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Proposed Subdivision -  
Preliminary Geotechnical  
Assessment

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898 New England Highway, and  
Wyndella Road, Lochinvar

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NEW22P-0012-AB  
4 March 2022

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4 March 2022

Lindsay Bennelong Developments Pty Ltd  
PO Box 7105  
BAULKHAM HILLS NSW 2153

**Attention: Mr Steve Chatfield**

Dear Steve,

**RE: PROPOSED RESIDENTIAL SUBDIVISION  
898 NEW ENGLAND HIGHWAY AND WYNDELLA ROAD, LOCHINVAR, NSW  
PRELIMINARY GEOTECHNICAL ASSESSMENT**

Please find enclosed our Preliminary Geotechnical Assessment report for the proposed residential subdivision to be located at 898 New England Highway and Wyndella Road, Lochinvar, NSW.

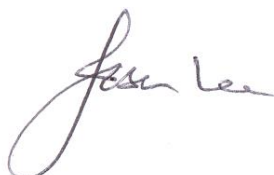
The purpose of the Preliminary Geotechnical Assessment is to inform the due diligence assessment being carried out prior to purchase, and potentially to support a Development Application (DA) submission to Maitland City Council at a later date.

The report includes preliminary recommendations for suitability of the site for development from a geotechnical perspective including assessment of the risk of slope instability and associated geotechnical constraints.

Additional detailed geotechnical investigation work will be required for design purposes at a later stage, including site classification for footings and pavement design for subdivision roads.

If you have any questions regarding this report, please do not hesitate to contact Shannon Kelly or the undersigned.

For and on behalf of Qualtest Laboratory (NSW) Pty Ltd



Jason Lee  
Principal Geotechnical Engineer

## Table of Contents:

1.0	Introduction.....	1
2.0	Desktop study.....	1
2.1	Previous Reports.....	1
2.2	Acid Sulfate Soil Risk Map .....	1
2.3	Geology Map.....	2
2.4	Soil Landscape Map .....	2
3.0	Field Work .....	3
4.0	Site Description.....	4
4.1	Surface Conditions .....	4
4.2	Subsurface Conditions.....	13
5.0	Discussion and Recommendations.....	18
5.1	General .....	18
5.2	Slope Stability and Recommended Geotechnical Constraints .....	18
5.2.1	Basis of Assessment.....	18
5.2.2	Principal Site Features and Evidence of Instability .....	19
5.2.3	Hazard Identification .....	19
5.2.4	Risk Evaluation for the Proposed Development.....	20
5.2.5	Recommended Geotechnical Constraints for Residential Development	20
5.3	Foundations .....	23
5.4	Excavation Conditions and Depth to Rock .....	23
5.5	Site Preparation.....	24
5.6	Fill Construction Procedures .....	25
6.0	Limitations.....	25

## Attachments:

Figures:	Figure AB1:	Site Location Plan & Approximate test Locations
	Figure AB2:	Site Features – Southern Portion
	Figure AB3:	Site Features – Northern Portion
Appendix A:	Results of Field Investigations	
Appendix B:	AGS 2007 Excerpts	

## 1.0 Introduction

Qualtest Laboratory NSW Pty Ltd (Qualtest) is pleased to present this report to Lindsay Bennelong Developments Pty Ltd (LBD) for the proposed land acquisition for a residential subdivision to be located at 898 New England Highway and Wyndella Road, Lochinvar, NSW.

The site comprises Lots 2, 3, 4, 5, 6 and 9 DP 747391, Lot 1 DP 65706 and Lots 12 and 13 DP1219648. Lot 1 DP 65706 is currently zoned RU1 Primary Production, the remainder of the site is zoned R1 General Residential. Lot 1 DP 65706 covers an area of approximately 34.83ha and the remainder of the site covers an area of approximately 22ha (total site area 56.8ha).

Based on LBD's email dated 16 December 2021 and phone call on 11 January 2022, the following scope of works have been requested for the site;

- *Geotechnical*
  - *Desktop and preliminary site investigation over the R1 zoned land; and*
  - *Desktop preliminary investigation over the RU1 zoned land".*

The scope of work for the preliminary geotechnical assessment included providing discussion and recommendations on the following:

- Description of the surface and subsurface conditions based upon desktop study, brief site walkover and test pits;
- Site capability assessment - Assessing the suitability of the site for development from a geotechnical perspective, including risk of slope instability and associated geotechnical constraints;
- Preliminary advice on foundation design parameters, site preparation, excavation conditions, and earthworks procedures.

This report presents the results of the field work investigations, and provides recommendations for the scope outlined above.

## 2.0 Desktop study

### 2.1 Previous Reports

No previous geotechnical information for the subject site has been provided to Qualtest during this assessment. Qualtest has undertaken assessment and reporting for a number of nearby subdivision developments to the south of the New England Highway, with results of those assessments given consideration during this assessment.

A Preliminary Contamination Assessment (PCA) has been prepared concurrently to this PGA by Qualtest (ref. NEW22P-0012-AA, March 2022). Selected information from the PCA is included in this report. Reference should be made to the PCA report for further details.

### 2.2 Acid Sulfate Soil Risk Map

The 1:25,000 Greta Acid Sulfate Soil Risk Map shows the site is located in an area of no known occurrence of Acid Sulfate Soils.

## 2.3 Geology Map

Reference to the 1:100,000 Newcastle Coalfield Regional Geology Sheet 9231 indicates the site to be underlain by the “Lochinvar” Formation (PdI) of the “Dalwood” Group, which is characterised by basalt, siltstone and sandstone rock types.

An overlay of the Newcastle Coalfield Regional Geology Series Sheet 9231 on a Google Earth image is shown below.



**Figure 1: Newcastle Geology Map Overlay:** Geological units are labelled in purple text. Approximate site boundary shown in red.

## 2.4 Soil Landscape Map

The soil landscape map published on the Department of Planning, Industry and Environment (DPIE) eSPADE version 2.1 is shown as follows.



**Figure 2: Soil Landscape Map Overlay:** Soil landscape units are labelled in yellow text. Approximate site boundary shown in white.

The northern area is mostly mapped as the North Eelah Landscape (nex), and typical qualities and limitations include the following: localised shallow soils, localised rock outcrop hazard, widespread foundation hazard, widespread productive arable land, widespread recharge zone, localised gully erosion hazard, widespread sheet erosion hazard, localised high run-on, localised seasonal waterlogging.

The southern area is mapped as the Lovedale Landscape (lvv), and typical qualities and limitations include the following: localised non-cohesive soils, widespread foundation hazard, localised discharge zone, localised salinity hazard, localised gully erosion hazard, widespread sheet erosion hazard, localised streambank erosion hazard, widespread high run-on, widespread poor drainage, localised permanent waterlogging, localised seasonal waterlogging, localised flood hazard.

### 3.0 Field Work

Field work investigations were carried out on 3, 4 and 7 February 2022 and comprised of:

- DBYD search and visual check of proposed test locations for the presence of underground services;
- Site walkover to make observations of surface features at the property and in the immediate surrounding area;

- Excavation of 55 test pits (TP01 to TP54 and TP1A) using a 2.7 tonne excavator equipped with a 450mm wide bucket. Test pits were terminated at depths of between 0.50m and 2.00m. A number of additional delineation test pits were carried out as part of the Preliminary Contamination Assessment (PCA), and details of those are not included within this report; and,
- Test pits were backfilled with the excavation spoil and compacted using the excavator bucket and tracks.

Investigations were carried out by an experienced Environmental Scientist from Qualtest who located the test pits, carried out the testing and sampling, produced field logs of the test pits, and made observations of the site surface conditions.

Engineering logs of the test pits are presented in Appendix A. Approximate test pit locations are shown on the attached Figure AB1. Test pits were located in the field by handheld GPS and relative to existing site features including topographic features, lot boundaries, existing developments and trees.

The site was also visited on 3 February 2022 by an experienced Senior Geotechnical Engineer from Qualtest who carried out site walkover to make observations of surface features at the property and in the immediate surrounding area.

## 4.0 Site Description

### 4.1 Surface Conditions

The site comprises Lots 2, 3, 4, 5, 6 and 9 DP 747391, Lot 1 DP 65706 and Lots 12 and 13 DP1219648, located at 898 New England Highway and Wyndella Road, Lochinvar, as shown on Figure AB1. Lot 1 DP 65706 covers an area of approximately 34.83ha on the northern part of the site, and the remainder of the site covers an area of approximately 22ha (total site area 56.8ha).

Lot 1 DP 65706 is currently zoned RU1 Primary Production, the remainder of the site is zoned R1 General Residential. Field observations with respect to urban capability for potential residential development were mostly limited to the R1 zoned portion of the site, in accordance with the requested scope.

The site is bounded to the south by the New England Highway, to the southwest, west and north by lots containing low density rural-residential housing and farmland, and to the east by Wyndella Road.

With reference to the Spatial Information Exchange maps which shows surface elevation in 10m contour intervals, ground levels are understood range from about RL 25m (AHD) in the vicinity of a tributary of Lochinvar Creek in the south-western corner of Lot 1 DP 65706, up to about RL 65m in the south-eastern corner of Lot 1 DP 65706.

Lot 1 DP 65706 is positioned on a locally prominent northwest trending spur formation, with the crest and upper slopes occupying the south-eastern to north-western part of Lot 1 DP 65706. The north to north-eastern area of the Lot is positioned on the mid to lower north facing slopes, and drains towards a tributary of Lochinvar Creek which is located along the northern boundary of the site.

The south-western to west area of the Lot is positioned on the mid to lower southwest facing slopes, and drains towards a tributary of Lochinvar Creek which crosses the south-western corner of the lot, and then drains along the western boundary of the site.

Site slopes on Lot 1 DP 65706 are observed or interpolated to mostly be in the order of 4° to 10°, with areas of steeper slopes of about 15° to 20° generally on the mid-slopes of the northern and parts of the south-western facing sides of the spur.

Field observations were made in the R1 General Residential zoned area and the nearby areas (the middle to southern part) of the site. This area is mostly positioned on the south-west facing mid to lower slopes of the spur formation. The north-eastern corner of the R1 zoned area is positioned on the upper slopes, with slopes measured to be in the order of 5° to 7°. Slopes in the order of 3° to 5° were observed on the mid to lower slopes, with some locally steeper slopes on the edges of dams, mounds and locally steeper areas on the edges of drainage depressions.

A prominent drainage tributary crosses the southern side of the site. The watercourse receives water from a multi pipe culvert which crosses beneath Wyndella Road near the south-eastern corner of the site. The watercourse drains across the site towards the west-northwest. Standing water was present in most of the length of the watercourse at the time of the site visit.

Two main drainage depressions drain in a general southwest direction across the site and join with the southern watercourse to the west of the site. The northern-most depression is roughly in line with a farm dam shown on Figure AB2, and a second depression is located south of the existing barn building.

The area adjacent to the southern boundary generally slopes at about 3° to 5° towards the north, draining into the primary watercourse and the low lying adjacent areas discussed below.

During the site investigation which was carried out following significant rainfall, the majority of the site appeared well drained primarily by way of surface runoff towards drainage depressions and creek tributaries. A relatively broad area of boggy ground and/or surface water was observed in the south to south-western areas. This included low lying areas alongside the primary watercourse, and the area in the south-western corner of the site receiving runoff from drains passing under the adjacent New England Highway formation.

Rock outcrops were observed in the northern part of the R1 zoned area and in the southern part of Lot 1 DP 65706. The rock appeared to include Conglomerate and Pebbly Sandstone of estimated very high strength based upon limited surface observations. Some areas of uneven ground potentially indicative of past surface disturbance, minor erosion and possibly surface slumping or creep movement were observed in the vicinity of the outcrops near the southern boundary of Lot 1 DP 65706.

There are a number of farm dams and ponds located on the site, including two dams and two ponds within the R1 area as shown on Figure AB2.

The majority of the site is undeveloped. A masonry clad building is located near the middle of the R1 zoned area. The site is divided in places by timber post and wire fencing.

Several areas of buried fill scattered across the site were identified during the contamination investigation, most of which are shown on Figures AB2 and AB3.

Vegetation generally comprises moderate grass cover and a few scattered trees, with a stand of trees near the western boundary alongside the watercourse, as shown on Figure AB2.

The majority of the site was judged to have good trafficability by way of 4WD vehicle on the day of the field investigation. The area to the south of the watercourse was not accessible due to the watercourse and wet ground in the vicinity.

Photographs of the site taken during the site walkover and mapping by Qualtest Senior Geotechnical Engineer are shown as follows.





**Photograph 1:** From Wyndella Road approx. 400m north of New England Highway (NEH) near site entry gate, facing south.



**Photograph 2:** From Wyndella Road approx. 400m north of NEH, facing southwest.



**Photograph 3:** From Wyndella Road approx. 400m north of NEH, facing northwest.



**Photograph 4:** From Wyndella Road approx. 400m north of NEH, facing north.



**Photograph 5:** From south-eastern portion of site, beside watercourse, facing east. Culvert under Wyndella Road visible in background.



**Photograph 6:** From south-eastern portion of site, beside watercourse, facing southeast. Intersection of Wyndella Road and NEH visible in background.



**Photograph 7:** From south-eastern corner of site facing northwest.



**Photograph 8:** From south-eastern corner of site facing north.



**Photograph 9:** From south-western corner of site facing north. Area of wet / boggy ground visible.



**Photograph 10:** From south-western corner of site facing northeast. Area of wet / boggy ground receiving runoff from NEH visible.



**Photograph 11:** From western boundary at corner in southern area of site facing north.



**Photograph 12:** From western boundary at corner in southern area of site facing east.



**Photograph 13:** From south-western portion of site, beside watercourse, facing east.



**Photograph 14:** From south-western portion of site, beside drainage depression, facing southeast towards pond.



**Photograph 15:** From beside western boundary in southern part of site, facing northeast.



**Photograph 16:** From beside western boundary in southern part of site, facing east.



**Photograph 17:** Facing southwest in drainage depression crossing southern side of site.



**Photograph 18:** Facing northeast towards barn building near the middle of the R1 zoned area.



**Photograph 19:** From northeast of Dam located on western side of R1 zoned area, facing southeast.



**Photograph 20:** From northeast of Dam located on western side of R1 zoned area, facing southwest towards dam.



**Photograph 21:** From northeast of Dam located on northern side of R1 zoned area, facing southwest towards dam.



**Photograph 22:** From northeast of Dam located on northern side of R1 zoned area, facing north.



**Photograph 23:** From western boundary at corner located near halfway along western side of R1 zoned area facing north.



**Photograph 24:** From western boundary at corner located near halfway along western side of R1 zoned area facing east.



**Photograph 25:** From north-western corner of R1 zoned area, facing east.



**Photograph 26:** From north-western corner of R1 zoned area, facing southeast.



**Photograph 27:** From near north-western corner of R1 zoned area, on Lot 1 DP 65706 facing west towards area of buried fill.



**Photograph 28:** From southern part of Lot 1 DP 65706 facing northeast towards area of buried fill.



**Photograph 29:** From south-western quadrant of Lot 1 DP 65706 facing southwest towards dam / excavation.



**Photograph 30:** From south-western quadrant of Lot 1 DP 65706 facing northwest towards dam / excavation.



**Photograph 31:** From north-western quadrant of Lot 1 DP 65706, on crest of spur facing west.



**Photograph 32:** From north-western quadrant of Lot 1 DP 65706, on crest of spur facing northwest.



**Photograph 33:** From north-eastern quadrant of Lot 1 DP 65706, on crest of spur facing north.



**Photograph 34:** From north-eastern quadrant of Lot 1 DP 65706, on crest of spur facing east.



**Photograph 35:** From south-eastern quadrant of Lot 1 DP 65706, near northern boundary of R1 zoned area facing south.



**Photograph 36:** From south-eastern quadrant of Lot 1 DP 65706, near northern boundary of R1 zoned area facing southwest.



**Photograph 37:** Facing southwest towards fill mound near boundary of Lot 1 DP 65706 and R1 zoned area.



**Photograph 38:** Outcropping rock near southern boundary of Lot 1 DP 65706.



**Photograph 39:** Outcropping rock near northern boundary of R1 zoned area.



**Photograph 40:** Outcropping rock in north-eastern part of R1 zoned area.



**Photograph 41:** From north-eastern corner of R1 zoned area, facing south.



**Photograph 42:** From north-eastern corner of R1 zoned area, facing southwest.

## 4.2 Subsurface Conditions

Table 1 presents a summary of the typical soil types encountered at test pit locations during the field investigation, divided into representative geotechnical units.

**TABLE 1 – SUMMARY OF GEOTECHNICAL UNITS AND SOIL TYPES**

Unit	Soil Type	Description
1A	FILL – TOPSOIL	<p>CLAY - medium to high plasticity, brown, trace fine grained sand.</p> <p>CLAY - low to medium plasticity, dark brown, with some silt.</p> <p>Sandy CLAY - low to medium plasticity, dark brown, fine to medium grained sand, with some asbestos containing material and some metal flaking in places.</p> <p>Clayey SAND - fine grained, dark brown, fines of low plasticity.</p> <p>Root affected to variable depths.</p>
1B	UNCONTROLLED FILL	<p>Sandy Gravelly CLAY, Gravelly CLAY – low to medium plasticity, brown / dark grey-brown with some orange-brown and white, fine grained sub-rounded to angular gravel.</p> <p>Sandy CLAY, CLAY - low to medium plasticity, brown to dark brown and grey-brown, fine to medium grained sand, trace gravel in places.</p> <p>Sandy GRAVEL - fine to medium grained, sub-rounded to sub-angular, fine to medium grained sand.</p> <p>CLAY - medium to high plasticity, brown, trace red-brown and orange-brown.</p> <p>With varying mixtures of (refer to logs): concrete, bricks, terracotta pipe, wood, asbestos containing material, some steel, plastic, coal, asphalt.</p> <p>Root affected surface zone in places.</p>
2	TOPSOIL	<p>Silty CLAY, CLAY - low to medium plasticity, brown to dark brown, some fine grained sand.</p> <p>Sandy CLAY - low to medium plasticity, grey-brown, dark brown, fine grained sand, with fine to coarse grained rounded to sub-angular gravel / Gravelly in places.</p> <p>CLAY - medium to high plasticity, brown to dark brown, some fine grained sand in places, trace fine grained sub-rounded gravel in places.</p> <p>Gravelly CLAY / Clayey GRAVEL in places.</p> <p>Root affected to variable depths.</p>
3	SLOPEWASH	<p>Silty CLAY, CLAY - low to medium plasticity, brown to grey-brown.</p> <p>Sandy CLAY, CLAY - medium plasticity, brown / grey to grey-brown, fine grained sand, with fine to coarse grained rounded to sub-rounded gravel / Gravelly in places.</p>



Unit	Soil Type	Description
4	RESIDUAL SOIL	<p>CLAY - medium to high plasticity, mixtures of brown, dark brown, pale brown, dark grey, red-brown, with some grey-brown, orange-brown, trace fine grained sand in places, some fine to medium / coarse grained rounded to sub-angular gravel in places.</p> <p>Sandy CLAY - medium plasticity, pale brown to brown, fine grained sand.</p> <p>Sandy CLAY / Clayey SAND - low to medium plasticity, brown to orange-brown, fine grained.</p> <p>Gravelly CLAY, Sandy Gravelly CLAY - medium to high plasticity, brown with some red-brown, fine to medium grained, sub-angular to sub-rounded gravel, with some extremely weathered rock.</p> <p>Clayey SAND / Sandy CLAY - fine to medium / coarse grained, brown, orange-brown, fines of low to medium plasticity, gravelly in places.</p> <p>Clayey GRAVEL – fine to coarse grained, sub-rounded to rounded, pale grey – brown, dark brown, fines of low to medium plasticity, some sand.</p> <p>Borderline Extremely Weathered Rock in places. With some highly weathered rock in places.</p>
5	EXTREMELY WEATHERED (XW) ROCK with soil properties	<p>Andesite: breaks down into Sandy CLAY - medium plasticity, pale brown to brown, fine grained sand, trace highly weathered rock.</p> <p>Sandstone: breaks down into Clayey SAND / Sandy CLAY - fine grained, orange-brown to brown, fines of low to medium plasticity, with some highly weathered sandstone.</p> <p>Sandstone: breaks down into Sandy CLAY - medium plasticity, brown to orange-brown, fine grained sand, with some highly weathered SANDSTONE - fine grained, orange-brown, estimated low to medium strength.</p>
6	HIGHLY WEATHERED (HW) TO MODERATELY WEATHERED (MW) ROCK	<p>SANDSTONE - fine grained, pale brown to brown / white, orange-brown, estimated low strength.</p> <p>SANDSTONE - fine to medium grained, brown to pale brown and orange-brown, estimated high strength, with some Sandy CLAY.</p>

Slow groundwater inflow was observed at TP09 and TP50 at depths of 1.20m and 1.90m, respectively. No other groundwater inflows or water levels were encountered in the other test pits during the limited time that they remained open on the day of the field investigations.

It should be noted that groundwater conditions can vary due to rainfall and other influences including regional groundwater flow, temperature, permeability, recharge areas, surface condition, and subsoil drainage.

Table 2 contains a summary of the distribution of the above geotechnical units at the test pit locations.

**TABLE 2 – SUMMARY OF GEOTECHNICAL UNITS ENCOUNTERED AT TEST LOCATIONS**

Location	Unit 1A Fill – Topsoil	Unit 1B Uncontrolled Fill	Unit 2 Topsoil	Unit 3 Slopewash	Unit 4 Residual Soil	Unit 5 XW Rock	Unit 6 HW to MW Rock
	Depth in metres (m)						
TP01	0.00 - 0.10	0.10 - 0.35	0.35 - 0.50	-	0.50 - 1.00	-	-
TP1A	-	0.00 - 1.60	-	-	1.60 - 1.90	-	-
TP02	-	-	0.00 - 0.35	-	0.35 - 0.90	-	-
TP03	-	-	0.00 - 0.10	0.10 - 0.25	0.25 - 0.90	-	-
TP04	-	-	0.00 - 0.15	-	0.15 - 0.80	-	-
TP05	-	-	0.00 - 0.15	-	0.15 - 0.70	-	-
TP06	-	-	0.00 - 0.20	-	0.20 - 2.00	-	-
TP07	-	-	0.00 - 0.30	-	0.30 - 0.70	-	-
TP08	-	-	0.00 - 0.10	-	0.10 - 0.70	-	-
TP09	-	-	0.00 - 0.15	-	0.15 - 2.00	-	-
TP10	0.00 - 0.20	0.20 - 0.50	-	-	0.50 - 0.90	-	-
TP11	-	-	0.00 - 0.05	-	0.05 - 0.60	-	-
TP12	-	-	0.00 - 0.10	0.10 - 0.25	0.25 - 0.65	-	-
TP13	-	-	0.00 - 0.10	0.10 - 0.25	0.25 - 2.00	-	-
TP14	-	0.00 - 0.15	-	0.15 - 0.25	0.25 - 0.70	-	-
TP15	-	-	0.00 - 0.05	-	0.05 - 0.60	-	-
TP16	-	-	0.00 - 0.10	-	0.10 - 1.80	1.80 - 2.00	-
TP17	-	-	0.00 - 0.10	-	0.10 - 0.70	-	-

Location	Unit 1A	Unit 1B	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
	Fill – Topsoil	Uncontrolled Fill	Topsoil	Slopewash	Residual Soil	XW Rock	HW to MW Rock
Depth in metres (m)							
TP18	-	-	0.00 - 0.15	0.15 - 0.25	0.30 - 0.70	-	-
TP19	-	-	0.00 - 0.03	0.03 - 0.23	0.23 - 1.00	-	1.30 - 1.32*
TP20	-	-	0.00 - 0.15	-	0.15 - 0.65	-	-
TP21	-	-	0.00 - 0.10	-	0.10 - 0.60	-	-
TP22	-	-	-	-	0.00 - 0.50	-	-
TP23	-	0.00 - 0.30	-	0.30 - 0.45	0.45 - 2.00	-	-
TP24	-	-	0.00 - 0.10	0.10 - 0.20	0.20 - 0.65	-	-
TP25	0.00 - 0.15	-	-	-	0.15 - 0.70	-	-
TP26	-	-	0.00 - 0.10	0.10 - 0.20	0.20 - 0.70	-	-
TP27	0.00 - 0.10	-	-	-	0.10 - 0.80	-	-
TP28	0.00 - 0.10	-	-	-	0.10 - 0.60	-	-
TP29	-	-	0.00 - 0.10	-	0.10 - 0.70	-	-
TP30	-	-	0.00 - 0.10	-	0.10 - 0.60	0.60 - 0.70	-
TP31	-	-	0.00 - 0.05	-	0.05 - 0.60	-	-
TP32	-	0.00 - 0.35	-	-	0.35 - 0.75	-	-
TP33	-	0.00 - 0.20	-	-	0.20 - 0.65	-	-
TP34	-	-	-	-	0.00 - 0.60	-	-
TP35	-	-	0.00 - 0.10	0.10 - 0.25	0.25 - 0.70	-	-
TP36	-	-	0.00 - 0.10	0.10 - 0.20	0.20 - 0.70	-	-

Location	Unit 1A Fill – Topsoil	Unit 1B Uncontrolled Fill	Unit 2 Topsoil	Unit 3 Slopewash	Unit 4 Residual Soil	Unit 5 XW Rock	Unit 6 HW to MW Rock
	Depth in metres (m)						
TP37	-	-	0.00 - 0.10	0.10 - 0.30	0.30 - 1.20	1.20 - 1.60	1.60 - 1.70*
TP38	-	0.00 - 0.60	0.60 - 0.80	-	0.80 - 1.30	-	-
TP39	-	-	0.00 - 0.10	-	0.10 - 0.60	-	-
TP40	-	-	0.00 - 0.10	0.10 - 0.30	0.30 - 0.70	-	-
TP41	-	-	0.00 - 0.10	0.10 - 0.30	0.30 - 0.70	-	-
TP42	-	-	0.00 - 0.20	-	0.20 - 0.70	-	-
TP43	-	-	0.00 - 0.20	-	0.20 - 0.85	-	0.85 - 1.10^
TP44	-	-	0.00 - 0.10	-	0.10 - 0.60	-	0.60 - 0.80
TP45	-	-	0.00 - 0.10	0.10 - 0.30	0.30 - 0.60	-	-
TP46	-	-	0.00 - 0.20	-	-	-	0.20 - 0.51*
TP47	-	-	0.00 - 0.20	-	0.20 - 0.80	-	-
TP48	-	-	0.00 - 0.10	-	0.10 - 0.70	-	-
TP49	-	-	0.00 - 0.10	-	0.10 - 0.90	-	-
TP50	-	0.00 - 1.50	-	-	1.50 - 2.00	-	-
TP51	-	0.00 - 0.80	-	-	-	-	-
TP52	-	-	0.00 - 0.10	-	0.10 - 0.80	-	-
TP53	0.00 - 0.10	0.10 - 0.35	-	-	0.35 - 1.10	-	-
TP54	-	0.00 - 1.20	-	-	1.20 - 1.40	-	-

Note: \* = Practical refusal of 2.7 tonne excavator met on Weathered Rock.  
 ^ = Slow progress or Very Slow progress met on Weathered rock.

## 5.0 Discussion and Recommendations

### 5.1 General

The site is considered suitable for residential development from a geotechnical viewpoint provided that development is carried out in accordance with sound engineering principles and good hillside practice (as set out in Appendix C), and with respect to the constraints and recommendations of this report, including geotechnical input during the design and construction phases.

Based upon the limited site testing and observations carried out during this preliminary assessment, geotechnical issues affecting site capability for residential development identified at the site include:

- The presence of wet/boggy areas in lower lying parts of the site, as well as watercourses, drainage depressions, farm dams and ponds. These may include areas or layers of inadequate bearing capacity for support of footings / earthworks and construction plant. There is also potential for abnormal moisture conditions associated with prolonged wet conditions. It is recommended that these potential issues are investigated prior to development in the vicinity of these areas, and addressed during earthworks prior to filling and footing construction. Measures such as drainage improvements, over-excavation, deepened footings, subgrade treatment or bridging layers may be required.
- The presence or inferred presence of localised areas of uncontrolled fill. Residential footings and pavements should be founded in suitable material beneath all uncontrolled fill, or the fill should be removed and replaced under engineering supervision.

Further geotechnical investigation and/or advice should be carried out during detailed design phase including for site classification, earthworks procedures, footing/retention design conditions and pavement design where required.

### 5.2 Slope Stability and Recommended Geotechnical Constraints

The site subject to slope stability assessment, including site walkover observations, comprises the R1 zoned area as shown on Figure AB1; however, the constraints are generally applicable to all areas of proposed development at the site.

#### 5.2.1 Basis of Assessment

The risk of slope instability has been assessed from the observed site conditions using methods consistent with those presented in the Australian Geomechanics Society (AGS) publication “*Practice Note Guidelines for Landslide Risk Management, 2007*”. Based on those methods, the risks to property associated with slope instability on the subject area have been assessed using the terms presented in AGS 2007, *Landslide Risk Assessment Qualitative Terminology for Use in Assessing Risk to Property*, extracts of which are attached in Appendix B.

The report provides an assessment of the risk of slope instability on the proposed development area (R1 zoned area). The report also recommends some geotechnical constraints for the site development in light of the slope instability assessment. The assessed risk to the proposed development is based on the geotechnical constraints and recommendations provided in this report being implemented. The onus is on the owner, potential owner, or interested party to decide whether the assessed level of risk is acceptable taking into account the likely consequences of the risk and the recommended geotechnical constraints.

## 5.2.2 Principal Site Features and Evidence of Instability

The assessment of the risk of slope instability has been based on the site observations recorded in Section 4 and the principal site features summarised below:

- Site situated in an area of gently to moderately undulating topography, mostly on the south-west facing mid to lower slopes of a locally prominent northwest trending spur formation;
- Ground surface slopes are generally in the order of about 3° to 7° across the majority of the site, with localised steeper slopes on the edges of dams, mounds and locally steeper areas on the edges of drainage depressions;
- Soil depths are assessed to be variable but generally in the range of about 0.2m to 2.0m on the mid to upper slopes, and generally greater than 2.0m on the lower to foot slopes;
- Soil profile generally comprising topsoil to depths in the order of 0.1m to 0.2m, overlying slopewash, and residual clay soils typically of stiff to hard consistency, with localised areas of filling;
- No evidence of seepage was observed and the site generally appeared moderately to well drained, mostly by way of downhill surface runoff. Some water was ponded at the low points of drainage depressions. A relatively broad area of boggy ground and/or surface water was observed in the south to south-western areas. This included low lying areas alongside the primary watercourse, and the area in the south-western corner of the site receiving runoff from drains passing under the adjacent New England Highway formation;
- There are a number of farm dams and ponds located on the site, including two dams and two ponds within the R1 area as shown on Figure AB2.
- Rock outcrops were observed in the northern part of the R1 zoned area and in the southern part of Lot 1 DP 65706. Some areas of uneven ground potentially indicative of past surface disturbance, erosion and possibly surface slumping or creep movement were observed in the vicinity of the outcrops near the southern boundary of Lot 1 DP 65706
- No evidence of deep soil erosion was observed at the site at the time of the field work;
- No obvious evidence of overall slope instability or significant damage attributable to ground movement was observed on or in the vicinity of the site during the field work.

## 5.2.3 Hazard Identification

Elements at risk for the identified hazards are the proposed subdivision developments, which may include proposed residences, sheds, swimming pools, roads and driveways and / or other site infrastructure.

The following hazards that could potentially impact on this site are assessed as follows:

- H1.** Potential broad deep seated instability;
- H2.** Potential shallow instability such as overloading of slopes by excessive loads, unsuitable batters/support or unsuitable founding depths, or failure of fill not placed in a proper manner or subject to erosion by concentrated surface flows.
- H3.** Potential shallow ground 'creep' movements or slumping.

## 5.2.4 Risk Evaluation for the Proposed Development

The matrix below evaluates the hazards outlined above and their likelihood of occurring based on the proposed development of the site, and assuming the geotechnical constraints and recommendations of this report are implemented. If these recommendations are not followed, the likelihood of hazards occurring may increase and the level of risk may change. Further advice should be sought where necessary.

Hazard	Location	Consequence	Likelihood	Risk
H1	Overall Site (R1 zoned area)	Major	Rare	Low
H2	Overall Site (R1 zoned area)	Medium	Unlikely	Low
H3	Overall Site (R1 zoned area)	Minor	Unlikely	Low

Based on the above, the proposed development is assessed as having a **"Low"** risk of slope instability.

It would be normal practice in the Maitland City Council local government area for development to proceed on a site with a risk level classification of Low.

Development should be carried out in accordance with sound engineering principles and good hillside practice (as set out in Appendix B), and the geotechnical constraints outlined in this report.

## 5.2.5 Recommended Geotechnical Constraints for Residential Development

### Type of Structure:

There are no particular geotechnical constraints on the type of structures provided they are founded on footings designed and constructed in accordance with AS2870, 'Residential Slabs and Footings'; however, it is recommended that development be designed to accommodate the natural slope profile where possible.

Flexible structures of timber, brick veneer or similar construction are preferred. Split level and suspended design is considered appropriate to limit slope modification in sloping areas of the site.

### Area for Development:

The site is considered feasible for development from a slope stability viewpoint; however, suitability for development is conditional upon the geotechnical constraints and recommendations provided in this report being implemented.

Specific advice should be followed for potentially problematic areas such as areas with uncontrolled fill or potential wet/boggy ground and/or inadequate bearing capacity, (particularly for any development proposed in the lower lying affected areas of the site).

Development of the site should be undertaken in accordance with good hillside construction practice and sound engineering principles as presented in the excerpts from AGS 2007 provided in Appendix B.

Care should be taken in the design of any developments in the vicinity of any existing excavations, fill platforms, embankments and dams, particularly if they involve surcharge loads or excavations.

#### Foundation Type:

This assessment should not be regarded as an assessment of foundation conditions for the proposed development at the site; however, preliminary recommendations are provided based on the information obtained during the preliminary assessment.

Strip / pad footings, pier and beam systems or split level raft slabs would be feasible from a slope stability viewpoint (broad raft slabs may not be suited to sloping areas of the site due to the slope modifications required).

Footings should not be founded within any existing uncontrolled fill. If uncontrolled fill is encountered, this will require piered foundations founded beneath the fill, removal of the fill, or removal and replacement of the fill to engineering specification.

Foundations should be designed and constructed in accordance with the recommendations and advice of AS2870, '*Residential Slabs and Footings*'.

Foundations near the crest of excavations should be taken to rock or founded behind or below a 1V:2H projection from the toe of the excavation.

Footings are to be founded outside of or below all zones of influence resulting from existing or future service trenches.

#### Excavations:

Excavations should be supported by properly designed and constructed retaining walls or else battered at 1V:2H or flatter and protected from erosion.

Excavations in competent bedrock (below the level of backhoe / excavator refusal) may be battered at 1V:1H.

Temporary excavations to depths of up to 1.2m in competent compact material with sufficient cohesion, such as clay of stiff consistency or better may be battered vertically, subject to inspection during excavation by the geotechnical authority.

The safe working procedures of Work Cover NSW Excavation work code of practice, dated January 2020 should be followed

Excavations should be designed for surcharge loading from slopes, retaining walls, structures and other improvements in the vicinity of the excavation.

Care should be taken not to disturb or destabilise existing underground services or structures. Excavations should remain outside a 1V:2H projection from the base of any structural footings.

Drainage measures should be implemented above and behind all temporary and permanent excavations to avoid concentrated water flows on the face of the cut or infiltration into the soil/rock profile behind the cut. Surface water flows from upslope areas should be diverted away from the cut face.

#### Filling:

The depth of unsupported fill on the site should preferably not exceed 1.5m and should be battered at 1V:2H or flatter and protected against erosion. All fill greater than 1.5m deep should preferably be supported by engineer designed retaining walls.

Where fill is to be placed on slopes in excess of 1V:8H (7°), a prepared surface should be benched or stepped into the slope.



Care should be taken during backfilling of any dams, gully areas or drainage depressions to reduce the risk of leaving a preferential underground drainage path which could result in softening of the surrounding area, piping erosion and/or localised seepage.

If backfilling depressions within the lower lying areas, it is likely to be necessary to divert drainage flows and/or provide dedicated sump and pump areas to prevent water ponding in areas of proposed fill placement. It is likely that excavation of over-wet material will be required prior to placement of fill in dams, drainage depressions and low lying wet areas.

Earthworks should be carried out in accordance with the recommendations outlined in AS3798-2007 '*Guidelines for Earthworks for Commercial and Residential Developments*'.

It is recommended that existing fill on site in any areas of proposed settlement sensitive development be removed and replaced with approved clean materials. The placement of such fill should be witnessed and documented by a geotechnical authority, carried out to 'Level 1' criteria as defined in Clause 8.2 – Section 8, of AS3798-2007.

Recommendations for earthworks procedures are provided in following sections of this report. Further geotechnical advice should be sought with regards to site preparation and fill construction procedures at the time of detailed geotechnical investigations and design.

#### Retaining Walls

All structural retaining walls and all landscaping walls in excess of 1.0m should be designed by an experienced engineer familiar with the site conditions.

All retaining walls should be designed for surcharge loading from slopes, structures and other existing/future improvements in the vicinity of the wall. Adequate subsurface and surface drainage should be provided behind all retaining walls.

Excavations for the construction of retaining walls result in a temporary reduction in the stability of the adjacent area particularly during wet weather until the wall is complete. This increased risk can be managed or reduced by appropriate construction planning, using temporary support, staged excavation and control of drainage.

#### Drainage and Sewage Disposal:

Adequate surface and storm water drainage should be installed and maintained on the site in accordance with local government requirements.

All collected stormwater run-off should be piped into the street / interallotment drainage system or discharged into existing storm water drains or watercourses in a controlled manner that limits erosion. Surface and sub-soil drains may be required to improve drainage.

Potential effects of site modifications on surface runoff and groundwater flowing from upslope should also be considered, with provision of subsurface drainage to intercept and redirect groundwater where assessed to be necessary.

Septic wastes should be connected to the reticulated disposal system.

#### Other:

Inspection should be carried out by a geotechnical authority during construction to confirm the conditions assumed in this report and in the design.

Further recommendations are provided in following sections of this report. Additional recommendations may be provided during further stages of the project.

### 5.3 Foundations

Site investigation and specific engineering foundation design should be carried out for any significant structures.

Footings should be founded below any existing uncontrolled fill, topsoil, deleterious or soft to firm / very loose to medium dense material, or other potentially deleterious material.

Shallow footings founded on stiff or better Residual Clay (Unit 4), or approved controlled fill (placed under Level 1 supervision in accordance with AS3798-2007) may be proportioned for a maximum allowable bearing pressure of 100kPa.

Shallow footings founded on very stiff or better Residual Clay (Unit 4) or Extremely Weathered Rock (Unit 5) may be proportioned for a maximum allowable bearing pressure of 150kPa.

Shallow footings founded on weathered rock below the depth of backhoe or excavator bucket refusal may be proportioned for a maximum allowable bearing pressure of 600kPa.

The recommended allowable bearing pressures assume that settlements will be less than about 1% of least footing width; although, relevant ground movements related to moisture changes in reactive clay would also apply.

Site classification in accordance with the classification system presented in AS2870-2011 '*Residential Slabs and Footings*' should be undertaken following further detailed geotechnical investigation of the site once site layout and site regrade designs are known.

Site classification will depend on a number of factors including depth of topsoil, depth of fill and residual soil, depth to rock, and reactivity of the natural soil and any fill material placed. Based upon experience with nearby projects, a preliminary indication is that lots may potentially be mostly classified Class 'H1', 'H2' or 'E'.

If any areas of uncontrolled fill of depths greater than 0.4m are encountered, footings should be designed in accordance with engineering principles for Class 'P' sites.

Recommendations for deep footings such as piles, and/or other parameters may be provided if required as part of future assessments.

### 5.4 Excavation Conditions and Depth to Rock

The depths of fill, topsoil, slopewash, residual soils and weathered rock, together with depths of slow progress or refusal of the 2.7 tonne excavator where encountered are summarised in Table 2.

As a general summary based upon the limited number of test pits taken to depths of 2.0m or prior refusal, soil depths are assessed to be variable but generally in the range of about 0.2m to 2.0m on the mid slopes, and generally greater than 2.0m on the lower / foot slopes. Rock outcrops were observed in the northern part of the R1 zoned area and in the southern part of Lot 1 DP 65706. The rock appeared to include Conglomerate and Pebbly Sandstone of estimated very high strength based upon limited surface observations.

In terms of excavation conditions, site materials can generally be divided into:

- Clayey and Granular Soils (Units 1, 2, 3 & 4). It is anticipated that these materials could be excavated by a conventional excavator or backhoe bucket;
- Weathered Rock (Units 5 & 6). Rippability is dependent on rock strength, depth, degree of weathering and number of defects within the rock mass which can vary significantly.

It is anticipated that the material encountered could be excavated by conventional 2.7 tonne excavator or equivalent at least to the depths indicated on the appended test pit logs.

It is expected that material below the depth of excavator bucket refusal will be excavatable by ripping to some greater depth, although this has not been assessed as part of the current investigation.

It is recommended that targeted investigations (e.g. cored boreholes and/or excavation trials) are carried out if significant excavations are proposed where bedrock depth or excavatability is important to design or construction.

The use of toothed buckets, ripping tines, and/or hydraulic rock hammers may be required if hard bands of weathered rock are encountered or for deep confined excavations such as for service trenches.

Groundwater may exist at some areas of the site such as within the topsoil / slopewash profile, from water perched above the residual clay / bedrock profile. It is possible that slow water inflow may be encountered from such layers, particularly if earthworks are carried out during or following periods of wet weather.

Recommended geotechnical constraints for excavation are provided in Section 5.2.5.

## 5.5 Site Preparation

Site preparation and earthworks suitable for pavement support and site re-grading should consist of:

- Following any bulk excavation to proposed subgrade level, all areas of proposed pavement construction or site re-grading should be stripped to remove all existing uncontrolled fill, vegetation, topsoil, root affected or other potentially deleterious materials;
- Stripping is generally expected to be required to depths of about 0.1m to 0.3m to remove topsoil and root affected material, and slopewash where required;
- Stripping of greater depths of fill material in addition to topsoil and root affected material is anticipated in areas affected by fill mounds or surface filling;
- Additional stripping may be required in any areas where poor, wet or saturated subgrade conditions are encountered (e.g. in the southern area of the site). Excavation of over-wet sandy/gravelly material may be required in areas of deeper slopewash in or near drainage depressions prior to placement of fill;
- Following stripping, the exposed subgrade should be proof rolled (minimum 10 tonne static roller), to identify any wet or excessively deflecting material. Any such areas should be over excavated and backfilled with an approved select material;
- The moisture content of the subgrade materials and therefore the need for moisture conditioning or over-excavation and replacement, will be largely dependent on pre-existing and prevailing weather conditions at the time of construction;
- Subgrade preparation should be carried out using a tracked excavator equipped with a smooth sided ('gummy') bucket to minimise the risk of over-disturbance of soils;
- Protect the area after subgrade preparation to maintain moisture content as far as practicable. The placement of subbase gravel would normally provide adequate protection; and,
- Site preparation should include provision of drainage and erosion control as required, as well as sedimentation control measures.

Subgrade soils are likely to have a propensity to soften relatively quickly with moisture ingress; therefore, it is particularly important that care be taken to ensure that the subgrade is not exposed to wet conditions.

The required time period to prepare the subgrade is likely to be dependent on the prevailing weather conditions at the time of construction.

If over-wet subgrades exist at the time of construction or deleterious materials are encountered at subgrade level, these materials should be over-excavated and be replaced with well graded granular select material with CBR of 15% or greater, or other material approved by the geotechnical authority as appropriate to the site conditions. The requirement for, and extent of subgrade replacement, should be confirmed by the geotechnical authority at the time of construction.

## 5.6 Fill Construction Procedures

Earthworks for pavement construction or support of foundations should consist of the following measures:

- Approved fill beneath pavements should be compacted in layers not exceeding 300mm loose thickness to the compaction requirements provided in an approved pavement design;
- The top 300mm of natural subgrade below pavements or the final 300mm of road subgrade fill should be compacted to a minimum density ratio of 100% Standard Compaction to provide a subgrade that is within the moisture range of 60% to 90% of Optimum Moisture Content (OMC);
- Site fill beneath structures should be compacted to a minimum density ratio of 98% Standard Compaction within  $\pm 2\%$  of OMC in cohesive soils;
- All fill should be supported by properly designed and constructed retaining walls or else battered at 1V:2H or flatter and protected against erosion;
- Where fill is to be placed on slopes in excess of 1V:8H ( $7^\circ$ ), a prepared surface should be benched or stepped into the natural slope;

Earthworks should be carried out in accordance with the recommendations outlined in AS3798-2007 '*Guidelines for Earthworks for Commercial and Residential Developments*'.

## 6.0 Limitations

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical design practices and standards. To our knowledge, they represent a reasonable interpretation of the general conditions of the site.

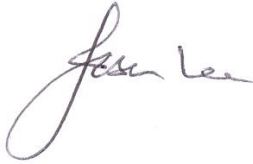
The extent of testing associated with this assessment is limited to discrete test locations. It should be noted that subsurface conditions between and away from the test locations may be different to those observed during the field work and used as the basis of the recommendations contained in this report.

If subsurface conditions encountered during construction differ from those given in this report, further advice should be sought without delay.

Data and opinions contained within the report may not be used in other contexts or for any other purposes without prior review and agreement by Qualtest. If this report is reproduced, it must be in full.

If you have any further questions regarding this report, please do not hesitate to contact Shannon Kelly or the undersigned.

For and on behalf of Qualtest Laboratory (NSW) Pty Ltd.

A handwritten signature in black ink, appearing to read "Jason Lee". The signature is written in a cursive style with a large, looping initial 'J'.

Jason Lee  
Principal Geotechnical Engineer

## **FIGURES:**

**FIGURE AB1: Site Location Plan & Approximate Test Locations**

**FIGURE AB2: Site Features – Southern Portion**

**FIGURE AB3: Site Features – Northern Portion**



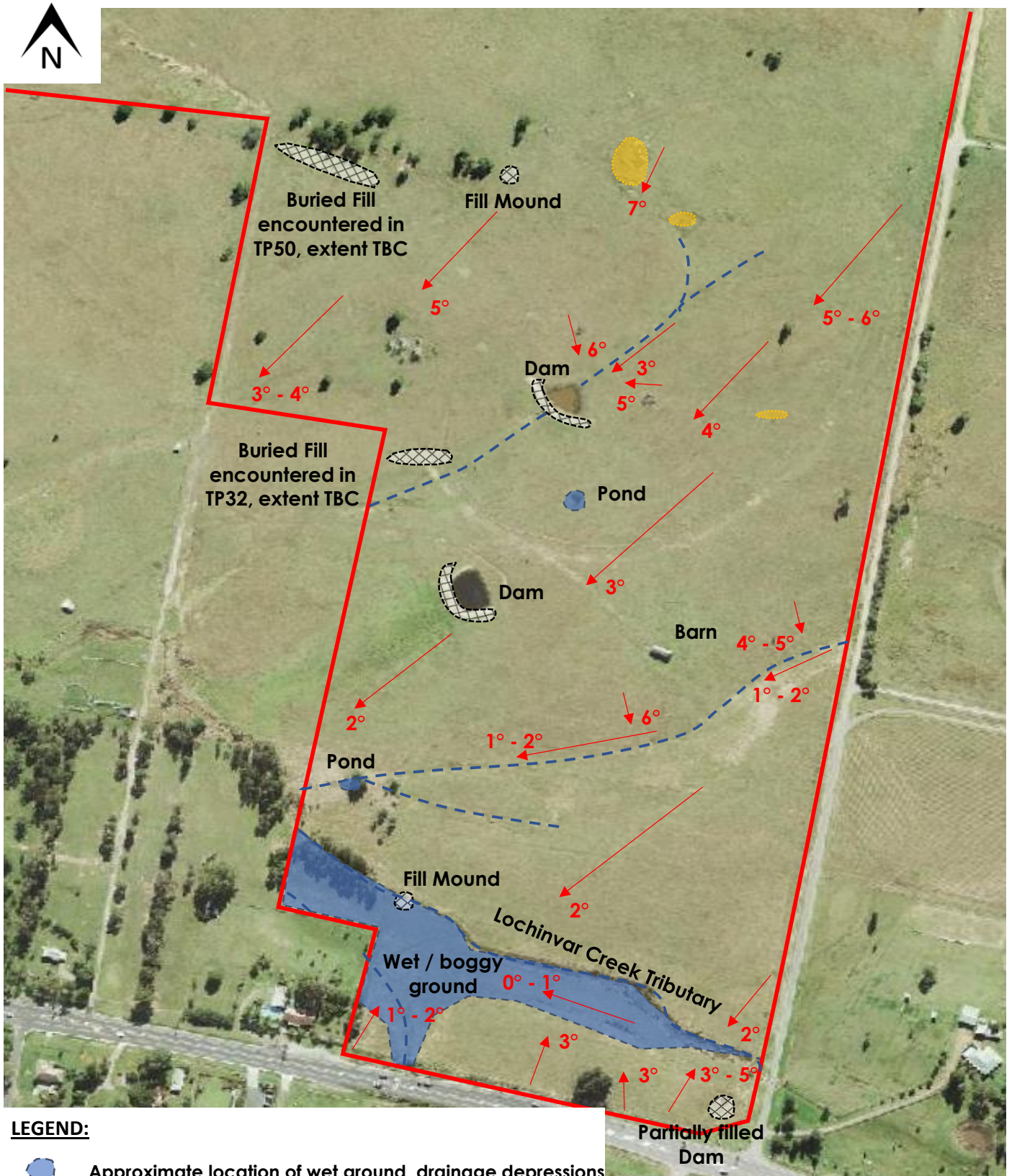
**LEGEND:**

Based upon Google Earth Image

- Approximate site boundary
- Approximate test pit location







Client:	LINDSAY BENNELONG DEVELOPMENTS PTY LTD	Drawing No:	FIGURE AB1
Project:	PRELIMINARY GEOTECHNICAL ASSESSMENT	Project No:	NEW22P-0012
Location:	898 NEW ENGLAND HIGHWAY, LOCHINVAR	Scale:	AS SHOWN
Title:	SITE LOCATION PLAN & APPROXIMATE TEST LOCATIONS	Date:	4/03/2022



Based on Sixmaps image

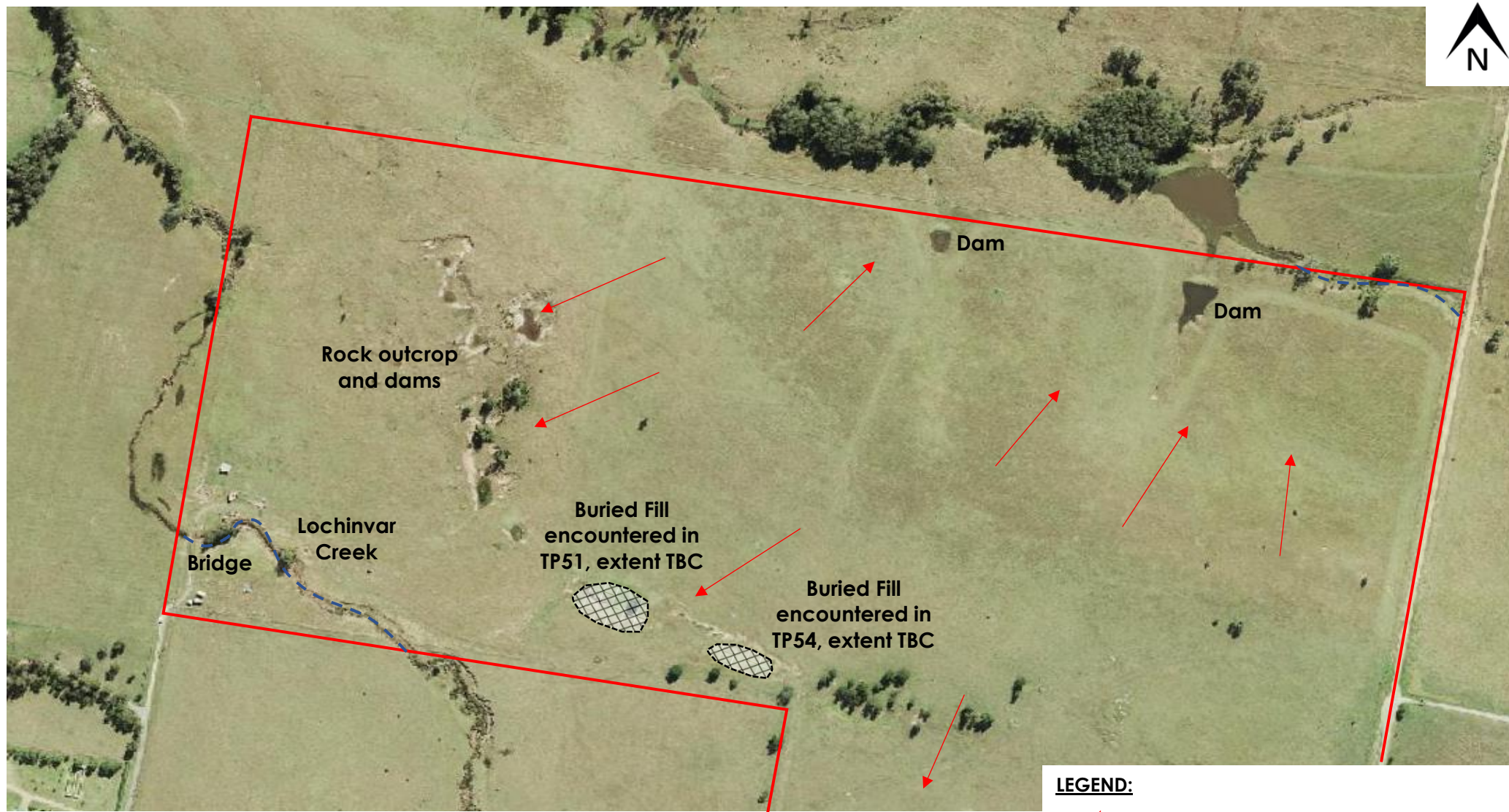
**LEGEND:**

-  Approximate location of wet ground, drainage depressions
-  Approximate location of observed fill.
-  Approximate location of rock outcrops.
-  Approximate slope direction and angle



Client:	LINDSAY BENNELONG DEVELOPMENTS PTY LTD	Drawing No:	FIGURE AB2
Project:	PRELIMINARY GEOTECHNICAL ASSESSMENT	Project No:	NEW22P-0012
Location:	898 NEW ENGLAND HIGHWAY, LOCHINVAR	Scale:	N.T.S.
Title:	SITE FEATURES - SOUTHERN PORTION	Date:	4/03/2022





Based on Sixmaps image

**LEGEND:**



**Site slope direction**



**Approximate location of observed fill.**



Client:	LINDSAY BENNELONG DEVELOPMENTS PTY LTD	Drawing No:	FIGURE AB3
Project:	PRELIMINARY GEOTECHNICAL ASSESSMENT	Project No:	NEW22P-0012
Location:	898 NEW ENGLAND HIGHWAY, LOCHINVAR	Scale:	N.T.S.
Title:	SITE FEATURES - NORTHERN PORTION	Date:	4/03/2022

# **APPENDIX A:**

## **Results of Field Investigations**



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP01  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	
E	Not Encountered	E 0.10m				CH	FILL-TOPSOIL: CLAY - medium to high plasticity, brown, trace fine grained sand, root affected in top 0.05m.	M > w <sub>p</sub>			FILL - TOPSOIL
						CI	FILL: Gravelly CLAY - medium plasticity, brown with some orange-brown and white, fine grained, sub-rounded gravel.				FILL
		E 0.40m				CL	TOPSOIL: CLAY - low to medium plasticity, dark brown, some fine grained sand.				TOPSOIL
		E 0.50m				CH	CLAY - medium to high plasticity, brown.				RESIDUAL SOIL
		E 0.60m									
				1.0			Hole Terminated at 1.00 m				
				1.5							
				2.0							

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)	Moisture Condition
VS Very Soft	<25	D Dry
S Soft	25 - 50	M Moist
F Firm	50 - 100	W Wet
St Stiff	100 - 200	W <sub>p</sub> Plastic Limit
VSt Very Stiff	200 - 400	W <sub>L</sub> Liquid Limit
H Hard	>400	
Fb Friable		
Density		
V Very Loose		Density Index <15%
L Loose		Density Index 15 - 35%
MD Medium Dense		Density Index 35 - 65%
D Dense		Density Index 65 - 85%
VD Very Dense		Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP01A**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 3/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information				Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY		Test Type
E	Not Encountered	0.20m		0.5 1.0 1.5 1.90m		CL	FILL - Sandy CLAY / CLAY - low to medium plasticity, brown to dark brown and grey-brown, fine to medium grained sand, with concrete, bricks, terracotta pipe, wood and asbestos containing material.	M < W <sub>p</sub>			FILL
		E									
		0.40m									
		E									
		0.50m									
		E									
		0.90m									
		E									
		1.00m									
		E									
1.40m											
E											
1.50m											
E											
1.70m											
E											
1.80m											
							Sandy CLAY - medium plasticity, brown, fine grained.	M > W <sub>p</sub>			RESIDUAL SOIL
				2.0			Hole Terminated at 1.90 m				

OT.LIB.1.1.GLB.Log.NON-CORED.BOREHOLE - TEST.PIT.NEW22P-0012.LOGS.GPJ <-DrawingFile>> 04/03/2022 09:10 - 10.01.00.01 Daigel Lab and In Situ Tool

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample <b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
		<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP02**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 3/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
E	Not Encountered	E 0.10m				CH	TOPSOIL: CLAY - medium to high plasticity, dark brown, trace fine grained, sub-rounded gravel.	M > W <sub>p</sub>	St	HP	200	TOPSOIL	
		0.40m			0.35m	CH	Grey-brown.				HP		190
		E 0.50m		0.5	0.90m	CH	CLAY - medium to high plasticity, brown with some grey-brown.				HP	160	
				1.0			Hole Terminated at 0.90 m						
				1.5									
				2.0									

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP03**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 3/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	0.10m TOPSOIL: Silty CLAY - low to medium plasticity, brown to dark brown, root affected.	M < w <sub>p</sub>	H	HP	>600	TOPSOIL
					CL	0.25m Silty CLAY - low to medium plasticity, brown to grey-brown.	SLOPE WASH					
		0.30m			CH	CLAY - medium to high plasticity, brown to orange-brown, trace fine grained sand.	HP				550	RESIDUAL SOIL
		E 0.40m									HP	
					CL	0.80m 0.90m Sandy CLAY / Clayey SAND - low to medium plasticity, brown to orange-brown, fine grained.	D - M				HP	
				1.0		Hole Terminated at 0.90 m						
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)	Moisture Condition
VS Very Soft	<25	D Dry
S Soft	25 - 50	M Moist
F Firm	50 - 100	W Wet
St Stiff	100 - 200	W <sub>p</sub> Plastic Limit
VSt Very Stiff	200 - 400	W <sub>L</sub> Liquid Limit
H Hard	>400	
Fb Friable		
Density	V Very Loose	Density Index <15%
L Loose	MD Medium Dense	Density Index 15 - 35%
D Dense	D Dense	Density Index 35 - 65%
VD Very Dense	VD Very Dense	Density Index 65 - 85%
		Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP04  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
E	Not Encountered	E 0.10m				CI	TOPSOIL: CLAY - medium plasticity, dark brown, trace fine grained sand.	M > w <sub>p</sub>	St	HP	200	TOPSOIL	
		E 0.30m				CH	CLAY - medium to high plasticity, dark grey.				HP	150	RESIDUAL SOIL
		E 0.40m		0.5			Grey-brown.				HP	150	
				1.0			Hole Terminated at 0.80 m						
				1.5									
				2.0									

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 Gradational or transitional strata  
 Definitive or distinct strata change

**Notes, Samples and Tests**  
U<sub>30</sub> 50mm Diameter tube sample  
CBR Bulk sample for CBR testing  
E Environmental sample (Glass jar, sealed and chilled on site)  
ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
B Bulk Sample  
**Field Tests**  
PID Photoionisation detector reading (ppm)  
DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
HP Hand Penetrometer test (UCS kPa)

**Consistency**  
VS Very Soft  
S Soft  
F Firm  
St Stiff  
VSt Very Stiff  
H Hard  
Fb Friable  
**Density**  
V Very Loose  
L Loose  
MD Medium Dense  
D Dense  
VD Very Dense

**UCS (kPa)**  
<25  
25 - 50  
50 - 100  
100 - 200  
200 - 400  
>400  
**Moisture Condition**  
D Dry  
M Moist  
W Wet  
W<sub>p</sub> Plastic Limit  
W<sub>L</sub> Liquid Limit  
Density Index <15%  
Density Index 15 - 35%  
Density Index 35 - 65%  
Density Index 65 - 85%  
Density Index 85 - 100%

OT LIB 1.1.GLB Log NON-CORED BOREHOLE - TEST PIT NEW22P-0012 LOGS.GPJ <-DrawingFile>> 04/03/2022 09:10 - 10.01.00.01 D:\gib Lab and In Situ Tool



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP05  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	TOPSOIL: Silty CLAY - low to medium plasticity, brown, root affected.	M < w <sub>p</sub>				TOPSOIL
						CI	Sandy CLAY / CLAY - medium plasticity, brown, fine grained sand.	M > w <sub>p</sub>	H	HP	500	RESIDUAL SOIL
		E 0.30m				CH	CLAY - medium to high plasticity, brown to pale brown, trace fine grained sand.					
		E 0.40m										
				0.5					HP	200		
							Hole Terminated at 0.70 m					
				1.0								
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	





# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP06  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations			
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result		
E	Not Encountered	E 0.10m				CI	TOPSOIL: CLAY - medium plasticity, dark brown, root affected in top 0.1m.					TOPSOIL		
					0.20m		CLAY - medium to high plasticity, dark grey-brown.					RESIDUAL SOIL		
		0.30m					CH		M > W <sub>p</sub>	VSt	HP	250		
		E 0.40m			0.5		CH				HP	250		
								CH	CLAY - medium to high plasticity, grey-brown.			HP	200	
								CH	Brown.			St	HP	200
						CH	Trace fine grained, sub-rounded to sub-angular gravel.				HP	280		
						CH	Gravelly CLAY - medium to high plasticity, brown, fine to medium grained, sub-angular to sub-rounded gravel, with some extremely weathered rock.			VSt	HP	300		
							Hole Terminated at 2.00 m							

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)	Moisture Condition	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
Density				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	

OT.LIB.1.1.GLB.Log\_NON-CORED BOREHOLE - TEST PIT\_NEW22P-0012.LOGS.GPJ <-DrawingFile>> 04/03/2022 09:10 -10.01.00.01 Daigel Lab and In Situ Tool



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP07  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations					
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result				
E	Not Encountered	E 0.10m				CI	TOPSOIL: CLAY - medium plasticity, brown to dark brown, trace fine grained sand, root affected. Brown, no roots.	M > w <sub>p</sub>	St	HP	150	TOPSOIL				
		E 0.20m										Clayey SAND / Sandy CLAY - fine to medium grained, brown, fines of low to medium plasticity.	M ~ w <sub>p</sub>	HP	90	RESIDUAL SOIL
		E 0.30m														CLAY - medium plasticity, brown to dark brown, trace fine grained sand, trace fine grained, rounded to sub-rounded gravel.
				0.5			Hole Terminated at 0.70 m									
				1.0												
				1.5												
				2.0												

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>50</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			

<b>Density</b>		<b>Density Index</b>	
V	Very Loose	<15%	
L	Loose	15 - 35%	
MD	Medium Dense	35 - 65%	
D	Dense	65 - 85%	
VD	Very Dense	85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP08  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E		0.10m		CH	TOPSOIL: CLAY - medium to high plasticity, dark brown, root affected.	M > W <sub>p</sub>	St	HP	180	TOPSOIL
				0.30m			CLAY - medium to high plasticity, pale grey-brown, root affected to 0.2m.					RESIDUAL SOIL
		E		0.40m		CH	Dark brown.					
				0.5			Hole Terminated at 0.70 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)
VS Very Soft	<25
S Soft	25 - 50
F Firm	50 - 100
St Stiff	100 - 200
VSt Very Stiff	200 - 400
H Hard	>400
Fb Friable	

Density	Density Index
V Very Loose	<15%
L Loose	15 - 35%
MD Medium Dense	35 - 65%
D Dense	65 - 85%
VD Very Dense	85 - 100%

**Moisture Condition**

- D Dry
- M Moist
- W Wet
- W<sub>p</sub> Plastic Limit
- W<sub>L</sub> Liquid Limit



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP09  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Water Level (1L/hr)	E 0.10m		0.10		CL	TOPSOIL: Silty CLAY - low to medium plasticity, brown.	M < W <sub>p</sub>				TOPSOIL
				0.30m			CL	CLAY - medium to high plasticity, brown with some orange-brown, trace fine grained sand.	M > W <sub>p</sub>	St - VSt	HP	250
		E 0.40m		0.5					HP	200		
				1.0					HP	230		
				1.5					HP	190		
				2.0					HP	220		
							Hole Terminated at 2.00 m					

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

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# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP10**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 3/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	FILL-TOPSOIL: CLAY - low to medium plasticity, dark brown, with some silt, root affected in top 0.1m.	M > W <sub>p</sub>				FILL - TOPSOIL
		E 0.20m		0.20m		CL	FILL: Sandy CLAY - low plasticity, brown to pale brown, fine grained sand.	M < W <sub>p</sub>	H	HP	>600	FILL / POSSIBLE SLOPE WASH
		E 0.30m		0.50m		CL	CLAY - medium to high plasticity, brown to dark brown with some fine grained, sub-angular gravel.	M > W <sub>p</sub>	VSt	HP	250	RESIDUAL SOIL
		E 0.50m		0.90m		CH	Brown.			HP	210	
		E 0.60m					Hole Terminated at 0.90 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)	Moisture Condition
VS Very Soft	<25	D Dry
S Soft	25 - 50	M Moist
F Firm	50 - 100	W Wet
St Stiff	100 - 200	W <sub>p</sub> Plastic Limit
VSt Very Stiff	200 - 400	W <sub>L</sub> Liquid Limit
H Hard	>400	
Fb Friable		
Density	V Very Loose	Density Index <15%
L Loose	MD Medium Dense	Density Index 15 - 35%
D Dense	D Dense	Density Index 35 - 65%
VD Very Dense	D Dense	Density Index 65 - 85%
		Density Index 85 - 100%

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# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP11  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m		0.5		CI 0.05m	TOPSOIL: CLAY - medium plasticity, dark brown, root affected. CLAY - medium to high plasticity, dark brown.	M > W <sub>p</sub>	St	HP	170	TOPSOIL
		E 0.30m				CH	Brown with some orange-brown.			HP	130	RESIDUAL SOIL
							Hole Terminated at 0.60 m					

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

OT.LIB.1.1.GLB.Log\_NON-CORED BOREHOLE - TEST PIT\_NEW22P-0012.LOGS.GPJ <-DrawingFile>> 04/03/2022 09:10 -10.01.00.01 Daigel Lab and In Situ Tool



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP12**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 3/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	0.10m TOPSOIL: Sandy CLAY - low to medium plasticity, grey-brown, fine grained sand, with trace fine to coarse grained, rounded gravel, root affected.	M < w <sub>p</sub>				TOPSOIL
		E 0.30m				CI	0.25m Sandy CLAY - medium plasticity, grey to grey-brown, fine grained sand, trace medium to coarse grained, rounded gravel.			HP	150	SLOPE WASH
		E 0.40m				CH	CLAY - medium to high plasticity, brown to orange-brown.  Brown to pale brown.	M > w <sub>p</sub>	St	HP	190	RESIDUAL SOIL
				0.5						HP	190	
				0.65m			Hole Terminated at 0.65 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 --- Gradational or transitional strata  
 — Definitive or distinct strata change

**Notes, Samples and Tests**  
 U<sub>30</sub> 50mm Diameter tube sample  
 CBR Bulk sample for CBR testing  
 E Environmental sample (Glass jar, sealed and chilled on site)  
 ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
 B Bulk Sample  
**Field Tests**  
 PID Photoionisation detector reading (ppm)  
 DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
 HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
<b>Density</b>				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP13  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations			
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result		
E	Not Encountered	E		0.10m		CL	TOPSOIL- Sandy CLAY - low to medium plasticity, brown, fine grained sand, root affected.	M < W <sub>p</sub>				TOPSOIL		
						CL	CLAY - low to medium plasticity, pale brown, with some silt.					SLOPE WASH / RESIDUAL SOIL		
				0.30m			CLAY - medium to high plasticity, brown with some grey.	H	HP	440	RESIDUAL SOIL			
				E		0.40m								
						0.5								
						1.0		CH	Grey with some brown.					
						1.30m			Red-brown.					
				1.5		CH	CLAY - medium to high plasticity, red-brown, with some fine to medium grained, sub-rounded to rounded gravel.							
				2.0			Hole Terminated at 2.00m							

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	





# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP14  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m		0.5		GP	FILL: Sandy GRAVEL - fine to medium grained, sub-rounded to sub-angular, fine to medium grained sand, with some asphalt.	D				FILL
			CL			Silty CLAY - low plasticity, grey.	M < Wp			SLOPE WASH		
		E 0.30m				CH	CLAY - medium to high plasticity, brown to pale brown.	M > Wp	VSt	HP 330	RESIDUAL SOIL	
		E 0.40m							HP 260			
									HP 280			
				1.0			Hole Terminated at 0.70 m			HP 220		
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>
VS	Very Soft	<25	D Dry
S	Soft	25 - 50	M Moist
F	Firm	50 - 100	W Wet
St	Stiff	100 - 200	W <sub>p</sub> Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub> Liquid Limit
H	Hard	>400	
Fb	Friable		
<b>Density</b>			
V	Very Loose		Density Index <15%
L	Loose		Density Index 15 - 35%
MD	Medium Dense		Density Index 35 - 65%
D	Dense		Density Index 65 - 85%
VD	Very Dense		Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP15  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CI	0.05m TOPSOIL: CLAY - medium plasticity, dark brown, root affected.	M > W <sub>p</sub>	VSt	HP	450	TOPSOIL
		E 0.20m		CH		0.20m CLAY - medium to high plasticity, dark brown.	RESIDUAL SOIL					
		E 0.30m		CH		CLAY - medium to high plasticity, brown with some orange-brown.	HP					350
				0.5		CH	CLAY - medium to high plasticity, brown with some orange-brown.			HP	310	
				0.60m	Hole Terminated at 0.60 m							
				1.0								
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

OT LIB 1.1.GLB Log NON-CORED BOREHOLE - TEST PIT NEW22P-0012 LOGS.GPJ -<DrawingFile>> 04/03/2022 09:10 -10.01.00.01 D:\gel Lab and In Situ Tool



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP16**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 4/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
E	Not Encountered	E	0.10m	0.10m	[Hatched Pattern]	CL	TOPSOIL: Sandy CLAY - low to medium plasticity, dark brown, fine grained sand, root affected.	M < W <sub>p</sub>				TOPSOIL	
			0.20m	0.20m		CH	Sandy CLAY - medium to high plasticity, brown, fine grained sand.			HP	>600	RESIDUAL SOIL	
		E	0.30m	0.30m	[Hatched Pattern]	CH	CLAY - medium to high plasticity, brown.			HP	>600		
				0.50m		CH		H	HP	600			
				1.00m		CH		HP	450				
					1.20m	1.20m	CI	Sandy CLAY - medium plasticity, pale brown to brown, fine grained sand.			HP	480	
					1.50m	1.50m	CI				HP	280	
			1.80m	1.80m					VSt	HP	320		
			2.00m	2.00m	[X Pattern]	Extremely Weathered Andesite with soil properties: breaks down into Sandy CLAY - medium plasticity, pale brown to brown, fine grained sand, trace highly weathered rock.			HP	350		EXTREMELY WEATHERED ROCK	
				2.00m			Hole Terminated at 2.00 m						

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)	Moisture Condition
VS Very Soft	<25	D Dry
S Soft	25 - 50	M Moist
F Firm	50 - 100	W Wet
St Stiff	100 - 200	W <sub>p</sub> Plastic Limit
VSt Very Stiff	200 - 400	W <sub>L</sub> Liquid Limit
H Hard	>400	
Fb Friable		
Density	V Very Loose	Density Index <15%
L Loose	MD Medium Dense	Density Index 15 - 35%
D Dense		Density Index 35 - 65%
VD Very Dense		Density Index 65 - 85%
		Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP17  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E		0.10m		CI	0.10m TOPSOIL: CLAY - medium plasticity, brown to dark brown, with some fine grained sand, root affected.	M > Wp	VSt	HP	300	TOPSOIL
		E		0.20m		CI	CLAY - medium plasticity, brown to dark brown, with some fine grained sand.				RESIDUAL SOIL	
		E		0.30m		CH	0.30m CLAY - medium to high plasticity, brown to pale brown.				HP	320
				0.5m		CH	0.70m Hole Terminated at 0.70 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
<b>Density</b>				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP18  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CI	TOPSOIL: Sandy CLAY - medium plasticity, brown, fine grained sand, with some silt.	M > W <sub>p</sub>				TOPSOIL
						CL	Silty CLAY - low to medium plasticity, pale grey-brown.	M < W <sub>p</sub>		HP	>600	SLOPE WASH
		E 0.30m				CH	CLAY - medium to high plasticity, brown.	M > W <sub>p</sub>	H	HP	>600	RESIDUAL SOIL
				0.5						HP	550	
				0.70m			Hole Terminated at 0.70 m			HP	400	
				1.0								
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP19  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations			
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result		
E	Not Encountered	E 0.10m		0.03m	[Hatched]	CL	TOPSOIL: Sandy CLAY - low plasticity, dark brown, fine grained, root affected.	M < w <sub>p</sub>				TOPSOIL		
			0.20m	CI		CLAY - medium plasticity, brown to grey-brown.							SLOPE WASH	
		E 0.30m		0.23m	[Hatched]	CH	CLAY - medium to high plasticity, brown to dark brown.	M > w <sub>p</sub>	H				RESIDUAL SOIL	
			0.50m	CH			HP						550	
			0.75m	CH		CLAY - medium to high plasticity, brown to pale brown and orange-brown with some grey.	HP						450	
	1.00m	CH	Sandy CLAY - medium to high plasticity, pale brown and orange-brown, fine grained sand.	HP	>600									
			1.30m	1.32m		CH	SANDSTONE - fine grained, pale brown to brown and orange-brown.					HP	>600	HIGHLY WEATHERED ROCK
				1.50m			Hole Terminated at 1.32 m Refusal							

OT.LIB.1.1.GLB.Log\_NON-CORED BOREHOLE - TEST PIT\_NEW22P-0012.LOGS.GPJ <-DrawingFile>> 04/03/2022 09:11 10.01.00.01 Daigel Lab and In Situ Tool

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose Density Index <15% L Loose Density Index 15 - 35% MD Medium Dense Density Index 35 - 65% D Dense Density Index 65 - 85% VD Very Dense Density Index 85 - 100%		



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP20**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 4/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	TOPSOIL: Sandy CLAY - low to medium plasticity, brown, fine grained sand.	M < w <sub>p</sub>				TOPSOIL
		E 0.30m				CH	CLAY - medium to high plasticity, brown.	M > w <sub>p</sub>	H	HP	>600	RESIDUAL SOIL
				0.5			With some orange-brown.		VSt	HP	260	
				0.65m			Hole Terminated at 0.65 m			HP	360	
				1.0								
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

OT.LIB.1.1.GLB.Log\_NON-CORED BOREHOLE - TEST PIT\_NEW22P-0012.LOGS.GPJ <-DrawingFile>> 04/03/2022 09:11 10.01.00.01 Daigel Lab and In Situ Tool



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP21  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m		0.10m		CL	TOPSOIL: Sandy CLAY - low to medium plasticity, dark brown, fine grained sand.	M < w <sub>p</sub>				TOPSOIL
		E 0.20m		0.20m		CI	CLAY - medium plasticity, dark brown, with some fine grained sand.	M > w <sub>p</sub>	VSt	HP	220	RESIDUAL SOIL
		E 0.30m		0.30m						HP	450	
				0.50m		HP	>600					
		0.60m		HP	>600							
				0.50m		CL	Sandy CLAY - low to medium plasticity, brown to pale brown, with some orange-brown, fine grained sand, with some highly weathered rock.	M ~ w <sub>p</sub>				
				0.60m			Hole Terminated at 0.60 m					

OT LIB 1.1.GLB Log NON-CORED BOREHOLE - TEST PIT NEW22P-0012 LOGS.GPJ <DrawingFile>> 04/03/2022 09:11 10.01.00.01 D:\gel Lab and In Situ Tool

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	





# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP22**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 4/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m		0.5		CH	Sandy CLAY - medium to high plasticity, brown and orange-brown, fine grained sand, with some medium to coarse grained, sub-rounded to rounded gravel.	M > W <sub>p</sub>	St	HP	180	RESIDUAL SOIL
		E 0.15m								HP	200	
		E 0.25m								H	HP	
				0.5			0.50m Increasing sand content.					
							Hole Terminated at 0.50 m					

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<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP23**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 4/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
E	Not Encountered	E 0.10m				CL	FILL: Sandy CLAY / Clayey SAND - low plasticity, orange-brown, fine grained sand.	M < w <sub>p</sub>				POSSIBLE FILL	
						CL	Sandy CLAY - low to medium plasticity, dark brown to dark grey-brown, fine grained sand.			HP	240	ALLUVIUM / POSSIBLE RESIDUAL SOIL	
					0.5		CH	Sandy CLAY / CLAY - medium to high plasticity, mostly medium plasticity, brown, fine grained sand.			HP	280	RESIDUAL SOIL
										VSt			
											HP	250	
											HP	350	
											HP	530	
				1.5			Medium plasticity, brown and some grey.			HP	560		
										HP	>600		
				2.0		CI	Sandy Gravelly CLAY - medium plasticity, brown with some grey, fine grained sand, fine to medium grained, sub-rounded gravel.	M < w <sub>p</sub>					
							Hole Terminated at 2.00 m						

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)	Moisture Condition
VS	Very Soft	<25	D Dry
S	Soft	25 - 50	M Moist
F	Firm	50 - 100	W Wet
St	Stiff	100 - 200	W <sub>p</sub> Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub> Liquid Limit
H	Hard	>400	
Fb	Friable		
Density			
V	Very Loose		Density Index <15%
L	Loose		Density Index 15 - 35%
MD	Medium Dense		Density Index 35 - 65%
D	Dense		Density Index 65 - 85%
VD	Very Dense		Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP24  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 3/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CI	TOPSOIL: CLAY - medium plasticity, dark brown, with some fine grained, sub-rounded to sub-angular gravel, root affected.	M < w <sub>p</sub>				TOPSOIL
						CL	Silty CLAY - low to medium plasticity, pale brown.	M < w <sub>p</sub>				SLOPE WASH
		E 0.30m				CH	CLAY - medium to high plasticity, brown.  Brown with some grey-brown.	M > w <sub>p</sub>	H	HP	>600	RESIDUAL SOIL
				0.5						HP	550	
				0.65m			Hole Terminated at 0.65 m			HP	300	
				1.0								
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

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# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP25  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E				CL	FILL-TOPSOIL: Sandy CLAY - low to medium plasticity, dark brown, fine to medium grained sand, with some asbestos containing material and some metal flaking.	M < W <sub>p</sub>				FILL - TOPSOIL
		E	0.20m			CH	CLAY - medium to high plasticity, brown and grey-brown.	M > W <sub>p</sub>	H	HP	>600	RESIDUAL SOIL
				0.30m						HP	>600	
				0.70m			Hole Terminated at 0.70 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>50</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
<b>Density</b>				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP26**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 4/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E		0.20m		CL	0.10m TOPSOIL: Sandy CLAY - low to medium plasticity, pale grey-brown to brown with some fine grained sand.	M < W <sub>p</sub>	H	HP	>600	TOPSOIL
		CL	0.20m Sandy CLAY - low to medium plasticity, grey-brown to pale grey, brown.			SLOPE WASH						
		CH	CLAY - medium to high plasticity, brown, with some orange-brown.			RESIDUAL SOIL						
		E		0.30m						HP	>600	
		Hole Terminated at 0.70 m										

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)	Moisture Condition	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
Density		V	Very Loose	Density Index <15%
L	Loose			Density Index 15 - 35%
MD	Medium Dense			Density Index 35 - 65%
D	Dense			Density Index 65 - 85%
VD	Very Dense			Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP27  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E		0.20m		CL	FILL-TOPSOIL: Sandy CLAY - low to medium plasticity, dark brown, fine to medium grained sand, with some asbestos containing material and some metal flaking.	M < w <sub>p</sub>				FILL - TOPSOIL
		E		0.30m		CH	CLAY - medium to high plasticity, brown and grey-brown.  Brown and orange-brown.	M > w <sub>p</sub>	H	HP >600  HP >600		RESIDUAL SOIL
				1.0			Hole Terminated at 0.80 m					
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

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# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP28  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	FILL-TOPSOIL: Sandy CLAY - low to medium plasticity, dark brown, fine to medium grained sand, with some asbestos containing material.	M < w <sub>p</sub>				FILL - TOPSOIL
		E 0.20m				CH	CLAY - medium to high plasticity, brown and grey-brown.	M ~ w <sub>p</sub>	H	HP	>600	RESIDUAL SOIL
		E 0.30m					Brown and orange-brown.			HP	>600	
							Hole Terminated at 0.60 m					

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			

<b>Density</b>		<b>Density Index</b>	
V	Very Loose	<15%	
L	Loose	15 - 35%	
MD	Medium Dense	35 - 65%	
D	Dense	65 - 85%	
VD	Very Dense	85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP29  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	0.10m TOPSOIL: Silty CLAY - low to medium plasticity, brown to dark brown, root affected.	M < w <sub>p</sub>				TOPSOIL
						CL	Sandy CLAY - low to medium plasticity, brown, fine grained sand.		H	HP	550	RESIDUAL SOIL
		E 0.30m				CH	0.30m CLAY - medium to high plasticity, brown to dark brown.	M > w <sub>p</sub>	VSt	HP	300	
						CH	0.50m Hole Terminated at 0.70 m			HP	220	
				1.0								
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
<b>Density</b>				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	

OT.LIB.1.1.GLB.Log.NON-CORED.BOREHOLE - TEST.PIT.NEW22P-0012.LOGS.GPJ <-DrawingFile>> 04/03/2022 09:11 10.01.00.01 Daigel Lab and In Situ Tool





# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP30**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 4/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				SC	TOPSOIL: Clayey SAND - fine grained, dark brown, fines of low plasticity.	M				TOPSOIL
							Sandy CLAY - medium to high plasticity, brown, fine to medium grained sand.	M > W <sub>p</sub>	St	HP	200	RESIDUAL SOIL
		E 0.30m				CH	Brown to orange-brown.		HP	320		
									VSt			
				0.5		SC	Extremely Weathered Sandstone with soil properties: breaks down into Clayey SAND / Sandy CLAY - fine grained, orange-brown to brown, fines of low to medium plasticity, with some highly weathered sandstone. Hole Terminated at 0.70 m	D	H	HP	500	EXTREMELY WEATHERED ROCK
				1.0								
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

OT LIB 1.1.GLB Log NON-CORED BOREHOLE - TEST PIT NEW22P-0012 LOGS.GPJ -<DrawingFile>> 04/03/2022 09:11 10.01.00.01 D:\gplab and in Situ Tool



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP31**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 4/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m		0.5		CL	0.05m TOPSOIL: Silty CLAY - low plasticity, brown, root affected.	M < w <sub>p</sub>	H	HP	>600	TOPSOIL
		E 0.20m				CI	CLAY - medium plasticity, brown to pale brown, trace fine grained, sub-rounded gravel.					
		E 0.30m					0.60m Brown and orange-brown.	M > w <sub>p</sub>		HP	>600	
							Hole Terminated at 0.60 m					

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 --- Gradational or transitional strata  
 — Definitive or distinct strata change

**Notes, Samples and Tests**  
 U<sub>30</sub> 50mm Diameter tube sample  
 CBR Bulk sample for CBR testing  
 E Environmental sample (Glass jar, sealed and chilled on site)  
 ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
 B Bulk Sample  
**Field Tests**  
 PID Photoionisation detector reading (ppm)  
 DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
 HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
<b>Density</b>				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP32  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.20m				CI	FILL: Sandy Gravelly CLAY - medium plasticity, dark brown, fine to medium grained sand, fine to medium grained, sub-angular to angular gravel, with some steel, concrete, bricks, plastic, asbestos containing material.	M < w <sub>p</sub>				FILL
		E 0.40m		0.35m		CI	Sandy CLAY - medium plasticity, brown and orange-brown, fine grained sand.	M > w <sub>p</sub>				RESIDUAL SOIL
		E 0.50m		0.5		CI	Increasing sand content.					
				0.75			Hole Terminated at 0.75 m					
				1.0								
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP33**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 4/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	FILL: Sandy CLAY - low to medium plasticity, brown, fine grained sand, trace fine grained, sub-rounded gravel, root affected in top 0.1m.	M < W <sub>p</sub>				FILL
		E 0.20m				CH	CLAY - medium to high plasticity, brown.			HP	>600	RESIDUAL SOIL
		E 0.30m				CH	Gravelly CLAY - medium to high plasticity, brown with some red-brown, fine grained, sub-angular to sub-rounded gravel.					
				0.5			Hole Terminated at 0.65 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 - - - Gradational or transitional strata  
 ——— Definitive or distinct strata change

**Notes, Samples and Tests**  
 U<sub>30</sub> 50mm Diameter tube sample  
 CBR Bulk sample for CBR testing  
 E Environmental sample (Glass jar, sealed and chilled on site)  
 ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
 B Bulk Sample  
**Field Tests**  
 PID Photoionisation detector reading (ppm)  
 DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
 HP Hand Penetrometer test (UCS kPa)

**Consistency**  
 VS Very Soft  
 S Soft  
 F Firm  
 St Stiff  
 VSt Very Stiff  
 H Hard  
 Fb Friable  
**Density**  
 V Very Loose  
 L Loose  
 MD Medium Dense  
 D Dense  
 VD Very Dense

**UCS (kPa)**  
 <25  
 25 - 50  
 50 - 100  
 100 - 200  
 200 - 400  
 >400  
**Moisture Condition**  
 D Dry  
 M Moist  
 W Wet  
 W<sub>p</sub> Plastic Limit  
 W<sub>L</sub> Liquid Limit  
 Density Index <15%  
 Density Index 15 - 35%  
 Density Index 35 - 65%  
 Density Index 65 - 85%  
 Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP34**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 4/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m E 0.20m E 0.30m		0.5		CH	CLAY - medium to high plasticity, brown, trace fine grained sand, root affected to 0.03m.	M > W <sub>p</sub>	VSt	HP	300	RESIDUAL SOIL
				0.60m			Hole Terminated at 0.60 m			HP	220	
				1.0								
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP35**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 7/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
E	Not Encountered	E 0.10m				CL	TOPSOIL: Silty CLAY - low to medium plasticity, brown, with some fine grained sand, root affected.	M < w <sub>p</sub>				TOPSOIL	
						CL	CLAY / Silty CLAY - low to medium plasticity, brown to grey-brown, with some fine grained sand.	M < w <sub>p</sub>				SLOPE WASH	
		E 0.20m											
		E 0.30m					CH	CLAY - medium to high plasticity, brown with some dark brown, trace fine grained sand and some fine grained, sub-rounded gravel.	M > w <sub>p</sub>	H	HP	>600	RESIDUAL SOIL
											HP	>600	
						CI	Sandy CLAY - medium plasticity, orange-brown to brown, fine grained sand, trace fine grained, sub-angular to sub-rounded gravel.	M < w <sub>p</sub>		HP	>600		
							Hole Terminated at 0.70 m						

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)	Moisture Condition
VS Very Soft	<25	D Dry
S Soft	25 - 50	M Moist
F Firm	50 - 100	W Wet
St Stiff	100 - 200	W <sub>p</sub> Plastic Limit
VSt Very Stiff	200 - 400	W <sub>L</sub> Liquid Limit
H Hard	>400	
Fb Friable		
Density	V Very Loose	Density Index <15%
L Loose	MD Medium Dense	Density Index 15 - 35%
D Dense	D Dense	Density Index 35 - 65%
VD Very Dense	D Dense	Density Index 65 - 85%
		Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP36**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 7/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	0.10m TOPSOIL: Sandy CLAY - low to medium plasticity, brown, fine grained sand, trace fine grained, sub-rounded gravel, root affected.	M < W <sub>p</sub>				TOPSOIL
		E 0.20m				CL	0.20m Sandy Gravelly CLAY - low to medium plasticity, brown, fine grained sand, fine grained, sub-rounded gravel.					SLOPE WASH
		E 0.30m				CH	0.5 Sandy CLAY / CLAY - medium to high plasticity, brown and orange-brown, fine grained sand.					HP
				0.70m			Hole Terminated at 0.70 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)	Moisture Condition	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
Density			Density Index <15%	
V	Very Loose		Density Index 15 - 35%	
L	Loose		Density Index 35 - 65%	
MD	Medium Dense		Density Index 65 - 85%	
D	Dense		Density Index 85 - 100%	
VD	Very Dense			

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# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP37  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
E	Not Encountered	E 0.10m		0.10		CL	TOPSOIL: Silty CLAY - low to medium plasticity, brown, root affected.	M < w <sub>p</sub>				TOPSOIL	
				0.20		CI	Sandy CLAY - medium plasticity, brown, fine grained.		VSt	HP	210	SLOPE WASH	
		E 0.30m		0.30		CI	Sandy CLAY - medium plasticity, brown, trace orange-brown, fine grained sand.				HP	600	RESIDUAL SOIL
				0.5		CI	Medium to high plasticity, brown and orange-brown.	M > w <sub>p</sub>		HP	550		
				1.0		CI	with some highly weathered sandstone.		H	HP	600		
				1.20		Extremely Weathered Sandstone with soil properties: breaks down into Sandy CLAY - medium plasticity, brown to orange-brown, fine grained sand, with some highly weathered SANDSTONE - fine grained, orange-brown, estimated low to medium strength.			HP	>600	EXTREMELY TO HIGHLY WEATHERED ROCK		
				1.5		Estimated medium strength, fine grained, brown and orange-brown.		D - M				HIGHLY WEATHERED ROCK	
				1.70		Hole Terminated at 1.70 m Refusal							
				2.0									

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
<b>Density</b>				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	





# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP38**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 7/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
E	Not Encountered	E 0.10m			[Cross-hatched pattern]	CH	FILL: CLAY - medium to high plasticity, brown, trace red-brown and orange-brown.	M < w <sub>p</sub>				FILL	
				0.60m									
		E 0.70m			[Wavy pattern]	CL	TOPSOIL: Silty CLAY - low plasticity, grey-brown, trace rootlets.						TOPSOIL
				0.80m									
E 0.90m			[Diagonal hatched pattern]	CH	Sandy CLAY - medium to high plasticity, brown with some grey and orange-brown, fine grained sand.	M > w <sub>p</sub>	H	HP	>600	HP	>600	RESIDUAL SOIL	
		1.0											
				1.30m			Hole Terminated at 1.30 m						
				1.5									
				2.0									

OT.LIB.1.1.GLB.Log\_NON-CORED BOREHOLE - TEST PIT\_NEW22P-0012.LOGS.GPJ <-DrawingFile>> 04/03/2022 09:11 10.01.00.01 Daigel Lab and In Situ Tool

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP39  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	0.10m TOPSOIL: Sandy CLAY - low to medium plasticity, brown to grey-brown, fine grained sand.	M < w <sub>p</sub>				TOPSOIL
		E 0.20m				CH	CLAY - medium to high plasticity, brown to grey-brown, trace fine grained sand.			HP	160	RESIDUAL SOIL
		E 0.30m				CH	Some orange-brown.		St	HP	190	
				0.5			Hole Terminated at 0.60 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>
VS	Very Soft	<25	D Dry
S	Soft	25 - 50	M Moist
F	Firm	50 - 100	W Wet
St	Stiff	100 - 200	W <sub>p</sub> Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub> Liquid Limit
H	Hard	>400	
Fb	Friable		
<b>Density</b>			
V	Very Loose		Density Index <15%
L	Loose		Density Index 15 - 35%
MD	Medium Dense		Density Index 35 - 65%
D	Dense		Density Index 65 - 85%
VD	Very Dense		Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP40  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	0.10m TOPSOIL: Sandy Gravelly CLAY - low to medium plasticity, brown, fine grained sand, fine to medium grained, sub-rounded to rounded, with some sub-angular gravel, root affected.	M < w <sub>p</sub>				TOPSOIL
		E 0.20m				CL	Sandy Gravelly CLAY - low to medium plasticity, brown, fine grained sand, fine to medium grained, sub-rounded to rounded, with some sub-angular gravel.					SLOPE WASH
		E 0.30m				CH	0.30m CLAY - medium to high plasticity, brown, trace orange-brown, trace fine grained sand.	M > w <sub>p</sub>	VSt	HP	380	RESIDUAL SOIL
				0.5		CH				HP	400	
				0.70m			Hole Terminated at 0.70 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 Gradational or transitional strata  
 Definitive or distinct strata change

**Notes, Samples and Tests**  
U<sub>30</sub> 50mm Diameter tube sample  
CBR Bulk sample for CBR testing  
E Environmental sample (Glass jar, sealed and chilled on site)  
ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
B Bulk Sample  
**Field Tests**  
PID Photoionisation detector reading (ppm)  
DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
HP Hand Penetrometer test (UCS kPa)

**Consistency**  
VS Very Soft  
S Soft  
F Firm  
St Stiff  
VSt Very Stiff  
H Hard  
Fb Friable  
**Density**  
V Very Loose  
L Loose  
MD Medium Dense  
D Dense  
VD Very Dense

**UCS (kPa)**  
<25  
25 - 50  
50 - 100  
100 - 200  
200 - 400  
>400  
**Moisture Condition**  
D Dry  
M Moist  
W Wet  
W<sub>p</sub> Plastic Limit  
W<sub>L</sub> Liquid Limit  
Density Index <15%  
Density Index 15 - 35%  
Density Index 35 - 65%  
Density Index 65 - 85%  
Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP41  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 4/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E		0.10m		CL	0.10m TOPSOIL: Sandy Gravelly CLAY - low to medium plasticity, brown, fine grained sand, fine to medium grained, sub-rounded to rounded, with some sub-angular gravel, root affected.	M < w <sub>p</sub>				TOPSOIL
		E		0.20m		CL	0.20m Sandy Gravelly CLAY - low to medium plasticity, brown, fine grained sand, fine to medium grained, sub-rounded to rounded, with some sub-angular gravel.					SLOPE WASH
		E		0.30m		CH	0.30m Gravelly CLAY - medium to high plasticity, brown, fine to medium grained, rounded to sub-rounded gravel.	M > w <sub>p</sub>	VSt	HP	270	RESIDUAL SOIL
				0.50m		CH	0.50m CLAY - medium to high plasticity, trace fine grained sand, brown and orange-brown, trace sub-rounded to rounded gravel.					HP
				0.70m			Hole Terminated at 0.70 m					

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 Gradational or transitional strata  
 Definitive or distinct strata change

**Notes, Samples and Tests**  
U<sub>30</sub> 50mm Diameter tube sample  
CBR Bulk sample for CBR testing  
E Environmental sample (Glass jar, sealed and chilled on site)  
ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
B Bulk Sample  
**Field Tests**  
PID Photoionisation detector reading (ppm)  
DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
HP Hand Penetrometer test (UCS kPa)

**Consistency**  
VS Very Soft  
S Soft  
F Firm  
St Stiff  
VSt Very Stiff  
H Hard  
Fb Friable  
**Density**  
V Very Loose  
L Loose  
MD Medium Dense  
D Dense  
VD Very Dense

**UCS (kPa)**  
<25  
25 - 50  
50 - 100  
100 - 200  
200 - 400  
>400  
**Moisture Condition**  
D Dry  
M Moist  
W Wet  
W<sub>p</sub> Plastic Limit  
W<sub>L</sub> Liquid Limit  
Density Index <15%  
Density Index 15 - 35%  
Density Index 35 - 65%  
Density Index 65 - 85%  
Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP42  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 7/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	TOPSOIL: Gravelly CLAY / Clayey GRAVEL - low to medium plasticity, brown to dark brown, fine to medium grained, sub-rounded to rounded gravel, with some fine to medium grained sand.	M < W <sub>p</sub>				TOPSOIL
		E 0.20m				CI	Gravelly CLAY - medium plasticity, brown to dark brown, fine to medium grained, sub-rounded to rounded gravel, trace fine grained sand.			HP	>600	RESIDUAL SOIL
		E 0.30m				CH	CLAY - medium to high plasticity, brown to orange-brown, trace fine grained sand, trace fine grained sub-rounded gravel.	M > W <sub>p</sub>	H	HP	>600	
				0.5			Hole Terminated at 0.70 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 Gradational or transitional strata  
 Definitive or distinct strata change

**Notes, Samples and Tests**  
U<sub>30</sub> 50mm Diameter tube sample  
CBR Bulk sample for CBR testing  
E Environmental sample (Glass jar, sealed and chilled on site)  
ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
B Bulk Sample  
**Field Tests**  
PID Photoionisation detector reading (ppm)  
DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)
VS Very Soft	<25
S Soft	25 - 50
F Firm	50 - 100
St Stiff	100 - 200
VSt Very Stiff	200 - 400
H Hard	>400
Fb Friable	

Density	Density Index
V Very Loose	<15%
L Loose	15 - 35%
MD Medium Dense	35 - 65%
D Dense	65 - 85%
VD Very Dense	85 - 100%

Moisture Condition
D Dry
M Moist
W Wet
W <sub>p</sub> Plastic Limit
W <sub>L</sub> Liquid Limit



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP43**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 7/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				SC	TOPSOIL: Clayey SAND - fine grained, brown to dark brown, fines of low plasticity, root affected.	D - M				TOPSOIL
		0.20m		SC		Clayey Gravelly SAND - fine grained, brown to pale brown, fine to medium grained, rounded gravel, fines of low plasticity.	RESIDUAL SOIL					
		E 0.30m		0.5		CH	CLAY - medium to high plasticity, grey-brown to brown, with some orange-brown, traces fine grained sand.	M > W <sub>p</sub>	VSt	HP	280	
				0.85m				With some highly to moderately weathered SANDSTONE - fine grained, orange-brown.			HP	320
				1.0			SANDSTONE - fine grained, orange-brown, with some brown and pale brown, estimated medium strength.					HIGHLY TO MODERATELY WEATHERED ROCK
				1.10m			Hole Terminated at 1.10 m Very slow progress					
				1.5								
				2.0								

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 --- Gradational or transitional strata  
 ——— Definitive or distinct strata change

**Notes, Samples and Tests**  
 U<sub>30</sub> 50mm Diameter tube sample  
 CBR Bulk sample for CBR testing  
 E Environmental sample (Glass jar, sealed and chilled on site)  
 ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
 B Bulk Sample  
**Field Tests**  
 PID Photoionisation detector reading (ppm)  
 DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
 HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)	Moisture Condition
VS Very Soft	<25	D Dry
S Soft	25 - 50	M Moist
F Firm	50 - 100	W Wet
St Stiff	100 - 200	W <sub>p</sub> Plastic Limit
VSt Very Stiff	200 - 400	W <sub>L</sub> Liquid Limit
H Hard	>400	
Fb Friable		
Density	V Very Loose	Density Index <15%
L Loose	MD Medium Dense	Density Index 15 - 35%
D Dense	D Very Dense	Density Index 35 - 65%
VD Very Dense		Density Index 65 - 85%
		Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP44  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 7/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations						
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result					
E	Not Encountered	E 0.10m		0.10m		CL	TOPSOIL: Sandy CLAY - low to medium plasticity, dark brown, fine grained sand, trace fine grained, sub-rounded to rounded gravel.	M > W <sub>p</sub>	VSt	HP	220	TOPSOIL					
		E 0.20m		0.20m		CH	CLAY - medium to high plasticity, dark brown, trace fine grained sand.					RESIDUAL SOIL					
		E 0.30m		0.30m													
				0.5m													
				0.60m			SANDSTONE - fine grained, pale brown to white, estimated low strength.						HIGHLY WEATHERED ROCK				
				0.80m			Hole Terminated at 0.80 m										
				1.0													
				1.5													
				2.0													

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 Gradational or transitional strata  
 Definitive or distinct strata change

**Notes, Samples and Tests**  
U<sub>30</sub> 50mm Diameter tube sample  
CBR Bulk sample for CBR testing  
E Environmental sample (Glass jar, sealed and chilled on site)  
ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
B Bulk Sample  
**Field Tests**  
PID Photoionisation detector reading (ppm)  
DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
HP Hand Penetrometer test (UCS kPa)

**Consistency**  
VS Very Soft  
S Soft  
F Firm  
St Stiff  
VSt Very Stiff  
H Hard  
Fb Friable  
**Density**  
V Very Loose  
L Loose  
MD Medium Dense  
D Dense  
VD Very Dense

**UCS (kPa)**  
<25  
25 - 50  
50 - 100  
100 - 200  
200 - 400  
>400  
**Moisture Condition**  
D Dry  
M Moist  
W Wet  
W<sub>p</sub> Plastic Limit  
W<sub>L</sub> Liquid Limit  
Density Index <15%  
Density Index 15 - 35%  
Density Index 35 - 65%  
Density Index 65 - 85%  
Density Index 85 - 100%



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP45  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 7/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	0.10m TOPSOIL: Sandy CLAY - low to medium plasticity, brown to dark brown, fine grained sand, root affected.	M < w <sub>p</sub>				TOPSOIL
				CL		Sandy CLAY - low to medium plasticity, brown to grey-brown, fine grained sand.	M ~ w <sub>p</sub>				SLOPE WASH	
		E 0.30m E 0.40m		CI		0.30m Sandy CLAY - medium plasticity, brown and orange-brown, fine to medium grained sand, with some SANDSTONE - fine grained, brown to pale orange-brown, estimated low to medium strength.	M > w <sub>p</sub>	H	HP	>600	RESIDUAL SOIL / HIGHLY WEATHERED ROCK	
				0.5			Hole Terminated at 0.60 m					
				1.0								
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

OT LIB 1.1.GLB Log NON-CORED BOREHOLE - TEST PIT NEW22P-0012 LOGS.GPJ <-DrawingFile>> 04/03/2022 09:11 10.01.00.01 D:\gel Lab and In Situ Tool





# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP46  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 7/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
E	Not Encountered	E 0.10m				CL	TOPSOIL: Sandy CLAY - low plasticity, dark brown, fine grained sand, root affected.	M < W <sub>p</sub>				TOPSOIL	
		E 0.30m						SANDSTONE - fine to medium grained, brown to pale brown and orange-brown, estimated high strength, with some Sandy CLAY - medium to high plasticity, brown with some orange-brown.					HIGHLY WEATHERED ROCK - RESIDUAL SOIL
		E 0.40m							SANDSTONE - fine grained, brown and orange-brown. Hole Terminated at 0.51 m Refusal				

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample <b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%		



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP47  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 7/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL	TOPSOIL: Sandy CLAY - low plasticity, dark brown, fine grained sand, root affected to 0.1m.	M < W <sub>p</sub>				TOPSOIL
					0.20m	GC	Clayey GRAVEL- fine to coarse grained, sub-rounded to rounded, pale grey-brown, fines of low to medium plasticity.	D				RESIDUAL SOIL
		E 0.30m			0.30m	CI	Sandy CLAY - medium plasticity, brown and orange-brown, fine to medium grained.	M > W <sub>p</sub>	H	HP	>600	
		E 0.40m			0.50m	SC	Clayey SAND - fine to coarse grained, brown and orange-brown, fines of low to medium plasticity.	D - M	H	HP	>600	
					0.80m						HP	>600
				1.0			Hole Terminated at 0.80 m					
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP48**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 7/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m				CL 0.10m	TOPSOIL: Sandy CLAY - low to medium plasticity, dark brown, fine grained sand, root affected.	M < w <sub>p</sub>				TOPSOIL
						GC 0.30m	Clayey GRAVEL - fine to coarse grained, rounded, dark brown, fines of low plasticity, with some fine grained sand. Pale brown to pale grey-brown.	D - M				RESIDUAL SOIL
		E 0.40m				CI 0.70m	Sandy CLAY - medium plasticity, brown and orange-brown, fine to medium grained sand, with some fine to medium grained, sub-rounded to sub-angular and rounded gravel.	M > w <sub>p</sub>	H	HP >600 HP >600 HP >600		
				0.5			Hole Terminated at 0.70 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 --- Gradational or transitional strata  
 — Definitive or distinct strata change

**Notes, Samples and Tests**  
 U<sub>50</sub> 50mm Diameter tube sample  
 CBR Bulk sample for CBR testing  
 E Environmental sample (Glass jar, sealed and chilled on site)  
 ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
 B Bulk Sample  
**Field Tests**  
 PID Photoionisation detector reading (ppm)  
 DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
 HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
<b>Density</b>				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP49**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 7/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.10m		0.10m		CL	TOPSOIL: Sandy CLAY - low to medium plasticity, dark brown, fine grained sand, root affected.	M < Wp				TOPSOIL
		E 0.20m		0.20m		GC	Clayey GRAVEL - fine to coarse grained, rounded, dark brown, fines of low plasticity, with some fine grained sand.					RESIDUAL SOIL / SLOPE WASH
		E 0.30m		0.30m		CH	Gravelly CLAY - medium to high plasticity, brown to dark brown, fine to coarse grained, sub-rounded to rounded gravel.	M > Wp	VSt	HP	400	RESIDUAL SOIL
				0.50m						HP	250	
		0.90m				H	HP			210	470	
				1.0			Hole Terminated at 0.90 m					
				1.5								
				2.0								

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP50  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 7/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E		E		0.20m	 CL	CL	FILL: Sandy Gravelly CLAY - low to medium plasticity, dark grey-brown, fine to coarse grained sand, fine to coarse grained, rounded to angular gravel, root affected in top 0.1m, with some asphalt, bricks, concrete, steel, plastic and asbestos containing material.	M < w <sub>p</sub>			FILL	
				0.40m								
		E		0.50m								
				0.90m								
		E		1.00m								
				1.40m								
		E		1.50m								
				1.60m								
		E		1.70m								
				2.00m								
				2.0	 CI	CI	Gravelly CLAY - medium plasticity, grey and brown to red-brown, fine to medium grained, rounded to angular gravel, with some extremely weathered rock.	M > w <sub>p</sub>	St	HP	150	RESIDUAL SOIL / EXTREMELY WEATHERED ROCK
			1.50m									
			1.60m									
			1.70m									
				2.0	Hole Terminated at 2.00 m							

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<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP51  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 7/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E 0.20m E 0.40m E 0.50m		0.5		CL	FILL: Sandy Gravelly CLAY - low to medium plasticity, dark grey-brown, fine to coarse grained sand, fine to coarse grained, rounded to angular gravel, root affected in top 0.1m, mostly concrete slabs, some bricks, asbestos containing material and some coal.	M < w <sub>p</sub>				FILL
				0.80m			Hole Terminated at 0.80 m					
				1.0								
				1.5								
				2.0								

**LEGEND:**

**Water**

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

**Strata Changes**

- Gradational or transitional strata
- Definitive or distinct strata change

**Notes, Samples and Tests**

- U<sub>30</sub> 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample (Glass jar, sealed and chilled on site)
- ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
- B Bulk Sample

**Field Tests**

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

<b>Consistency</b>		<b>UCS (kPa)</b>	<b>Moisture Condition</b>	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W <sub>p</sub>	Plastic Limit
VSt	Very Stiff	200 - 400	W <sub>L</sub>	Liquid Limit
H	Hard	>400		
Fb	Friable			
<b>Density</b>				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	



# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP52  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 7/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
E	Not Encountered	E 0.10m		0.10m		CI	TOPSOIL: CLAY - medium plasticity, dark brown, root affected.	M > w <sub>p</sub>	H	HP	>600	TOPSOIL	
			0.20m			CI	CLAY - medium plasticity, dark brown.				HP	600	RESIDUAL SOIL
		E 0.30m		0.5		CI	Brown, medium to high plasticity.				HP	320	
				0.80m			Hole Terminated at 0.80 m	VSt	HP	300			
				1.0									
				1.5									
				2.0									

**LEGEND:**  
**Water**  
 Water Level (Date and time shown)  
 Water Inflow  
 Water Outflow  
**Strata Changes**  
 Gradational or transitional strata  
 Definitive or distinct strata change

**Notes, Samples and Tests**  
U<sub>30</sub> 50mm Diameter tube sample  
CBR Bulk sample for CBR testing  
E Environmental sample (Glass jar, sealed and chilled on site)  
ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)  
B Bulk Sample  
**Field Tests**  
PID Photoionisation detector reading (ppm)  
DCP(x-y) Dynamic penetrometer test (test depth interval shown)  
HP Hand Penetrometer test (UCS kPa)

**Consistency**  
VS Very Soft  
S Soft  
F Firm  
St Stiff  
VSt Very Stiff  
H Hard  
Fb Friable  
**Density**  
V Very Loose  
L Loose  
MD Medium Dense  
D Dense  
VD Very Dense

**UCS (kPa)**  
<25  
25 - 50  
50 - 100  
100 - 200  
200 - 400  
>400  
**Moisture Condition**  
D Dry  
M Moist  
W Wet  
W<sub>p</sub> Plastic Limit  
W<sub>L</sub> Liquid Limit  
Density Index <15%  
Density Index 15 - 35%  
Density Index 35 - 65%  
Density Index 65 - 85%  
Density Index 85 - 100%

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# ENGINEERING LOG - TEST PIT

CLIENT: LINDSAY BENNELONG PTY LTD  
 PROJECT: PROPOSED SUBDIVISION  
 LOCATION: 898 NEW ENGLAND HIGHWAY, LOCHINVAR

TEST PIT NO: **TP53**  
 PAGE: 1 OF 1  
 JOB NO: NEW22P-0012  
 LOGGED BY: BS  
 DATE: 7/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR SURFACE RL:  
 TEST PIT LENGTH: 2.0 m WIDTH: 0.5 m DATUM:

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	0.10m E		0.10	[Cross-hatched pattern]	CI	FILL-TOPSOIL: Sandy CLAY - medium plasticity, dark brown, fine grained sand.	M > w <sub>p</sub>				FILL - TOPSOIL
		0.20m E		0.20		GP	FILL: Sandy GRAVEL - fine to medium, sub-rounded, brown, fine to coarse grained sand.	D				FILL
		0.40m E		0.40	[Diagonal hatched pattern]	CI	CLAY - medium plasticity, dark brown, with some fine to medium grained, sub-rounded to sub-angular gravel.	M ~ w <sub>p</sub>	H	HP	>600	RESIDUAL SOIL
		0.50m E		0.50							>600	
		0.80m E		0.80								
0.90m E		0.90	CH	CLAY - medium to high plasticity, brown to dark brown with some grey.	M > w <sub>p</sub>	VSt	HP	380				
				1.10			Hole Terminated at 1.10 m					
				1.5								
				2.0								

OT LIB 1.1.GLB Log NON-CORED BOREHOLE - TEST PIT NEW22P-0012 LOGS.GPJ <-DrawingFile>> 04/03/2022 09:11 10.01.00.01 D:\gel Lab and In Situ Tool

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	





# ENGINEERING LOG - TEST PIT

**CLIENT:** LINDSAY BENNELONG PTY LTD  
**PROJECT:** PROPOSED SUBDIVISION  
**LOCATION:** 898 NEW ENGLAND HIGHWAY, LOCHINVAR

**TEST PIT NO:** TP54  
**PAGE:** 1 OF 1  
**JOB NO:** NEW22P-0012  
**LOGGED BY:** BS  
**DATE:** 7/2/22

**EQUIPMENT TYPE:** 2.7 TONNE EXCAVATOR  
**TEST PIT LENGTH:** 2.0 m **WIDTH:** 0.5 m  
**SURFACE RL:**  
**DATUM:**

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
E	Not Encountered	E		0.10m	[Cross-hatched pattern]	CL	FILL: Sandy Gravelly CLAY - low to medium plasticity, dark grey-brown, fine to coarse grained sand, fine to coarse grained, rounded to angular gravel, root affected in top 0.1m, with some bricks, concrete, steel, plastic and large amounts of asbestos containing material.	M < w <sub>p</sub>				FILL
				1.20m			Sandy CLAY - low to medium plasticity, grey and orange-brown, fine grained sand.					
				1.40m			Hole Terminated at 1.40 m					

OT LIB 1.1.GLB Log NON-CORED BOREHOLE - TEST PIT NEW22P-0012 LOGS.GPJ <DrawingFile>> 04/03/2022 09:11 10.01.00.01 Dajgel Lab and In Situ Tool

<b>LEGEND:</b> <b>Water</b> Water Level (Date and time shown) Water Inflow Water Outflow <b>Strata Changes</b> Gradational or transitional strata Definitive or distinct strata change	<b>Notes, Samples and Tests</b> U <sub>30</sub> 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample (Glass jar, sealed and chilled on site) ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled) B Bulk Sample	<b>Consistency</b> VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<b>UCS (kPa)</b> <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	<b>Moisture Condition</b> D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	<b>Field Tests</b> PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	<b>Density</b> V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

## **APPENDIX B:**

**Selected Excerpts from AGS 2007 -  
Practice Note Guidelines for Landslide Risk  
Management**

## PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

### APPENDIX C: LANDSLIDE RISK ASSESSMENT

#### QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY

##### *QUALITATIVE MEASURES OF LIKELIHOOD*

Approximate Annual Probability		Implied Indicative Landslide Recurrence Interval		Description	Descriptor	Level
Indicative Value	Notional Boundary					
10 <sup>-1</sup>	5x10 <sup>-2</sup>	10 years	20 years	The event is expected to occur over the design life.	ALMOST CERTAIN	A
10 <sup>-2</sup>		100 years		The event will probably occur under adverse conditions over the design life.	LIKELY	B
10 <sup>-3</sup>	5x10 <sup>-3</sup>	1000 years	200 years	The event could occur under adverse conditions over the design life.	POSSIBLE	C
10 <sup>-4</sup>	5x10 <sup>-4</sup>	10,000 years	2000 years	The event might occur under very adverse circumstances over the design life.	UNLIKELY	D
10 <sup>-5</sup>	5x10 <sup>-5</sup>	100,000 years	20,000 years	The event is conceivable but only under exceptional circumstances over the design life.	RARE	E
10 <sup>-6</sup>	5x10 <sup>-6</sup>	1,000,000 years	200,000 years	The event is inconceivable or fanciful over the design life.	BARELY CREDIBLE	F

**Note:** (1) The table should be used from left to right; use Approximate Annual Probability or Description to assign Descriptor, not *vice versa*.

##### *QUALITATIVE MEASURES OF CONSEQUENCES TO PROPERTY*

Approximate Cost of Damage		Description	Descriptor	Level
Indicative Value	Notional Boundary			
200%	100%	Structure(s) completely destroyed and/or large scale damage requiring major engineering works for stabilisation. Could cause at least one adjacent property major consequence damage.	CATASTROPHIC	1
60%		Extensive damage to most of structure, and/or extending beyond site boundaries requiring significant stabilisation works. Could cause at least one adjacent property medium consequence damage.	MAJOR	2
20%	40%	Moderate damage to some of structure, and/or significant part of site requiring large stabilisation works. Could cause at least one adjacent property minor consequence damage.	MEDIUM	3
5%	10%	Limited damage to part of structure, and/or part of site requiring some reinstatement stabilisation works.	MINOR	4
0.5%	1%	Little damage. (Note for high probability event (Almost Certain), this category may be subdivided at a notional boundary of 0.1%. See Risk Matrix.)	INSIGNIFICANT	5

**Notes:** (2) The Approximate Cost of Damage is expressed as a percentage of market value, being the cost of the improved value of the unaffected property which includes the land plus the unaffected structures.

(3) The Approximate Cost is to be an estimate of the direct cost of the damage, such as the cost of reinstatement of the damaged portion of the property (land plus structures), stabilisation works required to render the site to tolerable risk level for the landslide which has occurred and professional design fees, and consequential costs such as legal fees, temporary accommodation. It does not include additional stabilisation works to address other landslides which may affect the property.

(4) The table should be used from left to right; use Approximate Cost of Damage or Description to assign Descriptor, not *vice versa*

**PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007**

**APPENDIX C: – QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY (CONTINUED)**

***QUALITATIVE RISK ANALYSIS MATRIX – LEVEL OF RISK TO PROPERTY***

<b>LIKELIHOOD</b>		<b>CONSEQUENCES TO PROPERTY (With Indicative Approximate Cost of Damage)</b>				
	<b>Indicative Value of Approximate Annual Probability</b>	<b>1: CATASTROPHIC 200%</b>	<b>2: MAJOR 60%</b>	<b>3: MEDIUM 20%</b>	<b>4: MINOR 5%</b>	<b>5: INSIGNIFICANT 0.5%</b>
<b>A – ALMOST CERTAIN</b>	10 <sup>-1</sup>	VH	VH	VH	H	M or L (5)
<b>B - LIKELY</b>	10 <sup>-2</sup>	VH	VH	H	M	L
<b>C - POSSIBLE</b>	10 <sup>-3</sup>	VH	H	M	M	VL
<b>D - UNLIKELY</b>	10 <sup>-4</sup>	H	M	L	L	VL
<b>E - RARE</b>	10 <sup>-5</sup>	M	L	L	VL	VL
<b>F - BARELY CREDIBLE</b>	10 <sup>-6</sup>	L	VL	VL	VL	VL

**Notes:** (5) For Cell A5, may be subdivided such that a consequence of less than 0.1% is Low Risk.

(6) When considering a risk assessment it must be clearly stated whether it is for existing conditions or with risk control measures which may not be implemented at the current time.

***RISK LEVEL IMPLICATIONS***

<b>Risk Level</b>		<b>Example Implications (7)</b>
<b>VH</b>	<b>VERY HIGH RISK</b>	Unacceptable without treatment. Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low; may be too expensive and not practical. Work likely to cost more than value of the property.
<b>H</b>	<b>HIGH RISK</b>	Unacceptable without treatment. Detailed investigation, planning and implementation of treatment options required to reduce risk to Low. Work would cost a substantial sum in relation to the value of the property.
<b>M</b>	<b>MODERATE RISK</b>	May be tolerated in certain circumstances (subject to regulator’s approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low. Treatment options to reduce to Low risk should be implemented as soon as practicable.
<b>L</b>	<b>LOW RISK</b>	Usually acceptable to regulators. Where treatment has been required to reduce the risk to this level, ongoing maintenance is required.
<b>VL</b>	<b>VERY LOW RISK</b>	Acceptable. Manage by normal slope maintenance procedures.

**Note:** (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk; these are only given as a general guide.

# PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

## APPENDIX G - SOME GUIDELINES FOR HILLSIDE CONSTRUCTION

### GOOD ENGINEERING PRACTICE

### POOR ENGINEERING PRACTICE

#### ADVICE

GEOTECHNICAL ASSESSMENT	Obtain advice from a qualified, experienced geotechnical practitioner at early stage of planning and before site works.	Prepare detailed plan and start site works before geotechnical advice.
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#### PLANNING

SITE PLANNING	Having obtained geotechnical advice, plan the development with the risk arising from the identified hazards and consequences in mind.	Plan development without regard for the Risk.
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#### DESIGN AND CONSTRUCTION

HOUSE DESIGN	Use flexible structures which incorporate properly designed brickwork, timber or steel frames, timber or panel cladding. Consider use of split levels. Use decks for recreational areas where appropriate.	Floor plans which require extensive cutting and filling. Movement intolerant structures.
SITE CLEARING	Retain natural vegetation wherever practicable.	Indiscriminately clear the site.
ACCESS & DRIVEWAYS	Satisfy requirements below for cuts, fills, retaining walls and drainage. Council specifications for grades may need to be modified. Driveways and parking areas may need to be fully supported on piers.	Excavate and fill for site access before geotechnical advice.
EARTHWORKS	Retain natural contours wherever possible.	Indiscriminatory bulk earthworks.
CUTS	Minimise depth. Support with engineered retaining walls or batter to appropriate slope. Provide drainage measures and erosion control.	Large scale cuts and benching. Unsupported cuts. Ignore drainage requirements
FILLS	Minimise height. Strip vegetation and topsoil and key into natural slopes prior to filling. Use clean fill materials and compact to engineering standards. Batter to appropriate slope or support with engineered retaining wall. Provide surface drainage and appropriate subsurface drainage.	Loose or poorly compacted fill, which if it fails, may flow a considerable distance including onto property below. Block natural drainage lines. Fill over existing vegetation and topsoil. Include stumps, trees, vegetation, topsoil, boulders, building rubble etc in fill.
ROCK OUTCROPS & BOULDERS	Remove or stabilise boulders which may have unacceptable risk. Support rock faces where necessary.	Disturb or undercut detached blocks or boulders.
RETAINING WALLS	Engineer design to resist applied soil and water forces. Found on rock where practicable. Provide subsurface drainage within wall backfill and surface drainage on slope above. Construct wall as soon as possible after cut/fill operation.	Construct a structurally inadequate wall such as sandstone flagging, brick or unreinforced blockwork. Lack of subsurface drains and weepholes.
FOOTINGS	Found within rock where practicable. Use rows of piers or strip footings oriented up and down slope. Design for lateral creep pressures if necessary. Backfill footing excavations to exclude ingress of surface water.	Found on topsoil, loose fill, detached boulders or undercut cliffs.
SWIMMING POOLS	Engineer designed. Support on piers to rock where practicable. Provide with under-drainage and gravity drain outlet where practicable. Design for high soil pressures which may develop on uphill side whilst there may be little or no lateral support on downhill side.	
DRAINAGE		
SURFACE	Provide at tops of cut and fill slopes. Discharge to street drainage or natural water courses. Provide general falls to prevent blockage by siltation and incorporate silt traps. Line to minimise infiltration and make flexible where possible. Special structures to dissipate energy at changes of slope and/or direction.	Discharge at top of fills and cuts. Allow water to pond on bench areas.
SUBSURFACE	Provide filter around subsurface drain. Provide drain behind retaining walls. Use flexible pipelines with access for maintenance. Prevent inflow of surface water.	Discharge roof runoff into absorption trenches.
SEPTIC & SULLAGE	Usually requires pump-out or mains sewer systems; absorption trenches may be possible in some areas if risk is acceptable. Storage tanks should be water-tight and adequately founded.	Discharge sullage directly onto and into slopes. Use absorption trenches without consideration of landslide risk.
EROSION CONTROL & LANDSCAPING	Control erosion as this may lead to instability. Revegetate cleared area.	Failure to observe earthworks and drainage recommendations when landscaping.

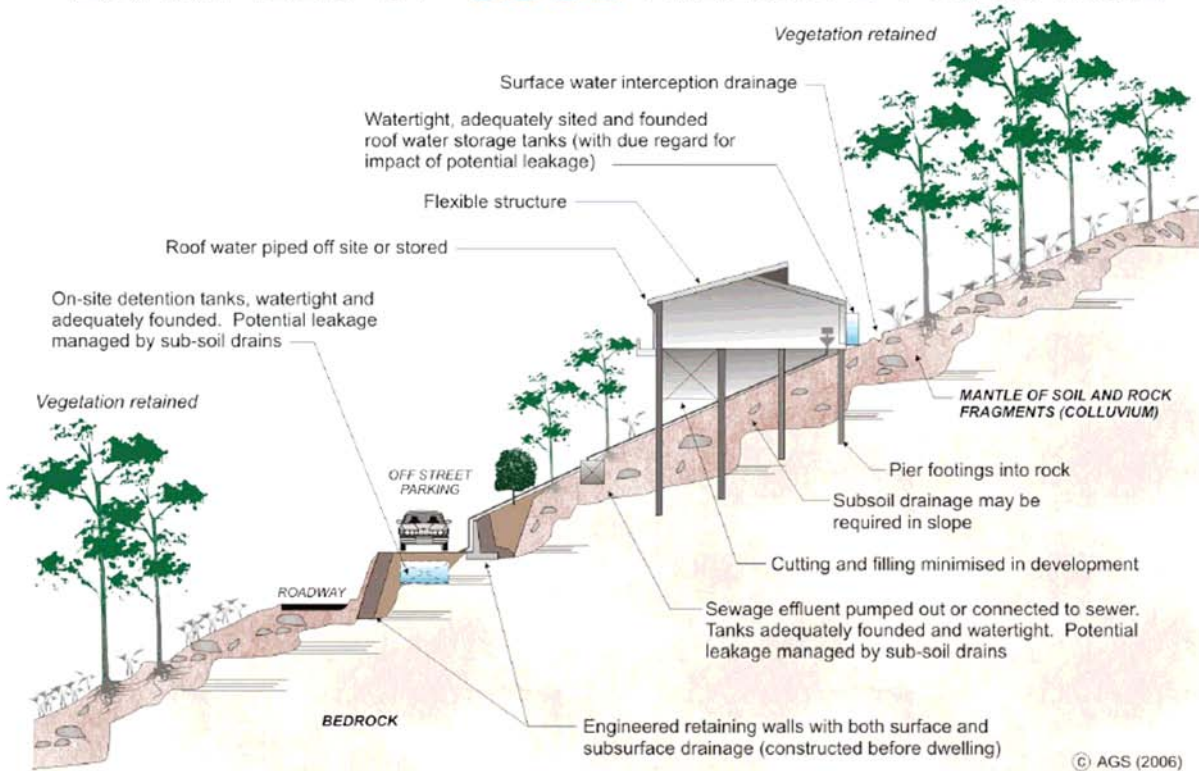
#### DRAWINGS AND SITE VISITS DURING CONSTRUCTION

DRAWINGS	Building Application drawings should be viewed by geotechnical consultant	
SITE VISITS	Site Visits by consultant may be appropriate during construction/	

#### INSPECTION AND MAINTENANCE BY OWNER

OWNER'S RESPONSIBILITY	Clean drainage systems; repair broken joints in drains and leaks in supply pipes. Where structural distress is evident see advice. If seepage observed, determine causes or seek advice on consequences.	
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## EXAMPLES OF **GOOD** HILLSIDE PRACTICE



## EXAMPLES OF **POOR** HILLSIDE PRACTICE

