNDARY
156.11m

LINE OF BUSH MANAGEMENT ZONE

TERRACE
TERRACE
LIFT
SERVING KITCHEN
½5.79m x 3.00m¾
UTILITY
⅓3.69m x 1.6m¾
LIFT
2.22
½4.24m x 3.75m¾
ENS
LOBBY
2.1m WIDE
SOUTH DINING ROOM
NORTH DINING ROOM
5,940
5,940
2,470
2,470
2,050
F+AMB
⅓3.34m x 2.25m¾
ACC
½2.25m x 1.65m¾
M+AMB
⅓3.06m x 2.25m¾
RL 12.050
LOUNGE
3,895
PRIVATE DINING
½5.30m x 3.33m¾
DIRTY UTILITY
⅓3.21m x 3.20m¾
2.21 ½4.24m x 3.75m¾
2.20 ½4.24m x 3.75m¾
2.19 ½4.24m x 3.75m¾
2.18 ½4.24m x 3.75m¾
2.17 ½4.24m x 3.75m¾
2.16 ½4.24m x 3.75m¾
2.15 ½4.24m x 3.75m¾
2.14 ½4.24m x 3.75m¾
2.13 ½4.24m x 3.75m¾
2.12 ½4.24m x 3.75m¾
2.11 ½4.24m x 3.75m¾
2.10 ½4.25m x 3.54m¾
SERVICE
ENS
½2.70m x 2.05m¾
½2.29m x 2.05m¾
½3.26m x 3.10m¾
STAFF TRAINING
½10.42m x 6.49m¾
CRAFT ROOM
¼4.49m x 4.02m¾
FIRE STAIR
2.01 ACCESSIBLE ¼4.24m x 3.47m¾
ENS ACC ½2.75m x 2.35m¾
LOUNGE
COURTYARD (BELOW)
2,200
½2.39m x 2.35m¾
FIRE STAIR
ENS ACC ½2.75m x 2.35m¾
2.09 ACCESSIBLE ¼4.21m x 3.35m¾
NURSES STATION
6,790
2.02 TWIN BED ½5.65m x 3.75m¾
2.03 ¼4.24m x 3.75m¾
2.04 ¼4.24m x 3.75m¾
WC
CLEAN UTILITY ½2.9m x 2.1m¾
LOUNGE
11,280
2.05 ¼4.24m x 3.75m¾
2.06 ¼4.24m x 3.75m¾
2.07 ¼4.24m x 3.75m¾
2.08 TWIN BED ½5.79m x 3.75m¾
LINE OF BUSH MANAGEMENT ZONE
LINE OF BUSH MANAGEMENT ZONE
LINE OF BUSH MANAGEMENT ZONE
LINE OF BUSH MANAGEMENT ZONE
LOUNGE
9,780
9,490
VERANDAH STRUCTURE
9,160
2
A
B
D

Rev C issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

LEVEL 2 FLOOR PLAN - NORTH

16017

Scale: 1:100 @ A1

Wednesday, 3 October 2018

DA-010 rev C

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522
ABN 21 278 857 200 ACN 001 964 254

thrum ARCHITECTS

Rev C issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

ROOF PLAN - SOUTH

16017

Scale: 1:100 @ A1

Wednesday, 3 October 2018

DA-011 rev C

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 95220
ABN 21 278 857 200 ACN 001 964 254

thrum ARCHITECTS

10:38 AM Wednesday, 3 October 2018 /Volumes/CAD-Jobs/16017 AGF HILLVIEW STREET WOY WOY/16017 CAD Files/16017 AGF HILLVIEW V19.

B

A

2

D

LINE OF BUSH MANAGEMENT ZONE

15,750

16,450

16,450

A/C LOUVRED PLANT ENCLOSURES,
7m x 3.6m x 1.6m

A/C LOUVRED PLANT ENCLOSURES,
7m x 3.6m x 1.6m

16,450

15,250

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

15,750

LINE OF BUSH MANAGEMENT ZONE

LINE OF BUSH MANAGEMENT ZONE

2

Rev C issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

ROOF PLAN - NORTH

16017

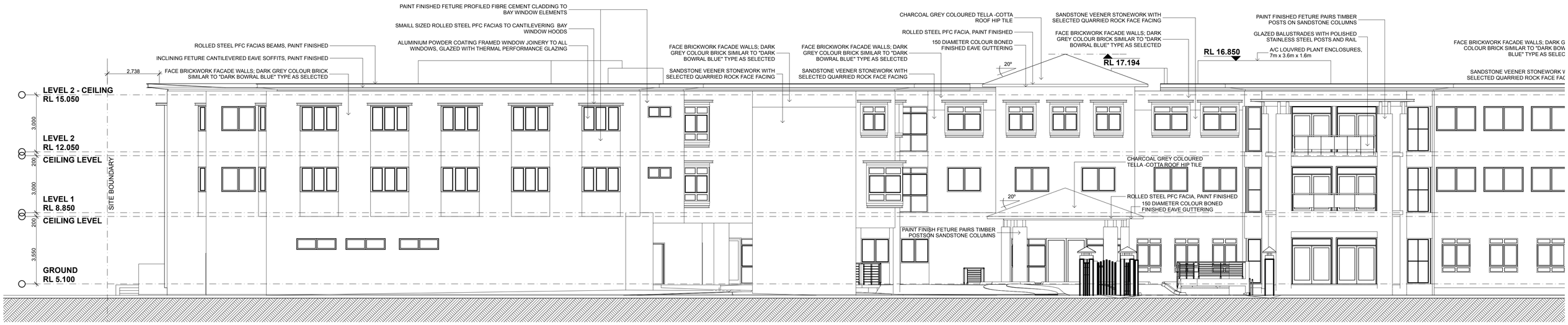
Scale: 1:100 @ A1 | Wednesday, 3 October 2018 | **DA-012 rev C**

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

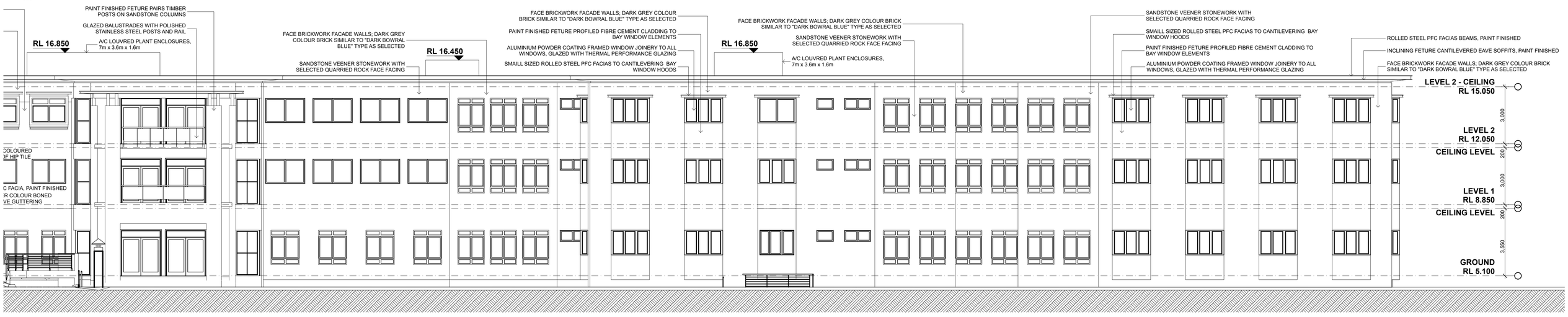
info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522
ABN 21 278 857 200 ACN 001 964 254



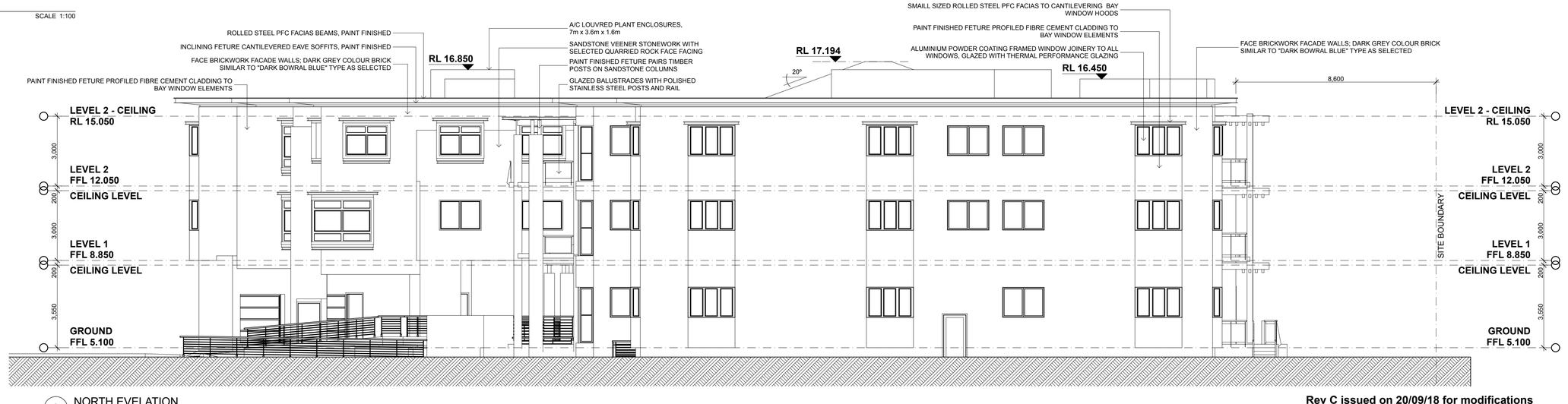
1 EAST ELEVATION - SOUTH

SCALE 1:100



2 EAST ELEVATION - NORTH

SCALE 1:100



3 NORTH EVELATION

SCALE 1:100

Rev C issued on 20/09/18 for modifications to western elevation and waste room **(NOT FOR CONSTRUCTION)**

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

EAST & NORTH ELEVATIONS

16017

Scale: @ A1

Wednesday, 3 October 2018

DA-013 rev C

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

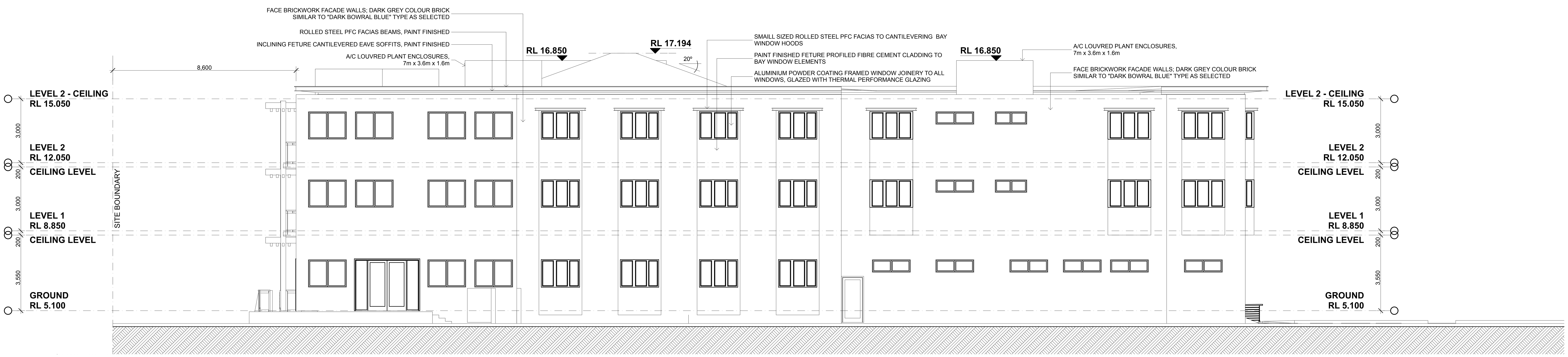
tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522
ABN 21 278 857 200 ACN 001 964 254

1 WEST ELEVATION - SOUTH
SCALE 1:100

2 WEST ELEVATION - NORTH
SCALE 1:100



3 SOUTH ELEVATION
SCALE 1:100

Rev C issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

WEST & SOUTH ELEVATIONS

16017

Scale: @ A1

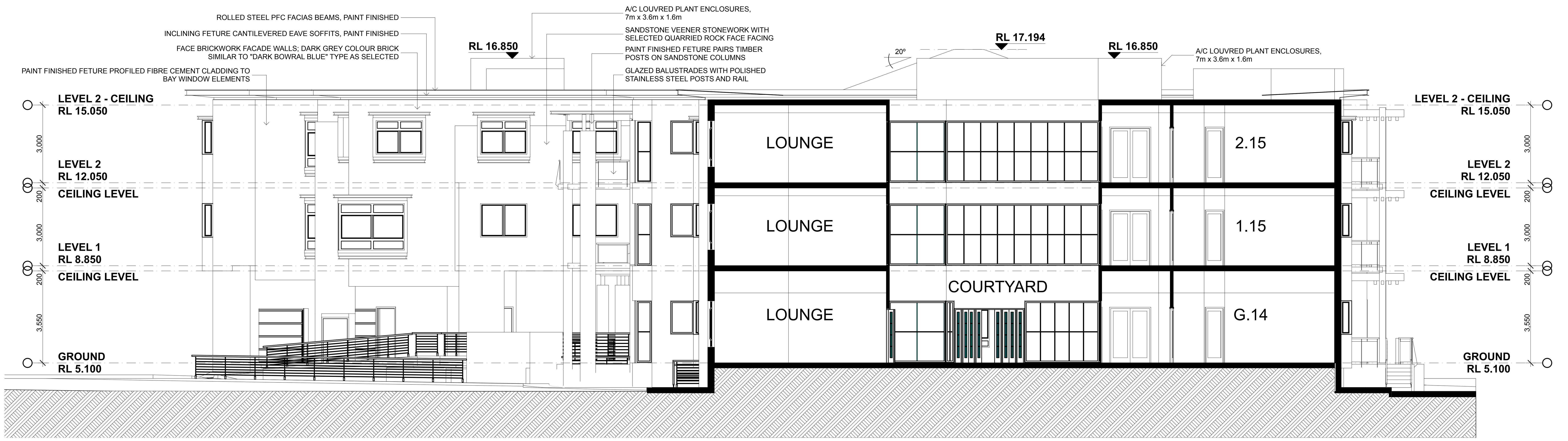
Wednesday, 3 October 2018

DA-014 rev C

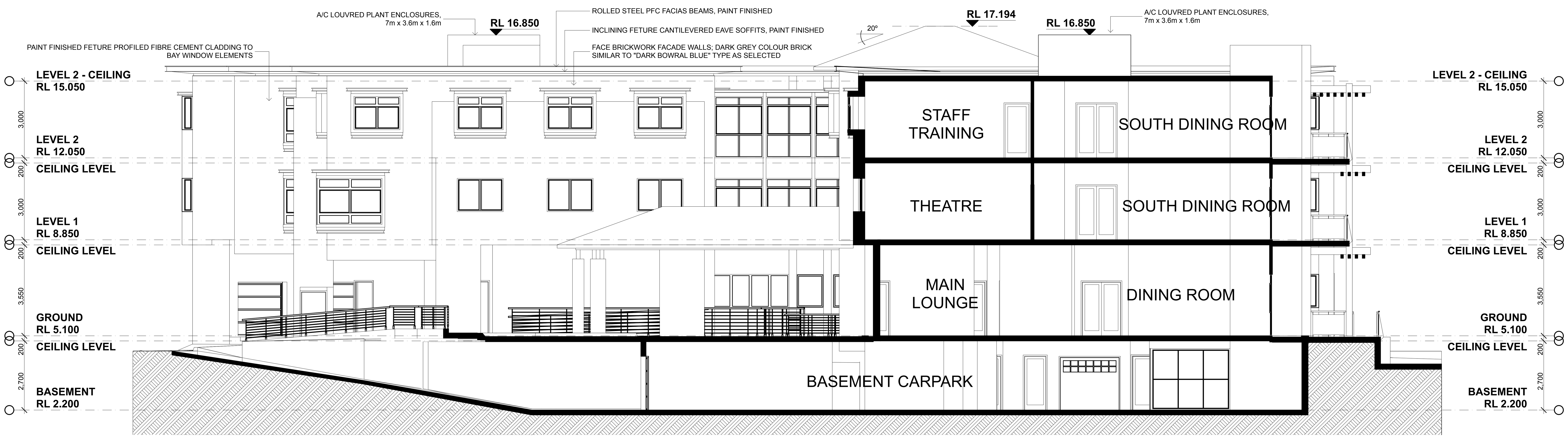
Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000
tel 02 9262 4455
fax 02 9299 1524
info@thrumarchitects.com.au
www.thrumarchitects.com.au
NSW Board of Architects: 95220
ABN 21 278 857 700 ACN 001 964 254

thrum ARCHITECTS

WEST RENDERED ELEVATION



1 SECTION AA
SCALE 1:100



2 SECTION BB
SCALE 1:100

Rev C issued on 20/09/18 for modifications to western elevation and waste room

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

SECTIONS AA & BB

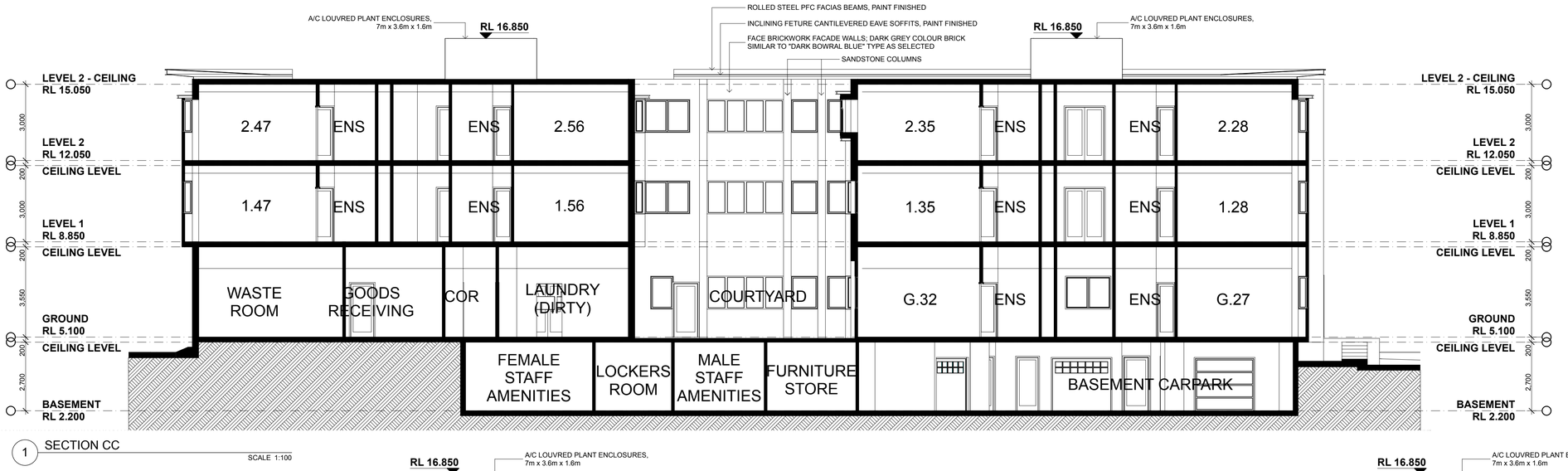
16017

Scale: @ A1

Wednesday, 3 October 2018

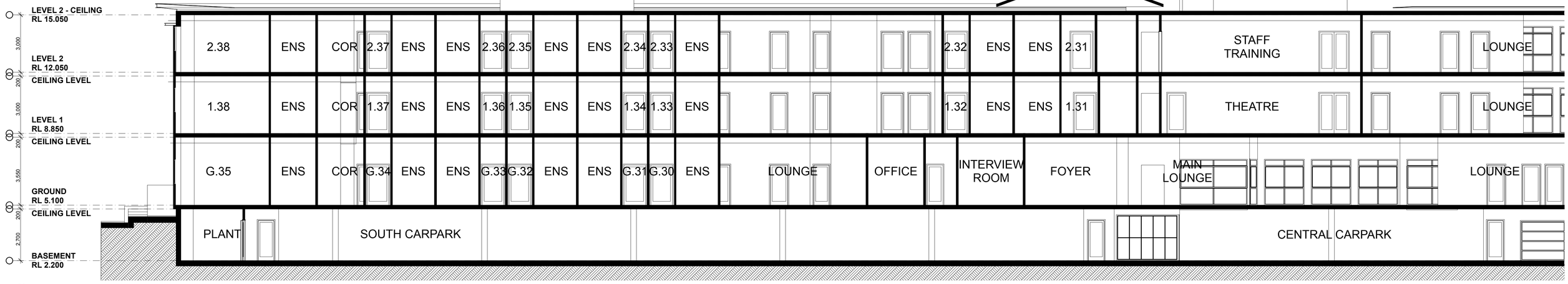
DA-015 rev C

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000
tel 02 9262 4455
fax 02 9299 1524
info@thrumarchitects.com.au
www.thrumarchitects.com.au
NSW Board of Architects: 95220
thrum ARCHITECTS



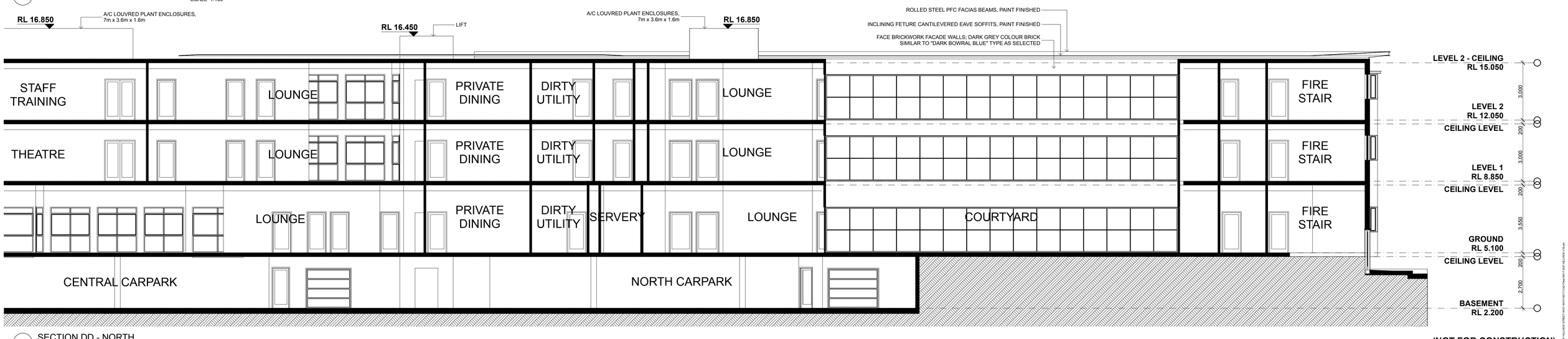
1 SECTION CC

SCALE 1:100



2 SECTION DD - SOUTH

SCALE 1:100



3 SECTION DD - NORTH

SCALE 1:100

(NOT FOR CONSTRUCTION)

Client:
THOMPSON HEALTH CARE

MULTI-LEVEL NURSING HOME FACILITY
45 HILLVIEW STREET
WOY WOY, NSW

SECTIONS CC & DD

16017

Scale: @ A1

Wednesday, 3 October 2018

DA-016 rev B

Thrum Architects Pty Limited
Level 3, 80 Clarence Street
Sydney NSW 2000

tel 02 9262 4455
fax 02 9299 1524

info@thrumarchitects.com.au
www.thrumarchitects.com.au

NSW Board of Architects: 9522
ABN 21 278 807 200 ACN 001 864 254

Appendix C

Logs and Test Results from Previous Investigations

Table 2 – Results of Screening Tests and Laboratory Test Results

Pit	Sample Depth [a] (m)	Sample Description	Screening Test Results				Laboratory Results					
			pH			Strength of Reaction [b]	pH_{KCL}	pH_{OX}	S_{POS} (%S)	TAA (moles H^+/tonne)	TPA (moles H^+/tonne)	TSA (moles H^+/tonne)
			pH_F	pH_{FOX}	pH_F - pH_{FOX}							
1	0.2	Grey SILTY SAND	4.2	***2.8***	***1.4***	2	-	-	-	-	-	-
	0.7	Grey SAND	4.3	***3.0***	***1.3***	1	4.1	***3.0***	<0.005	10	***27***	17
	1.3	Grey SAND	4.2	***3.1***	***1.1***	2	-	-	-	-	-	-
	1.8	Brown SAND	4.7	3.9	0.8	1	-	-	-	-	-	-
	2.5	Yellow SAND	5.7	5.1	0.6	1	-	-	-	-	-	-
2	0.1	Grey SILTY SAND	4.0	***2.6***	***1.4***	1	-	-	-	-	-	-
	0.5	Grey SAND	4.0	***3.1***	0.9	1	-	-	-	-	-	-
	1.5	Dark grey SAND	4.1	***3.1***	***1.0***	1	***3.8***	***2.6***	0.019	***263***	***275***	12
	2.0	Dark grey SAND	4.3	***3.2***	***1.1***	2	4.5	***3.0***	0.005	15	***55***	***40***
	2.5	Yellow SAND	5.5	4.4	***1.1***	2	-	-	-	-	-	-
3	0.2	Brown SILTY SAND	5.0	***3.4***	***1.6***	1	-	-	-	-	-	-
	0.6	Light yellow/grey SAND	6.1	4.4	***1.7***	1	-	-	-	-	-	-
	1.1	Light yellow/grey SAND	6.4	5.4	***1.0***	1	-	-	-	-	-	-
	1.8	Light yellow/grey SAND	6.4	5.3	***1.1***	1	-	-	-	-	-	-
	2.5	Yellow SAND	6.5	5.7	0.8	1	-	-	-	-	-	-

Table 2 – Results of Screening Tests and Laboratory Test Results (con't)

Pit	Sample Depth [a] (m)	Sample Description	Screening Test Results				Laboratory Results					
			pH			Strength of Reaction [b]	pH_{KCL}	pH_{OX}	S_{POS} (%S)	TAA (moles H^+/tonne)	TPA (moles H^+/tonne)	TSA (moles H^+/tonne)
4	0.2	Dark brown SILTY SAND	4.9	***3.2***	***1.7***	1	-	-	-	-	-	-
	0.5	Light grey SAND	5.2	***3.2***	***2.0***	2	5.7	3.7	0.007	<5	12	12
	1.0	Light grey SAND	6.4	5.8	0.6	1	-	-	-	-	-	-
	1.7	Yellow SAND	6.4	6.0	0.4	1	-	-	-	-	-	-
	2.4	Yellow SAND	5.5	4.3	***1.2***	1	-	-	-	-	-	-
ASSMAC Guideline (Ref. 1) Action Criteria Values		Sands to loamy sands	4	3.5	1	-	4	3	0.03	18	18	18
		Sandy loams to light clays							0.06[e]/0.03[f]	36[e]/18[f]	36[e]/18[f]	36[e]/18[f]
		Medium to heavy clays							0.1[e]/0.03[f]	62[e]/18[f]	62[e]/18[f]	62[e]/18[f]

Legend to Table 3:

a Depth below ground surface
b Strength of Reaction
- *1 denotes no or slight reaction*
- *2 denotes moderate reaction*
- *3 denotes violent reaction*
- *F denotes bubbling/frothy reaction indicative of organics of material*
- *C denotes colour change*
- *H denotes heat change*
- *O denoted odour*

c For actual acid sulphate soils (AASS)
d Indicative value only for Potential Acid Sulphate Soils (PASS)
e ASSMAC Action Criteria for disturbance of 1-1000 tonnes of material
f ASSMAC Action Criteria for disturbance of more than 1000 tonnes
NT Not Tested

Bolded italicised results exceed the ASSMAC action criteria for disturbance of less than 1000 tonnes of material, based on the assumption that less than 1000 tonnes will be removed between each data point during the excavation of the trench.

BOREHOLE LOG

CLIENT: Southern Cross Care (NSW & ACT)
PROJECT: Geo-Environmental Assessment
LOCATION: 45 Hillview Street, Woy Woy

SURFACE LEVEL: 4.015mAHD
EASTING: 342709.25
NORTHING: 6291503.1
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 41561.01
DATE: 19/7/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING: Dark grey, fine to medium angular gravel filling - became sandy below 0.05m with some rootlets, moist		D	0.1		PID = 0.2 ppm		Spoil
	0.2	SILTY SAND: Dark grey silty sand with some rootlets, damp		D	0.5		PID = 0.8 ppm		Bentonite
1				D	1.0		PID = 2.1 ppm		1
		- with light brown bands from 1.6m							
	1.9	SILTY SAND: Light brown silty sand, damp		D	2.0		PID = 1.2 ppm	23-07-12	2
2									
		- saturated from 2.5m							Backfilled with gravel
3				D	3.0		PID = 3.1 ppm		3
	3.5	SILTY SAND: Light grey silty sand with some fine shell fragments, saturated							
4	4.0	Bore discontinued at 4.0m. Limit of investigation		D	4.0		PID = 2.8 ppm		4

RIG: Dando Terrier **DRILLER:** Ian **LOGGED:** TW **CASING:**

TYPE OF BORING: Auger

WATER OBSERVATIONS: Free Groundwater Observed at 2.5m during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U$_x$	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics I Environment I Groundwater

BOREHOLE LOG

CLIENT: Southern Cross Care (NSW & ACT)
PROJECT: Geo-Environmental Assessment
LOCATION: 45 Hillview Street, Woy Woy

SURFACE LEVEL: 3.446mAHD
EASTING: 342684.86
NORTHING: 6291552.35
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 41561.01
DATE: 19/7/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SILTY SAND: Dark brown silty sand with some rootlets, moist		D	0.1		PID = 2.0 ppm		
				D	0.5		PID = 1.6 ppm		
	0.6	SILTY SAND: Light grey silty sand, moist							
	1			D	1.0		PID = 2.1 ppm		1
	1.5	SILTY SAND: Light brown silty sand, moist - saturated from 1.8m						▽	
	2			D	2.0		PID = 3.0 ppm		2
	3			D	3.0		PID = 1.9 ppm		3
	3.3	SILTY SAND: Light grey silty sand with some fine shell fragments, saturated							
	4			D	4.0		PID = 2.3 ppm		4
	4.0	Bore discontinued at 4.0m. Limit of investigation							

RIG: Dando Terrier **DRILLER:** Ian **LOGGED:** TW **CASING:**

TYPE OF BORING: Auger

WATER OBSERVATIONS: Free Groundwater Observed at 1.8m during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Southern Cross Care (NSW & ACT)
PROJECT: Geo-Environmental Assessment
LOCATION: 45 Hillview Street, Woy Woy

SURFACE LEVEL: 3.438mAHD
EASTING: 342681.84
NORTHING: 6291518.68
DIP/AZIMUTH: 90°/--

BORE No: 103
PROJECT No: 41561.01
DATE: 19/7/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SILTY SAND: Dark grey to black silty sand with rootlets, moist		D	0.1		PID = 2.0 ppm		
	0.2	SILTY SAND: Mottled grey brown silty sand with some rootlets, moist		D	0.5		PID = 1.5 ppm		Spoil
	0.6	SILTY SAND: Light brown silty sand, moist							Bentonite
	1			D	1.0		PID = 1.4 ppm		
		- saturated from 1.7m						23-07-12	
	2			D	2.0		PID = 1.9 ppm		Backfilled with gravel
	2.7	SILTY SAND: Light grey silty sand with fine shell fragments, saturated							
	3			D	3.0		PID = 2.3 ppm		
	4	4.0 Bore discontinued at 4.0m. Limit of investigation		D	4.0		PID = 2.6 ppm		

RIG: Dando Terrier **DRILLER:** Ian **LOGGED:** TW **CASING:**

TYPE OF BORING: Auger

WATER OBSERVATIONS: Free Groundwater Observed at 1.7m during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U$_x$	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics I Environment I Groundwater

BOREHOLE LOG

CLIENT: Southern Cross Care (NSW & ACT)
PROJECT: Geo-Environmental Assessment
LOCATION: 45 Hillview Street, Woy Woy

SURFACE LEVEL: 3.870mAHD
EASTING: 342677.79
NORTHING: 6291471.11
DIP/AZIMUTH: 90°/--

BORE No: 104
PROJECT No: 41561.01
DATE: 19/7/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SILTY SAND: Dark grey black silty sand with some rootlets, moist		D	0.1		PID = 2.1 ppm		
	0.2	SILTY SAND: Grey silty sand, moist		D	0.5		PID = 1.3 ppm		
	1			D	1.0		PID = 1.2 ppm		1
	1.5	SILTY SAND: Orange brown silty sand, damp							
	2	- saturated from 1.9m		D	2.0		PID = 2.4 ppm	▽	2
	2.4	SILTY SAND: Mottled light brown silty sand, saturated							
	2.95	SILTY SAND: Light grey silty sand with some fine shell fragments, saturated		D	3.0		PID = 2.8 ppm		3
	4			D	4.0		PID = 3.4 ppm		4
	4.0	Bore discontinued at 4.0m. Limit of investigation							

RIG: Dando Terrier **DRILLER:** Ian **LOGGED:** TW **CASING:**

TYPE OF BORING: Auger

WATER OBSERVATIONS: Free Groundwater Observed at 1.9m during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U$_x$	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

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

CERTIFICATE OF ANALYSIS 76498

Client:
Douglas Partners Tuggerah
Unit 5, 3 Teamster Close
Tuggerah
NSW 2259

Attention: Brent Kerry

Sample log in details:

Your Reference:	**41561.01, Hillview St Woy Woy**
No. of samples:	8 Soils, 2 Waters
Date samples received / completed instructions received	25/07/12 / 25/07/12

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	2/08/12 / 2/08/12
Date of Preliminary Report:	Not issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Rhian Morgan
Reporting Supervisor

Nick Sarlamis
Inorganics Supervisor

Matt Mansfield
Approved Signatory

Paul Ching
Approved Signatory

Jeremy Faircloth
Chemist

vTRH & BTEX in Soil				
Our Reference:	UNITS	76498-1	76498-7	76498-8
Your Reference	----------	101	101	102
Depth	----------	1.0	0.1	0.1
Date Sampled		19/07/2012	19/07/2012	19/07/2012
Type of sample		Soil	Soil	Soil
Date extracted	-	26/07/2012	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012	26/07/2012
vTRH C_6 - C_9	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	115	104	111

sTRH in Soil (C10-C36)				
Our Reference:	UNITS	76498-1	76498-7	76498-8
Your Reference	----------	101	101	102
Depth	----------	1.0	0.1	0.1
Date Sampled		19/07/2012	19/07/2012	19/07/2012
Type of sample		Soil	Soil	Soil
Date extracted	-	26/07/2012	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012	26/07/2012
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100
Surrogate o-Terphenyl	%	83	89	87

PAHs in Soil				
Our Reference:	UNITS	76498-1	76498-7	76498-8
Your Reference	----------	101	101	102
Depth	----------	1.0	0.1	0.1
Date Sampled		19/07/2012	19/07/2012	19/07/2012
Type of sample		Soil	Soil	Soil
Date extracted	-	26/07/2012	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012	26/07/2012
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	97	98	95

Organochlorine Pesticides in soil				
Our Reference:	UNITS	76498-1	76498-7	76498-8
Your Reference	----------	101	101	102
Depth	----------	1.0	0.1	0.1
Date Sampled		19/07/2012	19/07/2012	19/07/2012
Type of sample		Soil	Soil	Soil
Date extracted	-	26/07/2012	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012	26/07/2012
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	87	92	92

PCBs in Soil				
Our Reference:	UNITS	76498-1	76498-7	76498-8
Your Reference	----------	101	101	102
Depth	----------	1.0	0.1	0.1
Date Sampled		19/07/2012	19/07/2012	19/07/2012
Type of sample		Soil	Soil	Soil
Date extracted	-	26/07/2012	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012	26/07/2012
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	87	92	92

Acid Extractable metals in soil				
Our Reference:	UNITS	76498-1	76498-7	76498-8
Your Reference	----------	101	101	102
Depth	----------	1.0	0.1	0.1
Date Sampled		19/07/2012	19/07/2012	19/07/2012
Type of sample		Soil	Soil	Soil
Date digested	-	26/07/2012	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012	26/07/2012
Arsenic	mg/kg	<4	<4	<4
Cadmium	mg/kg	<0.5	<0.5	<0.5
Chromium	mg/kg	<1	13	3
Copper	mg/kg	<1	10	2
Lead	mg/kg	<1	3	5
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	14	1
Zinc	mg/kg	<1	17	11

Moisture				
Our Reference:	UNITS	76498-1	76498-7	76498-8
Your Reference	----------	101	101	102
Depth	----------	1.0	0.1	0.1
Date Sampled		19/07/2012	19/07/2012	19/07/2012
Type of sample		Soil	Soil	Soil
Date prepared	-	26/07/2012	26/07/2012	26/07/2012
Date analysed	-	27/07/2012	27/07/2012	27/07/2012
Moisture	%	5.5	4.2	7.9

Asbestos ID - soils				
Our Reference:	UNITS	76498-1	76498-7	76498-8
Your Reference	----------	101	101	102
Depth	----------	1.0	0.1	0.1
Date Sampled		19/07/2012	19/07/2012	19/07/2012
Type of sample		Soil	Soil	Soil
Date analysed	-	31/07/2012	31/07/2012	31/07/2012
Sample mass tested	g	Approx 40g	Approx 40g	Approx 40g
Sample Description	-	Brown coarse-grained sandy soil	Brown coarse-grained sandy soil & rocks	Brown coarse-grained sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

sPOCAS						
Our Reference:	UNITS	76498-1	76498-2	76498-3	76498-4	76498-5
Your Reference	----------	101	102	102	104	104
Depth	----------	1.0	0.5	3.0	0.5	1.0
Date Sampled		19/07/2012	19/07/2012	19/07/2012	19/07/2012	19/07/2012
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/07/2012	26/07/2012	26/07/2012	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012	26/07/2012	26/07/2012	26/07/2012
pH $_{kcl}$	pH units	4.0	5.4	5.1	4.0	4.3
TAA pH 6.5	moles H^+/t	15	<5	<5	12	5
s-TAA pH 6.5	%w/w S	0.02	<0.01	<0.01	0.02	<0.01
pH $_{Ox}$	pH units	3.0	3.5	3.0	3.0	3.5
TPA pH 6.5	moles H^+/t	72	100	40	65	35
s-TPA pH 6.5	%w/w S	0.12	0.16	0.06	0.10	0.06
TSA pH 6.5	moles H^+/t	57	100	37	52	30
s-TSA pH 6.5	%w/w S	0.09	0.16	0.06	0.08	0.05
ANC_E	% $CaCO_3$	<0.05	<0.05	<0.05	<0.05	<0.05
a-ANC_E	moles H^+/t	<5	<5	<5	<5	<5
s-ANC_E	%w/w S	<0.05	<0.05	<0.05	<0.05	<0.05
S_{KCl}	%w/w S	<0.005	<0.005	0.006	<0.005	<0.005
S_P	%w/w	<0.005	0.01	0.07	<0.005	<0.005
S_{POS}	%w/w	<0.005	0.01	0.06	<0.005	<0.005
a-S_{POS}	moles H^+/t	<5	8	41	<5	<5
Ca_{KCl}	%w/w	<0.005	0.06	0.006	<0.005	<0.005
Ca_P	%w/w	<0.005	0.07	0.009	<0.005	<0.005
Ca_A	%w/w	<0.005	0.009	<0.005	<0.005	<0.005
Mg_{KCl}	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Mg_P	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Mg_A	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
S_{HCl}	%w/w S	<0.005	[NT]	[NT]	<0.005	<0.005
S_{NAS}	%w/w S	<0.005	[NT]	[NT]	<0.005	<0.005
a-S_{NAS}	moles H^+/t	<5	[NT]	[NT]	<5	<5
s-S_{NAS}	%w/w S	<0.01	[NT]	[NT]	<0.01	<0.01
Fineness Factor	-	1.5	1.5	1.5	1.5	1.5
a-Net Acidity	moles H^+/t	16	11	43	13	<10
Liming rate	kg $CaCO_3$/t	1.2	0.81	3.2	0.97	<0.75
a-Net Acidity without ANCE	moles H^+/t	NA	NA	NA	NA	NA
Liming rate without ANCE	kg $CaCO_3$/t	NA	NA	NA	NA	NA

sPOCAS		
Our Reference:	UNITS	76498-6
Your Reference	----------	104
Depth	----------	3.0
Date Sampled		19/07/2012
Type of sample		Soil
Date prepared	-	26/07/2012
Date analysed	-	26/07/2012
pH kcl	pH units	5.1
TAA pH 6.5	moles H^+/t	5
s-TAA pH 6.5	%w/w S	<0.01
pH Ox	pH units	3.6
TPA pH 6.5	moles H^+/t	35
s-TPA pH 6.5	%w/w S	0.06
TSA pH 6.5	moles H^+/t	30
s-TSA pH 6.5	%w/w S	0.05
ANCE	%$CaCO_3$	<0.05
a-ANCE	moles H^+/t	<5
s-ANCE	%w/w S	<0.05
S_{KCl}	%w/w S	<0.005
S_P	%w/w	0.03
S_{POS}	%w/w	0.02
a-S_{POS}	moles H^+/t	15
Ca_{KCl}	%w/w	0.007
Ca_P	%w/w	0.007
Ca_A	%w/w	<0.005
Mg_{KCl}	%w/w	<0.005
Mg_P	%w/w	<0.005
Mg_A	%w/w	<0.005
Fineness Factor	-	1.5
a-Net Acidity	moles H^+/t	20
Liming rate	kg $CaCO_3$/t	1.5
a-Net Acidity without ANCE	moles H^+/t	NA
Liming rate without ANCE	kg $CaCO_3$/t	NA

vTRH & BTEX in Water			
Our Reference:	UNITS	76498-9	76498-10
Your Reference	----------	101W	103W
Depth	----------	-	-
Date Sampled		23/07/2012	23/07/2012
Type of sample		Water	Water
Date extracted	-	25/07/2012	25/07/2012
Date analysed	-	25/07/2012	25/07/2012
TRHC$_6$ - C$_9$	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	109	107
Surrogate toluene-d8	%	100	100
Surrogate 4-BFB	%	93	91

sTRH in Water (C10-C36)			
Our Reference:	UNITS	76498-9	76498-10
Your Reference	----------	101W	103W
Depth	----------	-	-
Date Sampled		23/07/2012	23/07/2012
Type of sample		Water	Water
Date extracted	-	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012
$TRHC_{10}$ - C_{14}	µg/L	<50	<50
$TRHC_{15}$ - C_{28}	µg/L	<100	<100
$TRHC_{29}$ - C_{36}	µg/L	<100	<100
Surrogate o-Terphenyl	%	87	92

PAHs in Water Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	76498-9 101W - 23/07/2012 Water	76498-10 103W - 23/07/2012 Water
Date extracted	-	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012
Naphthalene	µg/L	<1	<1
Acenaphthylene	µg/L	<1	<1
Acenaphthene	µg/L	<1	<1
Fluorene	µg/L	<1	<1
Phenanthrene	µg/L	<1	<1
Anthracene	µg/L	<1	<1
Fluoranthene	µg/L	<1	<1
Pyrene	µg/L	<1	<1
Benzo(a)anthracene	µg/L	<1	<1
Chrysene	µg/L	<1	<1
Benzo(b+k)fluoranthene	µg/L	<2	<2
Benzo(a)pyrene	µg/L	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1
Surrogate p-Terphenyl-d_{14}	%	107	99

HM in water - dissolved			
Our Reference:	UNITS	76498-9	76498-10
Your Reference	----------	101W	103W
Depth	----------	-	-
Date Sampled		23/07/2012	23/07/2012
Type of sample		Water	Water
Date prepared	-	26/07/2012	26/07/2012
Date analysed	-	27/07/2012	27/07/2012
Arsenic-Dissolved	µg/L	15	16
Cadmium-Dissolved	µg/L	<0.1	<0.1
Chromium-Dissolved	µg/L	3	4
Copper-Dissolved	µg/L	<1	<1
Lead-Dissolved	µg/L	<1	<1
Mercury-Dissolved	µg/L	<0.050	<0.050
Nickel-Dissolved	µg/L	<1	<1
Zinc-Dissolved	µg/L	5	6
Aluminium-Dissolved	µg/L	580	520
Cobalt-Dissolved	µg/L	<1	<1

Total Phenolics in Water			
Our Reference:	UNITS	76498-9	76498-10
Your Reference	----------	101W	103W
Depth	----------	-	-
Date Sampled		23/07/2012	23/07/2012
Type of sample		Water	Water
Date extracted	-	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05

Miscellaneous Inorganics			
Our Reference:	UNITS	76498-9	76498-10
Your Reference	----------	101W	103W
Depth	----------	-	-
Date Sampled		23/07/2012	23/07/2012
Type of sample		Water	Water
Date prepared	-	26/07/2012	26/07/2012
Date analysed	-	26/07/2012	26/07/2012
pH	pH Units	7.1	7.1
Total Suspended Solids @ 103-105^{O}C	mg/L	33	52
Total Dissolved Solids (grav)	mg/L	380	330

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Inorg-030	Total Phenolics - determined colorimetrically following disitillation, based upon APHA 21st ED 5530 D.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 21st ED, 4500-H+.
Inorg-019	Suspended Solids - determined gravimetrcially by filtration of the sample, in accordance with APHA 21st ED, 2540-D.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-5oC.

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/07/2012	[NT]	[NT]	LCS-1	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-1	26/07/2012
vTRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-1	100%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-1	107%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-1	99%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-1	96%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-1	98%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-1	99%
Surrogate aaa-Trifluorotoluene	%		Org-016	104	[NT]	[NT]	LCS-1	103%
QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/07/2012	[NT]	[NT]	LCS-1	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-1	26/07/2012
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-1	124%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	140%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	117%
Surrogate o-Terphenyl	%		Org-003	89	[NT]	[NT]	LCS-1	110%
QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/07/2012	[NT]	[NT]	LCS-1	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-1	26/07/2012
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	111%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	101%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	100%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	111%
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	108%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	106%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	[NT]	[NT]	LCS-1	114%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	105	[NT]	[NT]	LCS-1	100%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/07/2012	[NT]	[NT]	LCS-2	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-2	26/07/2012
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	105%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	98%
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	102%
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	99%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	107%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	96%
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	107%
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	99%
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	101%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	107%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-005	92	[NT]	[NT]	LCS-2	87%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/07/2012	[NT]	[NT]	LCS-2	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-2	26/07/2012
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	LCS-2	102%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	92	[NT]	[NT]	LCS-2	91%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			26/07/2012	[NT]	[NT]	LCS-2	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-2	26/07/2012
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-2	98%
Cadmium	mg/kg	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-2	104%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-2	101%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-2	101%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-2	99%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-2	99%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-2	102%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-2	102%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL Asbestos ID - soils	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL sPOCAS	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			26/07/2012	[NT]	[NT]	LCS	27/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS	27/07/2012
pH kcl	pH units		Inorg-064	[NT]	[NT]	[NT]	LCS	100%
TAA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	LCS	97%
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NR]	[NR]
pH Ox	pH units		Inorg-064	[NT]	[NT]	[NT]	LCS	93%
TPA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	LCS	109%
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NR]	[NR]
TSA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	LCS	109%
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NR]	[NR]
ANC_E	% $CaCO_3$	0.05	Inorg-064	<0.05	[NT]	[NT]	[NR]	[NR]
a-ANC_E	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NR]	[NR]
s-ANC_E	%w/w S	0.05	Inorg-064	<0.05	[NT]	[NT]	[NR]	[NR]
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	86%
S_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	95%
S_{POS}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	99%
a-S_{POS}	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	LCS	100%
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	91%
Ca_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
Ca_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	89%
Mg_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
Mg_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL sPOCAS	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
a-SNAS	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NR]	[NR]
s-SNAS	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NR]	[NR]
Fineness Factor	-	1.5	Inorg-064	<1.5	[NT]	[NT]	[NR]	[NR]
a-Net Acidity	moles H^+/t	10	Inorg-064	<10	[NT]	[NT]	LCS	100%
Liming rate	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	[NT]	[NT]	LCS	99%
a-Net Acidity without ANCE	moles H^+/t	10	Inorg-064	<10	[NT]	[NT]	[NR]	[NR]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL vTRH & BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/07/2012	[NT]	[NT]	LCS-W1	25/07/2012
Date analysed	-			25/07/2012	[NT]	[NT]	LCS-W1	25/07/2012
TRHC6 - C9	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	105%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	105%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	105%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	103%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	106%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	106%
Surrogate Dibromofluoromethane	%		Org-016	135	[NT]	[NT]	LCS-W1	121%
Surrogate toluene-d8	%		Org-016	100	[NT]	[NT]	LCS-W1	99%
Surrogate 4-BFB	%		Org-016	90	[NT]	[NT]	LCS-W1	102%
QUALITY CONTROL sTRH in Water (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/07/2012	[NT]	[NT]	LCS-W1	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-W1	26/07/2012
TRHC10 - C14	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	118%
TRHC15 - C28	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	111%
TRHC29 - C36	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	97%
Surrogate o-Terphenyl	%		Org-003	99	[NT]	[NT]	LCS-W1	128%

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/07/2012	[NT]	[NT]	LCS-W1	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-W1	26/07/2012
Naphthalene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	100%
Acenaphthylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	102%
Phenanthrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	96%
Anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	107%
Pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	103%
Benzo(a)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	99%
Benzo(b+k)fluoranthene	µg/L	2	Org-012 subset	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	106%
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	123	[NT]	[NT]	LCS-W1	102%

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			26/07/2012	[NT]	[NT]	LCS-W1	26/07/2012
Date analysed	-			27/07/2012	[NT]	[NT]	LCS-W1	27/07/2012
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	95%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W1	99%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	98%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	93%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	99%
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.050	[NT]	[NT]	LCS-W1	100%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	93%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	94%
Aluminium-Dissolved	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	LCS-W1	108%
Cobalt-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	96%

QUALITY CONTROL Total Phenolics in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/07/2012	[NT]	[NT]	LCS-W1	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-W1	26/07/2012
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-030	<0.05	[NT]	[NT]	LCS-W1	86%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			26/07/2012	[NT]	[NT]	LCS-W1	26/07/2012
Date analysed	-			26/07/2012	[NT]	[NT]	LCS-W1	26/07/2012
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-W1	101%
Total Suspended Solids @ 103-105^{O}C	mg/L	5	Inorg-019	<5	[NT]	[NT]	LCS-W1	103%
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	[NT]	[NT]	LCS-W1	93%

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.

Asbestos ID was analysed by Approved Identifier:	Paul Ching
Asbestos ID was authorised by Approved Signatory:	Paul Ching

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project Name: Hillview Street, Woy Woy
Project No: 41561.01
DP Contact Person: Brent Kerry
Prior Storage: esky / fridge / shelved (circle)

To: Envirolab Services
12 Ashley Street
Chatswood NSW
Ph: 9910 6200
Attn: Sample Reciept

Sample ID	Sample Type S-soil W-water	Lab ID	Analytes: SPOCAS	Combination 5A	pH	TDS	TSS	HM	Combination 4					Notes
101/1.0	S	1	X	X										Samples collected by TJW 19/7/12
102/0.5		2	X											
102/3.0		3	X											
104/0.5		4	X											
104/1.0		5	X											
104/3.0		6	X											
101/0.1		7		X										
102/0.1		8		X										
101 W	GW	9			X	X	X	X	X					Samples collected by TJW 23/7/12
102 W (103)	GW	10			X	X	X	X	X					
PQL (S)	mg/kg													
PQL (W)	mg/L													

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

Job No: 76498
Date Received: 25/7/12
Time Received: 12:00
Received by: PT
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished: 24/7/12
Total number of samples in container: 8 Soil & 2 Groundwater
Results required by: Normal Turnaround
BKerry

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax

Signature: PT
Date: 25/7/12 Lab Ref:

Send results to: Brent Kerry
Douglas Partners Pty Ltd
Address: ~~Unit D, 7 Donaldson Street~~ ~~Wyong North NSW 2259~~ Unit 5, 3 Teamster Close Tuggerah NSW 2259
Email: brent.kerry@douglaspartners.com.au

HM = Al, Co,

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

CERTIFICATE OF ANALYSIS 76498-A

Client:
Douglas Partners Tuggerah
Unit 5, 3 Teamster Close
Tuggerah
NSW 2259

Attention: Brent Kerry

Sample log in details:

Your Reference:	**41561.01, Hillview St Woy Woy**
No. of samples:	Additional Testing on 1 Soil
Date samples received / completed instructions received	25/07/12 / 15/08/12

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	22/08/12 / 16/08/12
Date of Preliminary Report:	Not issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

M. Mansfield
Matt Mansfield
Approved Signatory

Chromium Suite		
Our Reference:	UNITS	76498-A-3
Your Reference	----------	102
Depth	----------	3.0
Date Sampled		19/07/2012
Type of sample		Soil
Chromium Reducible Sulfur	%w/w	0.04
a-Chromium Reducible Sulfur	moles H^+/t	25

Method ID	Methodology Summary
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

Client Reference: 41561.01, Hillview St Woy Woy

QUALITY CONTROL Chromium Suite	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	[NT]	[NT]	LCS-1	91%
a-Chromium Reducible Sulfur	moles H^+/t	3	Inorg-068	<3	[NT]	[NT]	[NR]	[NR]

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project Name: .....
Project No: .....
DP Contact Person: .....
Prior Storage: esky / fridge / shelved (circle) .....

To: Envirolab Services .....
12 Ashley Street .....
Chatswood NSW .....
Ph: 9910 6200 .....
Attn: Sample Reciept .....

Sample ID	Sample Type S-soil W-water	Lab ID	Analytes												Notes
		3	X												
PQL (S)	mg/kg														
PQL (W)	mg/L														

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished: .....
Total number of samples in container: .....
Results required by: .....

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax

Signature: .....
Date: 15/8/12 Lab Ref: 76498A

Send results to: Brent Kerry
Douglas Partners Pty Ltd
Address:
Unit 5, 3 Teamster Close
Tuggerah NSW 2259

Email: brent.kerry@douglaspartners.com.au

Due: 22/8/12 std +1A