GEOTECHNIQUE PTY LTD

Member of

Claymore Renewal Project

Geotechnical investigation report

Summary

This report presents the results of a geotechnical investigation carried out for Claymore Renewal Project, a proposed residential subdivision at Claymore.

Objectives

Geotechnical investigation was carried out to assess surface and sub-surface conditions across the Claymore Project site (Claymore site) to ascertain that the site is suitable for proposed residential development and provide recommendations on site preparation methods and design of floor slabs, footings, pavement and retaining structures.

Methods and findings

The sub-surface profile across the site was assessed by excavating 74 test pits using a backhoe and drilling 9 boreholes using a truck mounted drilling rig. Test pits were terminated at backhoe refusal in bedrock or limit of backhoe reach, about 2.5m from existing ground surface. Boreholes were drilled to bedrock level adjacent to selected test pits where bedrock was not encountered.

Sub-surface profiles across the Claymore site comprise a sequence of topsoil/fill and natural soils underlain by bedrock. Natural soils in most test pits and boreholes include alluvial soils and residual soils. However, only alluvial or residual soil was encountered in some test pit and borehole locations. Bedrock is predominantly shale, with bands of siltstone. Depth to bedrock in most portions of the site is anticipated to be less than about 3.0m. However, in low lying areas, it could be up to 8.0m.

Soils encountered across the site are predominantly medium to high plasticity clayey soils, with potential for high reactivity and susceptibility to erosion. Soils across the site are non-saline and mildly aggressive to a depth of about 1.0m. However, at depths exceeding 1.0m soils are saline and moderately aggressive.

Conclusions

The risk of slope instability across the Claymore site is very low and the site is not within a mine subsidence district. Therefore, the site is suitable for proposed residential development provided (1) limitations imposed by high reactivity, erosion and salinity are addressed during site preparation and construction of buildings and other structures and (2) earthworks during site preparation and design of future buildings and other structures are carried out in accordance with the recommendations provided in this report.

Recommendations

Assessment of surface and sub-surface conditions and recommendations presented in this report are based on information from a limited number of test pits and boreholes and results of laboratory tests on representative soil samples. Therefore, it is possible that the sub-surface profile and physical and chemical properties of soils across the site could differ from those encountered in test pits and boreholes. Therefore, a Geotechnical Engineer should inspect and carry out appropriate laboratory and/or field tests during site preparation, as well as construction of footings and pavements, to confirm that assessments and recommendations presented in this report are applicable to the actual site conditions or provide alternative advice appropriate for actual site conditions. We recommend Level 1 Supervision during earthworks and construction of footings, retaining walls and pavements.

Contents

1. Objectives of assessment

At a glance

The objectives of geotechnical investigation were to assess geological and geotechnical conditions across the Claymore Urban Renewal Project site to ascertain that the site is suitable for proposed residential subdivision and provide recommendations on design and construction of future residences, retaining structures and internal roads.

Introduction

Claymore Urban Renewal Project site (Claymore site), covering an area of 125 hectares (ha), will be developed for public housing in 11 Stages over 12 to 15 years. This project is understood to deliver 1,280 dwellings, including detached cottages and townhouses.

Landcom is preparing an environmental assessment for a Project Application. Geotechnique Pty Ltd (Geotechnique) was commissioned to carry out a geotechnical investigation in order to provide geotechnical information specified in Director General Requirements. Geotechnical investigation was carried out in accordance with the scope of work outlined in the "Contract Document" signed by Geotechnique and Landcom on 5 April 2011.

Geotechnical investigation in the Claymore site was carried out with the following objectives;

- To assess geological and geotechnical conditions across the site in order to ascertain properties of soils encountered across the site, including erodibility, shrink/swell potential and salinity.
- To assess the risk of slope instability and mine subsidence across the site and ascertain that the site is suitable for residential subdivision.
- To provide specifications for earthworks, including specifications of materials suitable for use in controlled fill, degree of compaction and moisture content.
- To provide site classifications for residential lots, in accordance with relevant Australian Standard.
- To provide geotechnical parameters for design of retaining structures (earth pressure parameters), foundations (allowable bearing pressure and anticipated settlements) and pavements (California Bearing Ratio).

2. Site analysis

At a glance

Topography of the Claymore site is undulating, with ridgeline and several high points in the south and middle portions and low points within the riparian zone or main drainage depression along the northern site boundary. The main drainage depression dips towards the east. There are several minor drainage depressions in the southern and middle portions of the site, all dipping northerly towards the main depression. Although localised steep slopes are noted, ground surface dips in the range of 5% to 15% in most portions of the site.

Location

The Claymore site is located 2.0km northwest of Campbelltown CBD and is bound by the Hume Highway (M5) to the east, Eagle Vale suburb to the west and north and Badgally Road to the south. There are about 1100 dwellings, cottages and townhouses, school, commercial centre and several parks and reserves within the site.

Topography

The Claymore site is undulating, with ridgeline generally extending along Badgally Road. There are several high points in the southern and middle portions of the site, with low points generally within the riparian area along the northern site boundary.

There is a significant drainage depression dipping towards the east along the northern site boundary. Several other minor drainage depressions were noted dipping from the southern portion of the site towards the main drainage depression in the northern portion.

In general, ground surface across the site dips from the south towards the north west. However, locally the ground surface dips easterly or westerly towards the minor drainage depressions. Although ground surface slopes in most portions of the site range from about 5% to 15%, isolated areas of steep slopes were also noted.

Geology and landscape

Based on the Geological Map of Port Hacking – Wollongong (scale 1:100,000), bedrock underlying the natural soil at the Claymore site is anticipated to be Ashfield Shale, comprising dark grey to black shale and laminite (Reference 1). However, Bringelly Shale comprising shale, carbonaceous claystone, laminite, fine to medium grained lithic sandstone, rare coal is anticipated in high points in the southern portion of the site.

Reference to the Soil Landscape Map (scale 1:100,000) of Port Hacking - Wollongong indicates that the landscapes at the Claymore site belong to the Blacktown Group, which is characterised by gently undulating rises on Wianamatta Group shales, with local relief to 30.0m, ground slope less than 5%, broad rounded crests and gently inclined slopes (Reference 2). The sub-surface soil in this landscape is likely to be up to 3.0m thick, moderately reactive, highly plastic and of poor drainage.

The Salinity Potential Map for Western Sydney in 2002 (scale 1:140,000), prepared by The Department of Infrastructure, Planning and Natural Resources, indicates moderate potential for saline soils in most portions of the site, but high salinity potential along the creek lines (Reference 3).

3. Regulatory context

At a glance

Geotechnical investigation was carried out in accordance with Australian Standards on Geotechnical site investigation.

Assessments of results of geotechnical investigation as well as recommendations on design of residences, retaining structures and road pavement are based on relevant Australian Standards and Guidelines appropriate for proposed residential development. The main Australian Standards and Guidelines referred to in preparation of this report are listed below.

- Australian Standard AS1726-1993: Geotechnical Site Investigation, 1993 (Reference 4).
- Australian Standard AS2159-2009: Piling – Design and Installation, 2009 (Reference 5).
- Australian Standard AS3798-2007: Guidelines on Earthworks for Commercial and Residential Developments, 2007 (Reference 6).
- Australian Standard AS2870-2011: Residential Slabs and Footings, 2011 (Reference 7).
- NSW Department of Housing: Managing Urban Stormwater, Soils and Construction, 1998 (Reference 8).
- Lillicrap, A and McGhie, S.: Site Investigation for Urban Salinity, Department of Land and Water Conservation, 2002 (Reference 9).

4. Methods and results

At a glance

Geotechnical investigation consisted of excavating 74 test pits and drilling 9 boreholes to assess sub-surface conditions across the Claymore site, and testing of more than 130 representative soil samples to assess physical and chemical properties of soils.

The sub-surface profile across the site comprises a sequence of topsoil, fill and natural soil underlain by bedrock. Natural soils include alluvial soil and/or residual soil and bedrock is predominantly shale with bands of siltstone.

Soils across the Claymore project site are predominantly medium to high plasticity clay, with potential for high reactivity and excessive erosion. These soils at a depth range of 0.5m to 2.0m are generally saline and aggressive.

Scope of works

The scope of work for geotechnical investigation included the following;

- Review available information on geotechnical and geological aspects of the site, including soils and rock types, slope stability, site classification, foundation conditions, groundwater conditions, soil erosion potential, soil and water salinity.
- Attend a project inception meeting and project briefing.
- Contact the mine subsidence board to obtain information on whether the proposed development site is within a mine subsidence district and if so, obtain relevant information required for design of residences in a mine subsidence district.
- Carry out a walkover inspection / survey of the site to identify significant geological (landforms and types of soils and rocks) and hydro-geological (streams, dams, water wells, catchments and drainage) features of the site.
- Obtain and review services plans from “Dial Before you Dig”, to identify locations of underground services across the site.
- Scan the proposed test pit and borehole locations for underground services. We engaged a specialist services locator for this purpose.
- Excavate seventy four (74) test pits (TP1 to TP74) using a medium sized backhoe, to assess the sub-surface profiles and collect soil samples for laboratory testing. Test pits were excavated at about the locations indicated by Landcom in a plan provided for preparation of this report. Sixty (60) test pits were terminated at backhoe refusal in bedrock. However, fourteen (14) test pits (TP1 to TP4, TP8 to TP11, TP13, TP18, TP25, TP40, TP49 and TP51) were terminated at the limit of backhoe reach, generally about 2.5m from existing ground surface. Approximate test pit locations are indicated on Drawing No 12467/1-AA1 presented in Appendix 1. Excavation logs are also presented in Appendix 1.

- Carry out Dynamic Cone Penetration (DCP) tests adjacent to selected test pits to assess strength characteristics of sub-surface soils. DCP tests were terminated at refusal or about 1.0m from existing ground surface.

- Drill nine boreholes (BH2, BH9, BH11, BH13, BH18, BH25, BH40, BH49 and BH51) using a truck mounted drilling rig. Boreholes were drilled adjacent to selected test pits (TP2, TP9, TP11, TP13, TP18, TP25, TP40, TP49 and TP51 respectively), where bedrock was not encountered. Borehole logs are also presented in Appendix 1.

- Conduct Standard Penetration Tests (SPT) in the boreholes to assess the strength characteristics of the sub-surface soils

- Recover representative disturbed and undisturbed soil samples from test pits and boreholes for visual assessment and laboratory tests. After sampling the test pits were backfilled with excavated materials and compacted with the backhoe bucket. Backfilled test pits within public open space areas, such as football fields, were reinstated with turf.

- Measure depths to groundwater level or seepage in boreholes and test pits, if encountered.

Sub-surface Condition

Details of sub-surface materials encountered in each test pit and borehole are presented in the borehole and excavation logs presented in Appendix 1 and summarised below in Table 1.

Table 1 – Sub-surface Profiles encountered in Test Pits/Boreholes

Stage No	Test Pit/ Borehole	Termination Depth (m)	Depth Range for Topsoil/Fill (m)	Depth Range for Alluvial Soil (m)	Depth Range for Residual Soil (m)	Depth to Bedrock (m)
1	TP61	1.30	0.0-0.15	0.15-0.70	0.70-1.20	1.20
1	TP62	2.20	0.0-0.30	0.30-0.50	0.50-1.80	1.80
1	TP63	1.50	0.0-0.15	NE	0.15-1.10	1.10
1	TP64	1.70	0.0-0.10	0.10-0.60	0.60-1.50	1.50
1	TP65	2.00	0.0-0.20	0.20-0.70	0.70-1.10	1.10
1	TP66	1.50	0.0-0.10	0.10-1.10	1.10-1.40	1.40
1	TP67	1.70	0.0-0.40	0.40-0.90	0.90-1.50	1.50
1	TP68	1.10	0.0-0.10	0.10-0.80	0.80-1.00	1.00
1	TP69	1.70	0.0-0.10	0.10-0.70	0.70-1.70	1.70
2	TP56	2.50	0.0-0.15	0.15-2.00	2.00-2.20	2.20
2	TP57	0.70	0.0-0.10	NE	0.10-0.70	0.70
2	TP58	1.80	0.0-0.15	0.15-0.80	0.80-1.70	1.70
2	TP59	1.30	0.0-0.10	0.10-1.00	NE	1.00
2	TP60	0.70	0.0-0.40	0.40-0.60	NE	0.60
3	TP29	2.10	0.0-0.15	0.15-0.80	0.80-1.90	1.90
3	TP30	2.00	0.0-0.20	0.20-1.70	NE	1.70
3	TP31	3.00	0.0-0.10	0.10-1.00	1.00-3.00	3.00
3	TP32	1.10	0.0-0.15	0.15-0.80	0.80-1.00	1.00
3	TP70	1.80	0.0-0.15	0.15-1.10	1.10-1.60	1.60

TABLE 1 continued

Stage No	Test Pit/ Borehole	Termination Depth (m)	Depth Range for Topsoil/Fill (m)	Depth Range for Alluvial Soil (m)	Depth Range for Residual Soil (m)	Depth to Bedrock (m)
3	TP71	2.00	0.0-0.10	0.10-0.90	0.90-1.70	1.70
3	TP72	2.50	0.0-0.15	0.15-1.00	1.00-2.40	2.40
3	TP73	2.00	0.0-0.10	0.10-1.20	1.20-1.80	1.80
3	TP23	1.40	0.0-0.10	0.10-0.80	0.80-1.20	1.20
3	TP24	1.70	0.0-0.10	0.10-0.60	0.60-1.50	1.50
3	TP27	1.90	0.0-0.15	0.15-0.80	0.80-1.40	1.40
3	TP28	1.40	0.0-1.40	NE	NE	NE
4	TP33	0.90	0.0-0.10	0.10-0.80	NE	0.80
5	TP19	2.20	0.0-0.15	0.15-2.2	NE	2.20
5	TP20	1.50	0.0-0.20	NE	0.20-1.40	1.40
5	TP21	1.80	0.0-0.15	0.15-1.30	1.30-1.70	1.70
5	TP34	0.90	0.0-0.15	0.15-0.60	0.60-0.80	0.80
5	TP35	1.30	0.0-0.15	0.15-0.70	0.70-1.20	1.20
6	TP16	1.50	0.0-0.15	0.15-1.10	1.00-1.40	1.40
6	TP36	1.10	0.0-0.10	0.10-0.60	0.60-1.00	1.00
6	TP37	1.00	0.0-0.20	0.20-0.70	0.70-0.90	0.90
6	TP38	0.90	0.0-0.10	0.10-0.60	0.60-0.80	0.80
6	TP39	2.10	0.0-0.15	0.15-1.10	1.10-1.60	1.60
7	TP50	1.30	0.0-0.10	0.10-0.80	NE	0.80
7	TP51/BH51	4.20	0.0-1.10	1.10-3.70	3.70-4.20	4.20
7	TP52	2.20	0.0-0.20	0.20-2.20	NE	2.20
7	TP53	1.50	0.0-0.20	0.20-0.90	0.90-1.50	1.50
7	TP54	1.40	0.0-0.15	NE	0.15-1.40	1.40
7	TP55	1.60	0.0-0.70	NE	0.70-1.50	1.50
8	TP15	1.10	0.0-0.30	NE	0.30-0.80	0.80
8	TP40/BH40	6.30	0.0-0.20	0.20-5.80	5.80-6.30	6.30
8	TP41	2.80	0.0-0.20	0.20-0.90	0.90-2.50	2.50
8	TP45	1.60	0.0-0.15	NE	0.15-1.40	1.40
8	TP46	3.50	0.0-0.15	0.15-2.60	2.60-3.50	3.50
8	TP47	1.40	NE	NE	NE	0.00
8	TP48	2.10	NE	NE	0.0-1.50	1.50
8	TP49/BH49	4.00	0.0-0.20	0.20-3.50	3.50-4.00	4.00
8	TP74	1.50	0.0-0.15	0.15-0.90	0.90-1.40	1.40
9	TP9/BH9	8.00	0.0-0.15	0.15-3.30	3.30-8.00	8.00
9	TP10	4.00	0.0-0.15	0.15-2.90	2.90->4.00	NE
9	TP11/BH11	6.40	0.0-0.20	0.20-6.40	NE	6.40
9	TP12	1.20	0.0-0.20	0.20-0.80	0.80-1.00	1.00
9	TP13/BH13	6.30	0.0-0.20	0.20-3.50	3.50-6.30	6.30
9	TP14	2.20	0.0-0.20	0.20-1.60	NE	1.60

TABLE 1 continued

Stage No	Test Pit/ Borehole	Termination Depth (m)	Depth Range for Topsoil/Fill (m)	Depth Range for Alluvial Soil (m)	Depth Range for Residual Soil (m)	Depth to Bedrock (m)
9	TP42	2.50	0.0-0.30	0.30-1.00	1.00-1.80	1.80
9	TP43	1.30	0.0-0.5	NE	0.50-1.10	1.10
9	TP44	2.20	0.0-0.25	0.25-0.90	0.90-1.90	1.90
10	TP7	1.60	0.0-0.15	0.15-1.10	1.10-1.50	1.50
10	TP8	2.80	0.0-0.20	0.20->2.80	NE	NE
10	TP17	1.10	0.0-0.10	0.10-0.80	0.80-1.00	1.00
10	TP18/BH18	5.50	0.0-3.10	3.10-5.90	NE	5.90
11	TP1	2.50	0.0-0.20	0.20-2.50	NE	NE
11	TP2/BH2	3.95	0.0-0.15	0.15-2.70	NE	3.95
11	TP3	2.50	0.0-0.15	0.15-2.50	NE	NE
11	TP4	4.00	0.0-0.15	0.15-4.00	NE	NE
11	TP5	2.60	0.0-0.15	0.15-2.6	2.20-2.60	2.60
11	TP6	2.00	0.0-0.15	0.15-1.9	NE	1.90
11	TP22	1.60	0.0-0.10	NE	0.10-1.40	1.40
11	TP25/BH25	2.60	0.0-0.20	0.20-1.80	1.80-2.60	2.60

NE= Not Encountered

Table 1 indicates that the sub-surface profiles across the Claymore site comprise a sequence of topsoil/fill and natural soils underlain by bedrock. Natural soils in most test pits and boreholes include alluvial soils and residual soils. However, only alluvial or residual soil was encountered in some test pit and borehole locations. Bedrock is predominantly shale, with bands of siltstone. The materials encountered across the site are generally described as follows.

Fill	Silty Clay, medium to high plasticity, orange, brown, grey, moist, with some roots, ironstone and crushed shale
Topsoil	Silty Sand, fine grained and Silty Clay, low plasticity, dark brown, moist, with some roots
Alluvial Soils	Silty Clay, medium to high plasticity, orange, grey, yellow; moisture content generally equal to or lower than the plastic limit; stiff to hard.
Residual Soil	Silty Clay, Shaley Clay, medium to high plasticity, orange, grey, yellow; moisture content generally equal to or lower than the plastic limit; stiff to hard, with some ironstone
Bedrock	Shale, Siltstone, grey, brown, extremely weathered, very low to medium strength, with some iron stained bands

Anticipated depth ranges to bedrock across the eleven proposed stages of proposed development are presented below in Table 2.

TABLE 2 – Depths to Bedrock in Various Stages of Development

Stage	Depth Range to Bedrock (m)
1	1.00-1.80
2	0.60-2.20
3	1.00-3.00
4	0.80-1.50
5	0.80-2.20
6	0.80-1.60
7	0.80-4.20
8	0.00-6.30
9	1.00-8.00
10	1.00-5.90
11	1.00->4.00

Table 2 indicates the following;

- The depth to bedrock across Stages 1 to 6 is less than 3.0m from existing ground surface.
- The depth to bedrock in most portions of Stage 7 is less than 3.0m. However, it could be as deep as 5.0m in some portions.
- Stages 8 to 11 are located in low lying areas of the Claymore site, where depth to bedrock is 1.0m to 8.0m, deeper within the riparian corridor.

Groundwater level or seepage was not encountered in all test pits and boreholes to depths of about 3.0m from existing ground surface. However, groundwater seepage was encountered in some boreholes located in low lying areas at depths of 3.5m to 6.5m. It should be noted that fluctuations in the level of groundwater and/seepage might occur due to variations in rainfall and/or other factors.

Laboratory test results

Representative soil samples recovered from test pits/boreholes were tested in NATA accredited laboratories to assess physical and chemical properties. Laboratory test results are presented in Appendix 2. The types of number of various laboratory tests completed during the investigation are listed in Table 3.

TABLE 3 – Number of Laboratory Tests

Test Type	Number of Tests
Atterberg Limits	20
Emerson Class	14
Shrink Swell	16
Standard Compaction	10
California Bearing Ratio (CBR)	10
Salinity (Electrical Conductivity)	134
Soil Aggressivity (pH, Nitrate, Chloride, Resistivity)	17
Exchangeable Sodium Percentage	17

Results of physical properties tests are summarised below in Tables 4 to 6.

TABLE 4 – Results of Atterberg Limits and Emerson Class Tests

Test Pit	Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Emerson Class
TP1	0.30-0.50	NT	NT	NT	NT	2
TP3	0.50-0.70	51.0	24.0	27.0	14.5	4
TP5	0.50-0.70	63.0	23.0	40.0	17.5	5
TP7	0.50-0.70	67.0	38.0	39.0	16.0	5
TP10	0.60-1.00	45.0	18.0	27.0	13.0	NT
TP15	0.50-0.60	62.0	24.0	38.0	15.0	2
TP17	0.30-0.50	62.0	27.0	35.0	17.5	NT
TP20	0.60-0.80	70.0	30.0	40.0	20.0	NT
TP22	0.40-0.80	64.0	26.0	38.0	18.0	NT
TP23	0.50-0.70	64.0	26.0	38.0	18.0	5
TP27	0.50-0.70	57.0	25.0	32.0	15.5	NT
TP32	0.50-0.70	58.0	27.0	31.0	15.0	2
TP39	0.80-1.10	60.0	25.0	35.0	15.5	NT
TP43	0.50-0.80	36.0	19.0	17.0	8.5	2
TP46	0.20-0.50	52.0	20.0	32.0	16.5	6
TP49	0.60-0.90	36.0	15.0	21.0	10.5	NT
TP51	0.40-0.60	NT	NT	NT	NT	4
TP52	0.30-0.50	48.0	18.0	30.0	16.5	6
TP54	0.40-0.60	48.0	23.0	27.0	7.0	2
TP62	0.50-0.60	59.0	22.0	37.0	16.0	2
TP69	0.40-0.70	43.0	19.0	24.0	13.0	NT
TP73	0.50-0.60	NT	NT	NT	NT	2

NT = Not Tested

TABLE 5 – Results of Shrink Swell Index Test

Test Pit	Depth (m)	Shrink Swell Index (%/pF)
TP1	0.30-0.50	2.9
TP7	0.50-0.70	2.7
TP11	0.35-0.55	2.1
TP14	0.30-0.50	0.4
TP16	0.50-0.65	3.2
TP19	0.60-0.90	1.1
TP30	0.70-0.90	2.7
TP33	0.40-0.60	3.9
TP41	0.40-0.60	0.2
TP48	0.20-0.35	4.9
TP50	0.35-0.70	1.2
TP51	0.40-0.60	2.4
TP57	0.30-0.45	1.2
TP58	0.80-1.00	2.6
TP64	0.40-0.60	2.8
TP71	0.35-0.50	2.6

TABLE 6 – Results of Compaction and California Bearing Ratio Tests

Test Pit	Depth (m)	Field Moisture content (%)	Optimum Moisture Content (%)	Maximum Dry Density (t/m^3)	California Bearing Ratio (%)
TP3	0.50-0.70	14.8	16.5	1.85	7.0
TP10	0.60-1.00	13.2	17.0	1.76	5.0
TP17	0.30-0.50	16.7	22.5	1.57	3.0
TP20	0.60-0.80	19.1	23.5	1.57	3.0
TP27	0.50-0.70	14.1	18.0	1.74	2.0
TP32	0.50-0.70	15.5	19.5	1.64	2.0
TP39	0.80-1.10	19.5	23.0	1.61	3.5
TP49	0.60-0.90	11.4	15.0	1.80	8.0
TP54	0.40-0.60	13.7	18.0	1.69	3.0
TP69	0.40-0.70	13.6	17.5	1.76	3.5

Results of chemical properties tests are summarised below in Table 7 and 8.

TABLE 7 – Results of Electrical Conductivity (Salinity) Tests

Test Pit	Depth (m)	EC (dS/m)		Test Pit	Depth (m)	EC (dS/m)
TP1	0.0-0.2	2.80		TP22	0.4-0.6	1.90
TP1	2.0-2.1	1.50		TP23	0.5-0.6	0.47
TP2	0.5-0.6	6.70		TP23	1.2-1.3	1.30
TP2	1.5-1.6	7.20		TP24	0.5-0.6	0.22
TP2	2.0-2.1	8.40		TP25	1.3-1.4	3.20
TP3	0.5-0.6	0.26		TP26	0.5-0.6	1.50
TP3	2.0-2.1	3.70		TP27	0.2-0.3	2.40
TP4	1.0-1.1	1.20		TP27	0.8-0.9	2.20
TP4	2.0-2.1	8.10		TP28	0.7-1.0	2.00
TP4	2.8-2.9	3.80		TP29	0.7-0.8	0.56
TP5	1.5-1.6	0.43		TP30	0.25-0.35	0.22
TP6	1.0-1.1	1.10		TP30	1.7-1.8	0.45
TP7	0.8-0.9	0.39		TP31	1.5-1.6	1.10
TP7	1.3-1.4	0.58		TP31	2.5-2.6	1.40
TP8	1.5-1.6	2.40		TP32	0.5-0.6	0.67
TP9	0.85-0.95	0.55		TP33	0.15-0.25	2.50
TP9	2.0-2.2	1.90		TP34	0-0.15	0.28
TP9	3.0-3.2	1.80		TP34	0.5-0.6	0.77
TP10	0.4-0.5	0.16		TP35	0.5-0.6	0.31
TP10	2.5-2.6	3.60		TP35	1.0-1.1	3.00
TP10	3.5-3.6	2.30		TP36	0-0.1	0.37
TP11	0.25-0.35	1.50		TP36	1.0-1.1	1.90
TP11	1.5-1.6	6.20		TP37	0.25-0.35	0.40
TP12	0.6-0.7	3.20		TP37	0.9-1.0	0.83
TP13	1.0-1.1	5.80		TP38	0.7-0.8	0.61
TP13	2.0-2.1	6.40		TP39	0.2-0.3	1.00
TP14	0.7-1.0	0.92		TP39	1.1-1.2	0.82
TP14	1.3-1.6	0.99		TP39	1.6-1.7	1.00
TP15	0.3-0.5	1.40		TP40	1.0-1.1	0.96
TP16	0.2-0.3	0.30		TP41	0.4-0.6	0.19
TP17	0.3-0.4	0.80		TP41	2.0-2.1	5.20
TP18	0-0.15	0.54		TP42	0.35-0.45	5.30
TP18	0.9-1.2	9.10		TP44	0.5-0.6	0.86
TP19	0.6-0.7	1.20		TP44	1.5-1.6	1.00
TP19	1.6-1.7	0.79		TP44	2.0-2.1	0.94
TP20	0-0.2	0.88		TP45	0.5-0.6	0.86
TP20	1.2-1.3	1.70		TP46	1.1-1.2	5.50
TP21	0.8-0.9	1.80		TP46	2.0-2.1	5.10
TP21	1.5-1.6	2.10		TP46	3.0-3.1	6.40

TABLE 7 continued

Test Pit	Depth (m)	EC (dS/m)	Test Pit	Depth (m)	EC (dS/m)
TP48	0.5-0.6	7.70	TP64	0.4-0.5	0.37
TP48	1.0-1.1	4.70	TP64	1.0-1.1	2.30
TP48	1.5-1.6	4.60	TP64	1.5-1.6	1.90
TP49	1.5-1.6	2.10	TP65	0-0.2	0.37
TP50	0-0.1	0.46	TP65	0.5-0.6	0.88
TP50	1.0-1.1	0.89	TP65	1.5-1.6	2.10
TP51	0-0.2	0.25	TP66	1.0-1.1	2.80
TP51	0.6-0.7	0.31	TP67	0.45-0.55	1.60
TP51	1.4-1.5	4.40	TP67	0.8-0.9	4.20
TP52	1.0-1.1	6.80	TP67	1.4-1.5	8.30
TP53	0-0.2	0.34	TP68	0.5-0.6	1.10
TP53	1.0-1.1	0.24	TP69	0.15-0.25	0.30
TP54	0.9-1.0	3.70	TP69	1.0-1.1	1.30
TP55	0.15-0.25	1.40	TP69	1.7-1.8	2.00
TP55	1.5-1.6	2.40	TP70	1.0-1.1	1.20
TP57	0-0.1	0.39	TP70	1.5-1.6	0.71
TP57	0.6-0.7	1.50	TP71	0.5-0.6	1.80
TP58	0.2-0.3	0.26	TP71	1.0-1.1	1.60
TP58	0.9-1.0	0.49	TP71	1.7-1.8	0.54
TP58	1.5-1.6	0.96	TP72	0-0.15	0.38
TP59	0.45-0.55	0.82	TP72	1.0-1.1	3.70
TP60	0.2-0.3	0.16	TP72	2.0-2.1	3.20
TP60	0.6-0.7	0.79	TP73	0.5-0.6	2.50
TP61	0.3-0.4	0.84	TP73	1.0-1.1	2.80
TP62	0-0.3	0.55	TP73	1.5-1.6	2.90
TP62	1.1-1.2	1.20	TP74	0.2-0.5	0.31
TP62	1.8-1.9	1.90	TP74	0.65-0.75	0.52
TP63	0.5-0.6	1.80	TP74	1.4-1.5	0.59

TABLE 8 – Results of Aggressivity and Exchangeable Sodium Percentage Tests

Test Pit	Depth (m)	EC (dS/m)	pH	Chloride (ppm)	Sulphate (ppm)	Resistivity (ohm-cm)	Exchangeable Sodium (%)
TP2	0.5-0.6	670	5.3	1,200	15	1500	40
TP2	1.5-1.6	720	5.2	12	32	1400	42
TP2	2.0-2.1	840	8.4	330	85	1200	40
TP9	0.85-0.95	55	6.5	570	140	18000	9
TP9	2.0-2.2	190	6.0	900	120	5200	20
TP9	3.0-3.2	180	7.5	840	170	5500	18
TP34	0-0.15	28	5.0	4	15	36000	4
TP34	0.5-0.6	77	4.8	76	32	13000	11
TP46	1.1-1.2	550	4.6	720	92	1800	46
TP46	2.0-2.1	510	4.6	690	20	1900	44
TP46	3.0-3.1	640	4.9	820	48	1500	46
TP58	0.2-0.3	26	5.4	10	26	39000	5
TP58	0.9-1.0	49	5.9	11	55	20000	9
TP58	1.5-1.6	96	6.5	24	47	10000	18
TP72	0-0.15	38	5.3	15	10	27000	4
TP72	1.0-1.1	370	4.2	300	180	2700	28
TP72	2.0-2.1	320	4.3	310	100	3200	30

5. Assessments and Recommendations

At a glance

Soils across the Claymore project site are predominantly medium to high plasticity clay, with potential for high reactivity and excessive erosion. Most of these soils are non-saline and mildly aggressive to a depth of about 1.0m. However, at depths exceeding 1.0m, soils are saline and moderately aggressive.

The site has a low risk of slope instability and is unlikely to be impacted by mine subsidence. Therefore, the site is suitable for proposed residential development provided risks imposed by high reactivity, erosion and salinity are considered in design of future residences.

Soil properties

Soil plasticity and Dispersibility

Laboratory tests results for twenty (20) representative soil samples, presented in Table 4, indicate that the Liquid Limit and Plasticity Index values of soil samples vary from about 36% to 70% and about 17% to 20% respectively. Therefore, all soils across the site are assessed to be medium to high plasticity clayey materials. However, shaley clay is generally assessed to be of medium plasticity.

Laboratory tests results for sixteen (16) representative soil samples, presented in Table 5, indicate that the shrink/swell indices for soil samples vary from about 0.2%/pF to 4.9%/pF. However, most soil samples show shrink/swell indices between 2.0%/pF and 3.0%/pF. Therefore, all soils across the site are assessed to be reactive and susceptible to shrink/swell movements. The magnitude of shrink/swell movement depends on the thickness of reactive materials as well as shrink/swell index. The shrink/swell movements across the site are anticipated to vary from about 20.0mm to 35.0m for every 1.0m thickness of reactive material.

Dispersibility of the soils determines the erosion and piping potential of soils. Dispersibility of soils is usually assessed on the basis of Emerson Class Number, Percent Dispersion, Pinhole Class and chemical properties such as Exchangeable Sodium Percentage (ESP). As different methods of dispersibility assessments might provide different results, it is general practice to use more than one test method to assess dispersivity of soils (Reference 10). Emerson Class and ESP were determined for representative soil samples during the present investigation.

The Emerson Class test grades soils into eights classes, with Class 1 being highly dispersive and Class 8 being non-dispersive. Soils with Emerson Classes 1 to 4 are to be treated with caution, if used in construction. Soils with ESP values of 5% or more are considered sodic and those with ESP more than 15% are considered highly sodic (Reference 9). Sodic soils are dispersive and susceptible to excessive erosion.

Fourteen (14) soil samples were tested to determine Emerson Classes. The results presented in Table 4 indicate that nine (9) of these samples belong to Emerson Classes 2 and 4 and the remaining five (5) belong to Classes 5 and 6. Therefore, most soils within the site are potentially dispersive with high risk of erosion.

Exchangeable Sodium Percentage (ESP) was determined for seventeen (17) soil samples. The results presented in Table 8 indicate that fifteen (15) of these samples have ESP of 5% or more, indicating most soils are sodic and therefore susceptible to excessive erosion.

Although some soil samples indicate a low risk of erosion in some portions of the site, it is noted that most soil samples show a high risk of erosion. Furthermore, it is difficult to delineate the portions of the site with low risk to erosion unless very extensive sampling and testing are carried out. Therefore, we suggest that the entire soils are considered susceptible to erosion.

Soil salinity

Salinity refers to the presence of excess salt in the environment, either in soil or water. Soil salinity relates to the salt content of the soils. These salts usually involve sodium chloride, but other salts occur in some soils. Soil salinity in Western Sydney is thought to be primarily the result of early marine sediment deposits and the extent is largely related to the underlying Wianamatta Group shales. Surface and groundwater, as they flow through saline soils, dissolve the salts in soils and increase the concentration of salts in water.

Salinity is a serious problem for any development due to the many environmental, economic and social impacts. Main impacts attributed to soil salinity and relevant to proposed residential development include damage to houses, roads, highways and other structures, caused by the deterioration of brick, mortar, concrete, bitumen and asphalt, corrosion of metal (pipes, cables) etc.

Soil salinity is generally assessed by measuring Electrical Conductivity (EC) of a soil sample made up of 1:5 soil water suspension, which is one part in air dried soil to five parts distilled water. Thus determined Electrical Conductivity (EC) is multiplied by a factor varying from 6 to 23, based on the texture of the soil sample, to obtain Corrected Electrical Conductivity designated as EC_e (Reference 9). Alternatively, EC_e may be directly measured in soil saturation extract. Soils are classified as saline if Electrical Conductivity (EC_e) of the saturated extracts exceeds 4dS/m or 4mS/cm. The criteria for assessment of soil salinity classes are shown in the following Table 9 (Reference 9):

TABLE 9 – Criteria for Assessment of Soil Salinity

Classification	ECe (dS/m)	Comment
Non saline	<2	Salinity effects mostly negligible
Slightly saline	2 – 4	Yields of very sensitive crops may be affected
Moderately saline	4 – 8	Yields of many crops affected
Very saline	8 – 16	Only tolerant crops yield satisfactorily
Highly saline	>16	Only a few tolerant crops yield satisfactorily

Electrical conductivity was determined for one hundred and thirty four (134) representative soil samples from across the site and the results are summarised in Table 7. The tests indicate the following;

- Soils to depths of about 1.0m are generally non-saline or slightly saline. However, moderately saline soils were encountered in localised areas.
- Soils from depths of about 1.0m to 2.0m are generally moderately saline to very saline.

- Soils from depths exceeding about 2.0m are generally slightly saline to moderately saline

It is our assessment that saline soils are unlikely to be encountered during proposed development works if depth of excavation is less than 1.0m from existing ground surface. However, saline soils will be encountered in portions of the site where depth of excavation is more than 1.0m from existing ground surface. This means there is clear indication that soil salinity changes with depth. Although localised soils along the drainage line in the northern portion and low lying areas in the north eastern corner of the site appear to have higher salinity, there is no distinct indication that soil salinity at any depth range varies significantly across the site.

Soil aggressivity

Aqueous solution of chloride causes corrosion of iron and steel, including steel reinforcements in concrete. The aggressivity classifications of soil and groundwater applicable to iron and steel, in accordance with Australian Standard AS2159-1995 (Reference 5), are given below in Table 10.

TABLE 10 – Aggressivity Classifications for Steel/Iron

Chloride in Soil (%)	Chloride in Water (ppm)	pH	Resistivity (ohm-cm)	Soil Condition A*	Soil Condition B#
<0.5	<1000	>5.0	>5000	Non-aggressive	Non-aggressive
0.5-2.0	1000-10000	4.0-5.0	2000-5000	Mild	Non-aggressive
2.0-5.0	10000-20000	3.0-4.0	1000-2000	Moderate	Mild
>5.0	>20000	<3.0	<1000	Severe	Moderate

*Soil Condition A = high permeability soils (e.g. sands and gravels) which are below groundwater
#Soil Condition B = low permeability soils (e.g. silts and clays) and all soils above groundwater

The aggressivity classifications of soil and groundwater applicable to concrete, in accordance with Australian Standard AS2159-1995 (Reference 5), are given below in Table 11.

TABLE 11 – Aggressivity Classification for Concrete

Sulfate (SO_3) in Soil (%)	Sulfate (SO_3) in Water (ppm)	pH	Chloride (ppm)	Soil Condition A*	Soil Condition B#
<0.2	<300	>6.5	<2000	Non-aggressive	Non-aggressive
0.2-0.5	300-1000	5.0-6.0	2000-6000	Mild	Non-aggressive
0.5-1.0	1000-2500	4.5-5.0	6000-12000	Moderate	Mild
1.0-2.0	2500-500	4.0-4.5	12000-30000	Severe	Moderate
>2.0	>5000	<4.0	>30000	Very Severe	Severe

Approximately 100ppm of SO_4 = 80ppm of SO_3
*Soil Condition A = high permeability soils (e.g. sands and gravels) which are below groundwater
#Soil Condition B = low permeability soils (e.g. silts and clays) and all soils above groundwater

Seventeen (17) representative soil samples were tested for aggressivity determination and the test results are summarised in Table 8. As soils across the site are predominantly clayey with low permeability, the appropriate site condition is assessed to be “Condition B”. Therefore,

based on the laboratory test results and site conditions, the soils across the site are assessed to be mildly to moderately aggressive towards concrete and steel.

Proposed development

The Claymore Renewal Project is proposed to deliver approximately 1280 dwellings or lots in which a maximum of 30% of the yield (or approximately 380 dwellings) will be retained for public housing. The proposed residential development will be completed in eleven stages, (Stages 1 to 11).

Excavation conditions

Earthworks during proposed development works, including construction of building platforms, internal roads etc., is anticipated to involve some cut and fill operations. Although depth of excavation could be up to about 5.0m in localised areas, the depth of excavations in most portions of the site is anticipated to be less then 2.0m deep. It is noted that the excavations will be mainly limited to the higher ground. Geotechnical investigation indicates that the sub-surface materials to a depth of about 5.0m from existing ground surface will comprise topsoil, fill, natural soils (alluvial soil and residual soil) and bedrock (shale and siltstone) of varying weathered grades or strengths. Although medium strength bedrock may be encountered at depths exceeding 2.0m, bedrock to a depth of 2.0m is anticipated to include very low to low strength shale and siltstone.

Excavation of soils (including topsoil, fill, alluvial soil, residual soil) and very low to low strength bedrock can be achieved using conventional earthmoving equipment, such as excavators and dozers. However, excavation of medium strength or better bedrock could be considerably more difficult and require larger equipment (such as a Caterpillar D9 or equivalent, road header, rock saw etc.). It is our assessment that excavation into medium strength or better bedrock will be minor (not more than 1.5m) and therefore conventional earthmoving equipment may be adequate for entire excavation works provided a slow production rate is acceptable. However, we suggest that selection of rock cutting equipment is based on site access, desired smoothness of the excavated rock surface and acceptable ground vibration during rock excavation.

Groundwater level and/or seepage were not encountered in test pits or boreholes to depths of about 3.0m from existing ground surface. However, groundwater level was encountered at depths of 3.5m to 6.5m from existing ground surface in some boreholes located in low lying areas. Based on the understanding that the deep excavations, if any, will occur in higher ground and the fact that groundwater level and seepage were encountered at depths exceeding 3.5m in low lying areas, where fill placement may occur instead of excavation, we do not anticipate groundwater ingress during earthworks for proposed development works. It is also our assessment that groundwater inflow during proposed excavations, if any, could be adequately managed by a conventional sump and pump system.

It should be noted that fluctuations in the level of groundwater and/seepage might occur due to variations in rainfall and/or other factors. Trafficability problems could arise locally during wet weather or if water is allowed to pond on these materials.

Fill placement

Proposed development is understood to involve significant controlled fill placement during construction of building platforms and preparation of road subgrade. We recommend fill placement is carried out in a controlled manner, in accordance with the following recommendations.

- Strip and dispose of or separately stockpile topsoil for possible later use in landscaping.
- Strip and dispose of or separately stockpile existing fill for possible later use in controlled fill.
- After stripping of topsoil and/or fill, the exposed surface is anticipated to comprise natural soils (alluvial and/or residual soils). However, bedrock may be exposed at some locations. Proof roll the exposed alluvial or residual soils to detect localised heaving, which should be excavated to a depth of about 300mm and replaced with granular or low plasticity clay and compacted as described below. No proof rolling will be required if bedrock is exposed after stripping of topsoil and fill. If the backfilled area shows further movement during proof rolling, this office should be contacted.
- Place suitable fill materials on exposed bedrock or proof rolled natural soils. The fill should be placed in horizontal layers of 200mm to 250mm maximum loose thickness (depending on the size of equipment) and compacted to a Minimum Dry Density Ratio (MDDR) of 98% Standard, at moisture content within -2% to +2% of Optimum Moisture Content (OMC). Where controlled fill forms road subgrade, the upper 0.5m of the fill should be compacted to a Minimum Dry Density Ratio (MDDR) of 100% Standard, at moisture content within -2% to +2% of Optimum Moisture Content (OMC).
- Controlled fill should preferably comprise non-reactive soils (such as gravel, sand, crushed sandstone), with a maximum particle size not exceeding 75mm, or low to medium plasticity clay. However, most of the natural soils and bedrock available from excavations within the site are assessed to be suitable for use in controlled fill after removing deleterious materials (topsoil, organic materials, silt etc) and crushing to sizes finer than 75mm. High plasticity clay if used should be properly mixed with shaley clay/clayey shale.
- Fill placement should be supervised to ensure that material quality, layer thickness, testing frequency and compaction criteria, conform to the specification. We recommend Level 1 supervision or higher, in accordance with Australian Standard AS3798-2007 (Reference 6).

Batter slopes and retaining structures

As site topography is undulating, earthworks during construction of level building platforms and roads will involve both cut and fill operations. Therefore, site preparation works will result in cut and fill slopes, which may either be battered to naturally stable slopes or retained by engineered retaining structures. If battering is the preferred option, we recommend the batter slopes presented in Table 12.

TABLE 12 - Recommended Batter Slopes

Material	Temporary Slope (Vertical:Horizontal)	Permanent Slope (Vertical:Horizontal)
Controlled Fill/Residual Soil	1.5:1.0	2.5:1.0
Bedrock – Very low to low strength	1.0:1.0	1.5:1.0
Bedrock – Medium strength or better	Vertical	Vertical

Vertical excavations in medium strength or better bedrock, where required, will have a very low risk of instability. However, some local rock bolting or shotcreting might be required, depending on the relative orientation of discontinuities (bedding planes, joints, fractures etc) and excavation faces.

It is also recommended that the batter slopes are provided with adequate surface and sub-surface drainage and the crest of the batter slope is at least 1.0m away from site boundaries.

As the materials exposed at the cut and fill faces are anticipated to comprise controlled fill, alluvial soils, residual soils and very low to low strength bedrock, it is unlikely that very steep or vertical faces could be maintained in these materials. Furthermore, it is possible that adequate spaces are not available for battering the cut and fill faces to stable slopes, especially if excavation extends to site boundaries and/or adjacent structures. Under such circumstances, cut and fill faces might have to be retained by engineered retaining structures.

Appropriate retaining structures for the proposed development are anticipated to include gravity walls, cantilever walls and soldier piles with laggings. The earth pressure distribution on such retaining walls may be assumed to be triangular and estimated as follows:

$$p_h = \gamma k H$$

Where,

p_h = Horizontal pressure (kN/m^2)

γ = Total density of retained materials (kN/m^3)

k = Earth pressure coefficient (k_a or k_o)

H = Retained height (m)

For design of flexible retaining structures, where some lateral movement is acceptable, an active earth pressure coefficient (k_a) should be used. An at rest earth pressure coefficient (k_o) should be used if no lateral deformation is tolerable. Recommended earth pressure coefficients for design of retaining structures are presented in Table 13.

TABLE 13 – Recommended Earth Pressure Parameters

Material	Unit Weight (kN/m^3)	Active Earth Pressure Coefficient	Passive Earth Pressure (kPa)	At Rest Earth Pressure Coefficient
Controlled Fill/Residual Soil	18	0.40	Ignore	0.60
Bedrock – Very low to low strength	20	0.20	150	0.30
Bedrock – Medium strength or better	22	Not Applicable	500	Not Applicable

If the retaining structures are anchored or strutted, the active earth pressure is assumed to be rectangular and estimated as follows:

$$p_h = 0.3\gamma H$$

Where,

p_h = Horizontal pressure (kN/m^2)

γ = Total density of retained materials (kN/m^3)

Factor 0.3 in the above equation may be reduced to 0.2 for the portion of excavation in low strength bedrock.

These coefficients are based on the assumption that ground level behind the retaining structures is horizontal and the retained material is effectively drained. Additional earth pressures resulting from surcharge load on retained materials and groundwater pressure, if any, should also be allowed for in design of retaining structures. Groundwater pressure will not be applicable if retained material is completely drained and groundwater level is permanently maintained below the base retaining wall.

The design of any retaining structure should be checked for bearing capacity, overturning, sliding and overall stability of the slope.

Site classification

At completion of cut and fill operations, when building platforms are ready for construction of residences, sub-surface profiles within the residential lots are anticipated to belong to one of four types listed below:

Type 1 – Profile comprising alluvial and/or residual soil underlain by bedrock

Type 2 – Profile comprising a sequence of fill and alluvial and/or residual soil underlain by bedrock

Type 3 – Profile comprising fill over bedrock

Type 3 – Profile with exposed bedrock.

It is anticipated that all unsuitable materials will be removed and replaced with controlled fill, which will comprise alluvial/residual soil and/or crushed bedrock shale obtained from excavations within the site. Based on the nature and thickness of alluvial/residual soil and controlled fill likely to be encountered, future residential lots in the subdivision are expected to belong to Class “A” or “S” or “M” or “H1”, in accordance with Australian Standard AS2870-2011 (Reference 7). The general definitions of site classes provided in Australian Standard AS2870-2011 are reproduced below in Table 14.

TABLE 14 – Definitions of Site Classifications

Site Classification	Soil Thickness (m)	Foundation Condition	Ground Movement (mm)
Class A	Bedrock Exposed	Most sand and rock sites with little or no ground movement from moisture changes	Not Applicable
Class S	Less than 0.6	Slightly reactive sites, which might experience only slight ground movement from moisture changes	Less than 20
Class M	0.6-1.8	Moderately reactive clay or silt sites, which might experience moderate ground movement from moisture changes	20.0 to 40.0
Class H1	More than 1.8	Highly reactive clay sites, which might experience extreme ground movement from moisture changes	40.0 to 60.0

* Total thickness of controlled fill, alluvial soil and residual soil combined

For preliminary design purposes, Table 14 may be used to assess a site classification for a specific residential lot after the building platform has been constructed. Thickness of soil (alluvial soils, residual soil and controlled fill combined) varies across the site, which might indicate two or more site classes for a single residential lot. Under such circumstances, we suggest that the worst site class should be considered appropriate for that lot.

Site classifications presented in this report are based on the assumption that the shrink/swell characteristics of alluvial soils, residual soils and/or controlled fill at building platform level are indicated by results of laboratory tests on representative samples. Therefore, we recommend that additional laboratory tests are carried out after site preparation work, in order to provide site classifications for individual lots.

Floor slabs and footings

Floor slabs for future residences may be designed as ground bearing or suspended slabs supported by footings. If ground bearing floor slabs are desired, we recommend that the slabs are designed for appropriate site classification, in accordance with Australian Standard AS2870 "Residential Slabs and Footings" (Reference 7). Alternatively, floor slabs bearing on controlled fill, alluvial soils and residual soils may be designed for a recommended Modulus of Subgrade Reaction value of 15kPa/mm. Floor slabs bearing on very low to low strength shale may be designed for Modulus of Subgrade Reaction value of 30kPa/mm.

Loading conditions for the future residences are not known at this stage. However, we consider that shallow footings (pad or strip footings) founded in controlled fill or alluvial soils or residual soil or bedrock, or deep footings (bored piers) founded in bedrock, would be appropriate. Deep footings would be required only if footings are required to withstand lateral and uplift loads. The recommend allowable bearing pressures for design of footings are presented in the following Table 15.

TABLE 15 – Recommended Allowable Bearing Pressures

Founding Materials	Founding Depth* (m)	Allowable Bearing Pressure (kPa)	Allowable Shaft Adhesion (kPa)
Controlled Fill/Natural Soils	0.5-1.0	100	Ignore
Bedrock – Very low to low strength	2.0-3.0	700	50
Bedrock – Medium strength or better	>5.0	1200	120

* Depths indicative only from existing ground surface

As depths to different foundation materials could vary across the site, or even within a residential lot, the founding depths of footings to be constructed will also vary. It should be noted that the founding depths presented in Table 15 are indicative only and depth to bedrock in some portions of the site will be much deeper than 5.0m. The founding level at a specific location will have to be confirmed by an experienced Geotechnical Engineer, on the basis of assessment made during footing excavation or pier hole drilling. The engineer should ensure that the design strength of soil and rock is achieved.

The total settlements of footings founded on soils (controlled fill, alluvial soils, residual soils) and bedrock, under the recommended allowable bearing pressures, are estimated to be about 3% and 1% of the minimum dimension of footings or pier diameter respectively. The differential settlements are estimated to be about half of the estimated total settlements.

If footings are founded above and within the 1 Horizontal to 1 Vertical line projected from the base of excavation, the allowable bearing pressures are half of those recommended in the above table. However, the presence and orientation of rock discontinuities will determine if such footings are appropriate.

Internal road pavement

Pavements for internal roads within the site may be designed as flexible pavements or rigid pavements. The design thicknesses for both pavement types depend on (1) traffic loading and (2) subgrade condition. Statutory authorities (council) might also specify minimum pavement thicknesses for various roads.

Campbelltown City Council (Reference 11) provides recommended traffic loads, in terms of Equivalent Standard Axles (ESA), for design of flexible pavements for different road categories/types within Campbelltown City Council.

Based on geotechnical investigation, subgrade materials for internal roads within the site at completion of subgrade preparation are anticipated to be of four types, as follows;

Type 1 - Natural clayey soils subgrade

Type 2 - Bedrock subgrade

Type 3 - Fill Subgrade comprising clayey fill

Type 4 - Fill Subgrade comprising crushed shale

Based on results of laboratory tests on representative samples (Table 6) and visual assessments, the CBR values of natural soils (predominantly clayey alluvial and residual soils) and shaley clay/extremely weathered shale are assessed to vary from about 2.0% to 3.5% and 5.0% to 8.0% respectively. It is also our assessment that the CBR values of clay fill and crushed shale are similar to those of natural clay and shaley clay/extremely weathered shale respectively.

High plasticity natural clays with CBR values less than 3.0% were encountered in some test pits, especially within Stage 3. Subgrade materials with CBR values of less than 3.0% are assessed to be too weak and unsuitable as road subgrade in existing conditions. However, these soils may be used as road subgrade after stabilisation with 3.0% to 5.0% of lime, which will improve plasticity as well as strength (CBR) to acceptable levels.

Lime stabilisation may be omitted if all high plasticity and low strength natural subgrade materials (CBR <3.0%) are removed or no high plasticity and low strength natural soils are used as fill for road subgrade. Therefore, it will be necessary to assess (including laboratory testing if deemed necessary) the nature of subgrade during and after completion of subgrade preparation, to ascertain if lime stabilisation is required and what is the appropriate CBR value for design of pavement.

For the anticipated four types of subgrade, the recommended indicative CBR values for design of road pavement are presented in Table 16.

TABLE 16 – Recommended California Bearing Ratio Values

Subgrade Type	Material Description	Recommended CBR (%)
Types 1 and 3	Natural Soils and Clayey Fill	3.0
Types 2 and 4	Bedrock and crushed shale/siltstone	5.0

The indicative CBR values for Types 1 and 3 subgrade are based on the following assumptions;

- High plasticity and low strength natural clay (CBR<3%) is removed from natural subgrade and replaced with suitable materials, or
- High plasticity and low strength natural clay is not used in fill subgrade, or
- High plasticity and low strength natural clay is stabilised with 3% to 5% lime, if used as natural and/or fill subgrade.

Once road categories are finalised, design traffic loadings can be obtained using council guidelines. Then preliminary pavement design can be carried out using subgrade CBR values presented in Table 16. Alluvial and residual soils in existing condition and/or after use in

controlled fill are likely to belong to Subgrade Types 1 and 3. Likewise, shaley clay and bedrock in existing condition and/or after use in controlled fill are likely to belong to Subgrade Types 2 and 4. Therefore, design subgrade CBR value is likely to be about 3% (after lime stabilisation where needed) if subgrade level is within natural soils and 5% if bedrock is encountered at subgrade level. However, for final design, we recommend that the actual subgrade CBR values should be determined after completion of subgrade preparation.

Slope stability assessment

Site factors such as slope angles, depth of insitu soils, strengths of sub-surface materials and concentrations of water generally govern the stability of a site. The Australian Geomechanics Society (AGS) recommends that the landslide risk of a site is assessed on the basis of the likelihood of a landslide event and the consequences of that event (Reference 12). Using AGS guideline, assessed qualitative measures for the likelihood and consequence of landslides as well as level of risk for the Claymore site is as follows.

Qualitative Measures of Likelihood - It is our assessment that the event of a landslide within the site is conceivable but only under very exceptional circumstances ($\approx 10^{-5}$), i.e.: it is **"Rare"**.

Qualitative Measures of Consequences to Property - It is our assessment that the consequences of landslides to the property would be **"Minor"**, causing limited damage to part of structure, or part of the site requiring some reinstatement/stabilisation work

Qualitative Risk Analysis – Level of Risk to Property - Based on the above Qualitative Measures, the Claymore site is assessed to have a **"Very Low"** Risk Level. The abstract of definitions of risk levels, as provided by AGS, is presented in Table 17.

TABLE 17 – Definitions of Landslide Risks

Risk Level	Implication
Very High Risk (VH)	Extensive detailed investigation and research, planning and implementation of treatment options, essential to reduce risk to acceptable levels; may be too expensive and not practical.
High Risk (H)	Detailed investigation, planning and implementation of treatment options required to reduce risk to acceptable levels.
Moderate Risk (M)	Tolerable, provided a treatment plan is implemented to maintain or reduce risks. May be accepted. May require investigation and planning of treatment options.
Low Risk (L)	Usually accepted. Treatment requirements and responsibility to be defined to maintain or reduce risk.
Very Low Risk (VL)	Acceptable. Manage by normal slope maintenance procedures.

As the risk of slope instability across the site is assessed to be very low, it is our assessment that the Claymore Renewal Project area is suitable for residential development, from a slope stability point of view, providing good engineering and construction practices are used during construction stage. The risk level of the site, or portions of the site, could change if proposed development involves significant ground modifications, including fill placement and excavations. However, the risk level will still be low and acceptable for residential, if cut and

fill slopes resulting during proposed development works are battered or retained by retaining structures designed in accordance with recommendations provided in this report.

Mine subsidence

We contacted the Mine Subsidence Board, Picton, to enquire whether the Claymore Renewal Project site is within a mine subsidence district and if so to provide mine subsidence parameters for design of future residences and other structures within the site. We were advised by Mr D Bullock, District Manager, on 28 April 2011, that the Claymore Renewal Project site is not within a mine subsidence district and therefore there is no need to consider mine subsidence parameters during design of future residences and other structures.

Soil and water management plan

Soils likely to be disturbed during proposed development works are anticipated to be non-saline to a depth of about 1.0m and saline at depths exceeding 1.0m. The soils are also assessed to be potentially dispersive with a high risk of erosion. As depths of excavations during proposed development works are likely to be more than 1.0m, both soil salinity and dispersibility are likely to be of concern.

Given the problems associated with erosion and soil salinity in western Sydney, we recommend that some soil and water management principals are implemented during the proposed development works, as preventative measures in dealing with possible erosion and salinity. With regard to soil and water management, the objectives of this management plan are to:

- Minimise erosion and sediment loss, before, during and after construction.
- Minimise water pollution due to erosion, siltation and sedimentation.
- Maximise the re-use of on site materials.
- Reduce and manage salinity within the study area so that impacts on possible future structures and vegetation in the vicinity of the site are minimised and acceptable.

The only effective way to remove salts from soils to reduce the salinity risk to a tolerable level is by leaching/flushing, which is accomplished by allowing fresh water to infiltrate through saline soils so that salty water is collected and discharged out of the site using an appropriate drainage system. However, leaching is not considered to be appropriate for the Claymore Renewal Project. Therefore, earthworks across the site should be carried out in accordance with an approved soil management plan, which should aim at the following;

- Minimise moisture contact with the building materials.
- Ensure natural flow of surface and groundwater is maintained as much as possible.
- Use building materials appropriate to salinity conditions.

Soil management is an integral component of the development process. Developments must address any potential soil management issues identified and must adopt a preventative approach, rather than reactive.

We recommended the following as part of the soil management plan for development works in the Claymore Renewal project site;

- Develop the best use of the existing topography in order to minimise cut and fill operations. Cut and fill might expose saline soils at depth. Where cut and fill are required for building platforms and other structures, it is advised that such works are completed during the subdivision stage so as to have better control of overall drainage issues.

- Retaining walls for cut and fill slopes should be provided with adequate and appropriate drainage.

- For low lying areas, stormwater drains along roads can be used to control groundwater level.

- If fill is to be placed in low lying areas, a drainage layer should be placed beneath the fill to prevent groundwater rise and the drainage layer should be drained off the site.

- Finished ground surface in each lot should be provided with adequate fall to the street to allow run-off of water and prevent water ponding, waterlogging and infiltration of rainwater.

- Erosion and Sediment Control Plans must be developed and implemented by the earthworks contractors, in accordance with recommendations provided by the NSW Department of Housing (Reference 8). All sediment and erosion controls proposed by the Erosion and Sediment Control Plan are to be installed prior to commencement of any construction works.

- Carry out a water balance study to determine possible sources of recharge (rainfall, springs, dams etc) and paths to discharge.

- Ensure that construction activities do not affect the natural flow of groundwater. Where groundwater is intercepted during development works/excavation, the flow should be diverted to stormwater drains or creeks by providing appropriate surface and sub-surface drainage.

- Reduce groundwater recharge through appropriate land use and land management practices. This can be achieved by minimising deep infiltration and through-flow and maximising vegetation cover, planting of deep rooted trees and use of salt tolerant plants.

- Utilise native and deep-rooted plants to minimise soil erosion. Where vegetation cover is not adequate to control erosion, improve soil resistance to erosion by stabilising dispersive soils with hydrated lime and gypsum. Exact proportions of lime and gypsum to be used can be determined on the basis of laboratory testing, but for preliminary planning purposes we suggest about 3% to 5% of lime and gypsum.

- On cut and fill batters, provide a secured turf overlay or shotcreting, again to guard against erosion. Construction of a V-drain behind the crest of all slopes is also recommended to divert water away from the slope.

- Select construction materials and techniques suitable for a moderately aggressive saline environment (References 13 and 14).

General limitation

Assessment of the soil profile across the proposed development site and the recommendations presented in this report are based on information from a limited number of test pits and boreholes. Although boreholes and test pits were distributed across the site and extended to depths in excess of anticipated depths of excavation, actual sub-surface soil and rock conditions across the site and between boreholes/test pits might differ from those expected (interpreted). This is also applicable to groundwater conditions.

As the recommendations presented in this report are based on the generalised geotechnical model, the appropriateness of assessments and recommendations presented in this report will be verified and/or alternative recommendations provided during Level 1 Supervision of site preparation and construction works.

6. References

1. Sherwin, L. and Holmes, G.G (Ed) : Geology of the Wollongong and Port Hacking (Map sheets 9029-9129 scale 1 1:100,00), Geological Survey of New South Wales, Department of Mineral Resources, 1986.

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3. Department of Infrastructure, Planning and Natural Resources: Salinity Potential in Western Sydney (scale approximately 1:140,000), 2002

4. Australian Standard AS1726-1993: Geotechnical Site Investigation, 1993.

5. Australian Standard AS2159-2009: Piling – Design and Installation, 2009.

6. Australian Standard AS3798-2007: Guidelines on Earthworks for Commercial and Residential Developments, 2007.

7. Australian Standard AS2870-2011: Residential Slabs and Footings, 2011.

8. NSW Department of Housing: Managing Urban Stormwater, Soils and Construction, 1998.

9. Lillicrap, A and McGhie, S.: Site Investigation for Urban Salinity, Department of Land and Water Conservation, 2002.

10. Fell, R., MacGregor, P and Stapleton, D: - Geotechnical Engineering of Embankment Dams, 1992.

11. Campbelltown City Council: Development Control Plan 2009, Vol 2, Engineering Design for Development, 2009.

12. Australian Geomechanics Society (AGS) Landslide Taskforce, Landslide Practice Note Working Group:- "Practice Note Guidelines for Landslide Risk Management", March 2007.

13. Australian Standard AS3700-2001: Masonry Structures, 2001.

14. Cement Concrete & Aggregates Australia: Guide to Residential Slabs and Footings in Saline Environments, 2005.

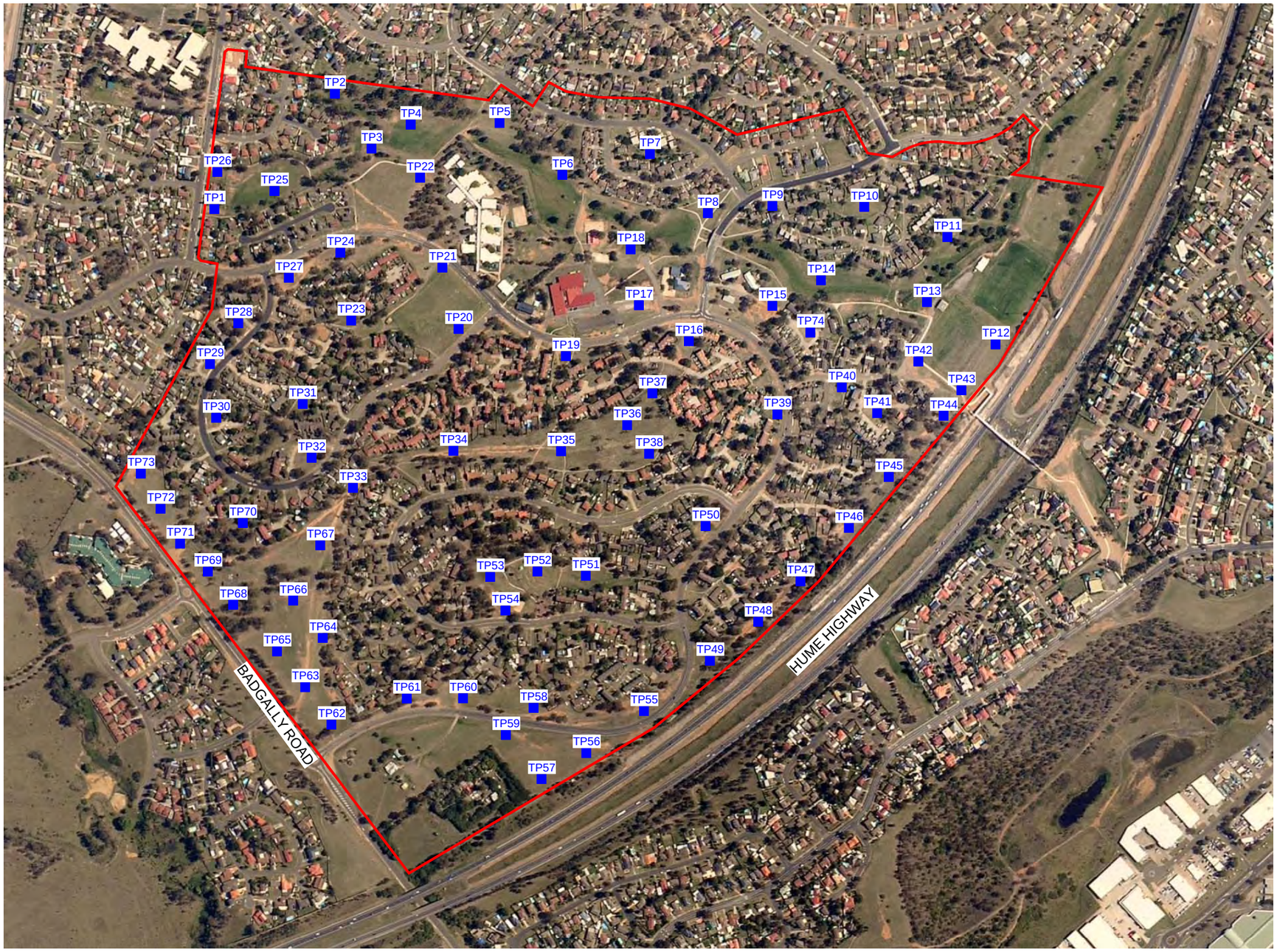
Appendix 1: Site plan and field logs

Test locations plan

Excavation logs

Borehole logs

Explanatory notes



Aerial photograph obtained from nearmap.com

N

LEGEND

Test Pit

0 75 150 225 300 375m

Scale 1:7500

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CONSULTING ENGINEERS

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Penrith NSW 2750
Tel: 02 4722 2700
Fax: 02 4722 2777

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www.geotech.com.au

NOTES

1. This drawing has been produced using a base plan provided by others, to which additional information e.g., test pits, borehole locations or notes have been added. Some or all of the information on this plan may not be relevant at the time of producing this drawing.
2. Site features are shown at approximate locations and are not to scale.

Landcom Parramatta
Claymore Urban Renewal
Badgally Road
Claymore

Test Pit Locations

Drawing No: 12467/1-AA1
Job No: 12467/1
Drawn By: MH
Date: 10 May 2011
Checked By: IJ

File Ref: Drawing 12467-1
Layers: 0, AA1

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 1
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			FILL; Silty Clay, medium plasticity, brown				
	ES		U_{50}		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt		Alluvial
					1		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M≤PL	VSt		
			DS		1.5		CL-CI	Silty CLAY, low to medium plasticity, orange brown	M≤PL	St-VSt		
					2							
					2.5			Test Pit No 1 terminated at 2.5m				
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 2
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt		
					1		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M≤PL	VSt		Moisture content increases
			DS		1.5							
			DS		2							
DRY					2.5							
								Test Pit No 2 terminated at 2.7m				
					3							
					3.5							
					4							
					4.5							

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Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 3
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES			CONE 4	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES			11			CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
				12								
				22								
			DB		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	St		
					1		CL-CI	Silty CLAY, low to medium plasticity, orange brown	M≤PL	St		
			DS		1.5							
			DS		2		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M≥PL	St-VSt		
					2.5			Test Pit No 3 terminated at 2.5m				
					3							
					3.5							
					4							
					4.5							

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Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 4
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
					0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	St		
							CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M≥PL	St		
			DS		1							
			DS		1.5							
					2							
			DS		2.5		CH	Silty CLAY, high plasticity, grey, with shale fragments	M≥PL	St		Residual
Dry					3			Test Pit No 4 terminated at 3.0m				
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 5
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		
			DS		1							
			DS		1.5							
			DS		2							
DRY					2.5		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
								Test Pit No 5 terminated at 2.6m due to refusal on shale bedrock				
					3							
					3.5							
					4							
					4.5							

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Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 6
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES		DS	CONE 7	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES			11			CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
				7								
				13								
				13			CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
				12	0.5							
				12								
				14								
				20								
			DS		1		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			DS		1.5							
DRY								SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 6 terminated at 2.0m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 7
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt-H		Alluvial
			U_{50}		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			DS		1							
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
Dry								Test Pit No 7 terminated at 1.6m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

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Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 8
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES				0.5			FILL; Silty Clay, medium plasticity, brown				
	ES				1							
Dry	ES		DS		1.5		CL-CI	Silty CLAY, low to medium plasticity, orange brown	M≤PL	St-VSt		Alluvial
					2							
					2.5			Test Pit No 8 terminated at 2.8m				
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 9
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES							FILL; Silty Clay, medium plasticity, brown, with brick fragments				
	ES				0.5			FILL; Silty Clay, low to medium plasticity, grey				
	ES		DS				CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
					1		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			DS		1.5							
					2							
			DS		2.5							
					3		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
					3.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	St		Residual
					4			Test Pit No 9 terminated at 3.7m				
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 10
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
			DS		0.5							
			DB				CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		
					1							
			DS									
					1.5							
					2							
							CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M=PL	VSt-H		
			DS		2.5							
					3		CH	Silty CLAY, high plasticity, orange brown, grey, traces of ironstone	M=PL	VSt-H		Residual
Dry					3.5							
			DS									
					4			Test Pit No 10 terminated at 4.0m				
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 11
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS				CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
			U_{50}		0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	H		
					1		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M≤PL	VSt-H		
			DS		1.5							
					2							
			DS		2.5							
					3							
					3.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M≤PL	VSt-H		
Dry												
					4			Test Pit No 11 terminated at 3.8m				
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 12
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES			CONE 3	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
				8								
	ES			9			CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		Alluvial
				8								
				8								
				9	0.5							
			DS	17			CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
				15								
				17			CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 12 terminated at 1.2m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 13
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS				CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
					0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	VSt		
							CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M≤PL	VSt		
			DS		1							
					1.5							
			DS		2							
					2.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M≥PL	VSt		
					3			Test Pit No 13 terminated at 3.0m				
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 14
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		U_{50}		0.5			FILL; Silty Clay, medium to high plasticity, brown, with shale fragments				
	ES		DS		1							
	ES		DS		1.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	VSt-H		Alluvial
					2			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2.5			Test Pit No 14 terminated at 2.2m due to refusal on shale bedrock				
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 15
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			FILL; Silty Clay, high plasticity, orange brown, traces of roots				
	ES							FILL; Silty Clay, medium plasticity, brown				
	ES		DS		0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	St		Residual
			DS									
			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
Dry					1.5			Test Pit No 15 terminated at 1.1m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 16
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS				CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
							CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			U_{50}		0.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
			DS		1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 16 terminated at 1.5m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 17
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			DB		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			DS		1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
								SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 17 terminated at 1.1m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 18
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES				0.5			FILL; Silty Clay, medium plasticity, brown		VSt		
	ES		DS		1			FILL; Clay, medium plasticity, dark grey		St		
	ES				1.5							
					2			Test Pit No 18 terminated at 2.2m				Test Pit located on drainage swale
					2.5							
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 19
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES							FILL; Silty Clay, medium plasticity, brown				
	ES		U_{50}		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		Alluvial
			DS		1							
					1.5							
			DS				CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
					2			Test Pit No 19 terminated at 2.2m due to refusal on extremely weathered shale				
					2.5							
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 20
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
			DB		0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	H		
					1							
			DS				CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry					1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 20 terminated at 1.5m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 21
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS	CONE 2	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES			11				FILL; Silty Clay, medium to high plasticity, brown, with shale fragments	M<PL	St		
				12								
	ES			10								
				5								
				6	0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	VSt		Alluvial
			DS	9								
				11								
				17			CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
					1							
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1.5							
								SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 21 terminated at 1.8m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 22
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
							CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			U_{50}		0.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		Residual
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		
			DS		1							
Dry			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 22 terminated at 1.6m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 23
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
					1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS					SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1.5			Test Pit No 25 terminated at 1.4m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 24
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			TOPSOIL; Silty Sand, fine grained, dark brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
			U_{50}		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt		
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No24 terminated at 1.7m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 25
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES							FILL; Clay, medium plasticity, dark grey		VSt		
					0.5							
	ES											
					1		CL-CI	Silty CLAY, low to medium plasticity, orange brown	M>PL	VSt		Alluvial
	ES											
			DS				CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M>PL	VSt-H		
					1.5							
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M>PL	H		Residual
			DS		2							
					2.5							
								Test Pit No 25 terminated at 2.6m				
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 26
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES			CONE 8	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES			7			CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt		Alluvial
				7								
				5								
				5	0.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
			DS	10								
				13								
				13			CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
				22								
			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 26 terminated at 1.2m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 27
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Sand, fine grained, dark brown, traces of roots				
	ES		DS				CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
			DB		0.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
			DS		1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
					1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 27 terminated at 1.9m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 28
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
dry	ES		DS	CONE 4	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
				8				FILL; Silty Clay, medium to high plasticity, brown, with shale fragments				
	ES			11								
				16								
				27	0.5							
				35/ref								
	ES				1							
	ES		DS									
					1.5			Test Pit No 28 terminated at 1.4m due to refusal on concrete pipe				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 29
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
					0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			DS									
					1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1.5							
Dry					2			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 29 terminated at 2.1m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 30
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS		0.5		CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			U_{50}				CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
					1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 30 terminated at 2.0m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 31
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS	CONE 6	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES			12			CL	Silty CLAY, low plasticity, grey, traces of root fibres, with ironstone	M<PL	VSt-H		Alluvial
				7								
				7	0.5							
			DS	11			CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		
				30	1							
							CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			DS		1.5							
							CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
			DS		2							
					2.5							
					3			Test Pit No 31 terminated at 3.0m due to refusal on bedrock				
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 32
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			DB		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt		
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 32 terminated at 1.1m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 33
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
			U_{50}		0.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		
			DS					SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1			Test Pit No 33 terminated at 0.9m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 34
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS	CONE 10	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES			11			CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
				8			CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
				9								
				8	0.5							
			DS	14			CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
				23				SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1			Test Pit No 34 terminated at 0.9m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 35
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
			DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			DS		1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
								SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1.5			Test Pit No 35 terminated at 1.3m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 36
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES							FILL; Silty Clay, medium to high plasticity, brown, with shale fragments				
	ES						CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	H		Alluvial
					0.5		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 36 terminated at 1.1m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 37
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt		Alluvial
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	VSt-H		Residual
Dry			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 37 terminated at 1.0m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 38
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES			CONE 5	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES			7			CL	Silty CLAY, low plasticity, grey, traces of root fibres	M≤PL	VSt-H		Alluvial
			DS	8								
				6			CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		
				7	0.5							
			DS	20			CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
								SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1			Test Pit No 38 terminated at 0.9m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 39
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
			DS					FILL; Silty Clay, medium plasticity, brown				
	ES				0.5							
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
			DB		1		CH	Silty CLAY, high plasticity, orange brown, grey				
			DS				CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		
			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 39 terminated at 2.1m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 40
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES			CONE 5	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS	8				FILL; Silty Clay, medium to high plasticity, brown, with shale fragments		VSt-H		
				6	0.5							
				9								
				14								
				9								
				15								
				14								
				15			CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
			DS		1							
					1.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
							CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	S-St		
			DS		2							
					2.5							
					3			Test Pit No 40 terminated at 3.0m				
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 41
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES			CONE 12	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
				11								
	ES			12				FILL; Silty Clay, low to medium plasticity, grey	M<PL	St		
				12								
	ES		U_{50}	12	0.5		CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
				14								
				15								
				17			CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	VSt		
				18								
				20	1		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	VSt		Residual
			DS		1.5							
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		
			DS		2							
					2.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					3			Test Pit No 41 terminated at 2.8m due to refusal on shale bedrock				
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 42
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			FILL; Crushed Shale, with medium to high plasticity clay and ironstone				
	ES		DS				CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	St		Alluvial
					0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	St-VSt		
					1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1.5							
			DS		2			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2.5			Test Pit No 42 terminated at 2.5m due to refusal on shale bedrock				
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 43
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES							FILL; Silty Clay, medium plasticity, brown				
	ES		DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1.5			Test Pit No 43 terminated at 1.3m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 44
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
			DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	VSt-H		
					1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1.5							
			DS		2			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2.5			Test Pit No 44 terminated at 2.2m due to refusal on shale bedrock				
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 45
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS				CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	VSt		Residual
			DS		0.5							
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		
			DS		1							
Dry					1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 45 terminated at 1.6m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 46
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
dry	ES			CONE 9 20	0		CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			DS		0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	H		
			DS		1		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			DS		1.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
			DS		2		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
					2.5							
					3							
					3.5			Test Pit No 46 terminated at 3.5m on shale bedrock				
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 47
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
dry	ES		DS		0			SHALE, grey brown, extremely to distinctly weathered				On the base of a drainage swale Bedrock
			DS		0.5							
					1							
					1.5			Test Pit No 47 terminated at 1.4m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 48
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0		CH	Silty CLAY, high plasticity, orange brown, grey	M≤PL	St		Residual
			U_{50}									
			DS		0.5		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		
			DS		1							
			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 48 terminated at 2.1m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 49
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
			DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, grey	M<PL	VSt		
			DB		1							
							CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		
			DS		1.5							
					2		CI-CH	Silty CLAY, medium to high plasticity, brown red, traces of ironstone and shale fragments	M<PL	H		
Dry			DS		2.5			Test Pit No 49 terminated at 2.5m				
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 50
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
			U_{50}		0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	VSt		
			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1.5			Test Pit No 50 terminated at 1.3m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 51
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES		DS		0			TOPSOIL; Silty Sand, fine grained, dark brown, traces of roots				
	ES							FILL; Silty Clay, medium plasticity, brown		H		
			U_{50}		0.5							
			DS									
	ES				1							
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
			DS		1.5		CL-CI	Silty CLAY, low to medium plasticity, orange brown	M≤PL	H		
Dry					2		CI-CH	Silty CLAY, medium to high plasticity, grey, with shale fragments	M<PL	H		
					2.5			Test Pit No 51 terminated at 2.5m				
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 52
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS	CONE 10, 11, 14, 22	0			TOPSOIL; Silty Sand, fine grained, dark brown, traces of roots				
	ES		DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		Alluvial
			DS		1		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
			DS		1.5							
					2			Test Pit No 52 terminated at 2.2m due to refusal on siltstone				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 53
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			TOPSOIL; Silty Sand, fine grained, dark brown, traces of roots				
	ES							FILL; Silty Clay, medium plasticity, brown				
	ES				0.5		CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
			DS		1		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
					1.5			Test Pit No 53 terminated at 1.5m due to refusal on siltstone/sandstone bedrock				Bedrock
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 54
Date : 05/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			DB		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		
							CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
			DS		1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 54 terminated at 1.6m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 55
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS					FILL; Silty Clay, medium to high plasticity, brown, with shale fragments				
								ASPHALTIC CONCRETE				Former road
	ES				0.5			FILL; Crushed Sandstone, with fine to medium grained sand, yellow brown				
	ES						CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 55 terminated at 1.6m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 56
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
					0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	VSt		
			DS		1		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
					1.5							
					2		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS					SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2.5			Test Pit No 56 terminated at 2.5m due to refusal on shale bedrock				
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 57
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS	CONE 5	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES			6			CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			U_{50}	6	0.5							
				8								
			DS	14								
				20				SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1			Test Pit No 57 terminated at 0.9m due to refusal on shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 58
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS		0.5		CL	Silty CLAY, low plasticity, grey, traces of root fibres, with ironstone	M<PL	St		Alluvial
			U_{50}		1		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt		
			DS		1.5		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	VSt-H		Residual
Dry								SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 58 terminated at 1.8m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 59
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS					FILL; Silty Clay, medium to high plasticity, brown, with shale fragments				
	ES		DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		Alluvial
			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1.5			Test Pit No 59 terminated at 1.3m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 60
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS					FILL; Silty Clay, medium to high plasticity, brown, with shale fragments				
	ES				0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		Alluvial
			DS					SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 60 terminated at 0.7m due to refusal on shale bedrock				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 61
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St-VSt		Alluvial
			DS				CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	VSt-H		
			DS		0.5		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
					1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1.5			Test Pit No 61 terminated at 1.3m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 62
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES		DS		0			FILL; Silty Clay, medium plasticity, brown				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
			DS		1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 62 terminated at 2.2m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 63
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		Alluvial
			DS		0.5							
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
					1							
			DS					SHALE, grey brown, extremely to distinctly weathered				Bedrock
					1.5			Test Pit No 63 terminated at 1.5m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 64
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES			CONE 3	0			TOPSOIL; Silty Clay, low plasticity, brown,				
	ES			12			CL	traces of roots Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
				11								
				12			CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	H		
			U_{50}	11	0.5							
				10			CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual Layer of shale
				15								
				25								
				22								
				15								
			DS		1							
			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 64 terminated at 1.7m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 65
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		Alluvial
			DS		0.5							
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
					1							
								SHALE, grey brown, extremely to distinctly weathered				Bedrock
			DS		1.5							
DRY					2			Test Pit No 65 terminated at 2.0m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 66
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
					0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	H		
			DS		1		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
					1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 66 terminated at 1.5m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 67
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES							FILL; Silty Clay, medium to high plasticity, brown, with shale fragments				
	ES		DS		0.5		CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
							CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstones	M<PL	H		
			DS		1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 67 terminated at 1.7m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 68
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
			DS		0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry			DS		1			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 68 terminated at 1.1m due to shale bedrock				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 69
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Dry	ES			CONE 4	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES		DS	5			CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
				5								
				7			CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		
			DB	10	0.5							
				12								
				14								
				29/ref			CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1							
					1.5							
			DS					SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2							
								Test Pit No 69 terminated at 2.1m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 70
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe **R.L. surface :**

Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES							FILL; Silty Clay, medium plasticity, brown				
	ES		DS		0.5		CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
							CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	H		
			DS		1							
							CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		Residual
			DS		1.5							
Dry								SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 70 terminated at 1.8m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE PTY LTD

engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road Claymore

Job No : 12467/1&2
Pit No : 71
Date : 03/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
			U_{50}				CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		
			DS		0.5							
			DS		1		CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
Dry					2			Test Pit No 71 terminated at 2.0m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 72
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES		DS		0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
	ES						CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
					0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	VSt		
			DS		1		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
			DS		1.5							
					2			Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
Dry					2.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 72 terminated at 2.5m due to refusal on shale bedrock				
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 73
Date : 04/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES			CONE 12	0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
				20			CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
	ES			22			CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	H		
				20								
				26								
			DS	32	0.5							
							CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
			DS		1							
							CH	Silty CLAY, high plasticity, grey, with shale fragments	M<PL	H		Residual
			DS		1.5							
DRY								SHALE, grey brown, extremely to distinctly weathered				Bedrock
					2			Test Pit No 73 terminated at 2.0m due to refusal on shale bedrock				
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
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engineering log - excavation

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No : 12467/1&2
Pit No : 74
Date : 02/05/2011
Logged/Checked by: AN.JK/AB.IJ

Equipment type and model: Backhoe
R.L. surface :
Excavation dimensions : 2.0 **m long** 0.5 **m wide** **datum :**

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	ES				0			TOPSOIL; Silty Sand, fine grained, dark brown, traces of roots				
	ES		DS		0.5			FILL; Silty Clay, medium plasticity, brown, traces of concrete, brick and fibro cement fragments				
	ES		DS				CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
					1		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	St		Residual
Dry			DS		1.5			SHALE, grey brown, extremely to distinctly weathered				Bedrock
								Test Pit No 74 terminated at 1.5m due to refusal on shale bedrock				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

GEOTECHNIQUE
PTY LTD

engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 2
Date : 13/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Explorer **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
V-bit						0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
								CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
				DS	N=6 /Ref	0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt		
						1		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M≤PL	VSt		Moisture content increases
TC-bit				DS	N=11 4,5,6	2							
						2.5							
						3							
				DS	N=12 3,5,7	3.5							
	Dry					4			Borehole No 2 terminated at 3.95m on shale				
						4.5							

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 9
Date : 13/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Explorer **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
V-bit						0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
									FILL; Silty Clay, medium plasticity, brown, with brick fragments				
						0.5			FILL; Silty Clay, low to medium plasticity, grey				
				DS	N=14 3,8,6			CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	VSt		Alluvial
						1		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
						1.5							
				DS	N=22 2,7,15	2							
						2.5							
						3		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	H		
								CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	St		Residual
				DS	N=8 2,4,4	3.5							
						4							
						4.5							

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 9
Date : 13/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Explorer **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
TC-bit	▼			DS	N=14 4,6,8	5		CI-CH	Silty CLAY, medium to high plasticity, orange, with shale fragments	M>PL	VSt-H		
				DS	N=23 5,10,13	6.5							Possible groundwater level
						8			Borehole No 9 terminated at 8.0m at SPT refusal				

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 11
Date : 06/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Ezy-cat **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
V-bit						0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
								CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
								CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	H		
				DS	N=26 7,10,16	0.5							
						1		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M≤PL	VSt-H		
				DS	N=18 6,7,11	1.5							
						2							
						2.5							
						3							
	▼					3.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M≤PL	VSt		Possible groundwater level
				DS	N=15 4,6,9								
						4							
						4.5							

GEOTECHNIQUE
PTY LTD

engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 11
Date : 06/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Ezy-cat **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
						5				M>PL	H		
				DS	N=24 6,10,14	5.5							
						6		CI-CH	Silty CLAY, medium to high plasticity, dark grey, with shale	M>PL	H		
						6.5			Borehole No 11 terminated at 6.4m on shale				
						7							
						7.5							
						8							
						8.5							
						9							
						9.5							

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 13
Date : 13/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Explorer **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
TC-bit						0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
								CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
						0.5		CH	Silty CLAY, high plasticity, orange brown, grey	M<PL	VSt		
				DS	N=18 3,7,11			CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M≤PL	VSt		
						1							
						1.5							
				DS	N=13 2,5,8	2							
						2.5		CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M≥PL	VSt		
						3							
						3.5							
				DS	N=14 4,5,9			CI-CH	Silty CLAY, medium to high plasticity, grey, orange	M≥PL	H		
						4							
	▼					4.5		CI	Silty CLAY, medium plasticity, dark grey, with shale fragments	M>PL	H		Possible groundwater level

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 13
Date : 13/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Explorer **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
				DS	21/300	5 5.5							
						6 6.5 7 7.5 8 8.5 9 9.5			Borehole No 13 terminated at 5.8m due to SPT refusal on shale bedrock				

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 18
Date : 13/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Explorer **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
V-bit						0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
									FILL; Silty Clay, medium plasticity, brown		VSt		
				DS	N=13 4,5,8	0.5							
						1			FILL; Clay, medium plasticity, dark grey		St		
				DS	N=8 3,4,4	2							
				DS	N=11 4,6,5	3.5							
						3		CI-CH	Silty CLAY, medium to high plasticity, orange-grey, traces of ironstones and shale	M>PL	St-VSt		Alluvial
						4							
						4.5							

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 18
Date : 13/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Explorer **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	▼			DS	N=8 3,3,5	5 5.5							Standing groundwater level
						6 6.5 7 7.5 8 8.5 9 9.5			Borehole No 18 terminated at 5.9m on possible siltstone/sandstone bedrock				

GEOTECHNIQUE
PTY LTD

engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 25
Date : 13/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Explorer **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
V-blt	▼					0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
									FILL; Clay, medium plasticity, dark grey		VSt		
				DS	N=14 3,5,9	0.5							
						1		CL-CI	Silty CLAY, low to medium plasticity, orange brown	M>PL	VSt		Alluvial
								CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M>PL	VSt-H		
						1.5		CH	Silty CLAY, high plasticity, grey, with shale fragments	M>PL	H		Residual Possible standing water table
				DS	N=42 7,18,24	2							
						2.5							
									Borehole No 25 terminated at 2.6m on shale				
						3							
						3.5							
						4							
						4.5							

GEOTECHNIQUE
PTY LTD

engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 40
Date : 06/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Ezy-cat **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
V-bit						0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
									FILL; Silty Clay, medium to high plasticity, brown, with shale fragments		VSt-H		
				DS	N=20 6,9,11	0.5							
						1		CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
						1.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	H		
								CI-CH	Silty CLAY, medium to high plasticity, brown, with ironstones and shale fragments	M<PL	S-St		
				DS	N=3 3,1,2	2							
						2.5							
						3							
				DS	N=8 1,3,5	3.5		CI	Silty CLAY, medium plasticity, orange-brown, with ironstones and shale	M>PL	St-H		
						4							
						4.5							

GEOTECHNIQUE
PTY LTD

engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 40
Date : 06/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Ezy-cat **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
						5					H		
				DS	N=28 7,12,16	5.5							
	Dry					6		CI	Silty CLAY, medium plasticity, brown, with shale	M=PL	H		Residual Bedrock
						6.5			Borehole No 40 terminated at 6.3m				
						7							
						7.5							
						8							
						8.5							
						9							
						9.5							

GEOTECHNIQUE
PTY LTD

engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 49
Date : 06/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Ezy-cat **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
V-bit	Dry					0			TOPSOIL; Silty Clay, low plasticity, brown, traces of roots				
								CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	St		Alluvial
				DS	N=17 9,9,8	0.5		CI-CH	Silty CLAY, medium to high plasticity, orange brown, grey	M<PL	VSt		Alluvial
						1							
								CI-CH	Silty CLAY, medium to high plasticity, orange brown, traces of ironstone	M<PL	VSt-H		
						1.5							
				DS	N=44 14,20,24	2		CI-CH	Silty CLAY, medium to high plasticity, brown red, traces of ironstone and shale fragments	M<PL	H		
						2.5							
						3							
				DS	N=37 7,16,21	3.5		CI-CH	Silty CLAY, medium to high plasticity, grey-brown, with shale fragments	M<PL	H		Residual
						4			Borehole No 49 terminated at 4.0m on shale bedrock				Bedrock
						4.5							

GEOTECHNIQUE
PTY LTD

engineering log - borehole

Client : Landcom Parramatta
Project : Claymore Urban Renewal
Location : Badgally Road
Claymore

Job No. : 12467/1&2
Borehole No. : 51
Date : 05/05/2011
Logged/Checked by: JK/AB.IJ

drill model and mounting : Ezy-cat **slope :** **deg.** **R.L. surface :**

hole diameter : 125 **mm** **bearing :** **deg.** **datum :**

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
V-bit	Dry					0			TOPSOIL; Silty Sand, fine grained, dark brown, traces of roots				
									FILL; Silty Clay, medium plasticity, brown		H		
				DS	N=38 12,16,22	0.5							
						1		CL	Silty CLAY, low plasticity, grey, traces of root fibres	M<PL	H		Alluvial
						1.5		CL-CI	Silty CLAY, low to medium plasticity, orange brown	M≤PL	H		
				DS	N=31 8,13,18	2							
								CI-CH	Silty CLAY, medium to high plasticity, grey, with shale fragments	M<PL	H		
						2.5							
						3							
								CI	Silty CLAY, medium plasticity, grey, traces of siltstone	M<PL	H		Residual
				DS	N=45 4,14,31	3.5							
						4							Bedrock
						4.5			Borehole No 51 terminated at 4.2m on shale				

EXPLANATORY NOTES

Introduction
These notes have been provided to simplify the geotechnical report with regard to investigation procedures, classification methods and certain matters relating to the Discussion and Comments section. Not all notes are necessarily relevant to all reports.

Geotechnical reports are based on information gained from finite sub-surface probing, excavation, boring, sampling or other means of investigation, supplemented by experience and knowledge of local geology. For this reason they must be regarded as interpretative rather than factual documents, limited to some extent by the scope of information on which they rely.

Description and Classification Methods
The methods of description and classification of soils and rocks used in this report are based on AS1726 - 1993 "Geotechnical Site Investigations". In general, descriptions cover the following properties; strength or density, colour, structure, soil or rock type, and inclusions. Identification and classification of soil and rock involves, to a large extent, judgement within the acceptable level commonly adopted by current geotechnical practices.

Soil types are described according to the predominating particle size, qualified by the grading or other particles present (e.g. sandy clay) on the following basis:

Soil Classification	Particle Size
Clay	Less than 0.002mm
Silt	0.002 to 0.06mm
Sand	0.06 to 2.00mm
Gravel	2.00mm to 60.00mm

Cohesive soils are classified on the basis of strength, either by laboratory testing or engineering examination. The strength terms are defined as follows:

Classification	Undrained Shear Strength kPa
Very Soft	Less than 12
Soft	12 – 25
Firm	25 – 50
Stiff	50 – 100
Very Stiff	100 – 200
Hard	Greater than 200

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT), as below:

Relative Density	SPT 'N' Value (blows/300mm)	CPT Cone Value (q_c-MPQ)
Very Loose	Less than 5	Less than 2
Loose	5 – 10	2 – 5
Medium Dense	10 – 30	5 – 15
Dense	30 – 50	15 – 25
Very Dense	>50	>25

Rock types are classified by their geological names, together with descriptive terms on degrees of weathering, strength, defects and other minor components. Where relevant, further information regarding rock classification is given on the following sheet.

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

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, type, moisture content, 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 (normally known as U_{50}) into the soil and withdrawing 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. Details of the type and method of sampling are given in the report.

Field Investigation Methods
The following is a brief summary of investigation methods currently carried out by this Company and comments on their use and application.

Hand Auger Drilling
The borehole is advanced by manually operated equipment. The diameter of the borehole ranges from 50mm to 100mm. Penetration depth of hand augered boreholes may be limited by premature refusal on a variety of materials, such as hard clay, gravels or ironstone.

Test Pits
These are excavated with a tractor-mounted backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3.0m for a backhoe and up to 6.0m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Care must be taken if construction is to be carried out near, or within the test pit locations, to either adequately recompact the backfill during construction, or to design the structure to accommodate the poorly compacted backfill.

Large Diameter Auger (e.g. Pengo)
The hole is advanced by a rotating plate or short spiral auger, generally 300mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5m) 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 sampling.

Continuous Spiral Flight Augers
The hole is advanced by using 90mm-115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling or insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be highly mixed with soil of other stratum.

Information from the drilling (as distinct from specific sampling by SPT or undisturbed samples) is of relatively lower reliability due to remoulding, mixing or softening of samples by groundwater, resulting in uncertainties of the original sample depth.

The spiral augers are usually advanced by using a V-bit through the soil profile to refusal, followed by Tungsten Carbide (TC) bit, to penetrate into bedrock. The quality and continuity of the bedrock may be assessed by examination of recovered rock fragments and through observation of the drilling penetration resistance.

Non-core Rotary Drilling (Wash Boring)
The hole is advanced by a rotary bit, with water being pumped down the drill rod 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 feel and rate of penetration.

Rotary Mud Stabilised Drilling
This is similar to rotary drilling, but uses drilling mud as a circulating fluid, which may consist of a range of products from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (e.g. SPT and U_{50}) samples).

Continuous Core Drilling
A continuous core sample is obtained using a diamond tipped core barrel. Providing full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush.

Portable Proline Drilling
This is manually operated equipment and is only used in sites which require bedrock core sampling and there is restricted site access to truck mounted drill rigs. The boreholes are usually advanced initially using a tricone roller bit and water circulation to penetrate the upper soil profile. In some instances, a hand auger may be used to penetrate the soil profile. Subsequent drilling into bedrock involves the use of NMLC triple tube equipment, using water as a lubricant.

Standard Penetration Tests
Standard penetration tests are used mainly in non-cohesive soils, but occasionally also in cohesive soils, as a means of determining density or strength and of obtaining a relatively undisturbed sample. The test procedure is described in AS1289 6.3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube under the impact of a 63kg hammer with a free fall of 769mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In a case where full penetration is obtained with successive blow counts for each 150mm of, say 4, 6 and 7 blows as;

  N = 13
  4,6,7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm as;

  15, 30/40mm

The results of the tests can be related empirically to the engineering properties of the soil. Occasionally the test method is used to obtain samples in 50mm diameter thin walled sample tubes in clays. In these circumstances, the test results are shown on the bore logs in brackets.

Cone Penetrometer Testing and Interpretation
Cone penetrometer testing (sometimes referred to as Dutch Cone-CPT) described in this report, has been carried out using an electrical friction cone penetrometer and the test is described in AS1289 6.5.1.

In the test, a 35mm diameter rod with cone tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig, which is fitted with a hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the friction resistance on a separate 130mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output on continuous chart recorders. The plotted results given in this report have been traced from the original records. The information provided on the charts comprises:

- Cone resistance - the actual end bearing force divided by the cross sectional area of the cone, expressed in MPa *
- Sleeve friction - the frictional force on the sleeve divided by the surface area, expressed in kPa

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and very soft clays, rising to 4% to 10% in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:

$$q_c \text{ (MPa)} = (0.4 \text{ to } 0.6)\ N \text{ (blows per 300mm)}$$

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:

$$q_c=(12 \text{ to } 18)C_u$$

Interpretation of CPT values can also be made to allow estimate of modulus or compressibility values, to allow calculation of foundation settlements. Inferred stratification, as shown on the attached report, is assessed from the cone and friction traces, from experience and information from nearby boreholes etc.

This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties and where precise information or soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometer (DCP)
Portable Dynamic Cone Penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows per successive 100mm increment of penetration.

There are two similar tests, Cone Penetrometer (commonly known as Scala Penetrometer) AS1289 6.3.2 and the Perth Sand Penetrometer AS1289 6.3.3. Scala Penetrometer is commonly adopted by this company and consists of a 16mm rod with a 20mm diameter cone end, driven with a 9kg hammer, dropping 510mm (AS1289 Test P3.2).

Laboratory Testing
Laboratory testing is carried out in accordance with Australian Standard 1289 "Methods of Testing Soil for Engineering Purposes". Details of the test procedures are given on the individual report forms.

Engineering Logs
The engineering logs presented herein are an engineering and/or geological interpretation of the sub-surface conditions and their reliability will depend to some extent on frequency of sampling and the method of drilling. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, however, this is not always practicable or possible to justify economically. As it is, the boreholes represent only a small sample of the total sub-surface profile. Interpretation of the information and its application to design and construction should take into account the spacing of boreholes, frequency of sampling and the possibility of other than 'straight line' variations between the boreholes.

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

- in low permeability soils groundwater, although present, may enter the hole slowly or perhaps not at all during the investigation period
- 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 due to the seasons or recent weather changes. They may not be the same at the time of construction as indicated in the report
- 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 be washed out of the hole if water observations are to be made

More reliable measurements can be achieved by installing standpipes that are read at intervals over several days, or 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 or surface water.

Engineering Reports
Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, perhaps a three-storey building, the information and interpretation may not be relevant if the design proposal is changed, say to a twenty-storey building. If this occurs, the Company will be pleased to review the report and sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of sub-surface conditions, discussions of geotechnical aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

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

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

Site Anomalies
In the event that conditions encountered on-site during construction appear to vary from those that were expected from the information contained in the report, the Company requests immediate notification. Most problems are much more easily resolved when conditions are exposed rather than at some later stage, well after the event.

Reproduction of Information for Contractual Purposes
Attention is drawn to the document "Guidelines for the Provision of Geotechnical Information in Tender Documents", published by the Institute of Engineers Australia. Where information obtained from this Investigation 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. The Company would be pleased to assist in this regard and/or make additional copies of the report available for contract purposes, at a nominal charge.

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

Review of Design
Where major civil or structural developments are proposed, or where only a limited investigation has been completed, or where the geotechnical conditions are complex, it is prudent to have the design reviewed by a Senior Geotechnical Engineer.

Appendix 2: Laboratory test results

Results of physical properties tests

Results of chemical properties tests

GEOTECH TESTING PTY LTD
ABN 71 076 676 321

Certified System Quality ISO 9001 SAI GLOBAL

LANDCOM PARRAMATTA
LEVEL 2 - 330 CHURCH STREET
PARRAMATTA NSW 2150

GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Job No:	12467/1	Tested By:	NW & AN
Laboratory	Penrith	Checked By:	AK
Date Tested	10/05/2011		

Sample Identification	Test Pit 10	Test Pit 15	Test Pit 39
Laboratory Number	12467/1-1	12467/1-4	12467/1-5
Depth (m)	0.6 - 1.0	0.5 - 0.6	0.8 - 1.1
Test Description			
Liquid Limit (W_L)	45%	62%	60%
Plastic Limit (W_P)	18%	24%	25%
Plastic Index (I_P)	27%	38%	35%
Linear Shrinkage (LS)	13.0%	15.0%	15.5%
Mould Length (mm)	127	125	125
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CI) CLAY, medium plasticity, grey	(CH) Silty CLAY, high plasticity, orange-brown & grey	(CH) Silty CLAY, high plasticity, orange-brown & grey

Form No R004 Vers 10 - 11/09 - Issued by ER

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Nata Accreditation Number 2734
Corporate Site Number 2727

A Kench 18/05/2011
Approved Signatory

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Job No:	12467/1	Tested By:	NW & AN
Laboratory	Penrith	Checked By:	AK
Date Tested	10/05/2011		

Sample Identification	Test Pit 43	Test Pit 46	Test Pit 49
Laboratory Number	12467/1-7	12467/1-8	12467/1-10
Depth (m)	0.5 - 0.8	0.2 - 0.5	0.6 - 0.9m
Test Description			
Liquid Limit (W_L)	36%	52%	36%
Plastic Limit (W_P)	19%	20%	15%
Plastic Index (I_P)	17%	32%	21%
Linear Shrinkage (LS)	8.5%	16.5%	10.5%
Mould Length (mm)	125	125	127
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CI) Silty CLAY, medium plasticity, grey	(CH) Silty CLAY, high plasticity, orange-brown & grey	(CI) Silty CLAY, medium plasticity, orange-brown & grey

Form No R004 Vers 10 - 11/09 - Issued by ER

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LANDCOM PARRAMATTA
LEVEL 2 - 330 CHURCH STREET
PARRAMATTA NSW 2150

GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Job No:	12467/1	Tested By:	NW & AN
Laboratory	Penrith	Checked By:	AK
Date Tested	10/05/2011		

Sample Identification	Test Pit 62	Test Pit 69
Laboratory Number	12467/1-14	12467/1-15
Depth (m)	0.5 - 0.6	0.4 - 0.7
Test Description		
Liquid Limit (W_L)	59%	43%
Plastic Limit (W_P)	22%	19%
Plastic Index (I_P)	37%	24%
Linear Shrinkage (LS)	16.0%	13.0%
Mould Length (mm)	125	127
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CH) Silty CLAY, high plasticity, orange-brown	(CI) Silty CLAY, medium plasticity, orange-brown

Form No R004 Vers 10 - 11/09 - Issued by ER

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Nata Accreditation Number 2734
Corporate Site Number 2727

A Kench 18/05/2011
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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Job No:	12467/1	Tested By:	AN
Laboratory	Penrith	Checked By:	AK
Date Tested	13/05/2011		

Sample Identification	Test Pit 3	Test Pit 17	Test Pit 20
Laboratory Number	12467/1-17	12467/1-18	12467/1-19
Depth (m)	0.5 - 0.7	0.3 - 0.5	0.6 - 0.8
Test Description			
Liquid Limit (W_L)	51%	62%	70%
Plastic Limit (W_P)	24%	27%	30%
Plastic Index (I_P)	27%	35%	40%
Linear Shrinkage (LS)	14.5%	17.5%	20.0%
Mould Length (mm)	127	127	127
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CI-CH) Silty CLAY, medium to high plasticity, orange-brown	(CH) Silty CLAY, high plasticity, orange-brown	(CH) Silty CLAY, high plasticity, orange-brown & grey

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Job No:	12467/1	Tested By:	AN
Laboratory	Penrith	Checked By:	AK
Date Tested	13/05/2011		

Sample Identification	Test Pit 27	Test Pit 32	Test Pit 54
Laboratory Number	12467/1-20	12467/1-21	12467/1-22
Depth (m)	0.5 - 0.7	0.5 - 0.7	0.4 - 0.6
Test Description			
Liquid Limit (W_L)	57%	58%	48%
Plastic Limit (W_P)	25%	27%	23%
Plastic Index (I_P)	32%	31%	25%
Linear Shrinkage (LS)	15.5%	15.0%	7.0%
Mould Length (mm)	125	125	127
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CH) Silty CLAY, high plasticity, brown, trace of fine to medium gravel	(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel	(CI) Silty CLAY, medium plasticity, orange-brown, trace of fine to medium gravel

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Job No:	12467/1	Tested By:	AN
Laboratory	Penrith	Checked By:	AK
Date Tested	13/05/2011		

Sample Identification	Test Pit 22
Laboratory Number	12467/1-27
Depth (m)	0.4 - 0.8
Test Description	
Liquid Limit (W_L)	64%
Plastic Limit (W_P)	26%
Plastic Index (I_P)	38%
Linear Shrinkage (LS)	18.0%
Mould Length (mm)	125
Sample History	Oven Dried Dry Sieved
Material Description	(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Job No:	12467/1	Tested By:	AV
Laboratory	Penrith	Checked By:	AK
Date Tested	17/05/2011		

Sample Identification	Test Pit 5	Test Pit 7	Test Pit 23
Laboratory Number	12467/1-33	12467/1-34	12467/1-36
Depth (m)	0.5 - 0.7	0.5 - 0.7	0.5 - 0.7
Test Description			
Liquid Limit (W_L)	63%	67%	64%
Plastic Limit (W_P)	23%	28%	26%
Plastic Index (I_P)	40%	39%	38%
Linear Shrinkage (LS)	17.5%	16.0%	18.0%
Mould Length (mm)	125	127	127
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel	(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel	(CH) Silty CLAY, high plasticity, orange-brown, trace of fine tomedium gravel

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Job No:	12467/1	Tested By:	AV
Laboratory	Penrith	Checked By:	AK
Date Tested	17/05/2011		

Sample Identification	Test Pit 52	Test Pit 73
Laboratory Number	12467/1-37	12467/1-38
Depth (m)	0.3 - 0.5	0.5 - 0.6
Test Description		
Liquid Limit (W_L)	48%	53%
Plastic Limit (W_P)	18%	20%
Plastic Index (I_P)	30%	33%
Linear Shrinkage (LS)	16.5%	15.0%
Mould Length (mm)	125	127
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CI-CH) Silty CLAY, medium to high plasticity, orange-brown, trace of fine to medium gravel	(CI) Silty CLAY, medium plasticity, orange-brown & grey

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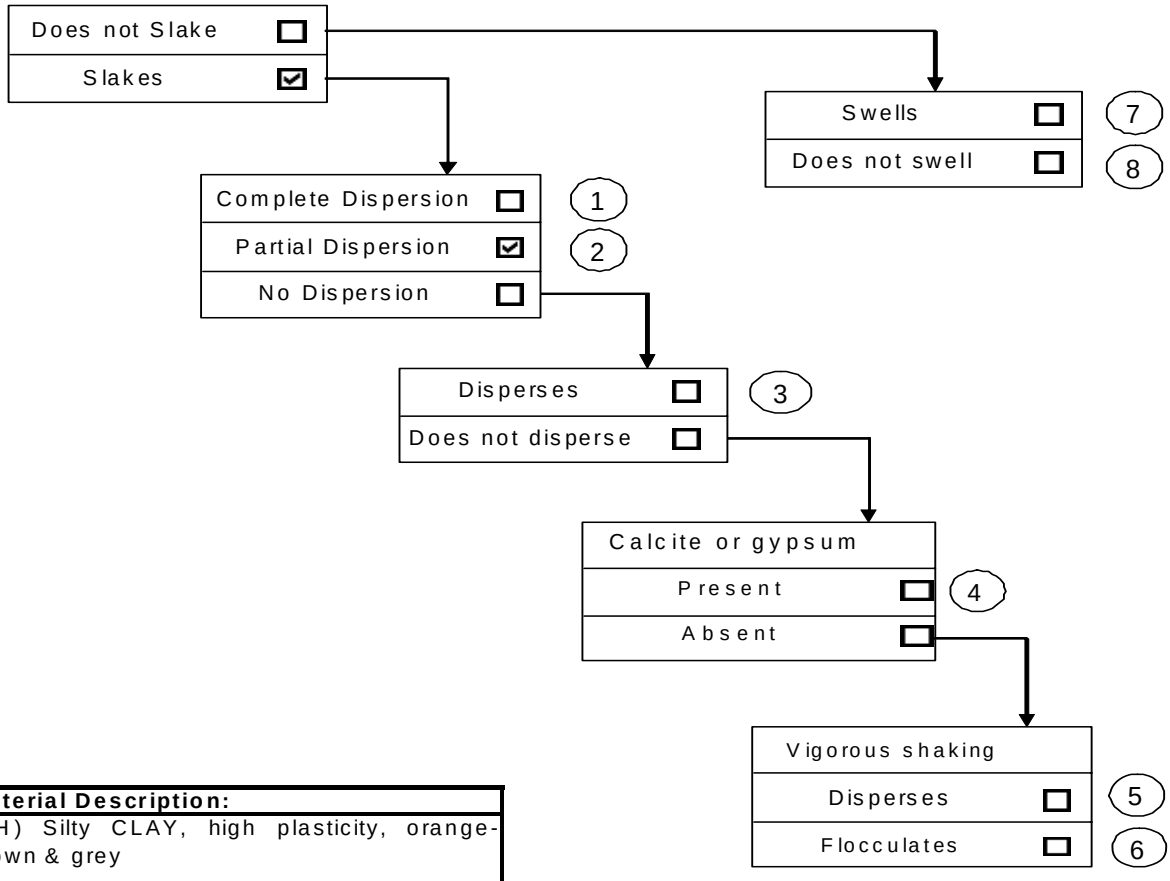
GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 06/05/2011

Sample Identification:	12467/1-4	**Test Pit No:**	15
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.6

Immersion of Air Dried Crumbs



Material Description:
(CH) Silty CLAY, high plasticity, orange-brown & grey

Type of Water Used:	Distilled
Water Temperature:	21.0°C

EMERSON CLASS NUMBER	2

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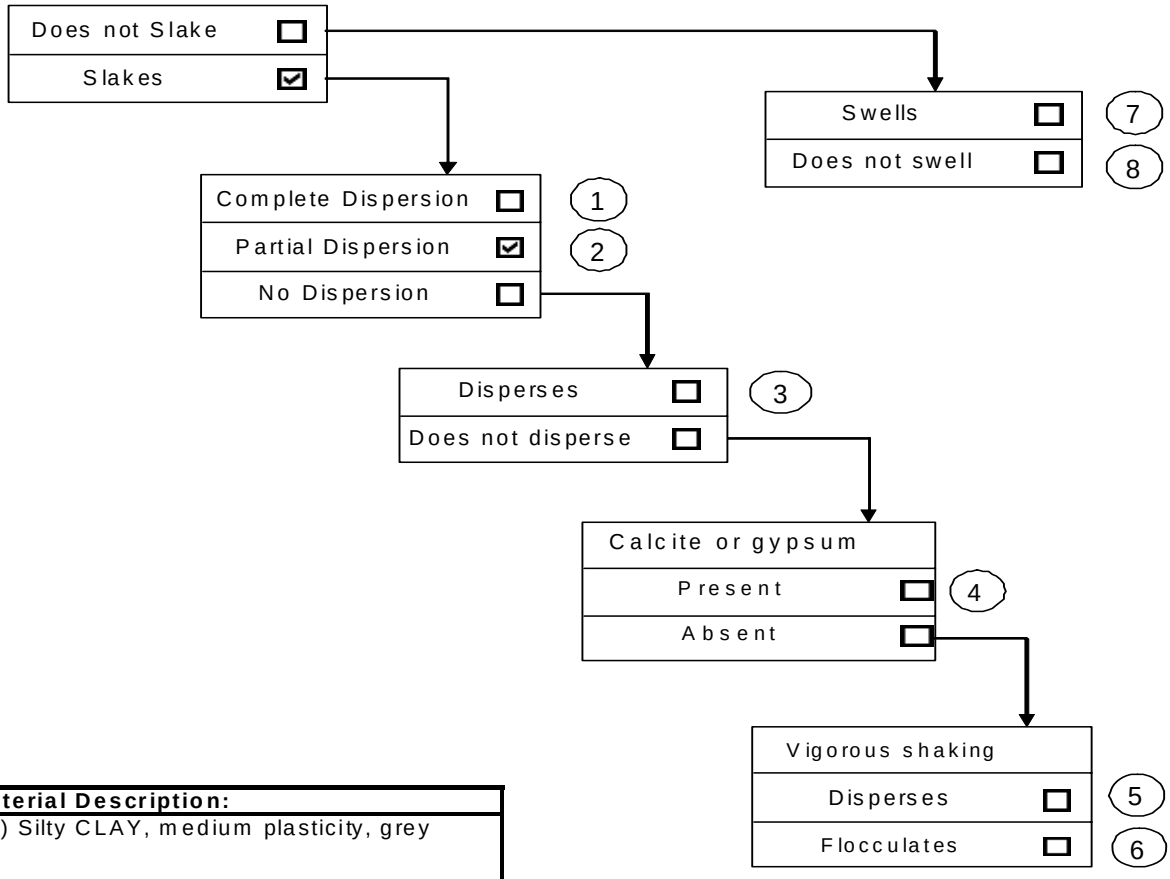
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 06/05/2011

Sample Identification:	12467/1-7	**Test Pit No:**	43
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.8

Immersion of Air Dried Crumbs



Material Description:
(CI) Silty CLAY, medium plasticity, grey

Type of Water Used:	Distilled
Water Temperature:	21.0°C

EMERSON CLASS NUMBER	2

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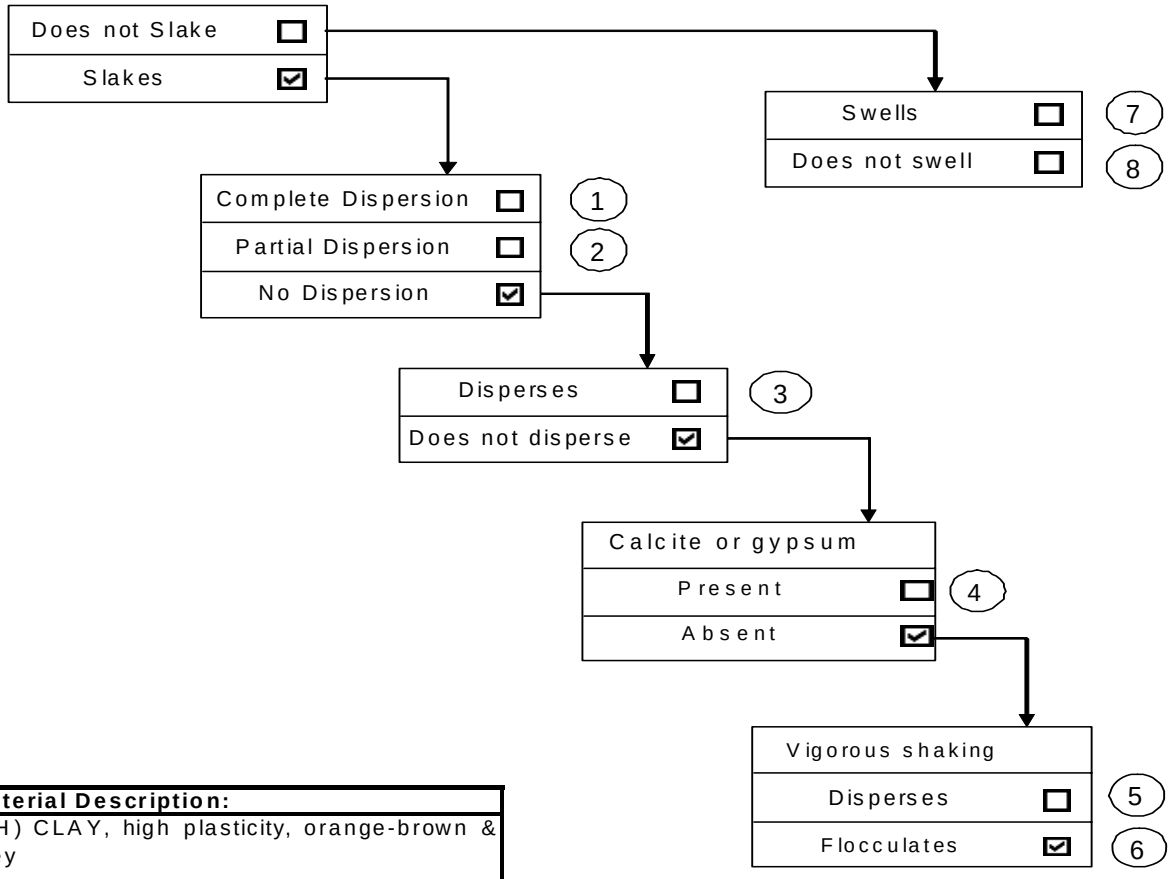
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 06/05/2011

Sample Identification:	12467/1-8	**Test Pit No:**	46
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.2 - 0.5

Immersion of Air Dried Crumbs



Material Description:
(CH) CLAY, high plasticity, orange-brown & grey

Type of Water Used:	Distilled
Water Temperature:	21.0°C

EMERSON CLASS NUMBER	6

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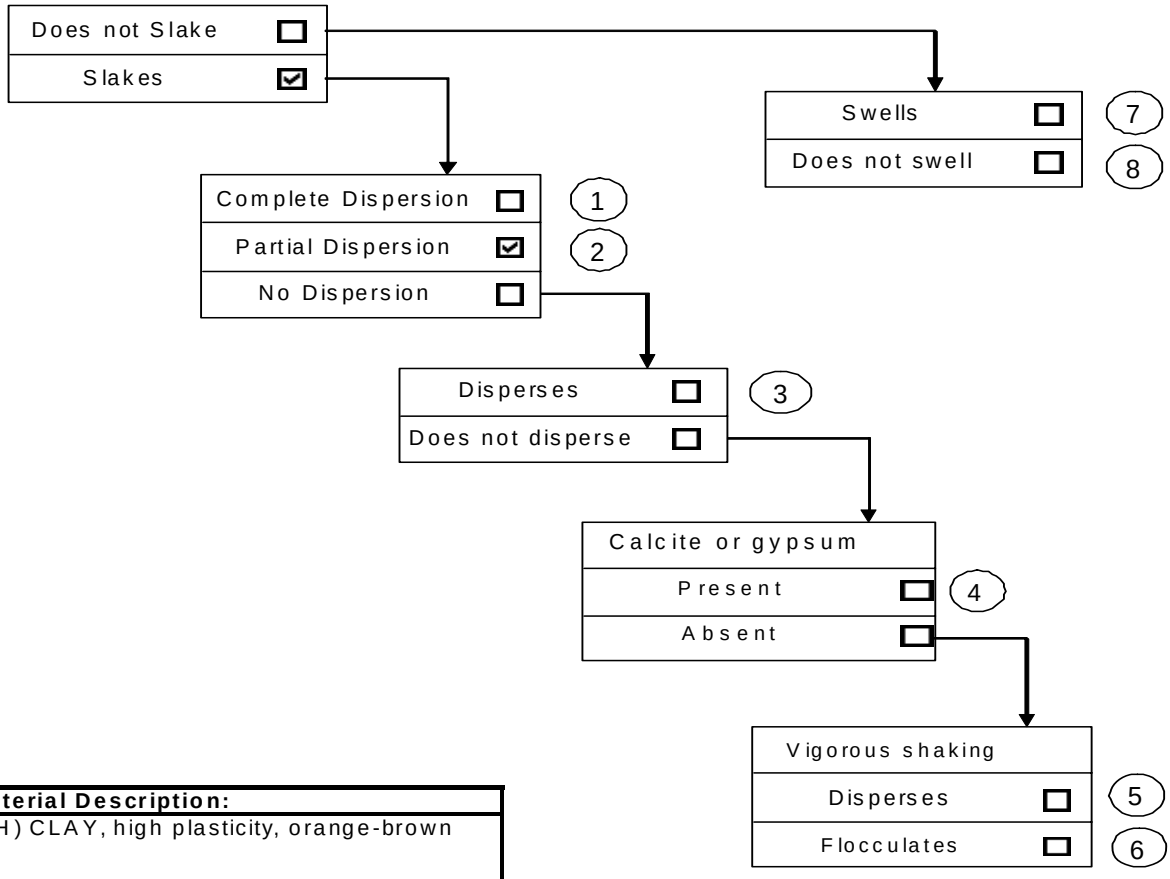
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 06/05/2011

Sample Identification:	12467/1-14	**Test Pit No:**	62
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.6

Immersion of Air Dried Crumbs



Material Description:
(CH) CLAY, high plasticity, orange-brown

Type of Water Used:	Distilled
Water Temperature:	21.0°C

EMERSON CLASS NUMBER	2

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CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 06/05/2011

Sample Identification:	12467/1-17	**Test Pit No:**	3
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.7

Immersion of Air Dried Crumbs

- Does not Slake ☐
- Slakes ☑
  - Swells ☐ (7)
  - Does not swell ☐ (8)
  - Complete Dispersion ☐ (1)
  - Partial Dispersion ☐ (2)
  - No Dispersion ☑
    - Disperses ☐ (3)
    - Does not disperse ☑
      - Calcite or gypsum
        - Present ☑ (4)
        - Absent ☐
          - Vigorous shaking
            - Disperses ☐ (5)
            - Flocculates ☐ (6)

Material Description:
(CI-CH) Silty CLAY, medium to high plasticity, orange-brown

Type of Water Used:	Distilled
Water Temperature:	21.0°C

EMERSON CLASS NUMBER	4

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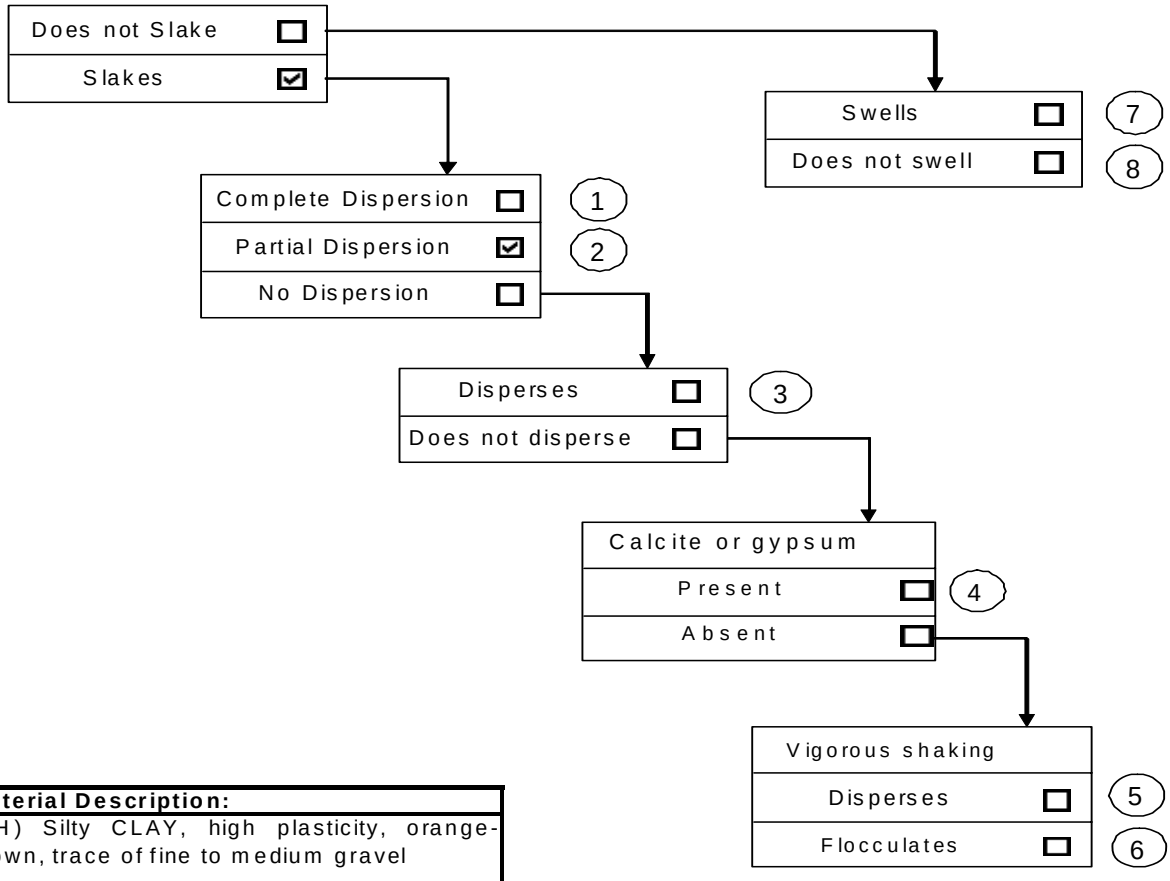
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 06/05/2011

Sample Identification:	12467/1-21	**Test Pit No:**	32
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.7

Immersion of Air Dried Crumbs



Material Description:
(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel

Type of Water Used:	Distilled
Water Temperature:	21.0°C

EMERSON CLASS NUMBER	2

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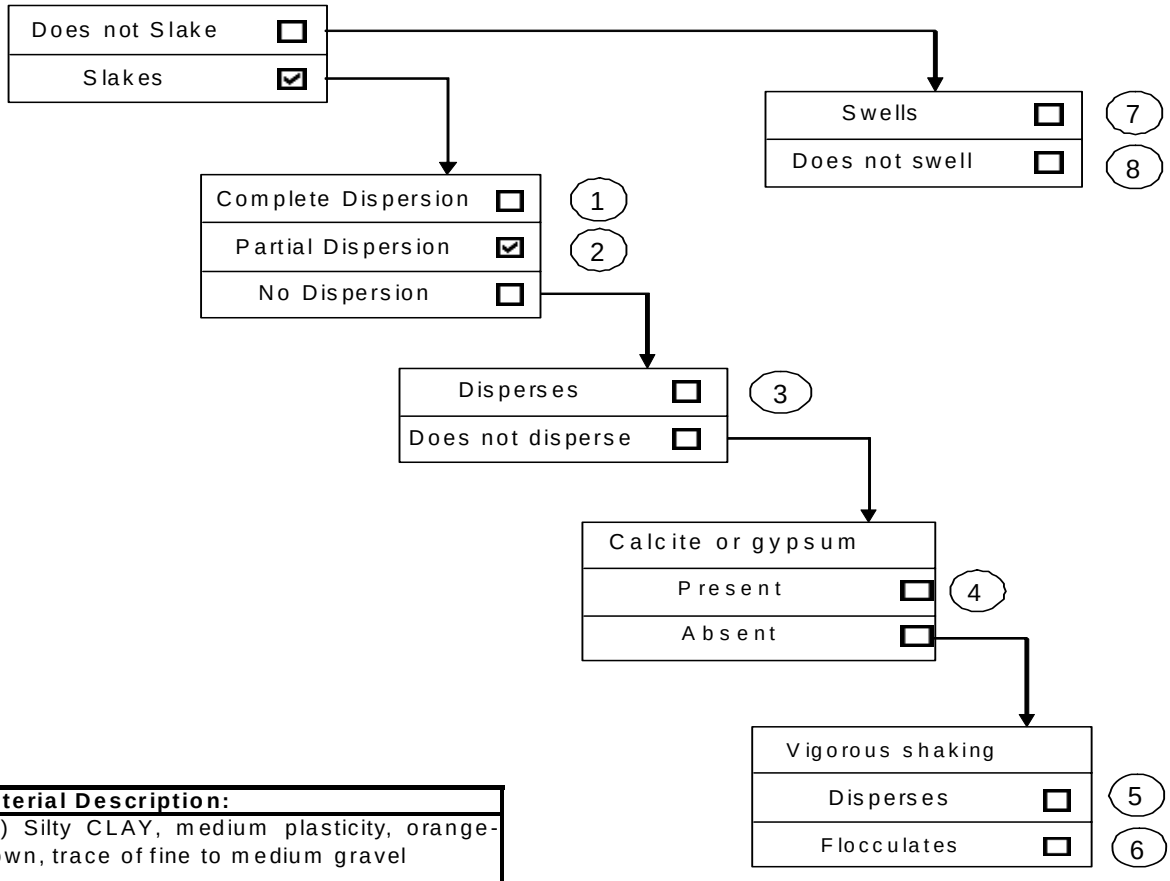
Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 06/05/2011

Sample Identification:	12467/1-22	**Test Pit No:**	54
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.6

Immersion of Air Dried Crumbs



Material Description:
(CI) Silty CLAY, medium plasticity, orange-brown, trace of fine to medium gravel

Type of Water Used:	Distilled
Water Temperature:	21.0°C

EMERSON CLASS NUMBER	2

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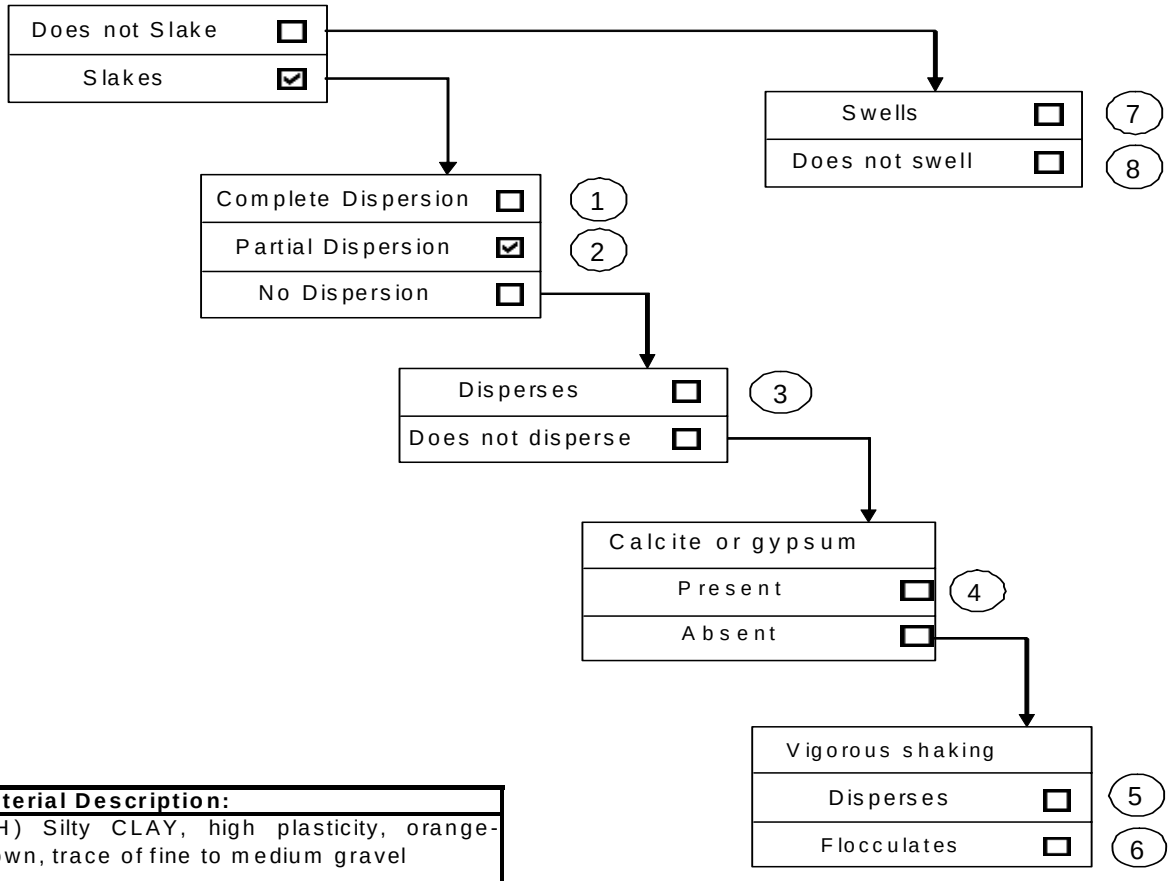
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 06/05/2011

Sample Identification:	12467/1-23	**Test Pit No:**	1
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.3 - 0.5

Immersion of Air Dried Crumbs



Material Description:
(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel

Type of Water Used:	Distilled
Water Temperature:	21.0°C

EMERSON CLASS NUMBER	2

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CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 06/05/2011

Sample Identification:	12467/1-30	**Test Pit No:**	51
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.4 - 0.6

Immersion of Air Dried Crumbs

- Does not Slake ☐
- Slakes ☑
  - Swells ☐ (7)
  - Does not swell ☐ (8)
  - Complete Dispersion ☐ (1)
  - Partial Dispersion ☐ (2)
  - No Dispersion ☐
    - Disperses ☐ (3)
    - Does not disperse ☑
      - Calcite or gypsum
        - Present ☑ (4)
        - Absent ☐
          - Vigorous shaking
            - Disperses ☐ (5)
            - Flocculates ☐ (6)

Material Description:
FILL: Silty clay, medium plasticity, brown

Type of Water Used:	Distilled
Water Temperature:	21.0°C

EMERSON CLASS NUMBER	4

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CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 18/05/2011

Sample Identification:	12467/1-33	**Test Pit No:**	5
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.7

Immersion of Air Dried Crumbs

- Does not Slake ☐
- Slakes ☑
  - Swells ☐ (7)
  - Does not swell ☐ (8)
  - Complete Dispersion ☐ (1)
  - Partial Dispersion ☐ (2)
  - No Dispersion ☑
    - Disperses ☐ (3)
    - Does not disperse ☑
      - Calcite or gypsum
        - Present ☐ (4)
        - Absent ☑
          - Vigorous shaking
            - Disperses ☑ (5)
            - Flocculates ☐ (6)

Material Description:
(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel

Type of Water Used:	Distilled
Water Temperature:	20.0°C

EMERSON CLASS NUMBER	5

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 18/05/2011

Sample Identification:	12467/1-34	**Test Pit No:**	7
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.7

Immersion of Air Dried Crumbs

- Does not Slake ☐
- Slakes ☑
  - Swells ☐ (7)
  - Does not swell ☐ (8)
  - Complete Dispersion ☐ (1)
  - Partial Dispersion ☐ (2)
  - No Dispersion ☑
    - Disperses ☐ (3)
    - Does not disperse ☑
      - Calcite or gypsum
        - Present ☐ (4)
        - Absent ☑
          - Vigorous shaking
            - Disperses ☑ (5)
            - Flocculates ☐ (6)

Material Description:
(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel

Type of Water Used:	Distilled
Water Temperature:	20.0°C

EMERSON CLASS NUMBER	5

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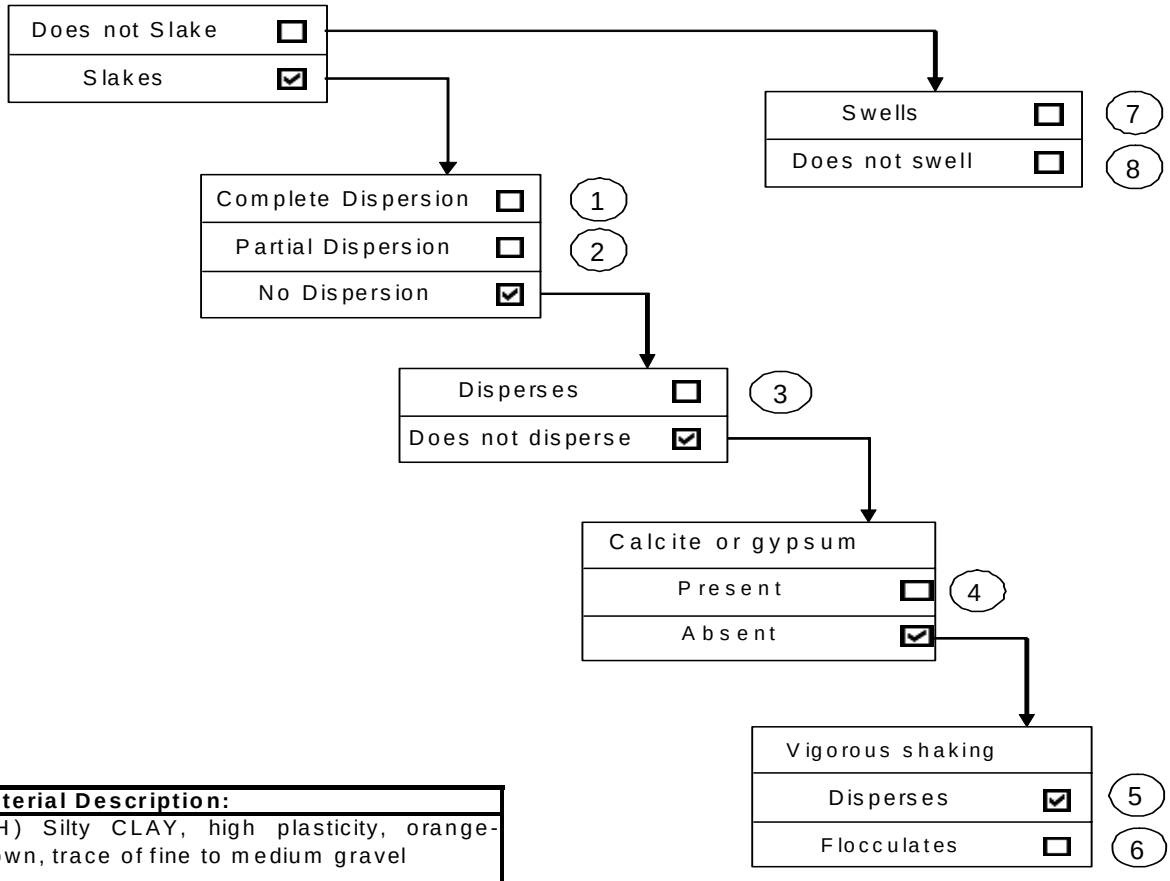
GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 18/05/2011

Sample Identification:	12467/1-36	**Test Pit No:**	23
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.7

Immersion of Air Dried Crumbs



Material Description:
(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel

Type of Water Used:	Distilled
Water Temperature:	20.0°C

EMERSON CLASS NUMBER	5

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 18/05/2011

Sample Identification:	12467/1-37	**Test Pit No:**	52
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.3 - 0.5

Immersion of Air Dried Crumbs

- Does not Slake ☐
- Slakes ☑
  - Swells ☐ (7)
  - Does not swell ☐ (8)
  - Complete Dispersion ☐ (1)
  - Partial Dispersion ☐ (2)
  - No Dispersion ☑
    - Disperses ☐ (3)
    - Does not disperse ☑
      - Calcite or gypsum
        - Present ☐ (4)
        - Absent ☑
          - Vigorous shaking
            - Disperses ☐ (5)
            - Flocculates ☑ (6)

Material Description:
(CI-CH) Silty CLAY, medium to high plasticity, orange-brown, trace of fine to medium gravel

Type of Water Used:	Distilled
Water Temperature:	20.0°C

EMERSON CLASS NUMBER	6

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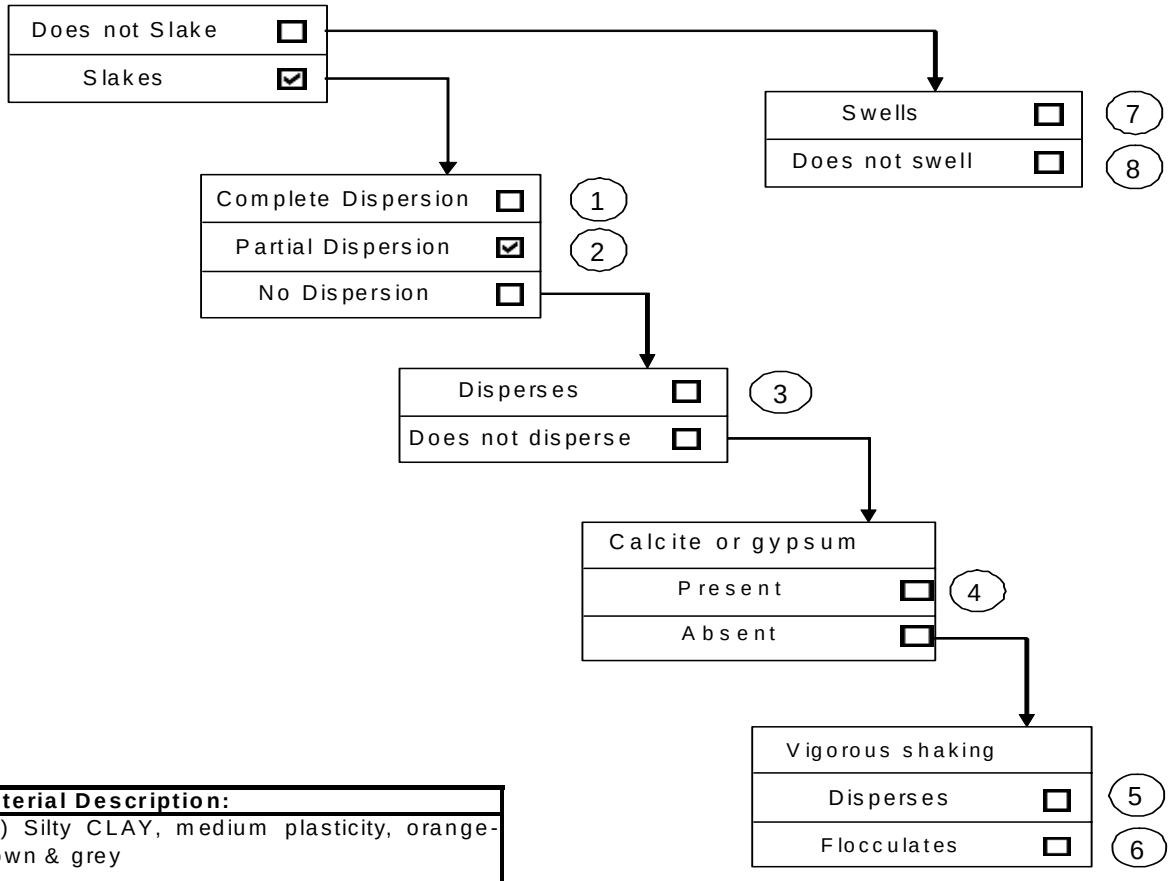
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

Emerson Crumb Dispersion

Job No. 12467/1 **Date:** 18/05/2011

Sample Identification:	12467/1-38	**Test Pit No:**	73
Test Procedure:	AS 1289 3.8.1	**Depth (m):**	0.5 - 0.6

Immersion of Air Dried Crumbs



Material Description:
(CI) Silty CLAY, medium plasticity, orange-brown & grey

Type of Water Used:	Distilled
Water Temperature:	20.0°C

EMERSON CLASS NUMBER	2

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Job No:	12467/1
Tested By:	AJP
Checked By:	AK
Date Tested:	05/05/2011
Laboratory	Penrith

GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - SHRINK / SWELL INDEX

Test Procedure: AS 1289 7.1.1

Sample Identification	Test Pit 11	Test Pit 14	Test Pit 41	Test Pit 48
Depth (m)	0.35 - 0.55	0.3 - 0.5	0.4 - 0.6	0.2 - 0.35
Laboratory Number	12467/1-2	12467/1-3	12467/1-6	12467/1-9
Test Description				
Moisture Content				
Initial %	14.5	10.3	8.1	17.9
Final %	20.6	20.4	20.5	26.8
Swell %	5.5	Nil	0.2	11.5
Shrinkage %	1.1	0.7	0.3	3.1
Shrink/Swell Index $\%/_{p}F$	2.1	0.4	0.2	4.9
Material Description	(CI) Gravelly CLAY, medium plasticity, orange-brown & grey	FILL: Silty gravelly clay, low plasticity, brown	(CL) Silty CLAY, low plasticity, grey, traces of root fibres	(CH) Silty CLAY, high plasticity, orange-brown & grey

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Job No:	12467/1
Tested By:	AJP
Checked By:	AK
Date Tested:	05/05/2011
Laboratory	Penrith

GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - SHRINK / SWELL INDEX

Test Procedure: AS 1289 7.1.1

Sample Identification	Test Pit 50	Test Pit 57	Test Pit 58	Test Pit 71
Depth (m)	0.35 - 0.7	0.3 - 0.45	0.8 - 1.0	0.35 - 0.5
Laboratory Number	12467/1-11	12467/1-12	12467/1-13	12467/1-16
Test Description				
Moisture Content				
Initial %	16.3	18.7	14.4	12.3
Final %	25.9	24.5	19.9	19.9
Swell %	2.3	1.7	4.3	5.1
Shrinkage %	1.0	1.3	2.5	2.2
Shrink/Swell Index $\%/_pF$	1.2	1.2	2.6	2.6
Material Description	(CL-CI) Silty CLAY, low to medium plasticity, orange-brown & grey	(CL-CI) Silty gravelly CLAY, low to medium plasticity, grey	(CI-CH) Silty CLAY, medium to high plasticity, orange-brown, trace of fine to medium gravel	(CI-CH) Silty CLAY, medium to high plasticity, orange-brown, trace of fine to medium gravel

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Job No:	12467/1
Tested By:	AN & NW
Checked By:	AK
Date Tested:	09/05/2011
Laboratory	Penrith

GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - SHRINK / SWELL INDEX

Test Procedure: AS 1289 7.1.1

Sample Identification	Test Pit 1	Test Pit 7	Test Pit 16	Test Pit 19
Depth (m)	0.3 - 0.5	0.5 - 0.7	0.5 - 0.65	0.6 - 0.9
Laboratory Number	12467/1-23	12467/1-24	12467/1-25	12467/1-26
Test Description				
Moisture Content				
Initial %	8.2	20.2	15.3	16.0
Final %	18.5	23.2	20.2	22.1
Swell %	9.8	2.5	7.3	1.1
Shrinkage %	0.3	3.7	2.0	1.5
Shrink/Swell Index $\%/_pF$	2.9	2.7	3.2	1.1
Material Description	(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel	(CI-CH) Silty CLAY, medium to high plasticity, orange-brown, trace of fine to medium gravel	(CH) Silty CLAY, high plasticity, orange-brown with yellow-brown mottling, trace of fine to medium gravel	(CL) Silty CLAY, low plasticity, orabge-brown, trace of fine to medium gravel

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Job No:	12467/1
Tested By:	AN & NW
Checked By:	AK
Date Tested:	09/05/2011
Laboratory	Penrith

GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

TEST RESULTS - SHRINK / SWELL INDEX

Test Procedure: AS 1289 7.1.1

Sample Identification	Test Pit 30	Test Pit 33	Test Pit 51	Test Pit 64
Depth (m)	0.7 - 0.9	0.4 - 0.6	0.4 - 0.6	0.4 - 0.6
Laboratory Number	12467/1-28	12467/1-29	12467/1-30	12467/1-31
Test Description				
Moisture Content				
Initial %	17.0	15.4	15.2	7.1
Final %	24.7	22.4	19.0	22.1
Swell %	6.1	8.3	2.5	9.0
Shrinkage %	1.8	2.8	3.0	0.5
Shrink/Swell Index $\%/_pF$	2.7	3.9	2.4	2.8
Material Description	(CI-CH) Silty CLAY, medium to high plasticity, orange-brown, trace of fine to medium gravel	(CH) Silty CLAY, high plasticity, brown, some fine to medium gravel	FILL: Sandy clay, medium plasticity, brown	(CH) Silty CLAY, high plasticity, orange-brown & grey

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

CALIFORNIA BEARING RATIO TEST REPORT

CBR Test Procedure	Laboratory Compaction Method	Sampling Method	Date of Test
AS1289 6.1.1	AS1289 5.1.1	AS1289 1.2.1 Clause 6.5.4	09/05/2011
Job No: 12467/1	Tested By: AN	Checked By: AK	Lab Penrith

Laboratory Number	12467/1-1	12467/1-5	12467/1-10	12467/1-15
	Test Pit 10	Test Pit 39	Test Pit 49	Test Pit 69
Depth (m)	0.6 - 1.0	0.8 - 1.1	0.6 - 0.9	0.4 - 0.7
Sample No	1	5	10	15
Date Sampled	03/05/2011	03/05/2011	03/05/2011	03/05/2011
Sample Description	(CI) CLAY, medium plasticity, grey	(CH) Silty CLAY, high plasticity, orange-brown & grey	(CI) Silty CLAY, medium plasticity, orange-brown & grey	(CI) Silty CLAY, medium plasticity, orange-brown
Maximum Dry Density t/m3	1.76	1.61	1.80	1.76
Optimum Moisture Content %	17.0	23.0	15.0	17.5
Field Moisture Content %	13.2	19.5	11.4	13.6
% Retained 19mm	<5	<5	<5	<5
Excluded (Yes / No / Not Applicable)	Yes	Yes	Yes	Yes

CBR TEST RESULTS

Dry Density t/m^3	Before soaking	1.73	1.61	1.83	1.76
	After soaking	1.71	1.57	1.82	1.69
Density Ratio %	Before soaking	98.5	100	101.5	100
Moisture Content %	Before soaking	17.2	23.0	14.5	16.1
	After soaking	19.6	26.9	18.0	20.3
Moisture Ratio %	Before soaking	101	100	97	98
Number of Days Soaked		4	4	4	4
Surcharge	kg	4.5	4.5	4.5	4.5
Moisture Content after test %	Top 30mm	22.3	30.1	21.0	24.9
	Whole Sample	19.5	26.7	17.9	20.0
Swell after soaking %		1.0	2.5	Nil	4.0
Penetration mm		5.0	2.5	5.0	5.0
CBR VALUE %		**5**	**3.5**	**8**	**3.5**

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

CALIFORNIA BEARING RATIO TEST REPORT

CBR Test Procedure		Laboratory Compaction Method		Sampling Method	Date of Test
AS1289 6.1.1		AS1289 5.1.1		AS1289 1.2.1 Clause 6.5.4	16/05/2011
Job No: 12467/1		Tested By: MW		Checked By: AK	Lab Penrith
Laboratory Number		12467/1-17	12467/1-18	12467/1-19	12467/1-20
Drawing No.		Test Pit 3 12467-1-AA1	Test Pit 17 12467-1-AA1	Test Pit 20 12467-1-AA1	Test Pit 27 12467-1-AA1
Depth (m)		0.5 - 0.7	0.3 - 0.5	0.6 - 0.8	0.5 - 0.7
Sample No		17	18	19	20
Date Sampled		05/05/2011	05/05/2011	05/05/2011	05/05/2011
Sample Description		(CI) Silty CLAY, medium plasticity, orange-brown, trace of fine to medium gravel	(CH) Silty CLAY, high plasticity, orange-brown, trace of fine to medium gravel	(CH) Silty CLAY, high plasticity, orange-brown & grey	(CI) Silty CLAY, medium plasticity, brown, some fine to medium gravel
Maximum Dry Density	t/m3	1.85	1.57	1.57	1.74
Optimum Moisture Content	%	16.5	22.5	23.5	18.0
Field Moisture Content	%	14.8	16.7	19.1	14.1
% Retained 19mm		<5	<5	<5	7
Excluded (Yes / No / Not Applicable)		Yes	Yes	Yes	Yes
CBR TEST RESULTS					
Dry Density t/m^3	Before soaking	1.84	1.57	1.57	1.72
	After soaking	1.83	1.52	1.52	1.65
Density Ratio %	Before soaking	99.5	100	100	99
Moisture Content %	Before soaking	15.9	22.1	22.4	18.0
	After soaking	18.8	27.2	25.9	22.4
Moisture Ratio %	Before soaking	96	98	95	100
Number of Days Soaked		4	4	4	4
Surcharge	kg	4.5	4.5	4.5	4.5
Moisture Content after test %	Top 30mm	21.0	29.8	32.6	26.5
	Whole Sample	18.8	27.1	25.8	22.3
Swell after soaking	%	0.5	3.0	3.5	4.0
Penetration	mm	2.5	2.5	5.0	2.5
CBR VALUE	%	**7**	**3**	**3**	**2**

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GEOTECHNICAL INVESTIGATION
CLAYMORE URBAN RENEWAL BADGALLY ROAD, CLAYMORE

CALIFORNIA BEARING RATIO TEST REPORT

CBR Test Procedure		Laboratory Compaction Method		Sampling Method	Date of Test
AS1289 6.1.1		AS1289 5.1.1		AS1289 1.2.1 Clause 6.5.4	16/05/2011
Job No: 12467/1		Tested By: MW		Checked By: AK	Lab Penrith
Laboratory Number		11467/1-21	11467/1-22		
DrawingNo. Depth (m) Sample No Date Sampled		Test Pit 32 12467-1-AA1 0.5 - 0.7 21 05/05/2011	Test Pit 54 12467-1-AA1 0.4 - 0.6 22 05/05/2011		
Sample Description		(CI) Silty CLAY, medium plasticity, orange-brown, trace of fine to medium gravel	(CI) Silty CLAY, medium plasticity, orange-brown, trace of fine to medium gravel		
Maximum Dry Density	t/m3	1.64	1.69		
Optimum Moisture Content	%	19.5	18.0		
Field Moisture Content	%	15.5	13.7		
% Retained 19mm		<5	<5		
Excluded (Yes / No / Not Applicable)		Yes	Yes		
CBR TEST RESULTS					
Dry Density t/m^3	Before soaking	1.64	1.71		
	After soaking	1.58	1.67		
Density Ratio %	Before soaking	100	101		
Moisture Content %	Before soaking	19.1	17.5		
	After soaking	24.7	21.5		
Moisture Ratio %	Before soaking	98	97		
Number of Days Soaked		4	4		
Surcharge	kg	4.5	4.5		
Moisture Content after test %	Top 30mm	29.9	23.0		
	Whole Sample	24.6	21.3		
Swell after soaking	%	3.5	2.5		
Penetration	mm	2.5	2.5		
CBR VALUE	%	**2**	**3**		

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ANALYTICAL REPORT

17 May 2011

Geotechnique
P.O. Box 880
PENRITH
NSW 2751

Attention: **Indra Jworchan**

Your Reference: 12467-1 - Claymore Urban Renewal - Badgally Road

Our Reference: SE87463 Samples: 197 Soils
Received: 6/5/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

TP5(2.2-2.3) labelled as TP5(1.7-1.8). ESP Subcontracted bto SGS Cairns.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Inorganic/Metal Supervisor

Huong Crawford
Metals Signatory

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Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-1 TP1 0.0-0.2 Soil 5/05/2011	SE87463-2 TP1 2.0-2.1 Soil 5/05/2011	SE87463-3 TP2 0.5-0.6 Soil 5/05/2011	SE87463-4 TP2 1.5-1.6 Soil 5/05/2011	SE87463-5 TP2 2.0-2.1 Soil 5/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	280	150	670	720	840
Resistivity in soil	ohm.m	[NA]	[NA]	15	14	12
Date Extracted- (pH 1:5 soil: Water)		[NA]	[NA]	17/05/2011	17/05/2011	17/05/2011
Date Analysed (pH 1:5 Soil: Water)		[NA]	[NA]	17/05/2011	17/05/2011	17/05/2011
pH 1:5 soil:water	pH Units	[NA]	[NA]	5.3	5.2	8.4
Date Extracted		[NA]	[NA]	16/05/2011	16/05/2011	16/05/2011
Date Analysed		[NA]	[NA]	16/05/2011	16/05/2011	16/05/2011
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	1,200	12	330
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	15	32	85

Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-6 TP3 0.5-0.6 Soil 5/05/2011	SE87463-8 TP3 2.0-2.1 Soil 5/05/2011	SE87463-9 TP4 1.0-1.1 Soil 5/05/2011	SE87463-10 TP4 2.0-2.1 Soil 5/05/2011	SE87463-11 TP4 2.8-2.9 Soil 5/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	26	370	120	810	380

Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-13 TP5 1.5-1.6 Soil 5/05/2011	SE87463-16 TP6 1.0-1.1 Soil 5/05/2011	SE87463-18 TP7 0.8-0.9 Soil 5/05/2011	SE87463-19 TP7 1.3-1.4 Soil 5/05/2011	SE87463-20 TP8 1.5-1.6 Soil 5/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	43	110	39	58	240

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Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-22 TP9 0.85-0.95 Soil 2/05/2011	SE87463-23 TP9 2.0-2.2 Soil 2/05/2011	SE87463-24 TP9 3.0-3.2 Soil 2/05/2011	SE87463-25 TP10 0.4-0.5 Soil 2/05/2011	SE87463-27 TP10 2.5-2.6 Soil 2/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	55	190	180	16	360
Resistivity in soil	ohm.m	180	52	55	[NA]	[NA]
Date Extracted- (pH 1:5 soil: Water)		17/05/2011	17/05/2011	17/05/2011	[NA]	[NA]
Date Analysed (pH 1:5 Soil: Water)		17/05/2011	17/05/2011	17/05/2011	[NA]	[NA]
pH 1:5 soil:water	pH Units	6.5	6.0	7.5	[NA]	[NA]
Date Extracted		16/05/2011	16/05/2011	16/05/2011	[NA]	[NA]
Date Analysed		16/05/2011	16/05/2011	16/05/2011	[NA]	[NA]
Chloride, Cl 1:5 soil:water	mg/kg	570	900	840	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	140	120	170	[NA]	[NA]

Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-28 TP10 3.5-3.6 Soil 2/05/2011	SE87463-29 TP11 0.25-0.35 Soil 2/05/2011	SE87463-30 TP11 1.5-1.6 Soil 2/05/2011	SE87463-32 TP12 0.6-0.7 Soil 5/05/2011	SE87463-35 TP13 1.0-1.1 Soil 2/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	230	150	620	320	580

Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-36 TP13 2.0-2.1 Soil 2/05/2011	SE87463-37 TP14 0.7-1.0 Soil 2/05/2011	SE87463-38 TP14 1.3-1.6 Soil 2/05/2011	SE87463-39 TP15 0.3-0.5 Soil 2/05/2011	SE87463-41 TP16 0.2-0.3 Soil 5/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	640	92	99	140	30

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Aggressivity Test in soil Our Reference:	UNITS	SE87463-44	SE87463-46	SE87463-47	SE87463-48	SE87463-50
Your Reference	----------	TP17	TP18	TP18	TP19	TP19
Depth	----------	0.3-0.4	0-0.15	0.9-1.2	0.6-0.7	1.6-1.7
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		5/05/2011	5/05/2011	5/05/2011	5/05/2011	5/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	80	54	910	120	79

Aggressivity Test in soil Our Reference:	UNITS	SE87463-51	SE87463-53	SE87463-55	SE87463-56	SE87463-57
Your Reference	----------	TP20	TP20	TP21	TP21	TP22
Depth	----------	0-0.2	1.2-1.3	0.8-0.9	1.5-1.6	0.4-0.6
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		2/05/2011	5/05/2011	4/05/2011	4/05/2011	5/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	88	170	180	210	190

Aggressivity Test in soil Our Reference:	UNITS	SE87463-60	SE87463-61	SE87463-63	SE87463-65	SE87463-67
Your Reference	----------	TP23	TP23	TP24	TP25	TP26
Depth	----------	0.5-0.6	1.2-1.3	0.5-0.6	1.3-1.4	0.5-0.6
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	5/05/2011	5/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	47	130	22	320	150

Aggressivity Test in soil Our Reference:	UNITS	SE87463-69	SE87463-70	SE87463-72	SE87463-75	SE87463-77
Your Reference	----------	TP27	TP27	TP28	TP29	TP30
Depth	----------	0.2-0.3	0.8-0.9	0.7-1.0	0.7-0.8	0.25-0.35
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	4/05/2011	4/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	240	220	200	56	22

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Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-79 TP30 1.7-1.8 Soil 4/05/2011	SE87463-82 TP31 1.5-1.6 Soil 4/05/2011	SE87463-83 TP31 2.5-2.6 Soil 4/05/2011	SE87463-84 TP32 0.5-0.6 Soil 4/05/2011	SE87463-86 TP33 0.15-0.25 Soil 4/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	45	110	140	67	250

Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-88 TP34 0-0.15 Soil 4/05/2011	SE87463-89 TP34 0.5-0.6 Soil 4/05/2011	SE87463-90 TP35 0.5-0.6 Soil 4/05/2011	SE87463-91 TP35 1.0-1.1 Soil 4/05/2011	SE87463-92 TP36 0-0.1 Soil 4/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	28	77	31	300	37
Resistivity in soil	ohm.m	360	130	[NA]	[NA]	[NA]
Date Extracted- (pH 1:5 soil: Water)		17/05/2011	17/05/2011	[NA]	[NA]	[NA]
Date Analysed (pH 1:5 Soil: Water)		17/05/2011	17/05/2011	[NA]	[NA]	[NA]
pH 1:5 soil:water	pH Units	5.0	4.8	[NA]	[NA]	[NA]
Date Extracted		16/05/2011	16/05/2011	[NA]	[NA]	[NA]
Date Analysed		16/05/2011	16/05/2011	[NA]	[NA]	[NA]
Chloride, Cl 1:5 soil:water	mg/kg	4.3	76	[NA]	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	15	32	[NA]	[NA]	[NA]

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Aggressivity Test in soil Our Reference:	UNITS	SE87463-93	SE87463-94	SE87463-95	SE87463-97	SE87463-98
Your Reference	----------	TP36	TP37	TP37	TP38	TP39
Depth	----------	1.0-1.1	0.25-0.35	0.9-1.0	0.7-0.8	0.2-0.3
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	4/05/2011	3/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	190	40	83	61	100

Aggressivity Test in soil Our Reference:	UNITS	SE87463-99	SE87463-100	SE87463-102	SE87463-104	SE87463-106
Your Reference	----------	TP39	TP39	TP40	TP41	TP41
Depth	----------	1.1-1.2	1.6-1.7	1.0-1.1	0.4-0.6	2.0-2.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	82	100	96	19	520

Aggressivity Test in soil Our Reference:	UNITS	SE87463-107	SE87463-112	SE87463-113	SE87463-114	SE87463-116
Your Reference	----------	TP42	TP44	TP44	TP44	TP45
Depth	----------	0.35-0.45	0.5-0.6	1.5-1.6	2.0-2.1	0.5-0.6
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		2/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	530	86	100	94	86

Aggressivity Test in soil Our Reference:	UNITS	SE87463-118	SE87463-119	SE87463-120	SE87463-123	SE87463-124
Your Reference	----------	TP46	TP46	TP46	TP48	TP48
Depth	----------	1.1-1.2	2.0-2.1	3.0-3.1	0.5-0.6	1.0-1.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	550	510	640	770	470
Resistivity in soil	ohm.m	18	19	15	[NA]	[NA]
Date Extracted- (pH 1:5 soil: Water)		17/05/2011	17/05/2011	17/05/2011	[NA]	[NA]

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Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-118 TP46 1.1-1.2 Soil 3/05/2011	SE87463-119 TP46 2.0-2.1 Soil 3/05/2011	SE87463-120 TP46 3.0-3.1 Soil 3/05/2011	SE87463-123 TP48 0.5-0.6 Soil 3/05/2011	SE87463-124 TP48 1.0-1.1 Soil 3/05/2011
Date Analysed (pH 1:5 Soil: Water)		17/05/2011	17/05/2011	17/05/2011	[NA]	[NA]
pH 1:5 soil:water	pH Units	4.6	4.6	4.9	[NA]	[NA]
Date Extracted		16/05/2011	16/05/2011	16/05/2011	[NA]	[NA]
Date Analysed		16/05/2011	16/05/2011	16/05/2011	[NA]	[NA]
Chloride, Cl 1:5 soil:water	mg/kg	720	690	820	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	92	20	48	[NA]	[NA]

Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-125 TP48 1.5-1.6 Soil 3/05/2011	SE87463-127 TP49 1.5-1.6 Soil 3/05/2011	SE87463-129 TP50 0-0.1 Soil 3/05/2011	SE87463-130 TP50 1.0-1.1 Soil 3/05/2011	SE87463-131 TP51 0-0.2 Soil 5/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	460	210	46	89	25

Aggressivity Test in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-132 TP51 0.6-0.7 Soil 5/05/2011	SE87463-133 TP51 1.4-1.5 Soil 5/05/2011	SE87463-135 TP52 1.0-1.1 Soil 5/05/2011	SE87463-137 TP53 0-0.2 Soil 5/05/2011	SE87463-138 TP53 1.0-1.1 Soil 5/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	31	440	680	34	24

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Aggressivity Test in soil Our Reference:	UNITS	SE87463-140	SE87463-142	SE87463-143	SE87463-147	SE87463-148
Your Reference	----------	TP54	TP55	TP55	TP57	TP57
Depth	----------	0.9-1.0	0.15-0.25	1.5-1.6	0-0.1	0.6-0.7
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		5/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	370	140	240	39	150

Aggressivity Test in soil Our Reference:	UNITS	SE87463-149	SE87463-150	SE87463-151	SE87463-153	SE87463-155
Your Reference	----------	TP58	TP58	TP58	TP59	TP60
Depth	----------	0.2-0.3	0.9-1.0	1.5-1.6	0.45-0.55	0.2-0.3
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	26	49	96	82	16
Resistivity in soil	ohm.m	390	200	100	[NA]	[NA]
Date Extracted- (pH 1:5 soil: Water)		17/05/2011	17/05/2011	17/05/2011	[NA]	[NA]
Date Analysed (pH 1:5 Soil: Water)		17/05/2011	17/05/2011	17/05/2011	[NA]	[NA]
pH 1:5 soil:water	pH Units	5.4	5.9	6.5	[NA]	[NA]
Date Extracted		16/05/2011	16/05/2011	16/05/2011	[NA]	[NA]
Date Analysed		16/05/2011	16/05/2011	16/05/2011	[NA]	[NA]
Chloride, Cl 1:5 soil:water	mg/kg	9.8	11	24	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	26	55	47	[NA]	[NA]

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Aggressivity Test in soil Our Reference:	UNITS	SE87463-156	SE87463-157	SE87463-159	SE87463-160	SE87463-161
Your Reference	----------	TP60	TP61	TP62	TP62	TP62
Depth	----------	0.6-0.7	0.3-0.4	0-0.3	1.1-1.2	1.8-1.9
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	79	84	55	120	190

Aggressivity Test in soil Our Reference:	UNITS	SE87463-162	SE87463-164	SE87463-165	SE87463-166	SE87463-167
Your Reference	----------	TP63	TP64	TP64	TP64	TP65
Depth	----------	0.5-0.6	0.4-0.5	1.0-1.1	1.5-1.6	0-0.2
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	4/05/2011	4/05/2011	4/05/2011	3/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	180	37	230	190	37

Aggressivity Test in soil Our Reference:	UNITS	SE87463-168	SE87463-169	SE87463-171	SE87463-172	SE87463-173
Your Reference	----------	TP65	TP65	TP66	TP67	TP67
Depth	----------	0.5-0.6	1.5-1.6	1.0-1.1	0.45-0.55	0.8-0.9
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	4/05/2011	4/05/2011	4/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	88	210	280	160	420

Aggressivity Test in soil Our Reference:	UNITS	SE87463-174	SE87463-175	SE87463-177	SE87463-178	SE87463-179
Your Reference	----------	TP67	TP68	TP69	TP69	TP69
Depth	----------	1.4-1.5	0.5-0.6	0.15-0.25	1.0-1.1	1.7-1.8
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	830	110	30	130	200

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Aggressivity Test in soil Our Reference:	UNITS	SE87463-181	SE87463-182	SE87463-183	SE87463-184	SE87463-185
Your Reference	----------	TP70	TP70	TP71	TP71	TP71
Depth	----------	1.0-1.1	1.5-1.6	0.5-0.6	1.0-1.1	1.7-1.8
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	120	71	180	160	54

Aggressivity Test in soil Our Reference:	UNITS	SE87463-186	SE87463-187	SE87463-188	SE87463-189	SE87463-190
Your Reference	----------	TP72	TP72	TP72	TP73	TP73
Depth	----------	0-0.15	1.0-1.1	2.0-2.1	0.5-0.6	1.0-1.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	4/05/2011	4/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	38	370	320	250	280
Resistivity in soil	ohm.m	270	27	32	[NA]	[NA]
Date Extracted- (pH 1:5 soil: Water)		17/05/2011	17/05/2011	17/05/2011	[NA]	[NA]
Date Analysed (pH 1:5 Soil: Water)		17/05/2011	17/05/2011	17/05/2011	[NA]	[NA]
pH 1:5 soil:water	pH Units	5.3	4.2	4.3	[NA]	[NA]
Date Extracted		16/05/2011	16/05/2011	16/05/2011	[NA]	[NA]
Date Analysed		16/05/2011	16/05/2011	16/05/2011	[NA]	[NA]
Chloride, Cl 1:5 soil:water	mg/kg	15	300	310	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	10	180	100	[NA]	[NA]

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Aggressivity Test in soil Our Reference:	UNITS	SE87463-191	SE87463-192	SE87463-193	SE87463-194
Your Reference	----------	TP73	TP74	TP74	TP74
Depth	----------	1.5-1.6	0.2-0.5	0.65-0.75	1.4-1.5
Sample Matrix		Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Extracted (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011
Date Analysed (Conductivity)		17/05/2011	17/05/2011	17/05/2011	17/05/2011
Electrical Conductivity 1:5 soil:water	µS/cm	290	31	52	59

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Cation Exchange Capacity*						
Our Reference:	UNITS	SE87463-3	SE87463-4	SE87463-5	SE87463-22	SE87463-23
Your Reference	----------	TP2	TP2	TP2	TP9	TP9
Depth	----------	0.5-0.6	1.5-1.6	2.0-2.1	0.85-0.95	2.0-2.2
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		5/05/2011	5/05/2011	5/05/2011	2/05/2011	2/05/2011
Cation Exchange Capacity*	mg/kg	#	#	#	#	#

Cation Exchange Capacity*						
Our Reference:	UNITS	SE87463-24	SE87463-88	SE87463-89	SE87463-118	SE87463-119
Your Reference	----------	TP9	TP34	TP34	TP46	TP46
Depth	----------	3.0-3.2	0-0.15	0.5-0.6	1.1-1.2	2.0-2.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		2/05/2011	4/05/2011	4/05/2011	3/05/2011	3/05/2011
Cation Exchange Capacity*	mg/kg	#	#	#	#	#

Cation Exchange Capacity*						
Our Reference:	UNITS	SE87463-120	SE87463-149	SE87463-150	SE87463-151	SE87463-186
Your Reference	----------	TP46	TP58	TP58	TP58	TP72
Depth	----------	3.0-3.1	0.2-0.3	0.9-1.0	1.5-1.6	0-0.15
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	3/05/2011	3/05/2011	4/05/2011
Cation Exchange Capacity*	mg/kg	#	#	#	#	#

Cation Exchange Capacity*			
Our Reference:	UNITS	SE87463-187	SE87463-188
Your Reference	----------	TP72	TP72
Depth	----------	1.0-1.1	2.0-2.1
Sample Matrix		Soil	Soil
Date Sampled		4/05/2011	4/05/2011
Cation Exchange Capacity*	mg/kg	#	#

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Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-1 TP1 0.0-0.2 Soil 5/05/2011	SE87463-2 TP1 2.0-2.1 Soil 5/05/2011	SE87463-3 TP2 0.5-0.6 Soil 5/05/2011	SE87463-4 TP2 1.5-1.6 Soil 5/05/2011	SE87463-5 TP2 2.0-2.1 Soil 5/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	8	12	11	10	15

Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-6 TP3 0.5-0.6 Soil 5/05/2011	SE87463-8 TP3 2.0-2.1 Soil 5/05/2011	SE87463-9 TP4 1.0-1.1 Soil 5/05/2011	SE87463-10 TP4 2.0-2.1 Soil 5/05/2011	SE87463-11 TP4 2.8-2.9 Soil 5/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	12	12	15	16	18

Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-13 TP5 1.5-1.6 Soil 5/05/2011	SE87463-16 TP6 1.0-1.1 Soil 5/05/2011	SE87463-18 TP7 0.8-0.9 Soil 5/05/2011	SE87463-19 TP7 1.3-1.4 Soil 5/05/2011	SE87463-20 TP8 1.5-1.6 Soil 5/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	17	16	19	10	13

Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE87463-22 TP9 0.85-0.95 Soil 2/05/2011	SE87463-23 TP9 2.0-2.2 Soil 2/05/2011	SE87463-24 TP9 3.0-3.2 Soil 2/05/2011	SE87463-25 TP10 0.4-0.5 Soil 2/05/2011	SE87463-27 TP10 2.5-2.6 Soil 2/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	9	11	16	10	17

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Moisture Our Reference:	UNITS	SE87463-28	SE87463-29	SE87463-30	SE87463-32	SE87463-35
Your Reference	----------	TP10	TP11	TP11	TP12	TP13
Depth	----------	3.5-3.6	0.25-0.35	1.5-1.6	0.6-0.7	1.0-1.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		2/05/2011	2/05/2011	2/05/2011	5/05/2011	2/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	19	15	12	16	12

Moisture Our Reference:	UNITS	SE87463-36	SE87463-37	SE87463-38	SE87463-39	SE87463-41
Your Reference	----------	TP13	TP14	TP14	TP15	TP16
Depth	----------	2.0-2.1	0.7-1.0	1.3-1.6	0.3-0.5	0.2-0.3
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		2/05/2011	2/05/2011	2/05/2011	2/05/2011	5/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	13	11	10	12	10

Moisture Our Reference:	UNITS	SE87463-44	SE87463-46	SE87463-47	SE87463-48	SE87463-50
Your Reference	----------	TP17	TP18	TP18	TP19	TP19
Depth	----------	0.3-0.4	0-0.15	0.9-1.2	0.6-0.7	1.6-1.7
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		5/05/2011	5/05/2011	5/05/2011	5/05/2011	5/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	14	17	18	15	10

Moisture Our Reference:	UNITS	SE87463-51	SE87463-53	SE87463-55	SE87463-56	SE87463-57
Your Reference	----------	TP20	TP20	TP21	TP21	TP22
Depth	----------	0-0.2	1.2-1.3	0.8-0.9	1.5-1.6	0.4-0.6
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		2/05/2011	5/05/2011	4/05/2011	4/05/2011	5/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	22	5	13	6	13

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Moisture Our Reference:	UNITS	SE87463-60	SE87463-61	SE87463-63	SE87463-65	SE87463-67
Your Reference	----------	TP23	TP23	TP24	TP25	TP26
Depth	----------	0.5-0.6	1.2-1.3	0.5-0.6	1.3-1.4	0.5-0.6
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	5/05/2011	5/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	13	8	13	14	9

Moisture Our Reference:	UNITS	SE87463-69	SE87463-70	SE87463-72	SE87463-75	SE87463-77
Your Reference	----------	TP27	TP27	TP28	TP29	TP30
Depth	----------	0.2-0.3	0.8-0.9	0.7-1.0	0.7-0.8	0.25-0.35
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	4/05/2011	4/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	12	6	7	12	12

Moisture Our Reference:	UNITS	SE87463-79	SE87463-82	SE87463-83	SE87463-84	SE87463-86
Your Reference	----------	TP30	TP31	TP31	TP32	TP33
Depth	----------	1.7-1.8	1.5-1.6	2.5-2.6	0.5-0.6	0.15-0.25
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	4/05/2011	4/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	8	9.9	11	15	21

Moisture Our Reference:	UNITS	SE87463-88	SE87463-89	SE87463-90	SE87463-91	SE87463-92
Your Reference	----------	TP34	TP34	TP35	TP35	TP36
Depth	----------	0-0.15	0.5-0.6	0.5-0.6	1.0-1.1	0-0.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	4/05/2011	4/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	10	10	13	10	11

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Moisture Our Reference:	UNITS	SE87463-93	SE87463-94	SE87463-95	SE87463-97	SE87463-98
Your Reference	----------	TP36	TP37	TP37	TP38	TP39
Depth	----------	1.0-1.1	0.25-0.35	0.9-1.0	0.7-0.8	0.2-0.3
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	4/05/2011	3/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	10	14	10	11	14

Moisture Our Reference:	UNITS	SE87463-99	SE87463-100	SE87463-102	SE87463-104	SE87463-106
Your Reference	----------	TP39	TP39	TP40	TP41	TP41
Depth	----------	1.1-1.2	1.6-1.7	1.0-1.1	0.4-0.6	2.0-2.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	15	9	11	8	15

Moisture Our Reference:	UNITS	SE87463-107	SE87463-112	SE87463-113	SE87463-114	SE87463-116
Your Reference	----------	TP42	TP44	TP44	TP44	TP45
Depth	----------	0.35-0.45	0.5-0.6	1.5-1.6	2.0-2.1	0.5-0.6
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		2/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	11	16	8	7	21

Moisture Our Reference:	UNITS	SE87463-118	SE87463-119	SE87463-120	SE87463-123	SE87463-124
Your Reference	----------	TP46	TP46	TP46	TP48	TP48
Depth	----------	1.1-1.2	2.0-2.1	3.0-3.1	0.5-0.6	1.0-1.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	11	14	12	17	12

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Moisture Our Reference:	UNITS	SE87463-125	SE87463-127	SE87463-129	SE87463-130	SE87463-131
Your Reference	----------	TP48	TP49	TP50	TP50	TP51
Depth	----------	1.5-1.6	1.5-1.6	0-0.1	1.0-1.1	0-0.2
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	3/05/2011	3/05/2011	5/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	9	10	15	11	16

Moisture Our Reference:	UNITS	SE87463-132	SE87463-133	SE87463-135	SE87463-137	SE87463-138
Your Reference	----------	TP51	TP51	TP52	TP53	TP53
Depth	----------	0.6-0.7	1.4-1.5	1.0-1.1	0-0.2	1.0-1.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		5/05/2011	5/05/2011	5/05/2011	5/05/2011	5/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	15	14	13	15	15

Moisture Our Reference:	UNITS	SE87463-140	SE87463-142	SE87463-143	SE87463-147	SE87463-148
Your Reference	----------	TP54	TP55	TP55	TP57	TP57
Depth	----------	0.9-1.0	0.15-0.25	1.5-1.6	0-0.1	0.6-0.7
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		5/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	10	9	9	17	19

Moisture Our Reference:	UNITS	SE87463-149	SE87463-150	SE87463-151	SE87463-153	SE87463-155
Your Reference	----------	TP58	TP58	TP58	TP59	TP60
Depth	----------	0.2-0.3	0.9-1.0	1.5-1.6	0.45-0.55	0.2-0.3
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	13	12	8	13	12

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Moisture Our Reference:	UNITS	SE87463-156	SE87463-157	SE87463-159	SE87463-160	SE87463-161
Your Reference	----------	TP60	TP61	TP62	TP62	TP62
Depth	----------	0.6-0.7	0.3-0.4	0-0.3	1.1-1.2	1.8-1.9
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	9	12	16	14	12

Moisture Our Reference:	UNITS	SE87463-162	SE87463-164	SE87463-165	SE87463-166	SE87463-167
Your Reference	----------	TP63	TP64	TP64	TP64	TP65
Depth	----------	0.5-0.6	0.4-0.5	1.0-1.1	1.5-1.6	0-0.2
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	4/05/2011	4/05/2011	4/05/2011	3/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	8	13	11	7	16

Moisture Our Reference:	UNITS	SE87463-168	SE87463-169	SE87463-171	SE87463-172	SE87463-173
Your Reference	----------	TP65	TP65	TP66	TP67	TP67
Depth	----------	0.5-0.6	1.5-1.6	1.0-1.1	0.45-0.55	0.8-0.9
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		3/05/2011	3/05/2011	4/05/2011	4/05/2011	4/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	12	12	8	10	15

Moisture Our Reference:	UNITS	SE87463-174	SE87463-175	SE87463-177	SE87463-178	SE87463-179
Your Reference	----------	TP67	TP68	TP69	TP69	TP69
Depth	----------	1.4-1.5	0.5-0.6	0.15-0.25	1.0-1.1	1.7-1.8
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	3/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	14	14	11	8	9

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Moisture Our Reference:	UNITS	SE87463-1 81	SE87463-1 82	SE87463-1 83	SE87463-1 84	SE87463-1 85
Your Reference	----------	TP70	TP70	TP71	TP71	TP71
Depth	----------	1.0-1.1	1.5-1.6	0.5-0.6	1.0-1.1	1.7-1.8
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	3/05/2011	3/05/2011	3/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	13	6	14	12	9

Moisture Our Reference:	UNITS	SE87463-1 86	SE87463-1 87	SE87463-1 88	SE87463-1 89	SE87463-1 90
Your Reference	----------	TP72	TP72	TP72	TP73	TP73
Depth	----------	0-0.15	1.0-1.1	2.0-2.1	0.5-0.6	1.0-1.1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	4/05/2011	4/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	18	14	11	12	12

Moisture Our Reference:	UNITS	SE87463-1 91	SE87463-1 92	SE87463-1 93	SE87463-1 94
Your Reference	----------	TP73	TP74	TP74	TP74
Depth	----------	1.5-1.6	0.2-0.5	0.65-0.75	1.4-1.5
Sample Matrix		Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	11	10	11	9

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Method ID	Methodology Summary
AN291	
AN106	Conductivity and TDS by Calculation (cTDS) - Conductivity is measured using a conductivity cell and dedicated meter, in accordance with APHA 21st Edition, 2510. TDS is calculated by TDS(mg/L)=0.6 x Conductivity(µS/cm).
AN101	pH - Measured using pH meter and electrode based on APHA 21st Edition, 4500-H+. For water analyses the results reported are indicative only as the sample holding time requirement specified in APHA was not met (APHA requires that the pH of the samples are to be measured within 15 minutes after sampling).
AN245	A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
Ext-002	Analysis subcontracted to SGS Environmental Services Cairns, NATA Accreditation No. 2562, Site No. 3146.
AN002	

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QUALITY CONTROL Aggressivity Test in soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	1	AN106	[NT]	SE87463-120	640 || [N/T]	[NR]	[NR]
Resistivity in soil	ohm.m	1	AN106	[NT]	SE87463-120	15 || [N/T]	[NR]	[NR]
Date Extracted- (pH 1:5 soil: Water)				[NT]	SE87463-120	17/05/2011 || [N/T]	[NR]	[NR]
Date Analysed (pH 1:5 Soil: Water)				[NT]	SE87463-120	17/05/2011 || [N/T]	[NR]	[NR]
pH 1:5 soil:water	pH Units	0	AN101	[NT]	SE87463-120	4.9 || [N/T]	[NR]	[NR]
Date Extracted				16/05/2011	SE87463-120	16/05/2011 || 16/05/2011	LCS	16/05/2011
Date Analysed				16/05/2011	SE87463-120	16/05/2011 || 16/05/2011	LCS	16/05/2011
Chloride, Cl 1:5 soil:water	mg/kg	0.25	AN245	<0.2	SE87463-120	820 || 830 || RPD: 1	LCS	99%
Sulphate, SO4 1:5 soil:water	mg/kg	0.5	AN245	<0.5	SE87463-120	48 || 48 || RPD: 0	LCS	98%

QUALITY CONTROL Cation Exchange Capacity*	UNITS	LOR	METHOD	Blank
Cation Exchange Capacity*	mg/kg		Ext-002	<2

QUALITY CONTROL Hold sample-**NO test** required	UNITS	LOR	METHOD	Blank
Sample on HOLD		[NT]		[NT]

QUALITY CONTROL Moisture	UNITS	LOR	METHOD	Blank
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	<1

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-1	280 || 280 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-13	43 || 43 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-27	360 || 360 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-41	30 || 30 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-57	190 || 190 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-79	45 || 46 || RPD: 2
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-92	37 || 36 || RPD: 3
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-113	100 || 110 || RPD: 10
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-130	89 || 90 || RPD: 1
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-1	280 || 280 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-13	43 || 43 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-27	360 || 360 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-41	30 || 30 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-57	190 || 190 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-79	45 || 46 || RPD: 2
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-92	37 || 36 || RPD: 3
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-113	100 || 110 || RPD: 10
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-130	89 || 90 || RPD: 1
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-148	150 || 150 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-162	180 || 180 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-175	110 || 110 || RPD: 0
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

QUALITY CONTROL Aggressivity Test in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	SE87463-190	280 || 290 || RPD: 4
Resistivity in soil	ohm.m	[NT]	[NT]
Date Extracted- (pH 1:5 soil: Water)		[NT]	[NT]
Date Analysed (pH 1:5 Soil: Water)		[NT]	[NT]
pH 1:5 soil:water	pH Units	[NT]	[NT]
Date Extracted		[NT]	[NT]
Date Analysed		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Unit 16/33 Maddox Street Alexandria NSW 2015 Australia
t +61 (0)2 8594 0400 f + 61 (0)2 8594 0499 www.au.sgs.com

LABORATORY REPORT COVERSHEET

Date: 17 May 2011

To: Geotechnique Pty Ltd
PO Box 880
PENRITH NSW 2015

Attention: Indra Jworchan

Your Reference: SE87463 - 12467-1 - Badgally Rd, Claymore
Laboratory Report No: CE71966

Samples Received: 11/05/2011
Samples / Quantity: 17 Soils

The above samples were received intact and analysed according to your written instructions. Unless otherwise stated, solid samples are reported on a dry weight basis and liquid samples as received.

Jon Scott
Asbestos Signatory
CAIRNS

Shey Goddard
Administration Manager
CAIRNS

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Unit 2, 58 Comport Street, Portsmith 4870 QLD Australia
t +61 (0)7 4035 5111 f +61 (0)7 4035 5122

CLIENT: Geotechnique Pty Ltd
PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

Cation Exchange Capacity Suite Our Reference Your Reference Type of Sample Date Sampled	Units	CE71966-1 TP2_0.5-0.6 Soil 5/05/2011	CE71966-2 TP2_1.5-1.6 Soil 5/05/2011	CE71966-3 TP2_2.0-2.1 Soil 5/05/2011
Date Extracted		12/05/2011	12/05/2011	12/05/2011
Date Analysed		17/05/2011	17/05/2011	17/05/2011
Sodium, Na	mg/kg	1,100	1,000	1,400
Sodium (meq%)	meq%	4.8	4.3	6.1
Exchangeable Sodium	%	41	42	40
Potassium, K	mg/kg	150	140	180
Potassium (meq%)	meq%	0.38	0.36	0.46
Exchangeable Potassium	%	3	3	3
Calcium, Ca	mg/kg	250	210	450
Calcium (meq%)	meq%	1.2	1.0	2.2
Exchangeable Calcium	%	11	10	15
Magnesium, Mg	mg/kg	630	570	790
Magnesium (meq%)	meq%	5.2	4.7	6.5
Exchangeable Magnesium	%	45	45	42
CEC	meq%	12	10	15

CLIENT: Geotechnique Pty Ltd

PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

Cation Exchange Capacity Suite Our Reference Your Reference Type of Sample Date Sampled	Units	CE71966-4 TP9_0.85-0.95 Soil 2/05/2011	CE71966-5 TP9_2.0-2.2 Soil 2/05/2011	CE71966-6 TP9_3.0-3.2 Soil 2/05/2011
Date Extracted		12/05/2011	12/05/2011	12/05/2011
Date Analysed		17/05/2011	17/05/2011	17/05/2011
Sodium, Na	mg/kg	190	590	650
Sodium (meq%)	meq%	0.83	2.6	2.8
Exchangeable Sodium	%	9	20	18
Potassium, K	mg/kg	67	94	140
Potassium (meq%)	meq%	0.17	0.24	0.36
Exchangeable Potassium	%	2	2	2
Calcium, Ca	mg/kg	1,300	590	960
Calcium (meq%)	meq%	6.5	2.9	4.8
Exchangeable Calcium	%	67	23	31
Magnesium, Mg	mg/kg	270	840	930
Magnesium (meq%)	meq%	2.2	6.9	7.6
Exchangeable Magnesium	%	23	54	49
CEC	meq%	9.7	13	16

CLIENT: Geotechnique Pty Ltd

PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

Cation Exchange Capacity Suite Our Reference Your Reference Type of Sample Date Sampled	Units	CE71966-7 TP34_0-0.15 Soil 4/05/2011	CE71966-8 TP34_0.5-0.6 Soil 4/05/2011	CE71966-9 TP46_1.1-1.2 Soil 3/05/2011
Date Extracted		12/05/2011	12/05/2011	12/05/2011
Date Analysed		17/05/2011	17/05/2011	17/05/2011
Sodium, Na	mg/kg	42	150	990
Sodium (meq%)	meq%	0.18	0.65	4.3
Exchangeable Sodium	%	4	11	46
Potassium, K	mg/kg	200	170	200
Potassium (meq%)	meq%	0.51	0.43	0.51
Exchangeable Potassium	%	10	7	5
Calcium, Ca	mg/kg	540	170	24
Calcium (meq%)	meq%	2.7	0.85	0.12
Exchangeable Calcium	%	53	14	1
Magnesium, Mg	mg/kg	210	490	550
Magnesium (meq%)	meq%	1.7	4.0	4.5
Exchangeable Magnesium	%	34	67	48
CEC	meq%	5.1	5.9	9.4

CLIENT: Geotechnique Pty Ltd

PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

Cation Exchange Capacity Suite Our Reference Your Reference Type of Sample Date Sampled	Units	CE71966-10 TP46_2.0-2.1 Soil 3/05/2011	CE71966-11 TP46_3.0-3.1 Soil 3/05/2011	CE71966-12 TP58_0.2-0.3 Soil 3/05/2011
Date Extracted		12/05/2011	12/05/2011	12/05/2011
Date Analysed		17/05/2011	17/05/2011	17/05/2011
Sodium, Na	mg/kg	1,400	1,300	93
Sodium (meq%)	meq%	6.1	5.6	0.40
Exchangeable Sodium	%	44	46	5
Potassium, K	mg/kg	190	210	110
Potassium (meq%)	meq%	0.49	0.54	0.28
Exchangeable Potassium	%	3	4	3
Calcium, Ca	mg/kg	73	160	950
Calcium (meq%)	meq%	0.36	0.80	4.7
Exchangeable Calcium	%	3	7	56
Magnesium, Mg	mg/kg	850	640	370
Magnesium (meq%)	meq%	7.0	5.2	3.0
Exchangeable Magnesium	%	50	43	36
CEC	meq%	14	12	8.5

CLIENT: Geotechnique Pty Ltd

PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

Cation Exchange Capacity Suite Our Reference Your Reference Type of Sample Date Sampled	Units	CE71966-13 TP58_0.9-1.0 Soil 3/05/2011	CE71966-14 TP58_1.5-1.6 Soil 3/05/2011	CE71966-15 TP72_0-0.15 Soil 4/05/2011
Date Extracted		12/05/2011	12/05/2011	12/05/2011
Date Analysed		17/05/2011	17/05/2011	17/05/2011
Sodium, Na	mg/kg	260	340	98
Sodium (meq%)	meq%	1.1	1.5	0.43
Exchangeable Sodium	%	9	18	4
Potassium, K	mg/kg	160	130	440
Potassium (meq%)	meq%	0.41	0.33	1.1
Exchangeable Potassium	%	3	4	11
Calcium, Ca	mg/kg	980	330	1,000
Calcium (meq%)	meq%	4.9	1.6	5.0
Exchangeable Calcium	%	37	20	49
Magnesium, Mg	mg/kg	810	570	450
Magnesium (meq%)	meq%	6.6	4.7	3.7
Exchangeable Magnesium	%	51	57	36
CEC	meq%	13	8.1	10

CLIENT: Geotechnique Pty Ltd

PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

Cation Exchange Capacity Suite Our Reference Your Reference Type of Sample Date Sampled	Units	CE71966-16 TP72_1.0-1.1 Soil 4/05/2011	CE71966-17 TP72_2.0-2.1 Soil 4/05/2011
Date Extracted		12/05/2011	12/05/2011
Date Analysed		17/05/2011	17/05/2011
Sodium, Na	mg/kg	820	670
Sodium (meq%)	meq%	3.6	2.9
Exchangeable Sodium	%	28	30
Potassium, K	mg/kg	170	220
Potassium (meq%)	meq%	0.43	0.56
Exchangeable Potassium	%	3	6
Calcium, Ca	mg/kg	170	65
Calcium (meq%)	meq%	0.85	0.33
Exchangeable Calcium	%	7	3
Magnesium, Mg	mg/kg	980	710
Magnesium (meq%)	meq%	8.0	5.8
Exchangeable Magnesium	%	62	60
CEC	meq%	13	9.6

CLIENT: Geotechnique Pty Ltd
PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

TEST PARAMETERS	UNITS	LOR	METHOD
Date Extracted			
Date Analysed			
Sodium, Na	mg/kg	2	AN122 / AN320 RH15D3
Sodium (meq%)	meq%	0.01	Calculation
Exchangeable Sodium	%	1	Calculation
Potassium, K	mg/kg	2	AN122 / AN320 RH15D3
Potassium (meq%)	meq%	0.01	Calculation
Exchangeable Potassium	%	1	Calculation
Calcium, Ca	mg/kg	2	AN122 / AN320 RH15D3
Calcium (meq%)	meq%	0.01	Calculation
Exchangeable Calcium	%	1	Calculation
Magnesium, Mg	mg/kg	2	AN122 / AN320 RH15D3
Magnesium (meq%)	meq%	0.01	Calculation
Exchangeable Magnesium	%	1	Calculation
CEC	meq%	0.01	AN122 / AN320 RH15D3

CLIENT: Geotechnique Pty Ltd

PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

QUALITY CONTROL	UNITS	Blank	Duplicate Sm#	Duplicate Sample||Duplicate	Spike Sm#	Spike Recovery
Date Extracted		12/5/11	CE71966-1	12/05/2011 || 12/05/2011	Batch Spike	12/5/11
Date Analysed		17/5/11	CE71966-1	17/05/2011 || 17/05/2011	Batch Spike	17/5/11
Sodium, Na	mg/kg	<2	CE71966-1	1100 || 1000 || RPD: 10	Batch Spike	88%
Sodium (meq%)	meq%	-	CE71966-1	4.8 || 4.3 || RPD: 11	Batch Spike	-
Exchangeable Sodium	%	-	CE71966-1	41 || 40 || RPD: 2	Batch Spike	-
Potassium, K	mg/kg	<2	CE71966-1	150 || 150 || RPD: 0	Batch Spike	96%
Potassium (meq%)	meq%	-	CE71966-1	0.38 || 0.38 || RPD: 0	Batch Spike	-
Exchangeable Potassium	%	-	CE71966-1	3 || 4 || RPD: 29	Batch Spike	-
Calcium, Ca	mg/kg	<2	CE71966-1	250 || 240 || RPD: 4	Batch Spike	107%
Calcium (meq%)	meq%	-	CE71966-1	1.2 || 1.2 || RPD: 0	Batch Spike	-
Exchangeable Calcium	%	-	CE71966-1	11 || 11 || RPD: 0	Batch Spike	-
Magnesium, Mg	mg/kg	<2	CE71966-1	630 || 610 || RPD: 3	Batch Spike	110%
Magnesium (meq%)	meq%	-	CE71966-1	5.2 || 5.0 || RPD: 4	Batch Spike	-
Exchangeable Magnesium	%	-	CE71966-1	45 || 46 || RPD: 2	Batch Spike	-
CEC	meq%	-	CE71966-1	12 || 11 || RPD: 9	Batch Spike	-

CLIENT: Geotechnique Pty Ltd

PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

QUALITY CONTROL	UNITS	Blank	Duplicate Sm#	Duplicate Sample||Duplicate
Date Extracted		[NT]	CE71966-11	12/05/2011 || 12/05/2011
Date Analysed		[NT]	CE71966-11	17/05/2011 || 17/05/2011
Sodium, Na	mg/kg	[NT]	CE71966-11	1300 || 1200 || RPD: 8
Sodium (meq%)	meq%	[NT]	CE71966-11	5.6 || 5.2 || RPD: 7
Exchangeable Sodium	%	[NT]	CE71966-11	46 || 44 || RPD: 4
Potassium, K	mg/kg	[NT]	CE71966-11	210 || 210 || RPD: 0
Potassium (meq%)	meq%	[NT]	CE71966-11	0.54 || 0.54 || RPD: 0
Exchangeable Potassium	%	[NT]	CE71966-11	4 || 5 || RPD: 22
Calcium, Ca	mg/kg	[NT]	CE71966-11	160 || 160 || RPD: 0
Calcium (meq%)	meq%	[NT]	CE71966-11	0.80 || 0.80 || RPD: 0
Exchangeable Calcium	%	[NT]	CE71966-11	7 || 7 || RPD: 0
Magnesium, Mg	mg/kg	[NT]	CE71966-11	640 || 650 || RPD: 2
Magnesium (meq%)	meq%	[NT]	CE71966-11	5.2 || 5.3 || RPD: 2
Exchangeable Magnesium	%	[NT]	CE71966-11	43 || 45 || RPD: 5
CEC	meq%	[NT]	CE71966-11	12 || 12 || RPD: 0

CLIENT: Geotechnique Pty Ltd
PROJECT: SE87463 - 12467-1 - Badgally Rd, Claymore **Laboratory Report No:** CE71966

LABORATORY REPORT

NOTES:
LOR - Limit of Reporting.

Analysis Date: **Between** 12/05/11 **and** 17/05/11

SGS Terms and Conditions are available at www.au.sgs.com

CoC 6/5/2011 @ 4:30pm

GEOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

Tel: (02) 4722 2700
Fax: (02) 4722 6161
email: info@geotech.com.au

TO: SGS ENVIRONMENTAL SERVICES
UNIT 16
33 MADDOX STREET
ALEXANDRIA NSW 2015

PH: 02 8594 0400 **FAX:** 02 8594 0499
ATTN: MS ANGELA MAMALICOS

Sampling By: AN/JK **Job No:** 12467-1
Project: Claymore Urban Renewal
Project Manager: IJ **Location** Badgally Road, CLAYMORE

	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP						KEEP SAMPLE
	Sampling details				Sample type		Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)								
1	TP1	0.0-0.2	5/05/2011	-	DSP		✓								YES
2	TP1	2.0-2.1	5/05/2011	-	DSP		✓								YES
3	TP2	0.5-0.6	5/05/2011	-	DSP			✓	✓						YES
4	TP2	1.5-1.6	5/05/2011	-	DSP		✓	✓	✓						YES
5	TP2	2.0-2.1	5/05/2011	-	DSP			✓	✓						YES
6	TP3	0.5-0.6	5/05/2011	-	DSP		✓								YES
7	TP3	1.5-1.6	5/05/2011	-	DSP										YES
8	TP3	2.0-2.1	5/05/2011	-	DSP		✓								YES
9	TP4	1.0-1.1	5/05/2011	-	DSP		✓								YES
10	TP4	2.0-2.1	5/05/2011	-	DSP		✓								YES
11	TP4	2.8-2.9	5/05/2011	-	DSP		✓								YES
12	TP5	1.0-1.1	5/05/2011	-	DSP										YES

SGS 6/5/11 4:30 Cool Room Floor. SE84463

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng		6/05/2011			6/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

GEOTECHNIQUE PTY LTD

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Sampling By: AN/JK **Job No:** 12467-1

Project: Claymore Urban Renewal

Project Manager: IJ **Location** Badgally Road, CLAYMORE

Sampling details				Sample type		Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)									
	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP						KEEP SAMPLE
13	TP5	1.5-1.6	5/05/2011	-	DSP		✓								YES
14	TP5	2.2-2.3	5/05/2011	-	DSP										YES
15	TP6	0.0-0.15	5/05/2011	-	DSP										YES
16	TP6	1.0-1.1	5/05/2011	-	DSP		✓								YES
17	TP6	1.5-1.6	5/05/2011	-	DSP										YES
18	TP7	0.8-0.9	5/05/2011	-	DSP		✓								YES
19	TP7	1.3-1.4	5/05/2011	-	DSP		✓								YES
20	TP8	1.5-1.6	5/05/2011	-	DSP		✓								YES
21	TP9	0-0.15	2/05/2011	-	DSP										YES
22	TP9	0.85-0.95	2/05/2011	-	DSP		✓	✓	✓						YES
23	TP9	2.0-2.2	2/05/2011	-	DSP		✓	✓	✓						YES
24	TP9	3.0-3.2	2/05/2011		DSP		✓	✓	✓						YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					6/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
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ATTN: MS ANGELA MAMALICOS

Sampling By: AN/JK **Job No:** 12467-1

Project: Claymore Urban Renewal

Project Manager: IJ **Location** Badgally Road, CLAYMORE

	Sampling details				Sample type		Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)								
	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP						KEEP SAMPLE
25	TP10	0.4-0.5	2/05/2011	-	DSP		✓								YES
26	TP10	1.0-1.1	2/05/2011	-	DSP										YES
27	TP10	2.5-2.6	2/05/2011	-	DSP		✓								YES
28	TP10	3.5-3.6	2/05/2011	-	DSP		✓								YES
29	TP11	0.25-0.35	2/05/2011	-	DSP		✓								YES
30	TP11	1.5-1.6	2/05/2011	-	DSP		✓								YES
31	TP11	2.5-2.6	2/05/2011	-	DSP										YES
32	TP12	0.6-0.7	5/05/2011	-	DSP		✓								YES
33	TP12	1.0-1.1	5/05/2011	-	DSP										YES
34	TP13	0.25-0.35	2/05/2011	-	DSP										YES
35	TP13	1.0-1.1	2/05/2011	-	DSP		✓								YES
36	TP13	2.0-2.1	2/05/2011	-	DSP		✓								YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					6/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
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Sampling By: AN/JK **Job No:** 12467-1

Project: Claymore Urban Renewal

Project Manager: IJ **Location** Badgally Road, CLAYMORE

Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)

	Sampling details				Sample type									
	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP					KEEP SAMPLE
37	TP14	0.7-1.0	2/05/2011	-	DSP		✓							YES
38	TP14	1.3-1.6	2/05/2011	-	DSP		✓							YES
39	TP15	0.3-0.5	2/05/2011	-	DSP		✓							YES
40	TP15	0.8-1.0	2/05/2011	-	DSP									YES
41	TP16	0.2-0.3	5/05/2011	-	DSP		✓							YES
42	TP16	0.9-1.0	5/05/2011	-	DSP									YES
43	TP16	1.4-1.5	5/05/2011	-	DSP									YES
44	TP17	0.3-0.4	5/05/2011	-	DSP		✓							YES
45	TP17	0.8-0.9	5/05/2011	-	DSP									YES
46	TP18	0-0.15	5/05/2011	-	DSP		✓							YES
47	TP18	0.9-1.2	5/05/2011	-	DSP		✓							YES
48	TP19	0.6-0.7	5/05/2011	-	DSP		✓							YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					6/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
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ALEXANDRIA NSW 2015

PH: 02 8594 0400 **FAX:** 02 8594 0499
ATTN: MS ANGELA MAMALICOS

Sampling By: AN/JK **Job No:** 12467-1

Project: Claymore Urban Renewal

Project Manager: IJ **Location** Badgally Road, CLAYMORE

Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)

	Location	Sampling details: Depth (m)	Date	Time	Sample type: Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP						KEEP SAMPLE
49	TP19	1.0-1.1	5/05/2011	-	DSP										YES
50	TP19	1.6-1.7	5/05/2011	-	DSP		✓								YES
51	TP20	0-0.2	2/05/2011	-	DSP		✓								YES
52	TP20	0.6-0.7	2/05/2011	-	DSP										YES
53	TP20	1.2-1.3	5/05/2011	-	DSP		✓								YES
54	TP21	0-0.15	4/05/2011	-	DSP										YES
55	TP21	0.8-0.9	4/05/2011	-	DSP		✓								YES
56	TP21	1.5-1.6	4/05/2011	-	DSP		✓								YES
57	TP22	0.4-0.6	5/05/2011	-	DSP		✓								YES
58	TP22	1.0-1.1	5/05/2011	-	DSP										YES
59	TP22	1.5-1.6	5/05/2011	-	DSP										YES
60	TP23	0.5-0.6	4/05/2011	-	DSP		✓								YES

Relinquished by: Name	Signature	Date	Received by: Name	Signature	Date
Zo Mung Thawng			Cindy Tan		6/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

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Laboratory Test Request / Chain of Custody Record

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email: info@geotech.com.au

TO: SGS ENVIRONMENTAL SERVICES
UNIT 16
33 MADDOX STREET
ALEXANDRIA NSW 2015

PH: 02 8594 0400 **FAX:** 02 8594 0499
ATTN: MS ANGELA MAMALICOS

Sampling By: AN/JK **Job No:** 12467-1

Project: Claymore Urban Renewal

Project Manager: IJ **Location** Badgally Road, CLAYMORE

Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)

	Location	Sampling details: Depth (m)	Date	Time	Sample type: Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP						KEEP SAMPLE
61	TP23	1.2-1.3	4/05/2011	-	DSP		✓								YES
62	TP24	0-0.1	4/05/2011	-	DSP										YES
63	TP24	0.5-0.6	4/05/2011	-	DSP		✓								YES
64	TP24	1.5-1.6	4/05/2011	-	DSP										YES
65	TP25	1.3-1.4	5/05/2011	-	DSP		✓								YES
66	TP25	2.0-2.1	5/05/2011	-	DSP										YES
67	TP26	0.5-0.6	5/05/2011	-	DSP		✓								YES
68	TP26	1.0-1.1	5/05/2011	-	DSP										YES
69	TP27	0.2-0.3	4/05/2011	-	DSP		✓								YES
70	TP27	0.8-0.9	4/05/2011	-	DSP		✓								YES
71	TP28	0-0.1	4/05/2011	-	DSP										YES
72	TP28	0.7-1.0	4/05/2011	-	DSP		✓								YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					6/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
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Sampling By: AN/JK **Job No:** 12467-1

Project: Claymore Urban Renewal

Project Manager: IJ **Location** Badgally Road, CLAYMORE

Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)

	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP						KEEP SAMPLE
					Sampling details		Sample type								
73	TP28	1.2-1.4	4/05/2011	-	DSP										YES
74	TP29	0-0.15	4/05/2011	-	DSP										YES
75	TP29	0.7-0.8	4/05/2011	-	DSP		✓								YES
76	TP29	1.5-1.6	4/05/2011	-	DSP										YES
77	TP30	0.25-0.35	4/05/2011	-	DSP		✓								YES
78	TP30	0.7-0.8	4/05/2011	-	DSP										YES
79	TP30	1.7-1.8	4/05/2011	-	DSP		✓								YES
80	TP31	0-0.1	4/05/2011	-	DSP										YES
81	TP31	0.6-0.7	4/05/2011	-	DSP										YES
82	TP31	1.5-1.6	4/05/2011	-	DSP		✓								YES
83	TP31	2.5-2.6	4/05/2011	-	DSP		✓								YES
84	TP32	0.5-0.6	4/05/2011	-	DSP		✓								YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					6/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
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Sampling By: AN/JK
Job No: 12467-1
Project: Claymore Urban Renewal
Project Manager: IJ
Location Badgally Road, CLAYMORE

	Sampling details				Sample type		Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)							
	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP					KEEP SAMPLE
85	TP32	1.0-1.1	4/05/2011	-	DSP									YES
86	TP33	0.15-0.25	4/05/2011	-	DSP		✓							YES
87	TP33	0.8-0.9	4/05/2011	-	DSP									YES
88	TP34	0-0.15	4/05/2011	-	DSP		✓	✓	✓					YES
89	TP34	0.5-0.6	4/05/2011	-	DSP		✓	✓	✓					YES
90	TP35	0.5-0.6	4/05/2011	-	DSP		✓							YES
91	TP35	1.0-1.1	4/05/2011	-	DSP		✓							YES
92	TP36	0-0.1	4/05/2011	-	DSP		✓							YES
93	TP36	1.0-1.1	4/05/2011	-	DSP		✓							YES
94	TP37	0.25-0.35	4/05/2011	-	DSP		✓							YES
95	TP37	0.9-1.0	4/05/2011	-	DSP		✓							YES
96	TP38	0.3-0.4	4/05/2011	-	DSP									YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					6

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

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Project Manager: IJ **Location** Badgally Road, CLAYMORE

Sampling details				Sample type		Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)								
Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity							KEEP SAMPLE
97 TP38	0.7-0.8	4/05/2011	-	DSP		✓								YES
98 TP39	0.2-0.3	3/05/2011	-	DSP		✓								YES
99 TP39	1.1-1.2	3/05/2011	-	DSP		✓								YES
100 TP39	1.6-1.7	3/05/2011	-	DSP		✓								YES
101 TP40	0.2-0.3	2/05/2011	-	DSP										YES
102 TP40	1.0-1.1	2/05/2011	-	DSP		✓								YES
103 TP40	2.5-2.6	2/05/2011	-	DSP										YES
104 TP41	0.4-0.6	2/05/2011	-	DSP		✓								YES
105 TP41	1.5-1.6	2/05/2011	-	DSP										YES
106 TP41	2.0-2.1	2/05/2011	-	DSP		✓								YES
107 TP42	0.35-0.45	2/05/2011	-	DSP		✓								YES
108 TP42	1.5-1.6	2/05/2011	-	DSP										YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng			Emily Y		6/5/11

Legend:

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Sampling By: AN/JK **Job No:** 12467-1

Project: Claymore Urban Renewal

Project Manager: IJ **Location** Badgally Road, CLAYMORE

Sampling details				Sample type		Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)									
	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP						KEEP SAMPLE
109	TP42	2.0-2.1	2/05/2011	-	DSP										YES
110	TP43	0.5-0.6	3/05/2011	-	DSP										YES
111	TP43	1.0-1.1	3/05/2011	-	DSP										YES
112	TP44	0.5-0.6	3/05/2011	-	DSP		✓								YES
113	TP44	1.5-1.6	3/05/2011	-	DSP		✓								YES
114	TP44	2.0-2.1	3/05/2011	-	DSP		✓								YES
115	TP45	0.2-0.3	3/05/2011	-	DSP										YES
116	TP45	0.5-0.6	3/05/2011	-	DSP		✓								YES
117	TP45	1.0-1.1	3/05/2011	-	DSP										YES
118	TP46	1.1-1.2	3/05/2011	-	DSP		✓	✓	✓						YES
119	TP46	2.0-2.1	3/05/2011	-	DSP		✓	✓	✓						YES
120	TP46	3.0-3.1	3/05/2011	-	DSP		✓	✓	✓						YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					6/5/11

Legend:

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Sampling By: AN/JK **Job No:** 12467-1
Project: Claymore Urban Renewal
Project Manager: IJ **Location** Badgally Road, CLAYMORE

Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)

	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity							KEEP SAMPLE
					Sampling details		Sample type								
121	TP47	0-0.1	2/05/2011	-	DSP										YES
122	TP47	0.5-0.6	2/05/2011	-	DSP										YES
123	TP48	0.5-0.6	3/05/2011	-	DSP		✓								YES
124	TP48	1.0-1.1	3/05/2011	-	DSP		✓								YES
125	TP48	1.5-1.6	3/05/2011	-	DSP		✓								YES
126	TP49	0.5-0.6	3/05/2011	-	DSP										YES
127	TP49	1.5-1.6	3/05/2011	-	DSP		✓								YES
128	TP49	2.4-2.5	3/05/2011	-	DSP										YES
129	TP50	0-0.1	3/05/2011	-	DSP		✓								YES
130	TP50	1.0-1.1	3/05/2011	-	DSP		✓								YES
131	TP51	0-0.2	5/05/2011	-	DSP		✓								YES
132	TP51	0.6-0.7	5/05/2011	-	DSP		✓								YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					6/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
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Project: Claymore Urban Renewal
Project Manager: IJ **Location** Badgally Road, CLAYMORE

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	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity								KEEP SAMPLE
133	TP51	1.4-1.5	5/05/2011	-	DSP		✓									YES
134	TP52	0-0.2	5/05/2011	-	DSP											YES
135	TP52	1.0-1.1	5/05/2011	-	DSP		✓									YES
136	TP52	2.0-2.1	5/05/2011	-	DSP											YES
137	TP53	0-0.2	5/05/2011	-	DSP		✓									YES
138	TP53	1.0-1.1	5/05/2011	-	DSP		✓									YES
139	TP54	0.4-0.6	5/05/2011	-	DSP											YES
140	TP54	0.9-1.0	5/05/2011	-	DSP		✓									YES
141	TP54	1.4-1.5	5/05/2011	-	DSP											YES
142	TP55	0.15-0.25	3/05/2011	-	DSP		✓									YES
143	TP55	1.5-1.6	3/05/2011	-	DSP		✓									YES
144	TP56	0-0.15	3/05/2011	-	DSP											YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng			Emily Yu		6/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
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Project Manager: IJ **Location** Badgally Road, CLAYMORE

Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)

	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP						KEEP SAMPLE
					Sampling details		Sample type								
145	TP56	1.0-1.1	3/05/2011	-	DSP										YES
146	TP56	2.2-2.3	3/05/2011	-	DSP										YES
147	TP57	0-0.1	3/05/2011	-	DSP		✓								YES
148	TP57	0.6-0.7	3/05/2011	-	DSP		✓								YES
149	TP58	0.2-0.3	3/05/2011	-	DSP		✓	✓	✓						YES
150	TP58	0.9-1.0	3/05/2011	-	DSP		✓	✓	✓						YES
151	TP58	1.5-1.6	3/05/2011	-	DSP		✓	✓	✓						YES
152	TP59	0.15-0.25	3/05/2011	-	DSP										YES
153	TP59	0.45-0.55	3/05/2011	-	DSP		✓								YES
154	TP59	1.0-1.1	3/05/2011	-	DSP										YES
155	TP60	0.2-0.3	3/05/2011	-	DSP		✓								YES
156	TP60	0.6-0.7	3/05/2011	-	DSP		✓								YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					5/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
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	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity						KEEP SAMPLE
157	TP61	0.3-0.4	3/05/2011	-	DSP		✓							YES
158	TP61	0.7-0.8	3/05/2011	-	DSP									YES
159	TP62	0-0.3	3/05/2011	-	DSP		✓							YES
160	TP62	1.1-1.2	3/05/2011	-	DSP		✓							YES
161	TP62	1.8-1.9	3/05/2011	-	DSP		✓							YES
162	TP63	0.5-0.6	3/05/2011	-	DSP		✓							YES
163	TP63	1.4-1.5	3/05/2011	-	DSP									YES
164	TP64	0.4-0.5	4/05/2011	-	DSP		✓							YES
165	TP64	1.0-1.1	4/05/2011	-	DSP		✓							YES
166	TP64	1.5-1.6	4/05/2011	-	DSP		✓							YES
167	TP65	0-0.2	3/05/2011	-	DSP		✓							YES
168	TP65	0.5-0.6	3/05/2011	-	DSP		✓							YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					6/5/11

Legend:

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	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity							KEEP SAMPLE
164	TP65	1.5-1.6	3/05/2011	-	DSP		✓								YES
170	TP66	0-0.1	4/05/2011	-	DSP										YES
171	TP66	1.0-1.1	4/05/2011	-	DSP		✓								YES
172	TP67	0.45-0.55	4/05/2011	-	DSP		✓								YES
173	TP67	0.8-0.9	4/05/2011	-	DSP		✓								YES
174	TP67	1.4-1.5	4/05/2011	-	DSP		✓								YES
175	TP68	0.5-0.6	3/05/2011	-	DSP		✓								YES
176	TP68	1.0-1.1	3/05/2011	-	DSP										YES
177	TP69	0.15-0.25	3/05/2011	-	DSP		✓								YES
178	TP69	1.0-1.1	3/05/2011	-	DSP		✓								YES
179	TP69	1.7-1.8	3/05/2011	-	DSP		✓								YES
180	TP70	0.5-0.6	4/05/2011	-	DSP										YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng			Emily Tan		5/5/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

G EOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

Tel: (02) 4722 2700
Fax: (02) 4722 6161
email: info@geotech.com.au

TO: **SGS ENVIRONMENTAL SERVICES**
UNIT 16
33 MADDOX STREET
ALEXANDRIA NSW 2015

PH: **02 8594 0400** FAX: **02 8594 0499**
ATTN: **MS ANGELA MAMALICOS**

Sampling By: AN/JK **Job No:** 12467-1

Project: Claymore Urban Renewal

Project Manager: IJ **Location** Badgally Road, CLAYMORE

	Sampling details				Sample type		Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)									
	Location	Depth (m)	Date	Time	Soil	Water	Electrical Conductivity (1:5)	Aggressivity	ESP							KEEP SAMPLE
180	TP70	1.0-1.1	4/05/2011	-	DSP		✓									YES
181	TP70	1.5-1.6	4/05/2011	-	DSP		✓									YES
183	TP71	0.5-0.6	3/05/2011	-	DSP		✓									YES
184	TP71	1.0-1.1	3/05/2011	-	DSP		✓									YES
185	TP71	1.7-1.8	3/05/2011	-	DSP		✓									YES
186	TP72	0-0.15	4/05/2011	-	DSP			✓	✓							YES
187	TP72	1.0-1.1	4/05/2011	-	DSP		✓	✓	✓							YES
188	TP72	2.0-2.1	4/05/2011	-	DSP			✓	✓							YES
189	TP73	0.5-0.6	4/05/2011	-	DSP		✓									YES
190	TP73	1.0-1.1	4/05/2011	-	DSP		✓									YES
191	TP73	1.5-1.6	4/05/2011	-	DSP		✓									YES
192	TP74	0.2-0.5	2/05/2011	-	DSP		✓									YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					5/04/11

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

G EOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

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TO: SGS ENVIRONMENTAL SERVICES
UNIT 16
33 MADDOX STREET
ALEXANDRIA NSW 2015

PH: 02 8594 0400 **FAX:** 02 8594 0499
ATTN: MS ANGELA MAMALICOS

Sampling By: AN/JK **Job No:** 12467-1

Project: Claymore Urban Renewal

Project Manager: IJ **Location** Badgally Road, CLAYMORE

	Sampling details			Sample type												
	Location	Depth (m)	Date	Time	Soil	Water	Notes: Aggressivity Test includes determination of EC,pH,Chloride,Sulphate and Resistivity (No Texture assessment required)									
							Electrical Conductivity (1:5)	Aggressivity								KEEP SAMPLE
193	TP74	0.65-0.75	2/05/2011	-	DSP		✓									YES
194	TP74	1.4-1.5	2/05/2011	-	DSP		✓									YES
195	TP3	0-0.2														
196	TP14	0-0.15														
197	TP76	0.6-0.7														
198	TP76	1.4-1.5														

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Zo Mung Thawng					3/5/14

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

SAMPLE RECEIPT ADVICE (SRA)

12 May 2011

Client Details			Laboratory Details		
Requested By	:	**Indra Jworchan**			
Client	:	Geotechnique	Laboratory	:	SGS Environmental Services
Contact	:	Frances Kuipers	Manager	:	Edward Ibrahim
Address	:	P.O. Box 880 PENRITH NSW 2751	Address	:	Unit 16, 33 Maddox Street Alexandria NSW 2015
Email	:	frances.kuipers@geotech.com.au	Email	:	au.samplereceipt.sydney@sgs.com
Telephone	:	02 4722 2700	Telephone	:	61 2 8594 0400
Facsimile	:	02 4722 6161	Facsimile	:	61 2 8594 0499
Project	:	12467-1 - Claymore Urban Renewal - Badgally Road	Report No	:	**SE87463**
Order Number	:		No. of Samples	:	198
Samples	:	197 Soils	Due Date	:	18/05/2011

Date Instructions Received	:	6/05/2011
Sample Receipt Date	:	6/5/11

Samples received in good order	:	YES (see below)	Samples received in correct containers	:	YES
Samples received without headspace	:	N/A	Sufficient quantity supplied	:	YES
Upon receipt sample temperature	:	Ambient	Cooling Method	:	None
Sample containers provided by	:	Customer	Samples clearly Labelled	:	NO
Turnaround time requested	:	Standard	Completed documentation received	:	YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

TP5(2.2-2.3) labelled as TP5(1.7-1.8). ESP Subcontracted bto SGS Cairns.
TP59(0.15-0.25) not received. Extra samples
TP8(0-0.2), TP14(0-0.15), TP46(0.6-0.7) and
TP76(1.4-1.5) to be placed on hold

The signed chain of custody will be returned to you with the original report.

SGS Australia Pty Ltd | Unit 16, 33 Maddox Street Alexandria New South Wales 2015 t+61 (0)2 8594 0400 f+61 (0)2 85940499 www.au.sgs.com
Member of the SGS Group (SGS SA)

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.
Please indicate ASAP if your request differs from these details.
Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.
Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	No Prep Required	Aggressivity Test in soil	Exchangeable Sodium Percent	Hold sample-NO test required	Moisture
1	TP1	X	x			X
2	TP1	X	x			X
3	TP2	X	X	X		X
4	TP2	X	X	X		X
5	TP2	X	X	X		X
6	TP3	X	x			X
7	TP3				X	
8	TP3	X	x			X
9	TP4	X	x			X
10	TP4	X	x			X
11	TP4	X	x			X
12	TP5				X	
13	TP5	X	x			X
14	TP5				X	
15	TP6				X	
16	TP6	X	x			X
17	TP6				X	
18	TP7	X	x			X

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description	No Prep Required	Aggressivity Test in soil	Exchangeable Sodium Percent	Hold sample-NO test required	Moisture
19	TP7	X	x			X
20	TP8	X	x			X
21	TP9				X	
22	TP9	X	X	X		X
23	TP9	X	X	X		X
24	TP9	X	X	X		X
25	TP10	X	x			X
26	TP10				X	
27	TP10	X	x			X
28	TP10	X	x			X
29	TP11	X	x			X
30	TP11	X	x			X
31	TP11				X	
32	TP12	X	x			X
33	TP12				X	
34	TP13				X	
35	TP13	X	x			X
36	TP13	X	x			X
37	TP14	X	x			X
38	TP14	X	x			X
39	TP15	X	x			X
40	TP15				X	
41	TP16	X	x			X
42	TP16				X	

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description	No Prep Required	Aggressivity Test in soil	Exchangeable Sodium Percent	Hold sample-NO test required	Moisture
43	TP16				X	
44	TP17	X	x			X
45	TP17				X	
46	TP18	X	x			X
47	TP18	X	x			X
48	TP19	X	x			X
49	TP19				X	
50	TP19	X	x			X
51	TP20	X	x			X
52	TP20				X	
53	TP20	X	x			X
54	TP21				X	
55	TP21	X	x			X
56	TP21	X	x			X
57	TP22	X	x			X
58	TP22				X	
59	TP22				X	
60	TP23	X	x			X
61	TP23	X	x			X
62	TP24				X	
63	TP24	X	x			X
64	TP24				X	
65	TP25	X	x			X
66	TP25				X	

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description	No Prep Required	Aggressivity Test in soil	Exchangeable Sodium Percent	Hold sample-NO test required	Moisture
67	TP26	X	x			X
68	TP26				X	
69	TP27	X	x			X
70	TP27	X	x			X
71	TP28				X	
72	TP28	X	x			X
73	TP28				X	
74	TP29				X	
75	TP29	X	x			X
76	TP29				X	
77	TP30	X	x			X
78	TP30				X	
79	TP30	X	x			X
80	TP31				X	
81	TP31				X	
82	TP31	X	x			X
83	TP31	X	x			X
84	TP32	X	x			X
85	TP32				X	
86	TP33	X	x			X
87	TP33				X	
88	TP34	X	X	X		X
89	TP34	X	X	X		X
90	TP35	X	x			X

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description	No Prep Required	Aggressivity Test in soil	Exchangeable Sodium Percent	Hold sample-NO test required	Moisture
91	TP35	X	x			X
92	TP36	X	x			X
93	TP36	X	x			X
94	TP37	X	x			X
95	TP37	X	x			X
96	TP38				X	
97	TP38	X	x			X
98	TP39	X	x			X
99	TP39	X	x			X
100	TP39	X	x			X
101	TP40				X	
102	TP40	X	x			X
103	TP40				X	
104	TP41	X	x			X
105	TP41				X	
106	TP41	X	x			X
107	TP42	X	x			X
108	TP42				X	
109	TP42				X	
110	TP43				X	
111	TP43				X	
112	TP44	X	x			X
113	TP44	X	x			X
114	TP44	X	x			X

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description	No Prep Required	Aggressivity Test in soil	Exchangeable Sodium Percent	Hold sample-NO test required	Moisture
115	TP45				X	
116	TP45	X	x			X
117	TP45				X	
118	TP46	X	X	X		X
119	TP46	X	X	X		X
120	TP46	X	X	X		X
121	TP47				X	
122	TP47				X	
123	TP48	X	x			X
124	TP48	X	x			X
125	TP48	X	x			X
126	TP49				X	
127	TP49	X	x			X
128	TP49				X	
129	TP50	X	x			X
130	TP50	X	x			X
131	TP51	X	x			X
132	TP51	X	x			X
133	TP51	X	x			X
134	TP52				X	
135	TP52	X	x			X
136	TP52				X	
137	TP53	X	x			X
138	TP53	X	x			X

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description	No Prep Required	Aggressivity Test in soil	Exchangeable Sodium Percent	Hold sample-NO test required	Moisture
139	TP54				X	
140	TP54	X	x			X
141	TP54				X	
142	TP55	X	x			X
143	TP55	X	x			X
144	TP56				X	
145	TP56				X	
146	TP56				X	
147	TP57	X	x			X
148	TP57	X	x			X
149	TP58	X	X	X		X
150	TP58	X	X	X		X
151	TP58	X	X	X		X
153	TP59	X	x			X
154	TP59				X	
155	TP60	X	x			X
156	TP60	X	x			X
157	TP61	X	x			X
158	TP61				X	
159	TP62	X	x			X
160	TP62	X	x			X
161	TP62	X	x			X
162	TP63	X	x			X
163	TP63				X	

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description	No Prep Required	Aggressivity Test in soil	Exchangeable Sodium Percent	Hold sample-NO test required	Moisture
164	TP64	X	x			X
165	TP64	X	x			X
166	TP64	X	x			X
167	TP65	X	x			X
168	TP65	X	x			X
169	TP65	X	x			X
170	TP66				X	
171	TP66	X	x			X
172	TP67	X	x			X
173	TP67	X	x			X
174	TP67	X	x			X
175	TP68	X	x			X
176	TP68				X	
177	TP69	X	x			X
178	TP69	X	x			X
179	TP69	X	x			X
180	TP70				X	
181	TP70	X	x			X
182	TP70	X	x			X
183	TP71	X	x			X
184	TP71	X	x			X
185	TP71	X	x			X
186	TP72	X	X	X		X
187	TP72	X	X	X		X

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description	No Prep Required	Aggressivity Test in soil	Exchangeable Sodium Percent	Hold sample-NO test required	Moisture
188	TP72	X	X	X		X
189	TP73	X	x			X
190	TP73	X	x			X
191	TP73	X	x			X
192	TP74	X	x			X
193	TP74	X	x			X
194	TP74	X	x			X
195	TP8				X	
196	TP14				X	
197	TP76				X	
198	TP76				X	

Sample No.	Description
1	TP1
2	TP1
3	TP2
4	TP2
5	TP2
6	TP3
7	TP3
8	TP3
9	TP4

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description
10	TP4
11	TP4
12	TP5
13	TP5
14	TP5
15	TP6
16	TP6
17	TP6
18	TP7
19	TP7
20	TP8
21	TP9
22	TP9
23	TP9
24	TP9
25	TP10
26	TP10
27	TP10
28	TP10
29	TP11
30	TP11
31	TP11
32	TP12
33	TP12
34	TP13
35	TP13
36	TP13
37	TP14
38	TP14

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description
39	TP15
40	TP15
41	TP16
42	TP16
43	TP16
44	TP17
45	TP17
46	TP18
47	TP18
48	TP19
49	TP19
50	TP19
51	TP20
52	TP20
53	TP20
54	TP21
55	TP21
56	TP21
57	TP22
58	TP22
59	TP22
60	TP23
61	TP23
62	TP24
63	TP24
64	TP24
65	TP25
66	TP25
67	TP26

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description
68	TP26
69	TP27
70	TP27
71	TP28
72	TP28
73	TP28
74	TP29
75	TP29
76	TP29
77	TP30
78	TP30
79	TP30
80	TP31
81	TP31
82	TP31
83	TP31
84	TP32
85	TP32
86	TP33
87	TP33
88	TP34
89	TP34
90	TP35
91	TP35
92	TP36
93	TP36
94	TP37
95	TP37
96	TP38

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description
97	TP38
98	TP39
99	TP39
100	TP39
101	TP40
102	TP40
103	TP40
104	TP41
105	TP41
106	TP41
107	TP42
108	TP42
109	TP42
110	TP43
111	TP43
112	TP44
113	TP44
114	TP44
115	TP45
116	TP45
117	TP45
118	TP46
119	TP46
120	TP46
121	TP47
122	TP47
123	TP48
124	TP48
125	TP48

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description
126	TP49
127	TP49
128	TP49
129	TP50
130	TP50
131	TP51
132	TP51
133	TP51
134	TP52
135	TP52
136	TP52
137	TP53
138	TP53
139	TP54
140	TP54
141	TP54
142	TP55
143	TP55
144	TP56
145	TP56
146	TP56
147	TP57
148	TP57
149	TP58
150	TP58
151	TP58
153	TP59
154	TP59
155	TP60

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description
156	TP60
157	TP61
158	TP61
159	TP62
160	TP62
161	TP62
162	TP63
163	TP63
164	TP64
165	TP64
166	TP64
167	TP65
168	TP65
169	TP65
170	TP66
171	TP66
172	TP67
173	TP67
174	TP67
175	TP68
176	TP68
177	TP69
178	TP69
179	TP69
180	TP70
181	TP70
182	TP70
183	TP71
184	TP71

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Geotechnique Report No : SE87463
Project : 12467-1 - Claymore Urban Renewal - Badgally Road

Sample No.	Description
185	TP71
186	TP72
187	TP72
188	TP72
189	TP73
190	TP73
191	TP73
192	TP74
193	TP74
194	TP74
195	TP8
196	TP14
197	TP76
198	TP76