



Douglas Partners
Geotechnics | Environment | Groundwater

Report on
Salinity Investigation and Management Plan

Stage 25, Stage 18B, Entertainment Precinct and the
Proposed School Site
The Hermitage Estate, Gledswood Hills

Prepared for
SH Camden Valley Pty Ltd

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Integrated Practical Solutions



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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.

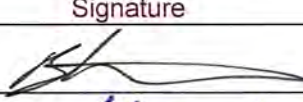
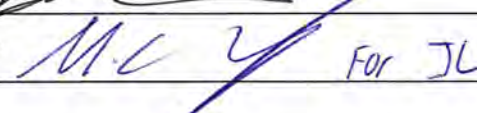
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Report on Salinity Investigation and Management Plan

Stage 25, Stage 18B, Entertainment Precinct and the Proposed School Site

The Hermitage Estate, Gledswood Hills

1. Introduction

This report presents the results of a salinity investigation and provides a salinity management plan for the proposed subdivision at Stage 25, Stage 18B, Entertainment Precinct and the Proposed School Site, The Hermitage Estate, Gledswood Hills (referred to herein as the site). The work was commissioned by Mr Jason Stephenson of Sekesui House Camden Valley Pty Ltd (SH), project developer.

Saline soils affect much of the Western Sydney Region. Buildings and infrastructure located on shales of the Wianamatta Group are particularly at risk. Salinity can affect urban structures in a number of ways, including corrosion of concrete, break down of bricks and mortar, corrosion of steel (including reinforcement), break up of roads, attack on buried infrastructure, reduced ability to grow vegetation and increased erosion potential.

It is understood that a residential and commercial subdivision is proposed and that an assessment of soil salinity is required for submission to Camden Council with the subdivision application and to assist in conceptual planning of the development.

The investigation comprised excavation of test pits, followed by laboratory testing of selected samples, engineering analysis and reporting. Details of the work undertaken and the results obtained are given within this report, together with comments relating to design and construction practice.

2. Previous Investigations and Results

Douglas Partners Pty Ltd (DP) has previously undertaken salinity investigation for the Hermitage Way link road which is located within a portion of the site. The relevant projects include:

- DP Report on Land Capability and Contamination Assessment, Turner Road Precinct, Catherine Field and Currans Hill , Project 40741 dated 28 February 2007 (DP, 2006): and
- DP Report on Salinity Investigation and Management Plan, The Hermitage Way, Gledswood Hills, Project 34295.26 dated 7 August 2013 (DP, 2013).
- DP Report on Salinity Investigation and Management Plan, Proposed Hermitage Way Final Link Road, Gledswood Hills, Project 34295.68 dated 13 October 2015. (DP, 2015A).
- DP Report on Salinity Investigation and Management Plan Addendum, Proposed Hermitage Way Final Link Road, Gledswood Hills, Project 34295.70 dated 19 November 2015 (DP, 2015B).

Nine previous test pits fall within the site boundary and have been tested for salinity:

- Three test pits excavated for the DP 2013 report (TP3, TP4 and TP6);
- Four test pits excavated for the DP 2015A report (TP101 – TP104); and
- Two test pits excavated for the DP 2015B report (TP201 and TP202),

The above mentioned test pits have been summarised and the results included in this investigation.

3. Scope of Works

The current report includes two parts:

1. Salinity assessment of the Site based upon:
 - Collection of samples at regular depth intervals from 44 test pits (14 deep test pits to 3 m (or prior refusal) and 30 shallow test pits to 1.5 m);
 - Review of test pits and laboratory results from the previous investigations;
 - Inspection of the Site for signs of salinity;
 - Analysis of electrical conductivity (EC1:5), pH and soil texture test results for 124 soil and weathered rock samples determined at a NATA accredited analytical laboratory, for classification of salinity and aggressivity;
 - Laboratory analysis of additional salinity, aggressivity and erodibility indicators, including chloride and sulphate concentrations (10 samples), sodicities (five samples) and dispersibility testing (five samples) at a NATA accredited analytical laboratory; and
 - Assessment of the results with respect to potential for salinity impacts on the development.
2. Preparation of a Salinity Management Plan (SMP) for the Site providing guidance on development strategies to reduce the impact of saline materials (if and where found). The Plan was based upon:
 - Review of the salinity investigation results;
 - Review of the following documents detailing Council requirements:
 - o 'Building in Salinity Prone Environments', Camden Council, 2004;
 - o 'Map of Salinity Potential in Western Sydney', DNR (2002);
 - o 'Guidelines to Accompany Map of Salinity Potential in Western Sydney', DNR (2002);
 - o 'Western Sydney Salinity Code of Practice' (amended January 2004), Rebecca Nicholson for WSROC, DNR and Natural Heritage Trust;
 - o 'Guide to Residential Slabs and Footings in a Saline Environment', Cement, Concrete and Aggregates, Australia (2005);
 - o 'Introduction to Urban Salinity', DNR (2003);
 - o 'Building in a Saline Environment' DNR (2003);

- o 'Roads and Salinity', DNR (2003);
- o 'Indicators of Urban Salinity', DNR (2002);
- o 'Site Investigations for Urban Salinity', DNR (2002);
- o 'Urban Salinity Processes', DNR (2004);
- o 'Waterwise Parks and Gardens', DNR (2004); and
- o 'Broad Scale Resources for Urban Salinity Assessment' DNR (2002).

4. Site Description

The Site has an area of approximately 16.5 ha and comprises Stage 25, Stage 18B, the Entertainment Precinct and the Proposed School Site. The site boundary is shown on Drawing 1 in Appendix B.

At the time of fieldwork, the majority of the site was un-occupied open space and predominately grass covered with sections of low density vegetation (trees). There was evidence of the old Camden Valley golf course, including grass covered sand bunkers and footpaths within portions of the site. A former motel area is located within the centre of the site. The site is bounded to the north by future residential development, to the east by the Sydney Water supply canal, to the south by Gledswood Country Club and other stages of the Hermitage Estate, and to the west by other stages of the Hermitage Estate and Camden Valley Way.

5. Geology and Hydrogeology

Reference to the Wollongong – Port Hacking 1:100 000 Geological Series Sheets indicates that the Site is underlain by Bringelly Shale (mapping unit Rwb) of the Wianamatta Group of Triassic age. This formation typically comprises shale, carbonaceous claystone, laminite and some minor coaly bands which weather to form clays of high plasticity. The results of the investigation were consistent with the geological mapping, with siltstone encountered in the pits that intersected rock.

Additional reference to the Map of Salinity Potential in Western Sydney, indicates that the site is located in an area of *"Moderate salinity potential"* where *"saline areas may occur which have not yet been identified or may occur if risk factors change adversely"*. The classification is based on the landform and geology and it is noted that due to the resolution at the scale of the mapping, it is not possible to delineate the zone boundaries with precision.

McNally (2005) describes some general features of the hydrogeology of Western Sydney which are relevant to this Site. The shale terrain of much of Western Sydney is known for saline groundwater, resulting either from the release of connate salt in shales of marine origin or from the accumulation of windblown sea salt. Seasonal groundwater level changes of 1 – 2 m can occur in a shallow regolith aquifer or a deeper shale aquifer due to natural influences.

Groundwater investigations undertaken by DP in the Camden area and previous studies of areas underlain by the Wianamatta Group and Quaternary alluvium indicate that:

- the shales have a very low intrinsic permeability, hence groundwater flow is likely to be dominated by fracture flow with resultant low yields (typically < 1 L/s) in bores; and
- The groundwater in the Wianamatta Group is typically brackish to saline with total dissolved solids (TDS) in the range 4000 – 5000 mg/L (but with cases of TDS up to 31750 mg/L being reported). The dominant ions are typically sodium and chloride and the water being generally unsuitable for livestock or irrigation.

6. Field Work Methods

The current field work for this salinity investigation comprised the excavation of 44 test pits (TP301 to TP344) with a backhoe fitted with a 450 mm bucket. These included TP301, TP305, TP307, TP310, TP313, TP316, TP319, TP320, TP325, TP327, TP330, TP337, TP341 and TP342, excavated to depths of up to 3 m or prior refusal (deep test pits) and the remaining test pits excavated to depths of up to 1.5 m or prior refusal (shallow test pits). The fieldwork was logged on site by a geo-environmental engineer, who collected representative disturbed samples to assist in strata identification and for laboratory testing. After carefully backfilling each test pit, the surface was reinstated to its previous level.

The test locations were nominated by DP and located on site by DP prior to the investigation using a differential GPS unit for which an accuracy of ± 200 mm is typical. The locations of the test pits are shown on Drawing 1 (Appendix B). The surface levels (to Australian Height Datum, AHD) and co-ordinates (in the MGA94 Zone 56 co-ordinate system) are given on the logs.

Selected test pits excavated within the Site for DP 2013 are included in this report. These include TP3, TP4 and TP6 to a depth of 1 – 3.5 m. Test pits were excavated with a Komatsu PC88 excavator fitted with a 450 mm wide bucket.

Test pits excavated within the Site for DP 2015A are included in this report. These include TP101 – TP104 which were excavated to depths of up to 1.6 – 3.2 m, with a Terex 880 backhoe fitted with a 450 mm bucket.

Test pits excavated within the Site for DP 2015B are included in this report. These include TP201 and TP202 which were excavated to a depth of 3 m (deep test pit), with a Terex 880 backhoe fitted with a 450 mm bucket.

7. Results

Subsurface conditions encountered in the test pits are given in the logs in Appendix C, which should be read in conjunction with the notes defining classification methods and descriptive terms.

The succession of strata is broadly summarised as follows:

- **TOPSOIL / TOPSOIL FILLING:** silty clay with trace rootlets encountered to depths of 0.2 m in TP 301 to TP 308, TP 310 to TP 312, TP 314 to TP 323, TP 325 to TP 328 and TP 330 to TP 341, TP343 and TP 344;
- **FILLING:** various filling material generally comprising silty clay and/or silty sand filling encountered to depths of 0.9 m in TP 309, TP 312, TP 313 and TP 324 with trace of anthropogenic material to depth of 0.4 m in TP 329 and TP 342;
- **CLAYS:** generally brown and red clay and silty clay to depths ranging from 0.2 – 3.1 m in all test pit locations, some intersecting bands of extremely weathered rock at depths ranging from 0.9 m to 2.6 m (TP 301, TP 305 to 307, TP 311, TP 319 to 320, TP 324 to 325, TP 327, TP 330, TP 337 and TP 341 to 344); and.
- **BEDROCK:** variably extremely low to medium strength shale and/or sandstone was encountered on first contact with bedrock at depths ranging between 1.0 to 2.9 m in TP 301, TP 305 to 308, TP 310, TP 313 to 314, TP317 to 319, TP 323 to 325, TP 327 to 330, TP 333 and TP 337, continuing to the depth of termination of 1.2 – 3.1 m. Rock strengths generally increased with depth.

No free groundwater was observed in any boreholes or test pits during auger drilling/excavation or for the short time that they were left open prior to backfilling. The introduction of water during the coring phase and the immediate backfilling of all test pits and boreholes after excavation precluded any further monitoring of groundwater levels.

No signs of efflorescence were noted during the inspection.

A Summary Table (Appendix D, presents the results of laboratory tests, assessments of aggressivity to concrete and steel, sodicity class, textural classification, calculated salinity E_{Ce} and salinity class inferred from E_{Ce} values using the method of Richards (1954). The Summary Table (Appendix D) also includes results of Emerson Crumb tests and derived Dispersion Potentials. The detailed laboratory test reports and chain of custody information are provided in Appendix E.

Due to limited cut to fill information available for the entire site, a “worst case” scenario was used to classify the extent of salinity and aggressivity of the site materials below the current ground surface. The “worst case” classification was carried out by utilising a maxima/minima analysis within the full investigated depth zone of 0 – 3.0 m at individual locations. The Summary Table (Appendix C) presents aggressivities and salinities for each pit location, based on minimum pH, minimum electrical resistivity and maximum E_{Ce} values within the investigated depth zone.

These values were used for spatial mapping of aggressivities and salinities throughout the investigation area (refer Drawings 2 to 4, Appendix B).

The total test sample numbers and the range of test results obtained are summarised in Table 1.

Table 1: Summary of Test Results

Parameter		Units	Samples	Minimum	Maximum
pH		pH units	154	4.5	9.8
Chlorides		(mg/kg)	17	<10	1200
Sulphates		(mg/kg)	17	<20	520
Aggressivity	to Concrete	[AS2159]		non-aggressive	mild
	to Steel	[AS2159]		non-aggressive	mild
Exchangeable Sodium (Na)		(meq/100g)	9	0.49	2.5
CEC (cation exchange capacity)		(meq/100g)	9	1.3	15
Sodicity [Na/CEC]		(ESP%)	9	3.3	72
Sodicity Class		[after DLWC]	-	non sodic	highly sodic
EC1:5 [Lab.]		(mS/cm)	154	8	870
Resistivity		Ω.cm	154	1149.4	125000
ECe [M x EC1:5] ¹		(dS/m)	-	0.06	7.4
Salinity Class		[after Richards 1954]	-	non-saline	moderately saline

1 M is soil textural factor

7.1 Aggressivity

Figure 1 (below) presents variations of aggressivity with depth, based on pH profiles at deep test pit locations, together with the aggressivity class ranges indicated in Australian Standard AS2159 (2009). The absence of free groundwater from all test pits and the impermeability of the sampled clay-rich soils indicate that soils at all test pits are in Condition “B” as defined by AS2159.

The pH profiles of Figure 1 indicate that the materials throughout the Site, at all investigated depths, are non-aggressive to steel. The chloride concentration guidelines of AS2159 support this non-aggressive classification. However, based on resistivity criteria (Appendix D), samples were classified as non-aggressive to mildly aggressive to steel.

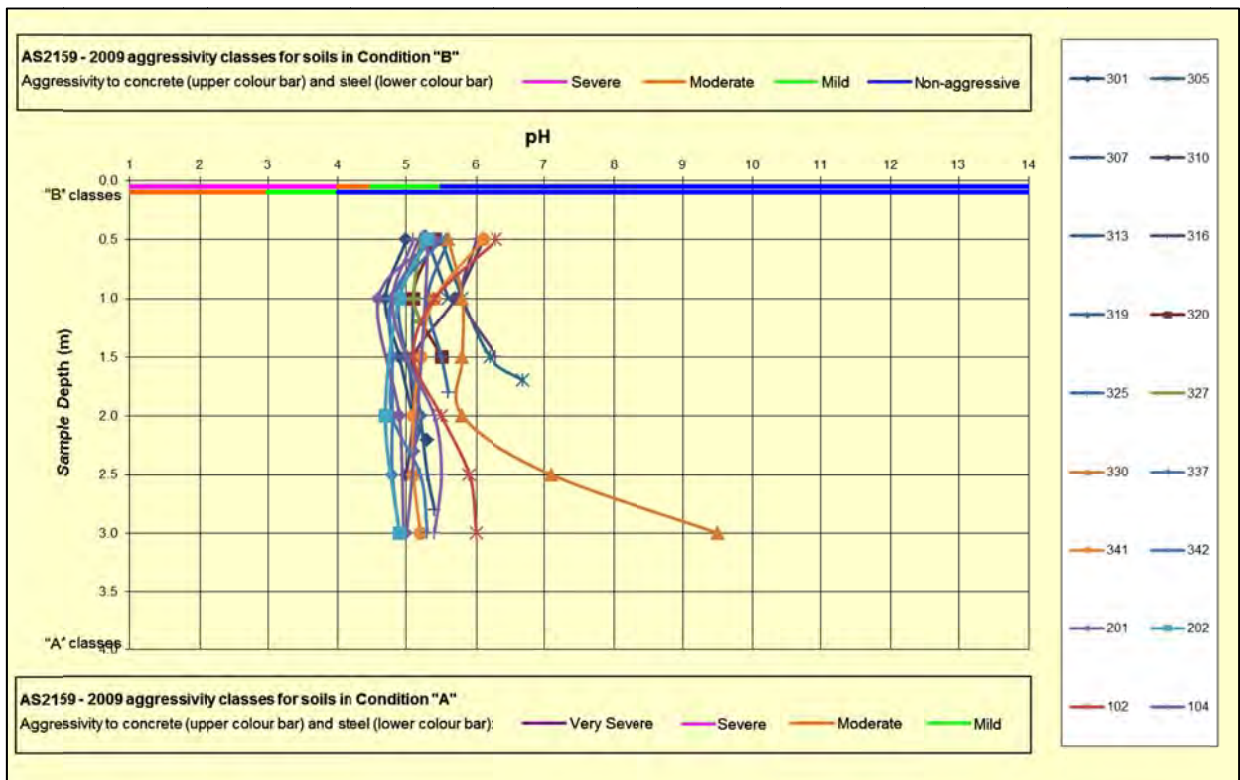


Figure 1: Vertical pH Profiles and Aggressivity Classes

The Summary Table also indicates that 24% of all samples were non-aggressive to concrete and that 76% were mildly aggressive to concrete,

The worst case results for each test pit were used to define approximate areas of mild (pH 4.5 – 5.5) aggressivity to concrete foundations and piles, represented by colour zones on Drawing 2 (Appendix B).

Calculated soil resistivities indicated higher aggressivities to steel than were indicated by pH measurements, hence worst case resistivities were interpolated and contoured to define areas of mild aggressivity (1000 – 2000 Ohm-cm) to steel (Drawing 3, Appendix B).

7.2 Salinity

Figure 2 (below) presents the variations of salinity with depth, based on salinity (ECe) profiles at deep test pit locations, together with the salinity classifications of Richards (1954).

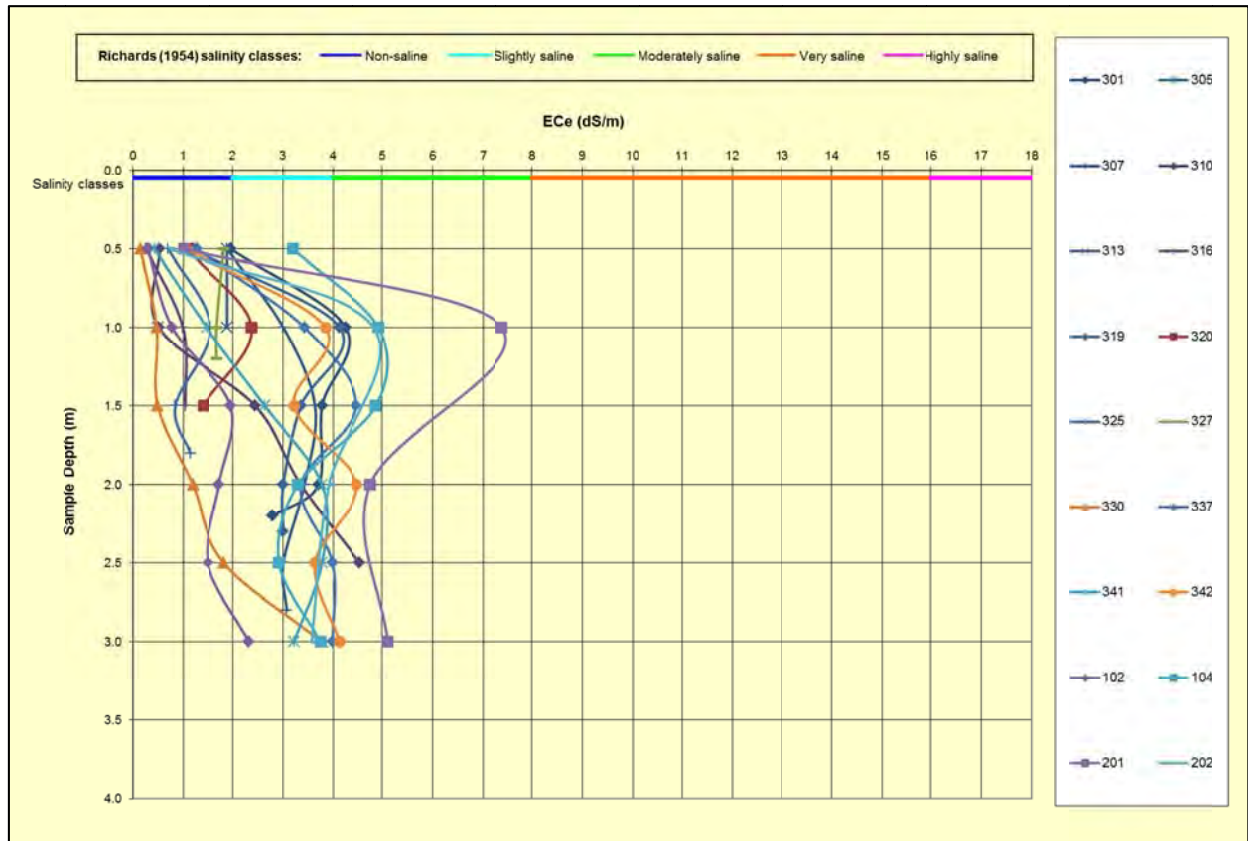


Figure 2: Vertical Salinity Profiles and Salinity Classes

The Summary Table (Appendix D) indicates that 45% of all soil samples were non-saline, 44% were slightly saline and 11% were moderately saline.

As for aggressivity, worst case ECe values were interpolated and contoured to define areas of slightly saline (ECe 2 – 4 dS/m) and moderately saline (ECe 4 – 8 dS/m) material (see Drawing 4, Appendix B).

7.3 Sodicty and Dispersibility

The sodicty test reported in the Summary Table shows non-sodic to highly sodic soils, indicating some potential for erodability of soils left exposed.

The dispersion potential of the soils, as measured by the Emerson Crumb Test (refer Summary Table, Appendix D), were determined to be a class 5 and 6 (no dispersion) over the five locations tested, at depths of 0.5 m – 1.0 m.

8. Impact of the Site Materials on the Proposed Development

The mild aggressivity to concrete and steel, the presence of moderately saline materials and the highly sodic soils are naturally occurring features of the local landscape and are not considered significant impediments to the proposed development, provided appropriate remediation or management techniques are employed.

Salinity and aggressivity affects the durability of concrete and steel by causing premature breakdown of concrete and corrosion of steel. This has impacts on the longevity of structures in contact with these materials. As a result management will be required (refer Section 9).

Sodic soils have low permeability due to infilling of interstices with fine clay particles during the weathering process, restricting infiltration of surface water and potentially creating perched water tables, seepage in cut faces or ponding of water in flat open areas. In addition, sodic soils tend to erode when exposed. Management of sodic soils is therefore required to prevent these adverse effects.

9. Salinity Management Plan

The current salinity investigation indicates that materials within the site are slightly to moderately saline. Testing of other parameters associated with salinity indicates that the materials are mildly aggressive to steel (by the resistivity and chloride criteria of AS2159) and concrete within the Site (by the pH and sulphate criteria of AS2159). In addition, shallow soils were highly sodic.

The following management strategies are confined to the management of those factors with a potential to impact on the development.

- A. Management should focus on capping of the upper surface of the sodic soils, both exposed by excavation and placed as filling, with a more permeable material to prevent ponding, to reduce capillary rise, to act as a drainage layer and to reduce the potential for erosion.
- B. When possible, place excavated materials in fill areas with similar salinity characteristics (ie: place material onto in-situ soils with a similar or higher aggressivity or salinity classification). With respect to imported fill material, testing should be undertaken prior to importation, to determine the salinity characteristics of the material, which should be non-aggressive and non-saline to slightly saline where possible but in any case not more aggressive or more saline than the material on which it is to be placed.
- C. Sodic soils can also be managed by maintaining vegetation where possible and planting new salt tolerant species. The addition of organic matter, gypsum and lime can also be considered where appropriate. After gypsum addition, reduction of sodicity levels may require some time for sufficient infiltration and leaching of sodium into the subsoils, however capping of exposed sodic material should remain the primary management method. Topsoil added at the completion of bulk earthworks is, in effect, also adding organic matter which may help infiltration and leaching of sodium.
- D. Avoid water collecting in low lying areas, in depressions, or behind fill. This can lead to water logging of the soils, evaporative concentration of salts, and eventual breakdown in soil structure resulting in accelerated erosion.

- E. Any pavements should be designed to be well drained of surface water. There should not be excessive concentrations of runoff or ponding that would lead to waterlogging of the pavement or additional recharge to the groundwater through any more permeable zones in the underlying filling material.
- F. Surface drains should generally be provided along the top of batter slopes to reduce the potential for concentrated flows of water down slopes possibly causing scour.
- G. Salt tolerant grasses and trees should be considered for landscaping, to reduce soil erosion as in Strategy A above and to maintain the existing evapo-transpiration and groundwater levels. Reference should be made to an experienced landscape planner or agronomist.

The following additional strategies are recommended for completion of service installation and for house / building construction. These strategies should be complementary to standard good building practices recommended within the Building Code of Australia, including cover to reinforcement within concrete and correct installation of a brick damp course (where used), so that it cannot be bridged to allow moisture to move into brick work and up the wall.

- H. Where materials are classified as non-aggressive to concrete piles (refer Drawing 2), piles should nevertheless have a minimum strength of 32 MPa and a minimum cover to reinforcement of 45 mm (as per AS2159).
- I. Where materials are classified as mildly aggressive to concrete piles (refer Drawing 2), piles should have a minimum strength of 32 MPa and a minimum cover to reinforcement of 60 mm (as per AS2159) to limit the corrosive effects of the surrounding materials (in accordance with AS2159).
- J. With regard to concrete structures, for non-saline and slightly saline soils (with salinities less than 4 dS/m) (refer Drawing 4):
 - o Where soils are classified as non-aggressive to concrete (AS3600 – A1) (Drawing 2), slabs and foundations should have a minimum strength of 20 MPa, and should be allowed to cure for a minimum of three days (as per AS3600) to limit the corrosive effects of the surrounding soils; and
 - o Where soils are classified as mildly aggressive to concrete (AS3600 – A2) (Drawing 2), slabs and foundations should have a minimum strength of 25 MPa, and should be allowed to cure for a minimum of three days (as per AS3600) to limit the corrosive effects of the surrounding soils;
- K. With regard to concrete structures, for moderately saline soils with salinities of 4 – 8 dS/m (refer Drawing 4):
 - o Where soils are classified as non-aggressive to concrete (AS3600 – A1) (Drawing 2), slabs and foundations should have a minimum strength of 25 MPa, a minimum cover to reinforcement of 45 mm from unprotected ground and should be allowed to cure for a minimum of three days (as per AS3600) to limit the corrosive effects of the surrounding soils;
 - o Where soils are classified as mildly aggressive to concrete (AS3600 – A2) (Drawing 2), slabs and foundations should have a minimum strength of 25 MPa, a minimum cover to reinforcement of 45 mm from unprotected ground and should be allowed to cure for a minimum of three days (as per AS3600) to limit the corrosive effects of the surrounding soils;

- L. Wet cast concrete pipes and currently manufactured spun concrete pipes are understood to have estimated compressive strengths of 50 MPa and 60 – 70 MPa, respectively, in excess of the requirements for mass concrete in J and K above. Reference to the maximum and minimum test results of Table 1 (Section 7 of this report) and to Tables E1 and 3.1 of AS 4058 – 2007 “Precast concrete pipes” indicates that the site falls within the AS 4058 Clay/Stagnant (low sulphate) soil type (chlorides $\leq 20,000$ ppm, $\text{pH} \geq 4.5$ and sulphates $\leq 1,000$ ppm) and (in the absence of tidal water flow) falls within the AS 4058 Normal durability environment. Under these conditions, AS 4058-compliant reinforced concrete pipes of general purpose Portland cement, with a minimum cover to reinforcement of 10 mm, are expected to have a design life in excess of 100 years. Any concrete pipes installed within the site should employ AS 4058-compliant steel reinforced pipes of general purpose Portland cement, with minimum cover to reinforcement of 10 mm, or should be fibre reinforced.
- M. Resistivity results indicate soils that are aggressive to steel (Drawing 3, Appendix B). This drawing identifies areas of mild aggressivity to steel (1000 – 2000 Ohm-cm) over the Site. For these areas of soil identified as mildly aggressive to steel, the following corrosion allowances (as per AS 2159 – 2009) should be taken into account by the designer:
- o Mild: uniform corrosion allowance 0.01 – 0.02 mm/year; and
- In instances where a coating is applied to the pile, if the design life of the pile is greater than the design life for the coating, consideration must be given to corrosion of the pile in accordance with the above list.
- N. In all masonry buildings a brick damp course should be installed so that it cannot be bridged either internally or externally. This will prevent moisture moving into brickwork and up the wall.
- O. The use of a bedding layer of sand (100 mm thick), overlain by a membrane of thick plastic (damp proof as opposed to vapour proof), is recommended under concrete slabs to act as a moisture barrier and drainage layer and to restrict capillary rise under the slab. As an alternative method for protection of concrete slabs for non-residential construction, higher strength (32 MPa) concrete may be placed directly on a layer of crushed rock. Such rock should be sourced locally from an area classified as non-saline or slightly saline or should be imported after stockpiling, testing and classification as non-saline or slightly saline.

10. Additional Recommendations and Conclusion

Additional investigation should be undertaken in development areas which are to be excavated deeper than 3 m, where direct sampling and testing of salinity has not been carried out. Salinity management strategies herein may need to be modified or extended following additional investigations by deep test pitting and/or drilling, sampling and testing for soil and water pH, electrical conductivity, TDS, sodicity, sulphates and chlorides. Such works, if required, could be conducted when final cut and fill requirements have been determined.

It is considered that the management strategies described herein when incorporated into the design and construction works are appropriate to mitigate the levels of salinity, aggressivity and sodicity identified at the Site

11. Limitations

Douglas Partners (DP) has prepared this report for this project at Stage 25, Stage 18B, The Entertainment Precinct and Proposed School Site in accordance with DP's proposal MAC160157 dated 12 May 2016 and acceptance received from Jason Stephenson on 13 May 2016. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of SH Camden Valley 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 this investigation. 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 (geotechnical / environmental / groundwater) 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.

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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.



Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low

reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:
4,6,7
N=13
- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:
15, 30/40 mm

Sampling Methods

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Symbols & Abbreviations

Douglas Partners



Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U ₅₀	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General



Asphalt



Road base



Concrete



Filling

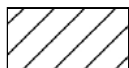
Soils



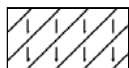
Topsoil



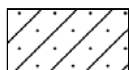
Peat



Clay



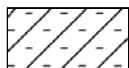
Silty clay



Sandy clay



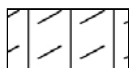
Gravelly clay



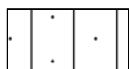
Shaly clay



Silt



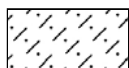
Clayey silt



Sandy silt



Sand



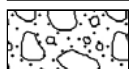
Clayey sand



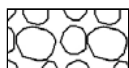
Silty sand



Gravel



Sandy gravel



Cobbles, boulders



Talus

Sedimentary Rocks



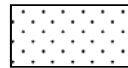
Boulder conglomerate



Conglomerate



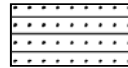
Conglomeratic sandstone



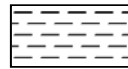
Sandstone



Siltstone



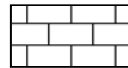
Laminite



Mudstone, claystone, shale

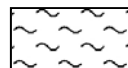


Coal

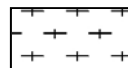


Limestone

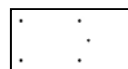
Metamorphic Rocks



Slate, phyllite, schist

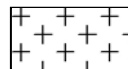


Gneiss

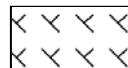


Quartzite

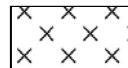
Igneous Rocks



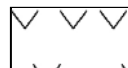
Granite



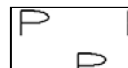
Dolerite, basalt, andesite



Dacite, epidote



Tuff, breccia



Porphyry



Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 - 5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.



Rock Strength

Rock strength is defined by the Point Load Strength Index ($IS_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $IS_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $IS_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and longer sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq 100 \text{ mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Appendix B

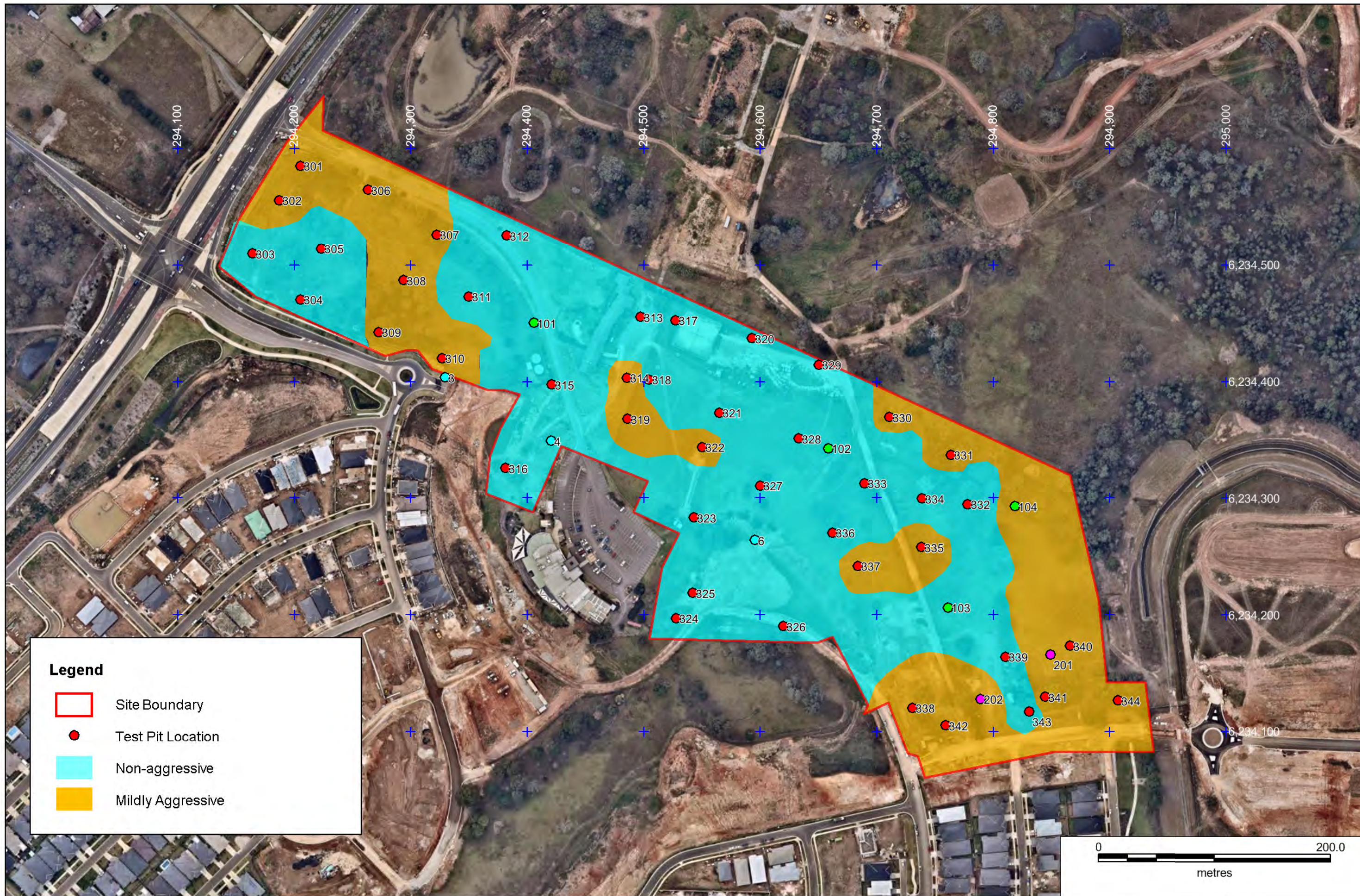
Drawings 1 to 4

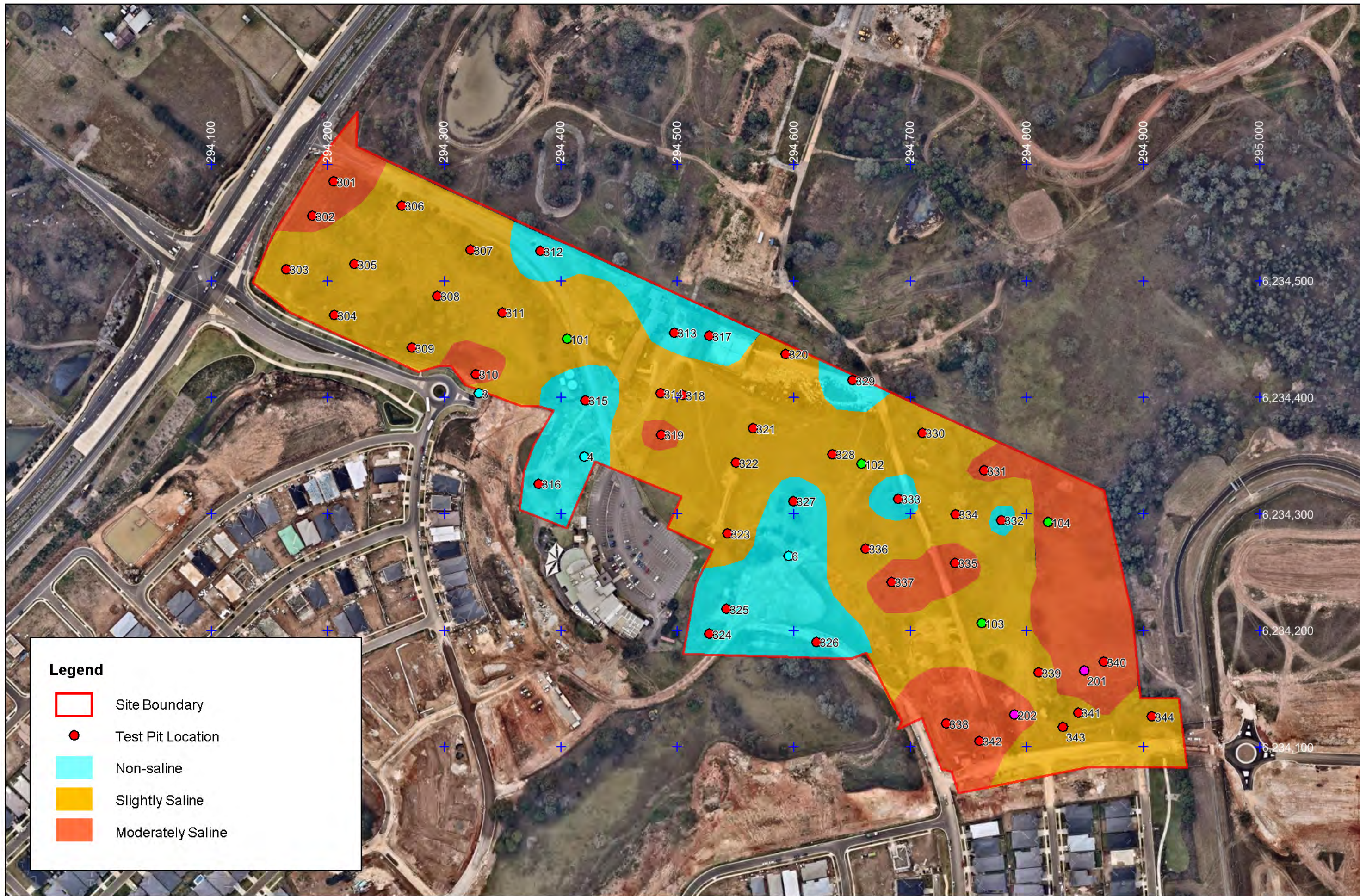




Legend

- Site Boundary
- Test Pit Location
- Non-aggressive
- Mildly Aggressive





Legend

- Site Boundary
- Test Pit Location
- Non-saline
- Slightly Saline
- Moderately Saline

Appendix C

Test Pit Logs

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 117.6 mAHD
EASTING: 294205
NORTHING: 6234586

PIT No: 301
PROJECT No: 34295.75
DATE: 19/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		FILLING - brown, silty clay with trace rootlets										
	0.2	SILTY CLAY - brown silty clay with trace rootlets										
	0.4	CLAY - red clay with trace rootlets										
117				D	0.5							
		- becoming red mottled grey below 0.9m		D	1.0							
1												
		- becoming more grey below 1.4m		D	1.5							
116												
				D	2.0							
2												
	2.2	SHALE - extremely low strength, extremely weathered, grey shale		D	2.2							
	2.3	Pit discontinued at 2.3m - refusal on extremely low strength shale										
115												
3												
114												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Test pit location moved due to water main

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 117.3 mAHD
EASTING: 294187
NORTHING: 6234556

PIT No: 302
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
117	0.1	TOPSOIL - brown, silty clay with trace rootlets		D	0.5							
		SILTY CLAY - brown, silty clay with trace rootlets										
	0.2	CLAY - red clay with trace rootlets										
116		- becoming red mottled grey below 0.6m		D	1.0							
115		- becoming grey mottled red below 1.4m		D	1.5							
114	1.6	Pit discontinued at 1.6m - limit of investigation										

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 116.2 mAHD
EASTING: 294164
NORTHING: 6234510

PIT No: 303
PROJECT No: 34295.75
DATE: 19/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
116		FILLING - brown, silty clay with trace roots, crushed concrete, gravel and fine grained sands										
		- mulch layer observed at 0.3m										
	0.6	CLAY - red clay with trace rootlets		D	0.5							
1				D	1.0							
115		- becoming light orange mottled grey below 1.4m		D	1.5							
1.6		Pit discontinued at 1.6m - limit of investigation										
2												
114												
3												
113												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	WL	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 118.4 mAHD
EASTING: 294205
NORTHING: 6234471

PIT No: 304
PROJECT No: 34295.75
DATE: 19/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
118 117 116 115	0.2	FILLING - brown silty clay with trace rootlets										
		CLAY - red clay with trace rootlets										
		- becoming red mottled grey below 0.4m		D	0.5							
		- becoming grey mottled red below 1.4m		D	1.0							
	1.6	Pit discontinued at 1.6m - limit of investigation		D	1.5							
	2											
	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 119.4 mAHD
EASTING: 294223
NORTHING: 6234514

PIT No: 305
PROJECT No: 34295.75
DATE: 20/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
119 118 117 116	0.3	FILLING - brown, silty clay with trace rootlets and organic matter										
		CLAY - red clay with trace rootlets		D	0.5							
	0.8	CLAY - light brown clay with fine grained sand		D	1.0							
	1.4	SHALE - extremely low strength, extremely weathered, grey brown shale		D	1.5							
	1.8	Pit discontinued at 1.8m - refusal on medium strength shale		D	1.7							
	2											
	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 119.7 mAHD
EASTING: 294263
NORTHING: 6234565

PIT No: 306
PROJECT No: 34295.75
DATE: 20/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
119	0.2	TOPSOIL - brown silty clay with trace rootlets										
		CLAY - red clay with trace rootlets										
		- becoming red mottled grey below 0.4m		D	0.5							
		- becoming grey mottled red below 0.7m		D	1.0							
118	1.4	SHALE - extremely low strength, extremely weathered, grey shale		D	1.5							
2				D	2.0							
				D	2.4							
117		Pit discontinued at 2.5m - refusal on medium strength shale										
3												
116												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
BB	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	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)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 121.8 mAHD
EASTING: 294322
NORTHING: 6234527

PIT No: 307
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
	0.05	TOPSOIL - brown silty clay with trace rootlets										
		CLAY - red mottled grey clay with trace rootlets										
				D	0.5							
121	1			D	1.0			1				
		- becoming grey mottled red (possibly extremely low strength, extremely weathered shale) with trace fine grained sand below 1.1m		D	1.5							
120	2			D	2.0			2				
	2.6	SHALE - low strength, highly weathered, brown shale		D	2.5							
119				D	2.8							
118	2.9	Pit discontinued at 2.9m - refusal on medium strength shale						3				
117	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Test pit location moved away from road verge due to water main

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 122.0 mAHD
EASTING: 294294
NORTHING: 6234487

PIT No: 308
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
122		TOPSOIL - brown silty clay with trace rootlets										
	0.2	CLAY - red mottled grey clay with trace rootlets										
		- becoming grey mottled red below 0.6m		D	0.5							
121	1			D	1.0							
		- with low strength, highly weathered, red shale bands below 1.4m		D	1.5							
120	1.6	Pit discontinued at 1.6m - limit of investigation										
	2											
119	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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 _s	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 118.4 mAHD
EASTING: 294272
NORTHING: 6234443

PIT No: 309
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
118		FILLING - brown silty clay with trace rootlets and (sandstone) cobbles		D	0.5							
0.9		CLAY - red clay with trace rootlets		D	1.0							
1												
1.7		- becoming red mottled grey below 1.4m		D	1.5							
1.6		Pit discontinued at 1.6m - limit of investigation										
2												
116												
3												
115												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 120.9 mAHD
EASTING: 294327
NORTHING: 6234420

PIT No: 310
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		FILLING - brown silty clay with trace rootlets										
	0.3	CLAY - red mottled grey clay with trace rootlets		D	0.5							
120	0.9	SHALE - low strength, highly weathered, grey and brown shale		D	1.0							
119				D	1.5							
118	2			D	2.0							
117	2.6	Pit discontinued at 2.6m - refusal on medium strength shale		D	2.5							
	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 122.5 mAHD
EASTING: 294350
NORTHING: 6234473

PIT No: 311
PROJECT No: 34295.75
DATE: 19/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
122	0.2	TOPSOIL - brown silty clay with trace rootlets										
		CLAY - red mottled grey clay with trace rootlets		D	0.5							
	1			D	1.0							
	1.4	SHALE - extremely low strength, extremely weathered, light brown shale		D	1.5							
121	1.6	Pit discontinued at 1.6m - limit of investigation										
	2											
120												
	3											
119												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 122.3 mAHD
EASTING: 294382
NORTHING: 6234526

PIT No: 312
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
122	0.05	FILLING (TOPSOIL) - brown silty clay with trace rootlets		D	0.5							
		FILLING - red mottled grey clay with trace rootlets and brown silty clay clumps										
	0.6	CLAY - red clay with trace rootlets										
1				D	1.0							
121				D	1.5							
1.6		Pit discontinued at 1.6m - limit of investigation										
2												
120												
3												
119												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 130.3 mAHD
EASTING: 294497
NORTHING: 6234456

PIT No: 313
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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130	0.1	FILLING - (igneous rock) gravel and silty clay		D	0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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	0.4	CLAY - red mottled grey clay with trace rootlets with fine grained sand																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 131.5 mAHD
EASTING: 294486
NORTHING: 6234404

PIT No: 314
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
131 <												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 130.0 mAHD
EASTING: 294421
NORTHING: 6234398

PIT No: 315
PROJECT No: 34295.75
DATE: 20/5/2016
SHEET 1 OF 1

[illegible]

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
- ☐ Cone Penetrometer AS1289.6.3.2

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



TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 131.2 mAHD
EASTING: 294381
NORTHING: 6234326

PIT No: 316
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
131	0.2	TOPSOIL - brown silty clay with trace rootlets		D	0.5							
		CLAY - red mottled grey clay with trace rootlets										
	0.7	SHALE - low strength, highly weathered, brown shale with trace fine sand		D	1.0							
	1.6	Pit discontinued at 1.6m - refusal on medium strength shale		D	1.5							
130												
129												
128												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 131.3 mAHD
EASTING: 294527
NORTHING: 6234453

PIT No: 317
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
131	0.2	TOPSOIL - brown silty clay with trace rootlets										
	0.4	SILTY SANDY CLAY - brown silty sandy clay with fine grained sand										
	0.5	CLAY - red mottled grey clay with trace rootlets and trace (ironstone) gravel (<10mm)		D	0.5							
1	1.0	SHALE - grey shale		D	1.0							
130	1.2	Pit discontinued at 1.2m - refusal on shale		D	1.2							
129												
2												
128												
3												
128												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 132.3 mAHD
EASTING: 294504
NORTHING: 6234402

PIT No: 318
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
132	0.2	TOPSOIL - brown silty clay with trace rootlets		D	0.5							
	0.35	SILTY CLAY - brown silty clay										
		CLAY - red mottled grey clay with trace rootlets										
		- becoming more grey below 0.5m										
131	1.4	SHALE - highly weathered, brown shale		D	1.5							
130	1.8	Pit discontinued at 1.8m - limit of investigation										
129	2.0											
	3.0											
	3.3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 133.0 mAHD
EASTING: 294486
NORTHING: 6234368

PIT No: 319
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
133		TOPSOIL - brown silty clay with trace rootlets										
	0.2	SILTY SANDY CLAY - light brown silty sandy clay with trace fine grained sand										
	0.4	CLAY - red mottled grey clay with trace roots and (ironstone) gravel (<10mm)		D	0.5							
		- with low strength, highly weathered, sandstone banding below 0.9m		D	1.0							
		- becoming grey below 1.4m		D	1.5							
132	1											
	1.6	SHALE - highly weathered, grey shale										
131	2											
	2.3	Pit discontinued at 2.3m - refusal on shale		D	2.3							
130	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 130.7 mAHD
EASTING: 294593
NORTHING: 6234437

PIT No: 320
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		TOPSOIL - brown silty clay with trace rootlets										
	0.2	CLAY - brown mottled red clay with trace rootlets										
	0.4	CLAY - red mottled grey clay with trace rootlets and (ironstone) gravel (<10mm)		D	0.5							
130												
1				D	1.0							
1.45												
1.5		SHALE - high strength, highly weathered, red and grey shale Pit discontinued at 1.5m - refusal on medium strength shale		D	1.5							
128												
2												
128												
3												
127												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	sp	Standard penetration test
E	Environmental sample	W	Water level	S	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 132.1 mAHD
EASTING: 294565
NORTHING: 6234374

PIT No: 321
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
132		TOPSOIL - brown silty clay										
	0.2	CLAY - dark brown clay with trace rootlets										
	0.4	CLAY - red mottled grey clay with trace rootlets										
				D	0.5							
1				D	1.0							
131		- becoming more grey below 1.2m										
				D	1.5							
1.6		Pit discontinued at 1.6m - limit of investigation										
2												
130												
3												
129												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	sp	Standard penetration test
E	Environmental sample	WL	Water level	S	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 132.6 mAHD
EASTING: 294550
NORTHING: 6234344

PIT No: 322
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
132		TOPSOIL - brown silty clay with trace rootlets										
	0.2	SILTY CLAY - brown silty clay										
	0.4	CLAY - red mottled grey clay with trace rootlets										
	0.9	CLAY - grey mottled red clay										
131	1.6	Pit discontinued at 1.6m - limit of investigation										
	2											
130	3											
129												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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 _s	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	W _s	Water seep	sp	Standard penetration test
E	Environmental sample	W _l	Water level	S	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 132.0 mAHD
EASTING: 294543
NORTHING: 6234283

PIT No: 323
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
132		TOPSOIL - brown silty clay with trace rootlets										
	0.2	CLAY - red mottled grey clay with trace rootlets		D	0.5							
		- becoming more grey below 0.8m										
131	1.0	SHALE - extremely low strength, extremely weathered, grey and orange shale		D	1.0			1				
	1.4	- becoming medium strength red/grey shale with fine grained sands at 1.4m Pit discontinued at 1.4m - refusal on shale		D	1.4							
130	2							2				
129	3							3				

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 130.9 mAHD
EASTING: 294527
NORTHING: 6234197

PIT No: 324
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		FILLING - light grey silty sand with trace rootlets										
	0.6	CLAY - red mottled grey clay with trace rootlets		D	0.5							
130	1	- becoming grey below 1.1m		D	1.0							
	1.4	SHALE - extremely low strength, extremely weathered, grey shale		D	1.5							
129	2			D	2.0							
	2.1	Pit discontinued at 2.1m - refusal on very low strength shale										
128	3											
127												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 130.2 mAHD
EASTING: 294542
NORTHING: 6234219

PIT No: 325
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
130	0.2	TOPSOIL - brown silty clay with trace rootlets										
	0.3	SILTY CLAY - silty clay with trace rootlets										
		CLAY - red clay with trace rootlets		D	0.5							
		- becoming orange mottled grey below 0.9m		D	1.0							
129	1.1	SHALE - extremely low strength, extremely weathered, orange and grey shale		D	1.5							
				D	1.8							
128	1.9	Pit discontinued at 1.9m - refusal on very low strength shale										
	2											
	3											
127												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Test pit location moved due to large stockpile

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	sp	Standard penetration test
E	Environmental sample	≡	Water level	S	Shear vane (kPa)
		V		V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 122.9 mAHD
EASTING: 294619
NORTHING: 6234190

PIT No: 326
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
122	0.1	FILLING - brown silty clay with trace rootlets										
		CLAY - red clay with trace rootlets										
				D	0.5							
				D	1.0							
121		- becoming red mottled grey below 1.3m		D	1.5							
	1.6	Pit discontinued at 1.6m - limit of investigation										
120	2											
119	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 130.9 mAHD
EASTING: 294600
NORTHING: 6234311

PIT No: 327
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		TOPSOIL - brown silty clay with trace rootlets										
	0.2	SILTY CLAY - brown silty clay with trace rootlets										
	0.4	CLAY - red mottled grey clay with trace rootlets		D	0.5							
130		- becoming light orange mottled grey with fine grained sand at 0.9m		D	1.0							
1				D	1.2							
	1.2	SHALE - medium strength, orange and grey shale										
	1.3	Pit discontinued at 1.3m - refusal on medium strength shale										
129												
	2											
128												
	3											
127												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 127.7 mAHD
EASTING: 294633
NORTHING: 6234352

PIT No: 328
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
127	0.2	TOPSOIL - brown silty clay with trace rootlets		D	0.5							
		SILTY CLAY - red/brown silty clay with trace rootlets										
	0.4	CLAY - red mottled orange clay with fine grained sand										
1				D	1.0							
1.3		SANDSTONE - extremely low strength, highly weathered, brown sandstone		D	1.5							
1.7		Pit discontinued at 1.7m - limit of investigation										
2												
3												
125												
124												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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 _s	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	W _s	Water seep	S	Standard penetration test
E	Environmental sample	W _L	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 129.9 mAHD
EASTING: 294650
NORTHING: 6234415

PIT No: 329
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)					
				Type	Depth	Sample	Results & Comments		5	10	15	20		
129 1	0.2	FILLING (road verge) - light brown silty sandy clay with trace (igneous rock, crushed brick and concrete) gravel and rootlets		D	0.5				1					
		FILLING - brown silty clay with trace rootlets												
	0.4	CLAY - red mottled grey clay with trace fine sand and rootlets												
	0.9	SANDSTONE - extremely low strength, extremely weathered, grey mottled light orange fine grained sandstone												D
	- becoming medium strength below 1.4m	D												1.3
1.4	Pit discontinued at 1.4m - refusal on extremely low strength sandstone													
128 2									2					
127 3									3					
126														

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 125.2 mAHD
EASTING: 294711
NORTHING: 6234370

PIT No: 330
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
125	0.3	FILLING (TOPSOIL) - brown silty clayey sand with trace roots										
		FILLING - brown sandy silty clay		D	0.5							
124	0.9	CLAY - red mottled orange clay with trace rootlets and fine grained sand		D	1.0			1				
		- with extremely low strength, extremely weathered, sandstone banding below 1.8m		D	1.5							
2	2.2	CLAY - brown/grey clay with extremely low strength, extremely weathered shale banding		D	2.0			2				
				D	2.5							
3	3.1	Pit discontinued at 3.1m - limit of investigation		D	3.0			3				
122												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 120.5 mAHD
EASTING: 294763
NORTHING: 6234337

PIT No: 331
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
	0.1	TOPSOIL - brown silty clay with trace rootlets										
		CLAY - red clay with trace rootlets										
120		- becoming red mottled grey below 0.5m		D	0.5							
1				D	1.0							
119				D	1.5							
1.6		Pit discontinued at 1.6m - limit of investigation										
2												
118												
3												
117												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 118.0 mAHD
EASTING: 294778
NORTHING: 6234295

PIT No: 332
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
118		TOPSOIL - dark brown silty clay with trace rootlets										
	0.2	SILTY CLAY - dark brown silty clay										
	0.4	CLAY - red clay with trace rootlets		D	0.5							
		- becoming red mottled grey below 0.8m										
117	1			D	1.0							
				D	1.5							
116	1.7	Pit discontinued at 1.7m - limit of investigation										
	2											
115	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 124.7 mAHD
EASTING: 294690
NORTHING: 6234313

PIT No: 333
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
124	0.2	TOPSOIL - brown silty clay with trace gravel and rootlets		D	0.5							
		SILTY CLAY - brown silty clay with trace rootlets										
	0.4	CLAY - red clay										
	0.5	SANDSTONE - extremely low strength, extremely weathered, red sandstone with fine to medium grains										
1		- becoming light brown below 0.8m		D	1.0							
123	1.4	Pit discontinued at 1.4m - refusal on extremely low strength sandstone		D	1.4							
122	2											
121	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 120.3 mAHD
EASTING: 294739
NORTHING: 6234300

PIT No: 334
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
120	0.2	TOPSOIL - brown silty clay with trace rootlets		D	0.5							
		CLAY - red mottled grey clay with trace rootlets										
	0.9	CLAY - grey mottled red clay with trace rootlets										
1				D	1.0							
119												
				D	1.5							
1.7		Pit discontinued at 1.7m - limit of investigation										
2												
118												
3												
117												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 119.3 mAHD

EASTING: 294738

NORTHING: 6234258

PIT No: 335

PROJECT No: 34295.75

DATE: 17/5/2016

SHEET 1 OF 1

[illegible]

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
- ☐ Cone Penetrometer AS1289.6.3.2

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



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TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 125.9 mAHD
EASTING: 294662
NORTHING: 6234270

PIT No: 336
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		TOPSOIL - brown silty clay with trace rootlets										
	0.15	SILTY CLAY - brown silty clay										
	0.4	CLAY - red mottled grey clay with trace rootlets		D	0.5							
		- becoming more orange with trace fine grained sand below 0.7m										
125	1			D	1.0							
				D	1.5							
124	2	Pit discontinued at 1.6m - limit of investigation										
123	3											
122												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 122.3 mAHD
EASTING: 294684
NORTHING: 6234242

PIT No: 337
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
122	0.2	TOPSOIL - brown silty clay with trace rootlets										
		SILTY CLAY - brown silty clay with trace rootlets										
	0.4	CLAY - red mottled grey clay with trace rootlets										
121		- becoming grey below 0.9m		D	0.5							
	1			D	1.0							
				D	1.5							
120	2.0	SHALE - extremely low strength, highly weathered, red shale with grey clay banding										
				D	2.5							
				D	3.0							
119	3.1	Pit discontinued at 3.1m - limit of investigation										

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 119.0 mAHD
EASTING: 294731
NORTHING: 6234120

PIT No: 338
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
119		TOPSOIL - brown silty clay with trace roots and rootlets										
	0.2	CLAY - red clay with trace roots and rootlets										
				D	0.5							
118	1			D	1.0							
		- becoming grey mottled red below 1.2m										
				D	1.5							
116	1.6	Pit discontinued at 1.6m - limit of investigation										
117	2											
116	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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	W	Water seep	S	Standard penetration test
E	Environmental sample	W	Water level	V	Shear vane (kPa)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 117.4 mAHD
EASTING: 294810
NORTHING: 6234164

PIT No: 339
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
117	0.2	TOPSOIL - brown silty clay with trace rootlets										
		CLAY - red mottled grey clay with trace rootlets										
				D	0.5							
				D	1.0							
116		- becoming grey mottled red below 0.9m		D	1.5							
115	1.6	Pit discontinued at 1.6m - limit of investigation										
114	2											
	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Test pit location moved due to large stockpile

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 117.4 mAHD
EASTING: 294866
NORTHING: 6234173

PIT No: 340
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
117		TOPSOIL - brown silty clay with trace rootlets										
	0.2	SILTY CLAY - brown silty clay with trace rootlets and (ironstone) gravel (<15mm)										
	0.4	CLAY - red clay with trace rootlets		D	0.5							
		- becoming light brown mottled grey below 0.9m		D	1.0							
116		- becoming grey below 1.5m		D	1.5							
115	1.6	Pit discontinued at 1.6m - limit of investigation										
	2											
114	3											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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	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)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 119.9 mAHD
EASTING: 294844
NORTHING: 6234130

PIT No: 341
PROJECT No: 34295.75
DATE: 19/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		TOPSOIL - brown silty clay with trace rootlets										
	0.2	CLAY - red clay with trace rootlets										
				D	0.5							
119												
1				D	1.0							
	1.1	CLAY - grey mottled red clay										
				D	1.5							
118				D	2.0							
2												
				D	2.5							
		SHALE - extremely low strength, extremely weathered, grey and red shale										
		- becoming medium strength shale below 3.0m										
117				D	3.0							
3	3.0	Pit discontinued at 3.0m - refusal on medium strength shale										
116												

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

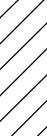
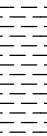
SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	G	Gas sample
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 119.7 mAHD
EASTING: 294759
NORTHING: 6234105

PIT No: 342
PROJECT No: 34295.75
DATE: 17/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
119		FILLING - silty clay with trace (igneous rock and crushed brick) gravel										
	0.4	FILLING - remnant grass layer (possible former topsoil)		D	0.5							
	0.6	CLAY - red clay with trace rootlets										
		- becoming grey below 1.3m		D	1.0							
118												
				D	1.5							
2												
2.5		SHALE - extremely low strength, extremely weathered, grey shale										
3												
3.1		Pit discontinued at 3.1m - limit of investigation										

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
BB	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	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)

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 120.6 mAHD
EASTING: 294831
NORTHING: 6234117

PIT No: 343
PROJECT No: 34295.75
DATE: 19/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		TOPSOIL - brown silty clay with trace rootlets										
	0.2	CLAY - red clay with trace rootlets		D	0.5							
	0.7	CLAY - grey mottled red clay with trace rootlets		D	1.0							
	1.4	SHALE - extremely low strength, extremely weathered, orange and grey shale		D	1.5							
	1.7	Pit discontinued at 1.7m - limit of investigation										
	2											
	3											
	117											

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: SH Camden Valley Pty Ltd
PROJECT: Salinity Investigation and Management Plan
LOCATION: St 25, 18B, Entertainment Prec & School Site
 The Hermitage, Gledswood Hills, NSW

SURFACE LEVEL: 120.5 mAHD
EASTING: 294907
NORTHING: 6234127

PIT No: 344
PROJECT No: 34295.75
DATE: 19/5/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
				Type	Depth	Sample	Results & Comments		5	10	15	20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
120	0.1	TOPSOIL - brown silty clay with trace rootlets		D	0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														

RIG: Backhoe - 450mm bucket

LOGGED: SAM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

- ☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
BB	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	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)

Appendix D

Summary Table: Laboratory Tests and Assessments

Test Bore or Pit	Test Location		Sample Depth	pH	Chloride Concentration	Sulphate Concentration	Resistivity By inversion of EC1:5	Soil Condition	Sample Aggressivity Class				
	East	North							Aggr. to Concrete - from sample pH	Aggr. to Concrete - from Sulphate conc.	Aggr. to Steel - from sample pH	Aggr. to Steel - from Chloride conc.	Aggr. to Steel - from sample Resistivity
	(m MGA56)	(m MGA56)											
			(m bgl)	(pH units)	(mg/kg)	(mg/kg)	Ω.cm	[AS2159-2009]	[AS2159-2009]				
301	294205.2	6234585.6	0.5	5	160	320	3571	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
301	294205.2	6234585.6	1.0	4.7			2000	B	Mild		Non-Aggressive		Non-Aggressive
301	294205.2	6234585.6	1.5	4.9			1852	B	Mild		Non-Aggressive		Mild
301	294205.2	6234585.6	2.0	5.1			1887	B	Mild		Non-Aggressive		Mild
301	294205.2	6234585.6	2.2	5.3			2500	B	Mild		Non-Aggressive		Non-Aggressive
302	294186.8	6234556.1	0.5	5.3			4545	B	Mild		Non-Aggressive		Non-Aggressive
302	294186.8	6234556.1	1.0	4.9			1724	B	Mild		Non-Aggressive		Mild
303	294164.1	6234510.0	0.5	6.8			7143	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
303	294164.1	6234510.0	1.5	5.1			2174	B	Mild		Non-Aggressive		Non-Aggressive
304	294205.4	6234470.6	0.5	5.4	260	230	3448	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
304	294205.4	6234470.6	1.0	5.3			2778	B	Mild		Non-Aggressive		Non-Aggressive
305	294223.0	6234514.4	0.5	5.5			3448	B	Mild		Non-Aggressive		Non-Aggressive
305	294223.0	6234514.4	1.0	5.8			3226	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
305	294223.0	6234514.4	1.5	6.2			2941	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
305	294223.0	6234514.4	1.7	6.7			2632	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
306	294263.3	6234565.0	0.5	5.1			2778	B	Mild		Non-Aggressive		Non-Aggressive
306	294263.3	6234565.0	1.5	4.8			1515	B	Mild		Non-Aggressive		Mild
307	294322.3	6234526.6	0.5	5.2	300	170	3704	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
307	294322.3	6234526.6	1.0	5.1			2326	B	Mild		Non-Aggressive		Non-Aggressive
307	294322.3	6234526.6	1.5	5.1			1923	B	Mild		Non-Aggressive		Mild
307	294322.3	6234526.6	2.0	5.2			2041	B	Mild		Non-Aggressive		Non-Aggressive
307	294322.3	6234526.6	2.5	5.3			2326	B	Mild		Non-Aggressive		Non-Aggressive
307	294322.3	6234526.6	2.8	5.4			2273	B	Mild		Non-Aggressive		Non-Aggressive
308	294293.7	6234487.2	0.5	5.1			4167	B	Mild		Non-Aggressive		Non-Aggressive
308	294293.7	6234487.2	1.0	4.9			1786	B	Mild		Non-Aggressive		Mild
309	294272.2	6234442.7	0.5	6.5			3125	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
309	294272.2	6234442.7	1.5	5.3			2000	B	Mild		Non-Aggressive		Non-Aggressive
310	294327.0	6234420.3	0.5	6.1			13158	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
310	294327.0	6234420.3	1.0	5.7			13699	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
310	294327.0	6234420.3	1.5	5.1			2857	B	Mild		Non-Aggressive		Non-Aggressive
310	294327.0	6234420.3	2.0	5.1			2083	B	Mild		Non-Aggressive		Non-Aggressive
310	294327.0	6234420.3	2.5	5			1538	B	Mild		Non-Aggressive		Mild
311	294349.8	6234473.1	0.5	5.4			5000	B	Mild		Non-Aggressive		Non-Aggressive
311	294349.8	6234473.1	1.5	4.9			2041	B	Mild		Non-Aggressive		Non-Aggressive
312	294382.3	6234525.7	0.5	6.1			6667	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
312	294382.3	6234525.7	1.0	5.6			5263	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
313	294497.4	6234455.7	0.5	5.3			3704	B	Mild	Non-Aggressive	Non-Aggressive		Non-Aggressive
313	294497.4	6234455.7	1.0	5.6			3704	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
314	294485.7	6234403.5	0.5	5.2			3846	B	Mild		Non-Aggressive		Non-Aggressive
314	294485.7	6234403.5	1.0	4.8			1818	B	Mild		Non-Aggressive		Mild
315	294421.1	6234397.7	0.5	5.9			21739	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
315	294421.1	6234397.7	1.5	5.5			6667	B	Mild		Non-Aggressive		Non-Aggressive
316	294381.1	6234326.0	0.5	6	53	40	26316	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
316	294381.1	6234326.0	1.0	5.8			9091	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
316	294381.1	6234326.0	1.5	6.3			7692	B	Non-Aggressive		Non-Aggressive	Non-Aggressive	Non-Aggressive
317	294527.2	6234452.9	0.5	5.9			9091	B	Non-Aggressive		Non-Aggressive	Non-Aggressive	Non-Aggressive
317	294527.2	6234452.9	1.0	5.4			5000	B	Mild		Non-Aggressive		Non-Aggressive
318	294504.2	6234402.0	0.5	5.1			3030	B	Mild		Non-Aggressive		Non-Aggressive
318	294504.2	6234402.0	1.5	4.9			2083	B	Mild		Non-Aggressive		Non-Aggressive
319	294486.0	6234368.3	0.5	5.3	160	110	5882	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
319	294486.0	6234368.3	1.0	4.9			1695	B	Mild		Non-Aggressive		Mild
319	294486.0	6234368.3	1.5	5			1786	B	Mild		Non-Aggressive		Mild
319	294486.0	6234368.3	2.0	5.2			2326	B	Mild		Non-Aggressive		Non-Aggressive
319	294486.0	6234368.3	2.3	5.1			2326	B	Mild	Non-Aggressive	Non-Aggressive		Non-Aggressive
320	294592.9	6234437.4	0.5	5.4	150	120	5556	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
320	294592.9	6234437.4	1.0	5.1			2941	B	Mild		Non-Aggressive		Non-Aggressive
320	294592.9	6234437.4	1.5	5.5			5000	B	Mild		Non-Aggressive		Non-Aggressive
321	294564.7	6234373.6	0.5	5.5			5000	B	Mild		Non-Aggressive		Non-Aggressive
321	294564.7	6234373.6	1.0	5			2632	B	Mild		Non-Aggressive		Non-Aggressive
322	294550.1	6234344.1	0.5	5.1			2222	B	Mild		Non-Aggressive		Non-Aggressive
322	294550.1	6234344.1	1.5	5			1923	B	Mild		Non-Aggressive		Mild
323	294543.1	6234283.2	0.5	4.6			2439	B	Mild		Non-Aggressive		Non-Aggressive
323	294543.1	6234283.2	1.0	4.7			2381	B	Mild		Non-Aggressive		Non-Aggressive
324	294527.5	6234197.2	0.5	6			125000	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
324	294527.5	6234197.2	1.0	5.2			15625	B	Mild		Non-Aggressive		Non-Aggressive
325	294541.9	6234218.6	0.5	5.6	50	82	10000	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
325	294541.9	6234218.6	1.0	5.3			4545	B	Mild		Non-Aggressive		Non-Aggressive
325	294541.9	6234218.6	1.5	5.5			8333	B	Mild		Non-Aggressive		Non-Aggressive
325	294541.9	6234218.6	1.8	5.6			5263	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
326	294619.4	6234190.3	0.5	5.5			11765	B	Mild		Non-Aggressive		Non-Aggressive
326	294619.4	6234190.3	1.0	5.6			11628	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
327	294599.6	6234310.9	0.5	5.2			3846	B	Mild		Non-Aggressive		Non-Aggressive
327	294599.6	6234310.9	1.0	5.1			3571	B	Mild		Non-Aggressive	Non-Aggressive	Non-Aggressive
327	294599.6	6234310.9	1.2	5.2			4167	B	Mild		Non-Aggressive		Non-Aggressive
328	294632.9	6234351.5	0.5	6.7			18519	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
328	294632.9	6234351.5	1.5	9.8			3030	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
329	294650.1	6234414.7	0.5	5.5			6250	B	Mild		Non-Aggressive		Non-Aggressive
329	294650.1	6234414.7	1.0	5.4			4762	B	Mild		Non-Aggressive		Non-Aggressive

Test Bore or Pit	Test Location		Sample Depth (m bgl)	Exchangeable Sodium (Na) Concentration (meq/100g)	Cation Exchange Capacity (meq/100g)	Sodicity [Na/CEC] (%)	Sodicity Class [after DLWC]	Emerson Crumb Class Number	Dispersion? (from Emerson Class) [AS1289.3.8.1]	Soil Texture Group (for detailed soil logs see Report Appendix) [after DLWC]	Textural Factor (M) [after DLWC]	EC _{1:5} [Lab.] (microS/cm)	EC _e [M x EC _{1:5}] (deciS/m)	Sample Salinity Class (Based on sample ECe) [Richards 1954]
	East	North												
	(m MGA56)	(m MGA56)												
301	294205.2	6234585.6	0.5	1.3	1.8	72	Highly Sodic	6	No	Medium clay	7	280	2.0	Non-Saline
301	294205.2	6234585.6	1.0							Light clay	8.5	500	4.3	Moderately Saline
301	294205.2	6234585.6	1.5							Medium clay	7	540	3.8	Slightly Saline
301	294205.2	6234585.6	2.0							Medium clay	7	530	3.7	Slightly Saline
301	294205.2	6234585.6	2.2							Medium clay	7	400	2.8	Slightly Saline
302	294186.8	6234556.1	0.5							Medium clay	7	220	1.5	Non-Saline
302	294186.8	6234556.1	1.0							Medium clay	7	580	4.1	Moderately Saline
303	294164.1	6234510.0	0.5							Medium clay	7	140	1.0	Non-Saline
303	294164.1	6234510.0	1.5							Medium clay	7	460	3.2	Slightly Saline
304	294205.4	6234470.6	0.5							Medium clay	7	290	2.0	Slightly Saline
304	294205.4	6234470.6	1.0							Medium clay	7	360	2.5	Slightly Saline
305	294223.0	6234514.4	0.5							Medium clay	7	290	2.0	Slightly Saline
305	294223.0	6234514.4	1.0							Clay loam	9	310	2.8	Slightly Saline
305	294223.0	6234514.4	1.5							Light medium clay	8	340	2.7	Slightly Saline
305	294223.0	6234514.4	1.7							Medium clay	7	380	2.7	Slightly Saline
306	294263.3	6234565.0	0.5							Medium clay	7	360	2.5	Slightly Saline
306	294263.3	6234565.0	1.5							Heavy clay	6	660	4.0	Slightly Saline
307	294322.3	6234526.6	0.5							Medium clay	7	270	1.9	Non-Saline
307	294322.3	6234526.6	1.0							Medium clay	7	430	3.0	Slightly Saline
307	294322.3	6234526.6	1.5							Medium clay	7	520	3.6	Slightly Saline
307	294322.3	6234526.6	2.0							Medium clay	7	490	3.4	Slightly Saline
307	294322.3	6234526.6	2.5							Medium clay	7	430	3.0	Slightly Saline
307	294322.3	6234526.6	2.8							Medium clay	7	440	3.1	Slightly Saline
308	294293.7	6234487.2	0.5							Medium clay	7	240	1.7	Non-Saline
308	294293.7	6234487.2	1.0							Medium clay	7	560	3.9	Slightly Saline
309	294272.2	6234442.7	0.5							Light medium clay	8	320	2.6	Slightly Saline
309	294272.2	6234442.7	1.5							Medium clay	7	500	3.5	Slightly Saline
310	294327.0	6234420.3	0.5							Medium clay	7	76	0.5	Non-Saline
310	294327.0	6234420.3	1.0							Medium clay	7	73	0.5	Non-Saline
310	294327.0	6234420.3	1.5							Medium clay	7	350	2.5	Slightly Saline
310	294327.0	6234420.3	2.0							Medium clay	7	480	3.4	Slightly Saline
310	294327.0	6234420.3	2.5							Medium clay	7	650	4.6	Moderately Saline
311	294349.8	6234473.1	0.5							Medium clay	7	200	1.4	Non-Saline
311	294349.8	6234473.1	1.5							Medium clay	7	490	3.4	Slightly Saline
312	294382.3	6234525.7	0.5							Medium clay	7	150	1.1	Non-Saline
312	294382.3	6234525.7	1.0							Medium clay	7	190	1.3	Non-Saline
313	294497.4	6234455.7	0.5							Medium clay	7	270	1.9	Non-Saline
313	294497.4	6234455.7	1.0							Medium clay	7	270	1.9	Non-Saline
314	294485.7	6234403.5	0.5							Medium clay	7	260	1.8	Non-Saline
314	294485.7	6234403.5	1.0							Medium clay	7	550	3.9	Slightly Saline
315	294421.1	6234397.7	0.5							Medium clay	7	46	0.3	Non-Saline
315	294421.1	6234397.7	1.5							Medium clay	7	150	1.1	Non-Saline
316	294381.1	6234326.0	0.5	0.67	1.3	52	Highly Sodic	6	No	Medium clay	7	38	0.3	Non-Saline
316	294381.1	6234326.0	1.0							Clay loam	9	110	1.0	Non-Saline
316	294381.1	6234326.0	1.5							Light medium clay	8	130	1.0	Non-Saline
317	294527.2	6234452.9	0.5							Heavy clay	6	110	0.7	Non-Saline
317	294527.2	6234452.9	1.0							Medium clay	7	200	1.4	Non-Saline
318	294504.2	6234402.0	0.5							Heavy clay	6	330	2.0	Non-Saline
318	294504.2	6234402.0	1.5							Medium clay	7	480	3.4	Slightly Saline
319	294486.0	6234368.3	0.5							Medium clay	7	170	1.2	Non-Saline
319	294486.0	6234368.3	1.0							Medium clay	7	590	4.1	Moderately Saline
319	294486.0	6234368.3	1.5							Heavy clay	6	560	3.4	Slightly Saline
319	294486.0	6234368.3	2.0							Medium clay	7	430	3.0	Slightly Saline
319	294486.0	6234368.3	2.3							Medium clay	7	430	3.0	Slightly Saline
320	294592.9	6234437.4	0.5	1	2.1	48	Highly Sodic			Heavy clay	6	180	1.1	Non-Saline
320	294592.9	6234437.4	1.0							Medium clay	7	340	2.4	Slightly Saline
320	294592.9	6234437.4	1.5							Medium clay	7	200	1.4	Non-Saline
321	294564.7	6234373.6	0.5							Heavy clay	6	200	1.2	Non-Saline
321	294564.7	6234373.6	1.0							Heavy clay	6	380	2.3	Slightly Saline
322	294550.1	6234344.1	0.5							Medium clay	7	450	3.2	Slightly Saline
322	294550.1	6234344.1	1.5							Medium clay	7	520	3.6	Slightly Saline
323	294543.1	6234283.2	0.5							Medium clay	7	410	2.9	Slightly Saline
323	294543.1	6234283.2	1.0							Medium clay	7	420	2.9	Slightly Saline
324	294527.5	6234197.2	0.5							Medium clay	7	8	0.1	Non-Saline
324	294527.5	6234197.2	1.0							Medium clay	7	64	0.4	Non-Saline
325	294541.9	6234218.6	0.5	1.3	3.9	33	Highly Sodic	5	No	Medium clay	7	100	0.7	Non-Saline
325	294541.9	6234218.6	1.0							Medium clay	7	220	1.5	Non-Saline
325	294541.9	6234218.6	1.5							Medium clay	7	120	0.8	Non-Saline
325	294541.9	6234218.6	1.8							Heavy clay	6	190	1.1	Non-Saline
326	294619.4	6234190.3	0.5							Medium clay	7	85	0.6	Non-Saline
326	294619.4	6234190.3	1.0							Medium clay	7	86	0.6	Non-Saline
327	294599.6	6234310.9	0.5							Medium clay	7	260	1.8	Non-Saline
327	294599.6	6234310.9	1.0							Heavy clay	6	280	1.7	Non-Saline
327	294599.6	6234310.9	1.2							Medium clay	7	240	1.7	Non-Saline
328	294632.9	6234351.5	0.5							Light medium clay	8	54	0.4	Non-Saline
328	294632.9	6234351.5	1.5							Medium clay	7	330	2.3	Slightly Saline
329	294650.1	6234414.7	0.5							Medium clay	7	160	1.1	Non-Saline
329	294650.1	6234414.7	1.0							Light medium clay	8	210	1.7	Non-Saline

Test Bore or Pit	Test Location		Sample Depth	pH	Chloride Concentration	Sulphate Concentration	Resistivity By inversion of EC1:5	Soil Condition	Sample Aggressivity Class				
	East	North							Aggr. to Concrete - from sample pH	Aggr. to Concrete - from Sulphate conc.	Aggr. to Steel - from sample pH	Aggr. to Steel - from Chloride conc.	Aggr. to Steel - from sample Resistivity
	(m MGA56)	(m MGA56)											
			(m bgl)	(pH units)	(mg/kg)	(mg/kg)	Ω.cm	[AS2159-2009]	[AS2159-2009]				
330	294710.6	6234369.8	0.5	5.6	<10	<10	47619	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
330	294710.6	6234369.8	1.0	5.8			14925	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
330	294710.6	6234369.8	1.5	5.8			12195	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
330	294710.6	6234369.8	2.0	5.8			5882	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
330	294710.6	6234369.8	2.5	7.1			3846	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
330	294710.6	6234369.8	3.0	9.5			1852	B	Non-Aggressive		Non-Aggressive		Mild
331	294763.3	6234337.4	0.5	4.9			2174	B	Mild		Non-Aggressive		Non-Aggressive
331	294763.3	6234337.4	1.0	4.8			1724	B	Mild		Non-Aggressive		Mild
332	294778.0	6234294.7	0.5	6.2			19608	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
332	294778.0	6234294.7	1.5	5.3			4000	B	Mild		Non-Aggressive		Non-Aggressive
333	294689.5	6234313.0	0.5	5.5			16393	B	Mild		Non-Aggressive		Non-Aggressive
333	294689.5	6234313.0	1.0	5.3			5556	B	Mild		Non-Aggressive		Non-Aggressive
334	294738.6	6234299.6	0.5	5.2			3125	B	Mild		Non-Aggressive		Non-Aggressive
334	294738.6	6234299.6	1.0	5			2041	B	Mild		Non-Aggressive		Non-Aggressive
335	294738.3	6234257.9	0.5	5.1			2381	B	Mild		Non-Aggressive		Non-Aggressive
335	294738.3	6234257.9	1.0	4.9			1563	B	Mild		Non-Aggressive		Mild
336	294661.6	6234270.3	0.5	5.7			10753	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
336	294661.6	6234270.3	1.5	5.1			2564	B	Mild		Non-Aggressive		Non-Aggressive
337	294683.8	6234241.8	0.5	5.3	140	120	5556	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
337	294683.8	6234241.8	1.0	4.8			2041	B	Mild		Non-Aggressive		Non-Aggressive
337	294683.8	6234241.8	1.5	4.8			1563	B	Mild		Non-Aggressive		Mild
337	294683.8	6234241.8	2.0	4.8			2083	B	Mild		Non-Aggressive		Non-Aggressive
337	294683.8	6234241.8	2.5	4.8			1754	B	Mild		Non-Aggressive		Mild
337	294683.8	6234241.8	3.0	4.9			1754	B	Mild		Non-Aggressive		Mild
338	294730.6	6234120.4	0.5	4.9			2632	B	Mild		Non-Aggressive		Non-Aggressive
338	294730.6	6234120.4	1.5	4.9			1587	B	Mild		Non-Aggressive		Mild
339	294810.1	6234164.1	0.5	5.5			7143	B	Mild		Non-Aggressive		Non-Aggressive
339	294810.1	6234164.1	1.0	5.1			2564	B	Mild		Non-Aggressive		Non-Aggressive
340	294865.9	6234173.4	0.5	5.3			3846	B	Mild		Non-Aggressive		Non-Aggressive
340	294865.9	6234173.4	1.0	4.8			1235	B	Mild		Non-Aggressive		Mild
341	294844.2	6234129.8	0.5	6.1	32	20	16393	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
341	294844.2	6234129.8	1.0	5.4			4762	B	Mild		Non-Aggressive		Non-Aggressive
341	294844.2	6234129.8	1.5	5.2			3030	B	Mild		Non-Aggressive		Non-Aggressive
341	294844.2	6234129.8	2.0	5.1			1852	B	Mild		Non-Aggressive		Mild
341	294844.2	6234129.8	2.5	5.1			1852	B	Mild		Non-Aggressive		Mild
341	294844.2	6234129.8	3.0	5.2			2174	B	Mild		Non-Aggressive		Non-Aggressive
342	294759.2	6234105.3	0.5	5.5			6667	B	Mild		Non-Aggressive		Non-Aggressive
342	294759.2	6234105.3	1.0	4.8			1818	B	Mild		Non-Aggressive		Mild
342	294759.2	6234105.3	1.5	4.8			2174	B	Mild		Non-Aggressive		Non-Aggressive
342	294759.2	6234105.3	2.0	4.8			1563	B	Mild		Non-Aggressive		Mild
342	294759.2	6234105.3	2.5	5.2			1923	B	Mild		Non-Aggressive		Mild
342	294759.2	6234105.3	3.0	5.3			1695	B	Mild		Non-Aggressive		Mild
343	294830.6	6234117.4	0.5	5.2			2941	B	Mild		Non-Aggressive		Non-Aggressive
343	294830.6	6234117.4	1.0	5			3125	B	Mild		Non-Aggressive		Non-Aggressive
344	294907.1	6234126.6	0.5	5.2			1887	B	Mild		Non-Aggressive		Mild
344	294907.1	6234126.6	1.5	5.4			2222	B	Mild		Non-Aggressive		Non-Aggressive
201	294846.0	6234169.0	0.5	5.4	62	160	5882	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
201	294846.0	6234169.0	1.0	4.6			1149	B	Mild		Non-Aggressive		Mild
201	294846.0	6234169.0	2.0	4.9			1471	B	Mild		Non-Aggressive		Mild
201	294846.0	6234169.0	3.0	5			1370	B	Mild		Non-Aggressive		Mild
202	294789	6234128	0.5	5.3			8333	B	Mild		Non-Aggressive		Non-Aggressive
202	294789	6234128	1.0	4.9	1200	520	1449	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild
202	294789	6234128	2.0	4.7			1786	B	Mild		Non-Aggressive		Mild
202	294789	6234128	3.0	4.9			1961	B	Mild		Non-Aggressive		Mild
101	294405.4	6234450.5	0.5	6.1			23810	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
101	294405.4	6234450.5	1.0	5.7			8333	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
101	294405.4	6234450.5	1.5	5.3			2273	B	Mild		Non-Aggressive		Non-Aggressive
102	294658.1	6234343.0	0.5	6.3	10	23	23810	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
102	294658.1	6234343.0	1.0	5.4	90	53	7692	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
102	294658.1	6234343.0	1.5	5.1			4348	B	Mild		Non-Aggressive		Non-Aggressive
102	294658.1	6234343.0	2.0	5.5			4348	B	Mild		Non-Aggressive		Non-Aggressive
102	294658.1	6234343.0	2.5	5.9			5000	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
102	294658.1	6234343.0	3.0	6			3226	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
103	294761.2	6234206.3	0.5	6			14493	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
103	294761.2	6234206.3	1.0	5.6			5556	B	Non-Aggressive		Non-Aggressive		Non-Aggressive
103	294761.2	6234206.3	1.5	5.1			2500	B	Mild		Non-Aggressive		Non-Aggressive
104	294818.3	6234292.9	0.5	5.1	240	400	2500	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
104	294818.3	6234292.9	1.0	4.8	800	430	1220	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild
104	294818.3	6234292.9	1.5	5			1538	B	Mild		Non-Aggressive		Mild
104	294818.3	6234292.9	2.0	5.4			2273	B	Mild		Non-Aggressive		Non-Aggressive
104	294818.3	6234292.9	2.5	5.5			2564	B	Mild		Non-Aggressive		Non-Aggressive
104	294818.3	6234292.9	3.0	5.4			2000	B	Mild		Non-Aggressive		Non-Aggressive
3	294329.3	6234403.7	1.0	4.5			1639	B	Mild		Non-Aggressive		Mild
4	294420.2	6234349.4	1.0	4.8			6667	B	Mild		Non-Aggressive		Non-Aggressive
4	294420.2	6234349.4	2.0	4.8			3846	B	Mild		Non-Aggressive		Non-Aggressive
6	294595.3	6234264.0	1.0	4.8	120	30	5882	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive

Test Bore or Pit	Test Location		Sample Depth (m bgl)	Exchangeable Sodium (Na) Concentration (meq/100g)	Cation Exchange Capacity (meq/100g)	Sodicity [Na/CEC] (%)	Sodicity Class [after DLWC]	Emerson Crumb Class Number	Dispersion? (from Emerson Class) [AS1289.3.8.1]	Soil Texture Group (for detailed soil logs see Report Appendix) [after DLWC]	Textural Factor (M) [after DLWC]	EC _{1:5} [Lab.] (microS/cm)	EC _e [M x EC _{1:5}] (decS/m)	Sample Salinity Class (Based on sample ECe) [Richards 1954]
	East	North												
	(m MGA56)	(m MGA56)												
330	294710.6	6234369.8	0.5							Medium clay	7	21	0.1	Non-Saline
330	294710.6	6234369.8	1.0					5	No	Medium clay	7	67	0.5	Non-Saline
330	294710.6	6234369.8	1.5							Heavy clay	6	82	0.5	Non-Saline
330	294710.6	6234369.8	2.0							Medium clay	7	170	1.2	Non-Saline
330	294710.6	6234369.8	2.5							Medium clay	7	260	1.8	Non-Saline
330	294710.6	6234369.8	3.0							Medium clay	7	540	3.8	Slightly Saline
331	294763.3	6234337.4	0.5							Heavy clay	6	460	2.8	Slightly Saline
331	294763.3	6234337.4	1.0							Medium clay	7	580	4.1	Moderately Saline
332	294778.0	6234294.7	0.5							Medium clay	7	51	0.4	Non-Saline
332	294778.0	6234294.7	1.5							Medium clay	7	250	1.8	Non-Saline
333	294689.5	6234313.0	0.5							Medium clay	7	61	0.4	Non-Saline
333	294689.5	6234313.0	1.0							Light medium clay	8	180	1.4	Non-Saline
334	294738.6	6234299.6	0.5							Medium clay	7	320	2.2	Slightly Saline
334	294738.6	6234299.6	1.0							Medium clay	7	490	3.4	Slightly Saline
335	294738.3	6234257.9	0.5							Medium clay	7	420	2.9	Slightly Saline
335	294738.3	6234257.9	1.0							Medium clay	7	640	4.5	Moderately Saline
336	294661.6	6234270.3	0.5							Medium clay	7	93	0.7	Non-Saline
336	294661.6	6234270.3	1.5							Medium clay	7	390	2.7	Slightly Saline
337	294683.8	6234241.8	0.5							Medium clay	7	180	1.3	Non-Saline
337	294683.8	6234241.8	1.0							Medium clay	7	490	3.4	Slightly Saline
337	294683.8	6234241.8	1.5							Medium clay	7	640	4.5	Moderately Saline
337	294683.8	6234241.8	2.0							Medium clay	7	480	3.4	Slightly Saline
337	294683.8	6234241.8	2.5							Medium clay	7	570	4.0	Slightly Saline
337	294683.8	6234241.8	3.0							Medium clay	7	570	4.0	Slightly Saline
338	294730.6	6234120.4	0.5							Medium clay	7	380	2.7	Slightly Saline
338	294730.6	6234120.4	1.5							Medium clay	7	630	4.4	Moderately Saline
339	294810.1	6234164.1	0.5							Medium clay	7	140	1.0	Non-Saline
339	294810.1	6234164.1	1.0							Medium clay	7	390	2.7	Slightly Saline
340	294865.9	6234173.4	0.5							Medium clay	7	260	1.8	Non-Saline
340	294865.9	6234173.4	1.0							Light clay	8.5	810	6.9	Moderately Saline
341	294844.2	6234129.8	0.5	0.6	4.2	14	Sodic	5	No	Medium clay	7	61	0.4	Non-Saline
341	294844.2	6234129.8	1.0							Medium clay	7	210	1.5	Non-Saline
341	294844.2	6234129.8	1.5							Light medium clay	8	330	2.6	Slightly Saline
341	294844.2	6234129.8	2.0							Medium clay	7	540	3.8	Slightly Saline
341	294844.2	6234129.8	2.5							Medium clay	7	540	3.8	Slightly Saline
341	294844.2	6234129.8	3.0							Medium clay	7	460	3.2	Slightly Saline
342	294759.2	6234105.3	0.5							Medium clay	7	150	1.1	Non-Saline
342	294759.2	6234105.3	1.0							Medium clay	7	550	3.9	Slightly Saline
342	294759.2	6234105.3	1.5							Medium clay	7	460	3.2	Slightly Saline
342	294759.2	6234105.3	2.0							Medium clay	7	640	4.5	Moderately Saline
342	294759.2	6234105.3	2.5							Medium clay	7	520	3.6	Slightly Saline
342	294759.2	6234105.3	3.0							Medium clay	7	590	4.1	Moderately Saline
343	294830.6	6234117.4	0.5							Medium clay	7	340	2.4	Slightly Saline
343	294830.6	6234117.4	1.0							Medium clay	7	320	2.2	Slightly Saline
344	294907.1	6234126.6	0.5							Heavy clay	6	530	3.2	Slightly Saline
344	294907.1	6234126.6	1.5							Medium clay	7	450	3.2	Slightly Saline
201	294846.0	6234169.0	0.5	1.1	13	8	Sodic			Heavy clay	6	170	1.0	Non-Saline
201	294846.0	6234169.0	1.0							Light clay	8.5	870	7.4	Moderately Saline
201	294846.0	6234169.0	2.0							Medium clay	7	680	4.8	Moderately Saline
201	294846.0	6234169.0	3.0							Medium clay	7	730	5.1	Moderately Saline
202	294789	6234128	0.5							Heavy clay	6	120	0.7	Non-Saline
202	294789	6234128	1.0	2.5	10	25	Highly Sodic			Medium clay	7	690	4.8	Moderately Saline
202	294789	6234128	2.0							Medium clay	7	560	3.9	Slightly Saline
202	294789	6234128	3.0							Medium clay	7	510	3.6	Slightly Saline
101	294405.4	6234450.5	0.5							Medium clay	7	42	0.3	Non-Saline
101	294405.4	6234450.5	1.0							Heavy clay	6	120	0.7	Non-Saline
101	294405.4	6234450.5	1.5							Heavy clay	6	440	2.6	Slightly Saline
102	294658.1	6234343.0	0.5	0.49	15	3	Non-Sodic			Medium clay	7	42	0.3	Non-Saline
102	294658.1	6234343.0	1.0					6	No	Heavy clay	6	130	0.8	Non-Saline
102	294658.1	6234343.0	1.5							Light clay	8.5	230	2.0	Non-Saline
102	294658.1	6234343.0	2.0							Medium clay	7.5	230	1.7	Non-Saline
102	294658.1	6234343.0	2.5							Medium clay	7.5	200	1.5	Non-Saline
102	294658.1	6234343.0	3.0							Medium clay	7.5	310	2.3	Slightly Saline
103	294761.2	6234206.3	0.5							Light clay	8.5	69	0.6	Non-Saline
103	294761.2	6234206.3	1.0							Heavy clay	6	180	1.1	Non-Saline
103	294761.2	6234206.3	1.5							Light medium clay	8	400	3.2	Slightly Saline
104	294818.3	6234292.9	0.5	0.85	13	7	Sodic			Light medium clay	8	400	3.2	Slightly Saline
104	294818.3	6234292.9	1.0					6	No	Heavy clay	6	820	4.9	Moderately Saline
104	294818.3	6234292.9	1.5							Medium clay	7.5	650	4.9	Moderately Saline
104	294818.3	6234292.9	2.0							Medium clay	7.5	440	3.3	Slightly Saline
104	294818.3	6234292.9	2.5							Medium clay	7.5	390	2.9	Slightly Saline
104	294818.3	6234292.9	3.0							Medium clay	7.5	500	3.8	Slightly Saline
3	294329.3	6234403.7	1.0							Heavy clay	6	610	3.7	Slightly Saline
4	294420.2	6234349.4	1.0							Medium clay	7	150	1.1	Non-Saline
4	294420.2	6234349.4	2.0							Medium clay	7	260	1.8	Non-Saline
6	294595.3	6234264.0	1.0							Heavy clay	6	170	1.0	Non-Saline

Appendix E

NATA Reports and Chain of Custody sheets

Determination of Emerson Class Number of Soil

Client:	SH CAMDEN VALLEY PTY LTD LTD	Project No:	34295.75		
Project:	Salinity Investigation and Management Plan	Report No:	MA16-211		
		Report Date:	03/06/2016		
Location:	Stage 25, The Hermitage, Gledswood Hills	Date of Test:	03/06/2016		
		Page:	1 of 1		

Sample No.	Depth (m)	Description	Water Type	Water Temp	Class No.
301	0.5	CLAY – Red clay	Distilled	21°C	6
316	0.5	CLAY – Red mottled grey clay	Distilled	21°C	6
325	0.5	CLAY – Red clay	Distilled	21°C	5
330	1.0	CLAY – Red mottled orange clay	Distilled	21°C	5
341	0.5	CLAY – Red clay	Distilled	21°C	5

Test Methods: AS 1289 3.8.1

Sampling Methods: Sampled By DP Engineering

Remarks:



NATA Accredited Laboratory Number: 828

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025

Tested: AS
Checked: AJS

A J Sweetland
Laboratory Manager



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email: sydney@envirolab.com.au
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Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS

147263

Client:

Douglas Partners Pty Ltd Smeaton Grange
18 Waler Crescent
Smeaton Grange
NSW 2567

Attention: Bradley Harris

Sample log in details:

Your Reference:	34295.75, Hermitage Estate, Salinity
No. of samples:	124 Soils
Date samples received / completed instructions received	24/05/16 / 24/05/16

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:	31/05/16 / 31/05/16
Date of Preliminary Report:	Not Issued

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Results Approved By:


Jacinta Hurst
Laboratory Manager

Envirolab Reference: 147263
Revision No: R 00



Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-1 301	147263-2 301	147263-3 301	147263-4 301	147263-5 301
Depth	-----	0.5	1.0	1.5	2.0	2.2
Date Sampled		19/05/2016	19/05/2016	19/05/2016	19/05/2016	19/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.0	4.7	4.9	5.1	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	280	500	540	530	400
Chloride, Cl 1:5 soil:water	mg/kg	160	[NA]	[NA]	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	320	[NA]	[NA]	[NA]	[NA]

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-6 302	147263-7 302	147263-8 303	147263-9 303	147263-10 304
Depth	-----	0.5	1.0	0.5	1.5	0.5
Date Sampled		19/05/2016	19/05/2016	19/05/2016	19/05/2016	19/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.3	4.9	6.8	5.1	5.4
Electrical Conductivity 1:5 soil:water	µS/cm	220	580	140	460	290
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	[NA]	260
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	[NA]	230

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-11 304	147263-12 305	147263-13 305	147263-14 305	147263-15 305
Depth	-----	1.0	0.5	1.0	1.5	1.7
Date Sampled		19/05/2016	20/05/2016	20/05/2016	20/05/2016	20/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.3	5.5	5.8	6.2	6.7
Electrical Conductivity 1:5 soil:water	µS/cm	360	290	310	340	380

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-16 306	147263-17 306	147263-18 307	147263-19 307	147263-20 307
Depth Date Sampled Type of sample	----- ----- -----	0.5 20/05/2016 Soil	1.5 20/05/2016 Soil	0.5 20/05/2016 Soil	1.0 20/05/2016 Soil	1.5 20/05/2016 Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.1	4.8	5.2	5.1	5.1
Electrical Conductivity 1:5 soil:water	µS/cm	360	660	270	430	520
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	300	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	170	[NA]	[NA]

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-21 307	147263-22 307	147263-23 307	147263-24 308	147263-25 308
Depth Date Sampled Type of sample	----- ----- -----	2.0 20/05/2016 Soil	2.5 20/05/2016 Soil	2.8 20/05/2016 Soil	0.5 20/05/2016 Soil	1.0 20/05/2016 Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.2	5.3	5.4	5.1	4.9
Electrical Conductivity 1:5 soil:water	µS/cm	490	430	440	240	560

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-26 309	147263-27 309	147263-28 310	147263-29 310	147263-30 310
Depth Date Sampled Type of sample	----- ----- -----	0.5 19/05/2016 Soil	1.5 19/05/2016 Soil	0.5 20/05/2016 Soil	1.0 20/05/2016 Soil	1.5 20/05/2016 Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	6.5	5.3	6.1	5.7	5.1
Electrical Conductivity 1:5 soil:water	µS/cm	320	500	76	73	350

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-31 310	147263-32 310	147263-33 311	147263-34 311	147263-35 312
Depth Date Sampled Type of sample	----- ----- -----	2.0 20/05/2016 Soil	2.5 20/05/2016 Soil	0.5 19/05/2016 Soil	1.5 19/05/2016 Soil	0.5 20/05/2016 Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.1	5.0	5.4	4.9	6.1
Electrical Conductivity 1:5 soil:water	µS/cm	480	650	200	490	150

Misc Inorg - Soil	UNITS	147263-36	147263-37	147263-38	147263-39	147263-40
Our Reference:	-----	312	313	313	314	314
Your Reference	-					
Depth	-----	1.0	0.5	1.0	0.5	1.0
Date Sampled		20/05/2016	20/05/2016	20/05/2016	20/05/2016	20/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.6	5.3	5.6	5.2	4.8
Electrical Conductivity 1:5 soil:water	µS/cm	190	270	270	260	550

Misc Inorg - Soil	UNITS	147263-41	147263-42	147263-43	147263-44	147263-45
Our Reference:	-----	315	315	316	316	316
Your Reference	-					
Depth	-----	0.5	1.5	0.5	1.0	1.5
Date Sampled		20/05/2016	20/05/2016	20/05/2016	20/05/2016	20/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.9	5.5	6.0	5.8	6.3
Electrical Conductivity 1:5 soil:water	µS/cm	46	150	38	110	130
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	53	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	40	[NA]	[NA]

Misc Inorg - Soil	UNITS	147263-46	147263-47	147263-48	147263-49	147263-50
Our Reference:	-----	317	317	318	318	319
Your Reference	-					
Depth	-----	0.5	1.0	0.5	1.5	0.5
Date Sampled		18/05/2016	18/05/2016	18/05/2016	18/05/2016	18/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.9	5.4	5.1	4.9	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	110	200	330	480	170
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	[NA]	160
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	[NA]	110

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-51 319	147263-52 319	147263-53 319	147263-54 319	147263-55 320
Depth	-----	1.0	1.5	2.0	2.3	0.5
Date Sampled		18/05/2016	18/05/2016	18/05/2016	18/05/2016	18/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	4.9	5.0	5.2	5.1	5.4
Electrical Conductivity 1:5 soil:water	µS/cm	590	560	430	430	180
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	[NA]	150
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	[NA]	120

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-56 320	147263-57 320	147263-58 321	147263-59 321	147263-60 322
Depth	-----	1.0	1.5	0.5	1.0	0.5
Date Sampled		18/05/2016	18/05/2016	18/05/2016	18/05/2016	18/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.1	5.5	5.5	5.0	5.1
Electrical Conductivity 1:5 soil:water	µS/cm	340	200	200	380	450

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-61 322	147263-62 323	147263-63 323	147263-64 324	147263-65 324
Depth	-----	1.5	0.5	1.0	0.5	1.0
Date Sampled		18/05/2016	18/05/2016	18/05/2016	19/05/2016	19/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.0	4.6	4.7	6.0	5.2
Electrical Conductivity 1:5 soil:water	µS/cm	520	410	420	8	64

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-66 325	147263-67 325	147263-68 325	147263-69 325	147263-70 326
Depth	-----	0.5	1.0	1.5	1.8	0.5
Date Sampled		19/05/2016	19/05/2016	19/05/2016	19/05/2016	19/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.6	5.3	5.5	5.6	5.5
Electrical Conductivity 1:5 soil:water	µS/cm	100	220	120	190	85

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-66 325	147263-67 325	147263-68 325	147263-69 325	147263-70 326
Depth	-----	0.5	1.0	1.5	1.8	0.5
Date Sampled		19/05/2016	19/05/2016	19/05/2016	19/05/2016	19/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Chloride, Cl 1:5 soil:water	mg/kg	50	[NA]	[NA]	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	82	[NA]	[NA]	[NA]	[NA]

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-71 326	147263-72 327	147263-73 327	147263-74 327	147263-75 328
Depth	-----	1.0	0.5	1.0	1.2	0.5
Date Sampled		19/05/2016	18/05/2016	18/05/2016	18/05/2016	18/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.6	5.2	5.1	5.2	6.7
Electrical Conductivity 1:5 soil:water	µS/cm	86	260	280	240	54

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-76 328	147263-77 329	147263-78 329	147263-79 330	147263-80 330
Depth	-----	1.5	0.5	1.0	0.5	1.0
Date Sampled		18/05/2016	18/05/2016	18/05/2016	18/05/2016	18/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	9.8	5.5	5.4	5.6	5.8
Electrical Conductivity 1:5 soil:water	µS/cm	330	160	210	21	67
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	<10	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	<10	[NA]

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-81 330	147263-82 330	147263-83 330	147263-84 330	147263-85 331
Depth	-----	1.5	2.0	2.5	3.0	0.5
Date Sampled		18/05/2016	18/05/2016	18/05/2016	18/05/2016	18/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.8	5.8	7.1	9.5	4.9
Electrical Conductivity 1:5 soil:water	µS/cm	82	170	260	540	460

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-86 331	147263-87 332	147263-88 332	147263-89 333	147263-90 333
Depth Date Sampled Type of sample	----- ----- -----	1.0 18/05/2016 Soil	0.5 18/05/2016 Soil	1.5 18/05/2016 Soil	0.5 18/05/2016 Soil	1.0 18/05/2016 Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	4.8	6.2	5.3	5.5	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	580	51	250	61	180

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-91 334	147263-92 334	147263-93 335	147263-94 335	147263-95 336
Depth Date Sampled Type of sample	----- ----- -----	0.5 18/05/2016 Soil	1.0 18/05/2016 Soil	0.5 18/05/2016 Soil	1.0 18/05/2016 Soil	0.5 18/05/2016 Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.2	5.0	5.1	4.9	5.7
Electrical Conductivity 1:5 soil:water	µS/cm	320	490	420	640	93

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-96 336	147263-97 337	147263-98 337	147263-99 337	147263-100 337
Depth Date Sampled Type of sample	----- ----- -----	1.5 18/05/2016 Soil	0.5 18/05/2016 Soil	1.0 18/05/2016 Soil	1.5 18/05/2016 Soil	2.0 18/05/2016 Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.1	5.3	4.8	4.8	4.8
Electrical Conductivity 1:5 soil:water	µS/cm	390	180	490	640	480
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	140	[NA]	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	120	[NA]	[NA]	[NA]

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-101 337	147263-102 337	147263-103 338	147263-104 338	147263-105 339
Depth	-----	2.5	3.0	0.5	1.5	0.5
Date Sampled		18/05/2016	18/05/2016	19/05/2016	19/05/2016	19/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	4.8	4.9	4.9	4.9	5.5
Electrical Conductivity 1:5 soil:water	µS/cm	570	570	380	630	140

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-106 339	147263-107 340	147263-108 340	147263-109 341	147263-110 341
Depth	-----	1.0	0.5	1.0	0.5	1.0
Date Sampled		19/05/2016	19/05/2016	19/05/2016	19/05/2016	19/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.1	5.3	4.8	6.1	5.4
Electrical Conductivity 1:5 soil:water	µS/cm	390	260	810	61	210
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	32	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	20	[NA]

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-111 341	147263-112 341	147263-113 341	147263-114 341	147263-115 342
Depth	-----	1.5	2.0	2.5	3.0	0.5
Date Sampled		19/05/2016	19/05/2016	19/05/2016	19/05/2016	18/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.2	5.1	5.1	5.2	5.5
Electrical Conductivity 1:5 soil:water	µS/cm	330	540	540	460	150

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	147263-116 342	147263-117 342	147263-118 342	147263-119 342	147263-120 342
Depth	-----	1.0	1.5	2.0	2.5	3.0
Date Sampled		18/05/2016	18/05/2016	18/05/2016	18/05/2016	18/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	4.8	4.8	4.8	5.2	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	550	460	640	520	590

Misc Inorg - Soil					
Our Reference:	UNITS	147263-121	147263-122	147263-123	147263-124
Your Reference	-----	343	343	344	344
	-				
Depth	-----	0.5	1.0	0.5	1.5
Date Sampled		19/05/2016	19/05/2016	19/05/2016	19/05/2016
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	25/05/2016	25/05/2016	25/05/2016	25/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016
pH 1:5 soil:water	pH Units	5.2	5.0	5.2	5.4
Electrical Conductivity 1:5 soil:water	µS/cm	340	320	530	450

ESP/CEC						
Our Reference:	UNITS	147263-1	147263-43	147263-55	147263-66	147263-109
Your Reference	-----	301	316	320	325	341
	-					
Depth	-----	0.5	0.5	0.5	0.5	0.5
Date Sampled		19/05/2016	20/05/2016	18/05/2016	19/05/2016	19/05/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	31/05/2016	31/05/2016	31/05/2016	31/05/2016	31/05/2016
Date analysed	-	31/05/2016	31/05/2016	31/05/2016	31/05/2016	31/05/2016
Exchangeable Ca	meq/100g	1.8	1.3	2.1	3.9	4.2
Exchangeable K	meq/100g	0.2	0.2	0.2	0.2	0.3
Exchangeable Mg	meq/100g	8.3	7.8	6.5	7.7	7.3
Exchangeable Na	meq/100g	1.3	0.67	1.0	1.3	0.60
Cation Exchange Capacity	meq/100g	12	9.9	9.9	13	12
ESP	%	11	7	11	10	5

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

Client Reference: 34295.75, Hermitage Estate, Salinity

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Misc Inorg - Soil						Base Duplicate %RPD		
Date prepared	-			25/06/2016	147263-1	25/05/2016 25/05/2016	LCS-1	25/06/2016
Date analysed	-			26/06/2016	147263-1	26/05/2016 26/05/2016	LCS-1	26/06/2016
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	147263-1	5.0 4.9 RPD: 2	LCS-1	102%
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	147263-1	280 290 RPD: 4	LCS-1	101%
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	147263-1	160 170 RPD: 6	LCS-1	95%
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	147263-1	320 330 RPD: 3	LCS-1	105%
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
ESP/CEC						Base Duplicate %RPD		
Date prepared	-			31/05/2016	[NT]	[NT]	LCS-1	31/05/2016
Date analysed	-			31/05/2016	[NT]	[NT]	LCS-1	31/05/2016
Exchangeable Ca	meq/100 g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	106%
Exchangeable K	meq/100 g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	108%
Exchangeable Mg	meq/100 g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	105%
Exchangeable Na	meq/100 g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	107%
ESP	%	1	Metals-009	[NT]	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL	UNITS	Dup. Sm#		Duplicate		Spike Sm#	Spike % Recovery	
Misc Inorg - Soil				Base + Duplicate + %RPD				
Date prepared	-	147263-11		25/05/2016 25/05/2016		LCS-2	25/06/2016	
Date analysed	-	147263-11		26/05/2016 26/05/2016		LCS-2	26/06/2016	
pH 1:5 soil:water	pH Units	147263-11		5.3 5.3 RPD: 0		LCS-2	103%	
Electrical Conductivity 1:5 soil:water	µS/cm	147263-11		360 410 RPD: 13		LCS-2	99%	
Chloride, Cl 1:5 soil:water	mg/kg	[NT]		[NT]		LCS-2	101%	
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]		[NT]		LCS-2	112%	
QUALITY CONTROL	UNITS	Dup. Sm#		Duplicate		Spike Sm#	Spike % Recovery	
Misc Inorg - Soil				Base + Duplicate + %RPD				
Date prepared	-	147263-21		25/05/2016 25/05/2016		LCS-3	25/06/2016	
Date analysed	-	147263-21		26/05/2016 26/05/2016		LCS-3	26/06/2016	
pH 1:5 soil:water	pH Units	147263-21		5.2 5.2 RPD: 0		LCS-3	102%	
Electrical Conductivity 1:5 soil:water	µS/cm	147263-21		490 510 RPD: 4		LCS-3	96%	
Chloride, Cl 1:5 soil:water	mg/kg	[NT]		[NT]		[NR]	[NR]	
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]		[NT]		[NR]	[NR]	

Client Reference: 34295.75, Hermitage Estate, Salinity

QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	147263-31	25/05/2016 25/05/2016	LCS-4	25/06/2016
Date analysed	-	147263-31	26/05/2016 26/05/2016	LCS-4	26/06/2016
pH 1:5 soil:water	pH Units	147263-31	5.1 5.2 RPD: 2	LCS-4	102%
Electrical Conductivity 1:5 soil:water	µS/cm	147263-31	480 500 RPD: 4	LCS-4	98%
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]	[NR]	[NR]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]	[NR]	[NR]
QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	147263-41	25/05/2016 25/05/2016	LCS-5	25/06/2016
Date analysed	-	147263-41	26/05/2016 26/05/2016	LCS-5	26/06/2016
pH 1:5 soil:water	pH Units	147263-41	5.9 5.8 RPD: 2	LCS-5	102%
Electrical Conductivity 1:5 soil:water	µS/cm	147263-41	46 49 RPD: 6	LCS-5	97%
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]	[NR]	[NR]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]	[NR]	[NR]
QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	147263-51	25/05/2016 25/05/2016	LCS-6	25/06/2016
Date analysed	-	147263-51	26/05/2016 26/05/2016	LCS-6	26/06/2016
pH 1:5 soil:water	pH Units	147263-51	4.9 4.9 RPD: 0	LCS-6	102%
Electrical Conductivity 1:5 soil:water	µS/cm	147263-51	590 580 RPD: 2	LCS-6	98%
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]	[NR]	[NR]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]	[NR]	[NR]
QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	147263-61	25/05/2016 25/05/2016	LCS-7	25/06/2016
Date analysed	-	147263-61	26/05/2016 26/05/2016	LCS-7	25/06/2016
pH 1:5 soil:water	pH Units	147263-61	5.0 5.0 RPD: 0	LCS-7	102%
Electrical Conductivity 1:5 soil:water	µS/cm	147263-61	520 570 RPD: 9	LCS-7	98%
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]	[NR]	[NR]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]	[NR]	[NR]

Client Reference: 34295.75, Hermitage Estate, Salinity

QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	147263-71	25/05/2016 25/05/2016	147263-10	25/05/2016
Date analysed	-	147263-71	26/05/2016 26/05/2016	147263-10	26/05/2016
pH 1:5 soil:water	pH Units	147263-71	5.6 5.5 RPD: 2	[NR]	[NR]
Electrical Conductivity 1:5 soil:water	µS/cm	147263-71	86 88 RPD: 2	[NR]	[NR]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]	147263-10	79%
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]	147263-10	107%
QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD		
Date prepared	-	147263-81	25/05/2016 25/05/2016		
Date analysed	-	147263-81	26/05/2016 26/05/2016		
pH 1:5 soil:water	pH Units	147263-81	5.8 5.7 RPD: 2		
Electrical Conductivity 1:5 soil:water	µS/cm	147263-81	82 100 RPD: 20		
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]		
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]		
QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD		
Date prepared	-	147263-90	25/05/2016 25/05/2016		
Date analysed	-	147263-90	26/05/2016 26/05/2016		
pH 1:5 soil:water	pH Units	147263-90	5.3 5.2 RPD: 2		
Electrical Conductivity 1:5 soil:water	µS/cm	147263-90	180 230 RPD: 24		
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]		
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]		
QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD		
Date prepared	-	147263-100	25/05/2016 25/05/2016		
Date analysed	-	147263-100	26/05/2016 26/05/2016		
pH 1:5 soil:water	pH Units	147263-100	4.8 4.7 RPD: 2		
Electrical Conductivity 1:5 soil:water	µS/cm	147263-100	480 620 RPD: 25		
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]		
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]		

QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	147263-120	25/05/2016 25/05/2016
Date analysed	-	147263-120	26/05/2016 26/05/2016
pH 1:5 soil:water	pH Units	147263-120	5.3 5.3 RPD: 0
Electrical Conductivity 1:5 soil:water	µS/cm	147263-120	590 610 RPD: 3
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]
QUALITYCONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	147263-109	25/05/2016 25/05/2016
Date analysed	-	147263-109	26/05/2016 26/05/2016
pH 1:5 soil:water	pH Units	147263-109	6.1 6.1 RPD: 0
Electrical Conductivity 1:5 soil:water	µS/cm	147263-109	61 50 RPD: 20
Chloride, Cl 1:5 soil:water	mg/kg	147263-109	32 29 RPD: 10
Sulphate, SO4 1:5 soil:water	mg/kg	147263-109	20 24 RPD: 18

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
NR: 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 batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Project Name:	Hermitage Estate, Salinity Investigation and Management Plan	To:	Envirolab Services
Project No:	34295.75	Sampler:	SM
Project Mgr:	BAH	Mob. Phone:	0412 754 162
Email:	Bradley.Harris@douglaspartners.com.au	Attn:	Tania Notaras
Date Required:	Standard	Phone:	(02) 9910 6200
		Fax:	(02) 9910 6201
		Email:	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type	Container Type	Analytes							Notes/preservation	
					EC	pH	Chlorides Sulphates	Sodicity	Texture (only)				
147263 301/0.5	1	19.05.16	S - soil	G - glass	x	x	x	x					
301/1.0	2	19.05.16	S	G	x	x							
301/1.5	3	19.05.16	S	G	x	x							
301/2.0	4	19.05.16	S	G	x	x							
301/2.2	5	19.05.16	S	G	x	x							
302/0.5	6	19.05.16	S	G	x	x							
302/1.0	7	19.05.16	S	G	x	x							
303/0.5	8	19.05.16	S	G	x	x							
303/1.5	9	19.05.16	S	G	x	x							
304/0.5	10	19.05.16	S	G	x	x	x						
304/1.0	11	19.05.16	S	G	x	x							

Lab Report No:	
Send Results to:	Douglas Partners Pty Ltd
Relinquished by:	BAH
Signed:	<i>[Signature]</i>
Date & Time:	23.05.16
Address:	18 Waler Crescent, Smeaton Grange 2567
Phone:	(02) 4647 0075
Fax:	(02) 4646 1886
Transported to laboratory by:	
Received by:	James Goddard

Project Name:	Hermitage Estate, Salinity Investigation and Management Plan	To:	EnviroLab Services
Project No:	34295.75	Sampler:	SM
Project Mgr:	BAH	Mob. Phone:	0412 754 162
Email:	Bradley.Harris@douglaspartners.com.au	Attn:	Tania Notaras
Date Required:	Standard	Phone:	(02) 9910 6200
		Fax:	(02) 9910 6201
		Email:	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type	Container Type	Analytes								Notes/preservation		
					EC	pH	Chlorides	Sulphates	Sodicity	Texture (only)					
147263															
305/0.5	12	20.05.16	S	G	x	x									
305/1.0	13	20.05.16	S	G	x	x									
305/1.5	14	20.05.16	S	G	x	x									
305/1.7	15	20.05.16	S	G	x	x									
306/0.5	16	20.05.16	S	G	x	x									
306/1.5	17	20.05.16	S	G	x	x									
307/0.5	18	20.05.16	S	G	x	x	x								
307/1.0	19	20.05.16	S	G	x	x									
307/1.5	20	20.05.16	S	G	x	x									
307/2.0	21	20.05.16	S	G	x	x									
307/2.5	22	20.05.16	S	G	x	x									
307/2.8	23	20.05.16	S	G	x	x									

Lab Report No:	
Send Results to:	Douglas Partners Pty Ltd
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Signed:	
Date & Time:	23.05.16
Address	18 Waler Crescent, Smeaton Grange 2567
Phone:	(02) 4647 0075
Fax:	(02) 4646 1886
Transported to laboratory by:	James Auckland
Received by:	James Auckland



Project Name:	Hermitage Estate, Salinity Investigation and Management Plan	To:	EnviroLab Services
Project No:	34295.75	Sampler:	SM
Project Mgr:	BAH	Mob. Phone:	0412 754 162
Email:	Bradley.Harris@douglaspartners.com.au	Attn:	Tania Notaras
Date Required:	Standard	Phone:	(02) 9910 6200
		Fax:	(02) 9910 6201
		Email:	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type	Container Type	Analytes									Notes/preservation					
					EC	pH	Chlorides	Sulphates	Sodicity	Texture (only)									
147263	308/0.5	24	S	G	x	x													
	308/1.0	25	S	G	x	x													
	309/0.5	26	S	G	x	x													
	309/1.5	27	S	G	x	x													
	310/0.5	28	S	G	x	x													
	310/1.0	29	S	G	x	x													
	310/1.5	30	S	G	x	x													
	310/2.0	31	S	G	x	x													
310/2.5	32	S	G	x	x														
311/0.5	33	19.05.16	S	G	x	x													
311/1.5	34	19.05.16	S	G	x	x													
312/0.5	35	20.05.16	S	G	x	x													
312/1.0	36	20.05.16	S	G	x	x													

Lab Report No:	
Send Results to:	Douglas Partners Pty Ltd
Address	18 Waler Crescent, Smeaton Grange 2567
Phone:	(02) 4647 0075
Fax:	(02) 4646 1886
Relinquished by:	BAH
Transported to laboratory by:	
Received by:	James Goodard
Date & Time:	23.05.16

Project Name: Hermitage Estate, Salinity Investigation and Management Plan		To: Envirolab Services
Project No: 34295.75	Sampler: SM	12 Ashley Street, Chatswood NSW 2067
Project Mgr: BAH	Mob. Phone: 0412 754 162	Attn: Tania Notaras
Email: Bradley.Harris@douglaspartners.com.au		Phone: (02) 9910 6200 Fax: (02) 9910 6201
Date Required: Standard		Email: tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type		Container Type	Analytes						Notes/preservation
			S - soil	W - water		EC	pH	Chlorides	Sulphates	Sodicity	Texture (only)	
14263												
313/0.5	37	20.05.16	S		G	x	x					
313/1.0	38	20.05.16	S		G	x	x					
314/0.5	39	20.05.16	S		G	x	x					
314/1.0	40	20.05.16	S		G	x	x					
315/0.5	41	20.05.16	S		G	x	x					
315/1.5	42	20.05.16	S		G	x	x					
316/0.5	43	20.05.16	S		G	x	x	x		x		
316/1.0	44	20.05.16	S		G	x	x					
316/1.5	45	20.05.16	S		G	x	x					
317/0.5	46	18.05.16	S		G	x	x					
317/1.0	47	18.05.16	S		G	x	x					
318/0.5	48	18.05.16	S		G	x	x					
318/1.5	49	18.05.16	S		G	x	x					

Lab Report No:	
Send Results to: Douglas Partners Pty Ltd	Address 18 Waler Crescent, Smeaton Grange 2567 Phone: (02) 4647 0075 Fax: (02) 4646 1886
Relinquished by:	Transported to laboratory by:
Signed: 	Date & Time: 23.05.16 Received by: James Coddard

Project Name: Hermitage Estate, Salinity Investigation and Management Plan		To: Envirolab Services
Project No: 34295.75	Sampler: SM	12 Ashley Street, Chatswood NSW 2067
Project Mgr: BAH	Mob. Phone: 0412 754 162	Attn: Tania Notaras
Email: Bradley.Harris@douglaspartners.com.au		Phone: (02) 9910 6200 Fax: (02) 9910 6201
Date Required: Standard		Email: tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type	Container Type	Analytes								Notes/preservation	
					EC	pH	Chlorides	Sulphates	Sodicity	Texture (only)				
147263			S - soil W - water	G - glass P - plastic										
319/0.5	50	18.05.16	S	G	x	x	x							
319/1.0	51	18.05.16	S	G	x	x								
319/1.5	52	18.05.16	S	G	x	x								
319/2.0	53	18.05.16	S	G	x	x								
319/2.3	54	18.05.16	S	G	x	x								
320/0.5	55	18.05.16	S	G	x	x	x							
320/1.0	56	18.05.16	S	G	x	x								
320/1.5	57	18.05.16	S	G	x	x								
321/0.5	58	18.05.16	S	G	x	x								
321/1.0	59	18.05.16	S	G	x	x								
322/0.5	60	18.05.16	S	G	x	x								
322/1.5	61	18.05.16	S	G	x	x								

Lab Report No:		Address 18 Waler Crescent, Smeaton Grange 2567		Phone: (02) 4647 0075	Fax: (02) 4646 1886
Send Results to: Douglas Partners Pty Ltd					
Relinquished by:		Transported to laboratory by:			
Signed:	Date & Time:	Received by: James Gedford			



Project Name:	Hermitage Estate, Salinity Investigation and Management Plan	To:	Envirolab Services
Project No:	34295.75	Sampler:	SM
Project Mgr:	BAH	Mob. Phone:	0412 754 162
Email:	Bradley.Harris@douglaspartners.com.au	Attn:	Tania Notaras
Date Required:	Standard	Phone:	(02) 9910 6200
		Fax:	(02) 9910 6201
		Email:	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type		Container Type	Analytes						Notes/preservation
			S - soil	W - water		EC	pH	Chlorides	Sulphates	Sodicity	Texture (only)	
147263												
323/0.5	62	18.05.16	S		G	x	x					
323/1.0	63	18.05.16	S		G	x	x					
324/0.5	64	19.05.16	S		G	x	x					
324/1.0	65	19.05.16	S		G	x	x					
325/0.5	66	19.05.16	S		G	x	x	x				
325/1.0	67	19.05.16	S		G	x	x					
325/1.5	68	19.05.16	S		G	x	x					
325/1.8	69	19.05.16	S		G	x	x					
326/0.5	70	19.05.16	S		G	x	x					
326/1.0	71	19.05.16	S		G	x	x					
327/0.5	72	18.05.16	S		G	x	x					
327/1.0	73	18.05.16	S		G	x	x					
327/1.2	74	18.05.16	S		G	x	x					

Lab Report No:	
Send Results to:	Douglas Partners Pty Ltd
Relinquished by:	
Signed:	
Date & Time:	23.05.16
Address	18 Waler Crescent, Smeaton Grange 2567
Phone:	(02) 4647 0075
Fax:	(02) 4646 1886
Transported to laboratory by:	
Received by:	James Goddard



Project Name:	Hermitage Estate, Salinity Investigation and Management Plan	To:	EnviroLab Services
Project No:	34295.75	Sampler:	SM
Project Mgr:	BAH	Mob. Phone:	0412 754 162
Email:	Bradley.Harris@douglaspartners.com.au	Attn:	Tania Notaras
Date Required:	Standard	Phone:	(02) 9910 6200
		Fax:	(02) 9910 6201
		Email:	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type	Container Type	Analytes								Notes/preservation		
					EC	pH	Chlorides Sulphates	Sodicity	Texture (only)						
1A-763 328/0.5	75	18.05.16	S - soil	G - glass		x									
328/1.5	76	18.05.16	S	G		x									
329/0.5	77	18.05.16	S	G		x									
329/1.0	78	18.05.16	S	G		x									
330/0.5	79	18.05.16	S	G		x	x								
330/1.0	80	18.05.16	S	G		x									
330/1.5	81	18.05.16	S	G		x									
330/2.0	82	18.05.16	S	G		x									
330/2.5	83	18.05.16	S	G		x									
330/3.0	84	18.05.16	S	G		x									
331/0.5	85	18.05.16	S	G		x									
331/1.0	86	18.05.16	S	G		x									

Lab Report No:			
Send Results to:	Douglas Partners Pty Ltd	Address	18 Waler Crescent, Smeaton Grange 2567
Relinquished by:		Phone:	(02) 4647 0075
Signed:		Fax:	(02) 4646 1886
		Transported to laboratory by:	
		Received by:	James Goddard
		Date & Time:	23.05.16



Project Name:	Hermitage Estate, Salinity Investigation and Management Plan	To:	EnviroLab Services
Project No:	34295.75	Sampler:	SM
Project Mgr:	BAH	Mob. Phone:	0412 754 162
Email:	Bradley.Harris@douglaspartners.com.au	Attn:	Tania Notaras
Date Required:	Standard	Phone:	(02) 9910 6200
		Fax:	(02) 9910 6201
		Email:	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type		Container Type	Analytes						Notes/preservation
			S - soil	W - water		FC	pH	Chlorides	Sulphates	Sodicity	Texture (only)	
14263												
332/0.5	68A	18.05.16	S		G	x	x					
332/1.5	68B	18.05.16	S		G	x	x					
333/0.5	68C	18.05.16	S		G	x	x					
333/1.0	90	18.05.16	S		G	x	x					
334/0.5	91	18.05.16	S		G	x	x					
334/1.0	92	18.05.16	S		G	x	x					
335/0.5	93	18.05.16	S		G	x	x					
335/1.0	94	18.05.16	S		G	x	x					
336/0.5	95	18.05.16	S		G	x	x					
336/1.5	96	18.05.16	S		G	x	x					
337/0.5	97	18.05.16	S		G	x	x	x				
337/1.0	98	18.05.16	S		G	x	x					
337/1.5	99	18.05.16	S		G	x	x					

Lab Report No:			
Send Results to:	Douglas Partners Pty Ltd	Address	18 Waler Crescent, Smeaton Grange 2567
Relinquished by:		Phone:	(02) 4647 0075
Signed:		Date & Time:	23.05.16
	Transported to laboratory by:		
	Received by: James Coddery		



Project Name:	Hermitage Estate, Salinity Investigation and Management Plan	To:	EnviroLab Services
Project No:	34295.75	Sampler:	SM
Project Mgr:	BAH	Mob. Phone:	0412 754 162
Email:	Bradley.Harris@douglaspartners.com.au	Attn:	Tania Notaras
Date Required:	Standard	Phone:	(02) 9910 6200
		Fax:	(02) 9910 6201
		Email:	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type	Container Type	Analytes								Notes/preservation						
					EC	pH	Chlorides	Sulphates	Sodicity	Texture (only)									
14263			S - soil	G - glass															
337/2.0	100	18.05.16	S	G	x	x													
337/2.5	101	18.05.16	S	G	x	x													
337/3.0	102	18.05.16	S	G	x	x													
338/0.5	103	19.05.16	S	G	x	x													
338/1.5	104	19.05.16	S	G	x	x													
339/0.5	105	19.05.16	S	G	x	x													
339/1.0	106	19.05.16	S	G	x	x													
340/0.5	107	19.05.16	S	G	x	x													
340/1.0	108	19.05.16	S	G	x	x													
341/0.5	109	19.05.16	S	G	x	x		x											
341/1.0	110	19.05.16	S	G	x	x													
341/1.5	111	19.05.16	S	G	x	x													
341/2.0	112	19.05.16	S	G	x	x													

Lab Report No:	
Send Results to:	Douglas Partners Pty Ltd
Address	18 Waler Crescent, Smeaton Grange 2567
Phone:	(02) 4647 0075
Fax:	(02) 4646 1886
Relinquished by:	Transported to laboratory by:
Signed:	Received by: <i>James Gaddard</i>
Date & Time:	23.05.16

Project Name: Hermitage Estate, Salinity Investigation and Management Plan		To: Envirolab Services
Project No: 34295.75	Sampler: SM	12 Ashley Street, Chatswood NSW 2067
Project Mgr: BAH	Mob. Phone: 0412 754 162	Attn: Tania Notaras
Email: Bradley.Harris@douglaspartners.com.au		Phone: (02) 9910 6200 Fax: (02) 9910 6201
Date Required: Standard		Email: tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type	Container Type	Analytes								Notes/preservation						
					EC	pH	Chlorides	Sulphates	Sodicity	Texture (only)									
149263			S - soil	G - glass	P - plastic														
341/2.5	113	19.05.16	S	G		x													
341/3.0	114	19.05.16	S	G		x													
342/0.5	115	18.05.16	S	G		x													
342/1.0	116	18.05.16	S	G		x													
342/1.5	117	18.05.16	S	G		x													
342/2.0	118	18.05.16	S	G		x													
342/2.5	119	18.05.16	S	G		x													
342/3.0	120	18.05.16	S	G		x													
343/0.5	121	19.05.16	S	G		x													
343/1.0	122	19.05.16	S	G		x													
344/0.5	123	19.05.16	S	G		x													
344/1.5	124	19.05.16	S	G		x													
Lab Report No:																			
Send Results to:				Douglas Partners Pty Ltd				Address 18 Waler Crescent, Smeaton Grange 2567				Phone: (02) 4647 0075				Fax: (02) 4646 1886			
Relinquished by:																			
Signed:				Date & Time: 23.05.16				Transported to laboratory by: James Goddard											