

HO 53/1-AB  
23rd August 2000

Forestry Tasmania  
79 Melville St  
HOBART TAS 7000

Attenti Mr Dario Tomat  
on:

Dear Sir,

**R PRELIMINARY GEOTECHNICAL ASSESSMENT  
E: PROPOSED INTEGRATED FOREST PRODUCTS YARD  
HUON DISTRICT**

This letter presents our report on a geotechnical assessment completed for a proposed integrated forest products development site near the confluence of the Arve and Huon Rivers.

If you have any questions related to this report or we can be of further assistance, please do not hesitate to contact Mr Barry Weldon or the undersigned.

**For and on behalf of  
COFFEY GEOSCIENCES PTY LTD**

**DAN O'TOOLE**

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3 Copies Forestry Tasmania

## **TABLE OF CONTENTS**

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<b>1. INTRODUCTION</b>	<b>1</b>
<b>2. BACKGROUND INFORMATION</b>	<b>1</b>
<b>3. RESULTS OF ASSESSMENT</b>	<b>2</b>
<b>4. CONCLUSIONS</b>	<b>4</b>

### **FIGURES**

- 1 FORESTRY TASMANIA: GEOTECHNICAL ASSESSMENT PROPOSED INTEGRATED TIMBER PROCESSING YARD**

Important information about your Coffey Report

### **APPENDIX**

- A** Explanation sheets - soil descriptions (2 pages)
- B** Engineering logs TP1 to TP12

## 1. INTRODUCTION

This report presents the results of a preliminary geotechnical assessment undertaken by Coffey Geosciences Pty Ltd (Coffey) for a proposed integrated forest products development site near the confluence of the Arve and Huon Rivers. Mr D Thomat of Forestry Tasmania following a submission by Coffey to Dr J McCambridge at SEMF Holdings Pty Ltd commissioned the assessment (ref HO 53.1(P)-AA dated 11<sup>th</sup> July 2000).

It is understood that Forestry Tasmania plan to develop an integrated forest products site in a 40ha area. The development will include log storage and sorting facilities, saw, veneer and woodchip mills, in addition to an on-site power station plant that will be fed by waste from these operations.

Forestry Tasmania provided an excavator to excavate a number of test pits on the 11<sup>th</sup> August 2000. The preliminary assessment comprised a desktop review of available information, a series of test pits and reconnaissance of the geology and geomorphology of the area.

## 2. BACKGROUND INFORMATION

The proposed Huon integrated forest products site is located on a low ridge, trending roughly North-South. The dominant vegetation is button grass and tea tree. A recently constructed road and former access tracks to gravel deposits cross the proposed site. The light grey to white quartzite gravel has apparently been quarried for road construction materials.

The proposed Huon site is mapped on the Geological Atlas 1:250,000 digital series Geology of Southeast Tasmania produced by Mineral Resources Tasmania (1999 edition) as Permian Age siltstone and sandstone deposits. More detailed information is provided in a report to Forestry Tasmania (Huon Forest District) prepared by Mr C Sharples in November 1994 entitled, *Geomorphic Values Survey: Barnback Block, Huon Forest District*.

In that report, Sharples confirms the underlying bedrock geology as Permian marine siltstones and sandstones. He mapped the edge of a fluvio-glacial terrace escarpment that encircles the ridge and described the surface deposits as Pleistocene glacio-fluvial deposits of cobble and boulder grade. The glacio-fluvial landforms of the Weld Plains are shown by Sharples on Map Four as potentially vulnerable features of geoconservation significance in the Barnback block. The glacio-fluvial landforms include the high level terrace remnants at 484850mE 5233600mN, which is roughly centred on the proposed integrated forest products site. The landforms are classified by Sharples as *Representative at the State level* and *Outstanding at the Regional level* and he considered them to be "... vulnerable to degradation of specified values if disturbed by specific

*activities*". Sharples infers that the specific activity is excavation as he goes on to state that the terrace remnants are "... *vulnerable to excavation; some quarrying has already taken place – features are still in good condition but future quarrying should be monitored to ensure important features are preserved.*"

A trench like feature that was encountered during preliminary assessment of the access road across the proposed site, marks the edge and head scarp region of a major rockslide that occurred in the past. Some of the tension cracks associated with the movement were revealed during construction of the road to the Huon River crossing downstream from its confluence with the Arve River. A power station is proposed on the terrace remnant at the southern end of the ridge above the old landslide feature. The landslide feature does not appear to extend upslope to the terrace remnant.

### **3. RESULTS OF ASSESSMENT**

The reconnaissance geomorphologic mapping confirms that the site is located predominantly on a terrace that almost encircles a North-South trending ridge. The slope on the terrace is gentle with local slopes up to 9°. The edge of the terrace is embayed in places and slopes may steepen up to 14°. Around the eastern and southern edge of the terrace, an escarpment slope of about 28° to 32° leads to the relatively narrow modern floodplain of the Huon River.

An old rockslide has occurred on the slope below the terrace remnant at the southern end of the project site. During the present site assessment no new evidence of slope instability was observed at the terrace or ridge level. However, the natural vegetation of tea tree and button grass can be deceptive and provide the illusion of a relatively even ground surface especially when viewed from above. Test pit locations consequently were selected to provide a range of topographic settings and were not confined to the terrace remnant on the ridge.

A total of eleven test pits were excavated on the proposed site. The approximate locations are shown on Figure 1. Engineering logs are presented in the Appendix and are preceded by descriptive terms and symbols used in their preparation.

In general the proposed site is underlain by alluvial and glacio-fluvial deposits that comprised:-

Unit 1: Silty SAND to Sandy GRAVEL, dark grey to black, subrounded quartzite gravel, roots and rootlets, organic.

Unit 2: Sandy GRAVEL to Gravelly SAND, light grey to white, subrounded quartzite gravel, some cobbles.

Unit 3: Silty GRAVEL to SAND, dark brown to black, subrounded quartzite gravel, sometimes cemented.

Unit 4: Gravelly CLAY to Sandy GRAVEL, mottled yellow-orange-brown, subrounded quartzite gravel, trace cobbles

Unit 5: Silty CLAY to Sandy SILT, extremely weathered siltstone rock with soil-like properties.

Unit 6: SILTSTONE, orange – grey, distinctly weathered siltstone rock with rock mass defects.

Unit 1 has a peaty characteristic, is the topsoil horizon and should be easily removed by grader or bulldozer blade and backhoe or excavator bucket. The material should be stockpiled for landscaping and re-spreading as topsoil.

Unit 2 is generally a gravel product that is medium dense to dense and has an estimated allowable bearing capacity of 200kPa. It has a distinctive light grey to white colour and in the past the material has been quarried for road construction purposes. The gravel was not sampled for laboratory testing during this investigation but was visually assessed as suitable for road base-course gravel and as a base for extensive areas of hard standing, paved areas and concrete floors that may be required for the various timber processing buildings. Where levelling is required, consideration should be given to stockpiling the material for re-laying as a founding material. The unit is usually underlain by a dark brown to black silty gravel to cemented sand that could be used as a visual marker to indicate the vertical extent of the material. Dozer or grader blade and backhoe or excavator bucket should be able to excavate Unit 2 materials. Unsupported long term cut and fill batters in this material should not be made any steeper than 1.5:1 (H:V) and should be topsoiled to encourage revegetation to reduce potential surface erosion.

Unit 3 is a dark coloured layer, it is usually thin and appears to contain organic material. It is unlikely to be useful as a road construction material. It is cemented in places and if the overburden materials are stripped to this layer, it is expected to form a trafficable crust that will generally prevent the ingress of surface water to lower levels. To assist surface drainage, it may be necessary to rip through this layer to provide egress of water to lower layers. The Forestry Tasmania nursery at Perth had drainage problems associated with a hardpan layer and it is believed that deep ripping and / or the installation of deep drains was necessary to overcome the drainage problems. Unit 3 is estimated to have an allowable bearing capacity of 250kPa. The cemented nature of the unit may allow steep unsupported long term cut and fill batters but the unit is generally thin (depth range of 0.1 to 0.3m) and cut and fill batter slopes of 1.5:1 (H:V) or flatter are recommended.

Unit 4 is variable in composition but is considered to represent Pleistocene age glacio-fluvial gravels. An attempt was made at test pit 3 to assess the depth of this layer but the unit continued beyond the limit of the excavator reach at about

4.8m below ground surface. The unit comprises medium dense to dense gravel and very stiff gravelly clays. The estimated allowable bearing capacity is 200kPa. Depending on the composition, the gravelly portions of the unit are expected to be suitable as sub-base gravel whereas the clayey portions should be suitable as a selected fill. Long term unsupported cut and fill batters in this material should be constructed at 1.5:1 (H:V) or flatter. Some of the access road fills have been constructed from this unit at 1:1 batter slopes and are showing evidence of erosion. In other places, tension cracks have developed in the shoulder and shallow slumps and landslides can be expected in some fill batters between test pit locations 5 and 6 approximately. The tension cracks are likely to have been caused by settlement due to inadequate compaction at the edge of the fill.

Unit 5 was extremely weathered siltstone rock that has an estimated allowable bearing capacity of 150 to 200kPa. The material is expected to be suitable for use as fill. Excavations in this unit are expected to be achieved using excavator bucket or bulldozer ripper and blade. Long term cut and fill batter slopes should be constructed at 2.5:1 (H:V) or flatter in this material.

Unit 6 is distinctly weathered siltstone rock. This unit was encountered in test pit 9 that was located in a hollow and had the lowest elevation of all test pits. It is unlikely that the proposed development on the terrace level will encounter this material. In this material, long term cut batter slopes will be controlled by defects in the rock mass and an assessment of slope stability should be undertaken if the unit is exposed in any excavations. The unit is expected to require ripping prior to excavation. Fill batter slopes of 1:1 should be possible in this unit.

Throughout the study area there is evidence of quarrying and areas have been stripped of Unit 1, and Unit 2 has been quarried and removed from parts of the study area. Units 5 and 6 are considered to be in-situ weathered Permian bedrock. Remnant bedding planes in test pit 6 dip to the south southwest at about 45° and provide support for a northwest – southeast trending fault inferred at this location by Sharples. The bedding in test pit 9 dips towards the southwest to west southwest at between 5° and 15° and is consistent with dips and direction recorded on the Geological Atlas.

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

This preliminary geotechnical assessment indicates that the proposed integrated forest products development site is located on a glacio-fluvial terrace situated on a north south trending ridge that is underlain by Permian age sedimentary rocks. Apart from the organic topsoil layer, these materials have an estimated allowable bearing capacity of 200kPa or higher and from a geotechnical aspect the site is considered suitable for the proposed development.

Sharples has indicated that the glacio-fluvial terraces have potential geoconservation value. It is concluded that the development has the potential to further devalue the geoconservation potential of the site. In order to develop the proposed integrated forest products yard it will be necessary to document and record the soil profiles.

The light grey to white quartzite gravel/sand of Unit 2 is assessed as a natural sub base to base course gravel suitable for use beneath standing areas, paved areas and concrete floors. It should be carefully managed during earthworks with provision being made to quarry and stockpile any excess material for use as a base course elsewhere on the project site, or as a road construction material.

If the project proceeds further on this site, Coffey are able to assist with the development of a program to document and record the soil profiles and other morphological and geological factors that may be of interest from a geoconservation point of view. It is recommended that additional geotechnical investigations be undertaken for structures located toward the southern or river end of the terrace above the area where a rockslide has been identified in the Permian bedrock to assess the footing conditions for any proposed future structures in this area.

Should you have any queries regarding the above please do not hesitate to contact either Barry Weldon or the undersigned.

**For and on behalf of**  
**COFFEY GEOSCIENCES PTY LTD**

**DAN O'TOOLE**

REFERENCE:

Sharples, C., 1994. Geomorphic Values Survey: Barnback Block, Huon Forest District, A report to Forestry Tasmania (Huon Forest District).

HO 53/1-AB  
23rd August 2000

1

**APPENDIX A**

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**EXPLANATION SHEETS - SOIL DESCRIPTIONS**

# Information

Important information about your **Coffey** Report



Coffey

*As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.*

## **Your report is based on project specific criteria**

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

## **Subsurface conditions can change**

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

## **Interpretation of factual data**

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by

earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

## **Your report will only give preliminary recommendations**

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

## **Your report is prepared for specific purposes and persons**

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

### **Interpretation by other design professionals**

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

### **Data should not be separated from the report\***

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

### **Geoenvironmental concerns are not at issue**

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

### **Rely on Coffey for additional assistance**

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design toward construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

### **Responsibility**

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

*\* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical Information in Construction Contracts" published by the Institution of Engineers Australia, National Headquarters, Canberra, 1987.*

# Soil Description

## Explanation Sheet

### DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil.

Other materials are described using rock description terms.

### AS1726-1993

The descriptive terms used by Coffey are given below. They are broadly consistent with AS1726-1993.

### UCS & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on the following page.

### MOISTURE CONDITION

**Dry** Looks and feels dry. Cohesive and cemented soils hard, friable or powdery. Uncemented granular soils run freely through hands.

**Moist** Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

**Wet** As for moist but with free water forming on hands when handled.

### CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH $S_u$ (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 – 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 – 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 – 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 – 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

### DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	9 – 15
Loose	15 – 35
Medium Dense	35 – 65
Dense	65 – 85
Very Dense	85 – 100

### PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 $\mu$ m to 2.36 mm
	medium	200 $\mu$ m to 600 $\mu$ m
	fine	75 $\mu$ m to 200 $\mu$ m

### MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION
Trace of ...	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: $\leq$ 5% Fine grained soils: $\leq$ 15%
With some ...	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 – 12% Fine grained soils: 15 – 30%

### SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous exposure or sample	Weakly cemented	Easily broken up by hand in air or water
Lenses	Discontinuous layers of lenticular shape	Moderately cemented	Effort is required to break up the soil by hand in air or water
Pockets	Irregular inclusions of differential material		

### SOIL STRUCTURE

#### WEATHERED IN PLACE SOILS

Extremely weathered material Structure and fabric of parent rock visible.

Residual soil Structure and fabric of parent rock not visible.

#### TRANSPORTED SOILS

Aeolian soil Deposited by wind

Alluvial soil Deposited by streams and rivers

Colluvial soil Deposited on slopes (transported downslope by gravity)

Fill Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.

Lacustrine soil Deposited by lakes

Marine soil Deposited in ocean basins, bays, beaches and estuaries



**SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION**

		<b>FIELD IDENTIFICATION PROCEDURES</b> (Excluding particles larger than 63 mm and basing fractions on estimated mass)		<b>GROUP SYMBOLS</b>	<b>TYPICAL NAMES</b>	
COARSE GRAINED SOILS More than 50% of material less than 60 mm is larger than 0.075 mm	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.	GW	Well graded gravels, gravel-sand mixtures, little or no fines.	
		GRAVELS WITH FINES (Appreciable amount of fines)	Predominantly one size or a range of sizes with some intermediate sizes missing.	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines, uniform gravels.	
		CLEAN SANDS (Little or no fines)	Non-plastic fines (for identification procedures see ML below)	GM	Silty gravels, poorly graded gravel-sand silt mixtures.	
			Plastic fines (for identification procedures see CL below)	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.	
	SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes	SW	Well graded sands and gravelly sands, little or no fines, uniform gravels.	
		SANDS WITH FINES (Appreciable amount of fines)	Predominantly one size or a range of sizes with some intermediate sizes missing.	SP	Poorly graded sands, gravelly sands, little or no fines, uniform gravels.	
			Non-plastic fines (for identification procedures see ML below).	SM	Silty sands, poorly graded sand-silt mixtures.	
		Plastic fines (for identification procedures see CL below).	SC	Clayey sands, poorly graded sand-clay mixture.		
	IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
	FINE GRAINED SOILS More than 50% of material less than 60 mm is smaller than 0.075 mm	SILTS & CLAYS Liquid limit less than 50	DRY STRENGTH	DILATANCY	TOUGHNESS	ML
None to Low			Quick to slow	None		
Medium to High			None to very slow	Medium		
SILTS & CLAYS Liquid limit greater than 50		Low to medium	Slow	Low	OL	Organic silts and organic silt - clays of low to medium plasticity.*
		Low to medium	Slow to none	Low to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, silts of high Liquid Limit.*
		High to very high	None	High	CH	Inorganic clays of high plasticity.*
SILTS & CLAYS Liquid limit greater than 50	Medium to high	None to very slow	Low to medium	OH	Organic clays of high plasticity.*	
	HIGHLY ORGANIC SOILS Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			Pt	Peat and other highly organic soils.	

\* Low plasticity - Liquid Limit  $W_L$  less than 35%. Medium plasticity -  $W_L$  between 35% and 50%.

**DEFECTS**

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed.	
SHEARED ZONE	Zone in clayey soil with roughly parallel almost planar boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks	
SHEARED SURFACE	A near planar smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one or a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing or grains. May contain organic matter	
DYKE	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Some dykes are formed by infilling of open joints.	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	

Excavation No. **TP1**  
 Sheet 1 of 1  
 Office Job No.: **HO53/1**  
 Date started: **11.8.2000**  
 Date completed: **11.8.2000**  
 Logged by: **KdeC**  
 Checked by: *allw*



# Engineering log - Excavation

Client: **Forestry Tasmania**  
 Principal:  
 Project: **Integrated Timber Processing Yard, Huon**  
 Test pit location:

equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
 excavation dimensions: 4m long 1.6m wide Northing: m datum:

excavation information				material substance											
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	100 kPa	200 kPa	300 kPa	400 kPa	structure and additional observations
1	2	3			RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.							
E							SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD					
					0.5		GW	GRAVEL; fine to coarse (5mm - 60mm), light grey, subrounded quartzite, low liquid limit silt to coarse sand fines	M to W	MD-D					
					1.0		SW	GRAVELLY SAND; fine sand, light grey to white, trace of low liquid limit silt, subrounded quartzite gravel fine to coarse (5mm - 60mm), trace of cobbles (60mm -200mm)	M	MD					
					1.5		GM	SILTY GRAVEL; fine to medium subrounded quartzite gravel, dark brown to black low liquid limit silt fines, organics GRAVELLY CLAY; medium plasticity clay, mottled yellow-orange-brown, trace of red. Fine to medium sand and fine to coarse subrounded quartzite gravel, trace of cobbles	M to D	MD-D					Isolated pocket of grey clay measured at 100kPa with Pocket Penetrometer
					1.5		CL			St-VSt					
					2.0										
					2.5			Test pit TP1 terminated at 2.25m							
					3.0										

Sketch

<b>method</b> N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description based on unified classification system</b> <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Form GEO 5.2 Issue 3 Rev.2 TESTPIT HO53.GPJ COFFEY.GDT 22.08.00

# Engineering log - Excavation

Client: **Forestry Tasmania**  
 Principal:  
 Project: **Integrated Timber Processing Yard, Huon**  
 Test pit location:

Excavation No. **TP2**  
 Sheet 1 of 1  
 Office Job No.: **HO53/1**  
 Date started: **11.8.2000**  
 Date completed: **11.8.2000**  
 Logged by: **KdeC**  
 Checked by: *Blw*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
 excavation dimensions: 4m long 1.6m wide Northing: m datum:

excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
1	2	3			RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
U					0.5		SM	SILTY SAND; fine to medium sand, black to dark grey, angular quartz gravel (5mm to 200mm), rootlets & organics	M-W	MD		
					0.5		GP	SANDY GRAVEL; fine to medium sand with quartzite gravel (5mm to 200mm), pale grey				
					0.8		SW	GRAVELLY SAND; medium grained sand in irregular dark brown to black band, angular gravel and cobbles	M	MD-D		Water trickling into test pit through sandy gravel layer
					0.8		CL	SANDY CLAY; medium to high plasticity clay, some fine sand, mottled orange-yellow-brown		St-VSt		
					1.0		SP	SAND; fine to medium, orange		MD		
					1.0		GP	SANDY GRAVEL; medium sand, mottled orange-brown-grey, angular gravel (40mm-70mm) and cobbles (up to 180mm), pockets of orange high plasticity clay				
					2.0							
					2.5			Test pit TP2 terminated at 2.1m				
					3.0							

Sketch

Form: GEO 5.2 Issue: 3 Rev: 2 TESTPIT\_HO53.GPJ COFFEY.GDT 22.08.00

<b>method</b> N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil  <b>penetration</b>  1 no resistance ranging to refusal 2 3 4  <b>water</b>  water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description based on unified classification system</b>  <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP3**

# Engineering log - Excavation

Sheet 1 of 2

Office Job No.: **HO53/1**

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *SEN*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
 excavation dimensions: 10m long 1.6m wide Northing: m datum:

excavation information				material substance										
method	penetration			notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/density index	hand penetrometer			structure and additional observations
	1	2	3								100 kPa	200 kPa	300 kPa	
E					0.5		SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD				
							SW	GRAVELLY SAND; fine to medium sand, pale grey, angular to subrounded quartzite gravel (10 to 20mm)		MD-D				
							SP CL	SAND; fine to medium, cemented in places, dark brown to black CLAY; medium plasticity, mottled orange-yellow-brown, trace of fine sand		MD VST				
					1.0		GP	SANDY GRAVEL; angular quartzite gravel and cobbles (up to 160mm) in matrix of fine sand, mottled orange, yellow to red. Some pockets of red, low liquid limit silty material		MD				
					1.5									
					2.0									
					2.5									
					3.0									

Sketch

Form GEO 5.2 Issue 3 Rev.2 TESTPIT HO53.GPJ COFFEY.GDT 22.08.00

<b>method</b> N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil  <b>penetration</b> 1 2 3 4  no resistance ranging to refusal  <b>water</b>  water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description based on unified classification system</b>  <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP3**  
 Sheet 2 of 2  
 Office Job No.: **HO53/1**  
 Date started: **11.8.2000**  
 Date completed: **11.8.2000**  
 Logged by: **KdeC**  
 Checked by: *[Signature]*



# Engineering log - Excavation

Client: **Forestry Tasmania**  
 Principal:  
 Project: **Integrated Timber Processing Yard, Huon**  
 Test pit location:

equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
 excavation dimensions: 10m long 1.6m wide Northing: m datum:

excavation information				material substance										
method	penetration			notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type; plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/density index	hand penetrometer			structure and additional observations
	1	2	3								100 kPa	200 kPa	300 kPa	
U					3.5			SANDY GRAVEL; angular quartzite gravel and cobbles (up to 160mm) in matrix of fine sand, mottled orange, yellow to red. Some pockets of red, low liquid limit silty material (continued)	M	MD				
					4.0									
					4.5									
					5.0			Test pit TP3 terminated at 4.8m						
					5.5									
					6.0									

Sketch

<b>method</b> N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil  <b>penetration</b> 1 2 3 4  water ▽ water level on date shown ► water inflow ◄ water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP4**

# Engineering log - Excavation

Sheet 1 of 1  
 Office Job No.: **HO53/1**  
 Date started: **11.8.2000**  
 Date completed: **11.8.2000**  
 Logged by: **KdeC**  
 Checked by: *ADW*

Client: **Forestry Tasmania**  
 Principal:  
 Project: **Integrated Timber Processing Yard, Huon**  
 Test pit location:



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
 excavation dimensions: 4m long 1.6m wide Northing: m datum:

excavation information				material substance									
method	penetration	support	water	notes samples, tests, etc	depth RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
1	2	3							soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 300 400	
						0.5		SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD		
								GP	SANDY GRAVEL; angular quartzite gravel and cobbles (up to 160mm) in matrix of fine sand, mottled orange, yellow to red. Some pockets of red, low liquid limit, silty material				
						1.0		SP	SAND; fine to medium, cemented in places, dark brown to black		VD		
								ML to CL	SILTY CLAY; medium plasticity clay, mottled orange, yellow & brown, trace of fine silt		VSt		
						1.5		CL	GRAVELLY CLAY; medium plasticity clay, mottled yellow-orange-brown, trace of red. Fine to medium sand and fine to coarse subrounded quartzite gravel, trace of cobbles				
						2.0			Test pit TP4 terminated at 1.8m				
						2.5							
						3.0							

Sketch

Form GEO.5.2 Issue 3 Rev.2 TESTPIT\_HO53.GPJ\_COFFEY.GDT 22.08.00

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water ▽ water level on date shown ► water inflow ◄ water outflow	notes, samples, tests U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP5**

# Engineering log - Excavation

Sheet 1 of 1  
Office Job No.: **HO53/1**

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *ADW*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
excavation dimensions: 4.5m long 1.6m wide Northing: m datum:

excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
1 2 3					RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
E							SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD		
					0.5		SP	SAND; fine to medium, cemented in places, dark brown to black				
					1.0		GP	SANDY GRAVEL; rounded to subangular quartz gravel, pale grey medium to fine sand		D		
					1.5		GP	SANDY GRAVEL; rounded to subangular quartz gravel, dark brown medium to fine sand, cemented in places		MD-D		
					2.0		GW	SANDY GRAVEL; quartz gravel and cobbles up to 70mm, medium sand and pockets of clay, mottled orange, red and yellow	M-D	MD		
					2.5			Test pit TP5 terminated at 2.07m				
					3.0							

Sketch

Form GEO 5.2 Issue 3 Rev.2 TESTPIT\_HO53.GPJ COFFEY.GDT 22.08.00

<b>method</b> N natural exposure X existing excavation B† backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil  <b>penetration</b> 1 2 3 4 no resistance ranging to refusal  <b>water</b> ▽ water level on date shown ► water inflow ◄ water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description based on unified classification system</b>  <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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# Engineering log - Excavation

Client: **Forestry Tasmania**  
 Principal:  
 Project: **Integrated Timber Processing Yard, Huon**  
 Test pit location:

Excavation No. **TP6**  
 Sheet 1 of 1  
 Office Job No.: **HO53/1**  
 Date started: **11.8.2000**  
 Date completed: **11.8.2000**  
 Logged by: **KdeC**  
 Checked by: *[Signature]*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
 excavation dimensions: 3.5m long 1.6m wide Northing: m datum:

excavation information				material substance									
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
	1 2 3								soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
EI								SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD		
						0.5		GC	CLAYEY GRAVEL; medium to high plasticity clay, pale yellow-cream to light brown, angular quartz gravel (20mm-100mm)				
						1.0		ML to CL	SILTY CLAY; low plasticity clay with silt fines, mottled orange to grey, some remnant dropstones		VSt-H		Extremely weathered siltstone bedrock, remnant dropstones & bedding, orientation 192/46 degrees & 204/47 degrees. (Magnetic dip direction and dip).
						1.5						X	
						2.0			Test pit TP6 terminated at 1.7m				
						2.5							
						3.0							

Sketch

Form GEO 5.2 Issue 3 Rev 2 TESTPIT HO53 GPJ COFFEY.GDT 22.08.00

<b>method</b> N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description based on unified classification system</b> <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP7**

# Engineering log - Excavation

Sheet 1 of 1  
Office Job No.: **H053/1**

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**



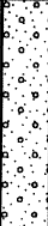
Logged by: **KdeC**

Test pit location:

Checked by: 







equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
excavation dimensions: 3.2m long 1.6m wide Northing: m datum:

excavation information				material substance											
method	penetration			notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/density index	hand penetrometer				structure and additional observations
	1	2	3								100 kPa	200 kPa	300 kPa	400 kPa	
E					0.5		SM	SILTY SAND; fine to medium sand, dark brown to black, angular to rounded quartz gravel (5mm to 60mm), subrounded to rounded cobbles up to 180mm	M	MD					
					0.5 - 1.0		GC	CLAYEY GRAVEL; medium plasticity, mottled orange-red to yellow rounded cobbles up to 190mm, angular gravel 20mm to 60mm, some fine sand to silt							
					1.0 - 1.6		GP	SANDY GRAVEL; rounded, coarse gravel (70mm) and fine gravel (5mm - 10mm) in angular to subangular medium to coarse sand, mottled orange-red, pale grey to white at base of pit							
Test pit TP7 terminated at 1.6m															

Sketch

Form GEO 5.2 Issue 3 Rev.2 TESTPIT\_H053.GPJ COFFEY.GDT 22.08.00

<b>method</b> N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil  <b>penetration</b> 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP8**  
 Sheet 1 of 1  
 Office Job No.: **HO53/1**  
 Date started: **11.8.2000**  
 Date completed: **11.8.2000**  
 Logged by: **KdeC**  
 Checked by: *SLW*



# Engineering log - Excavation

Client: **Forestry Tasmania**  
 Principal:  
 Project: **Integrated Timber Processing Yard, Huon**  
 Test pit location:

equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
 excavation dimensions: 3.1m long 1.6m wide Northing: m datum:

excavation information				material substance											
method	penetration			notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/density index				structure and additional observations	
	1	2	3							100 kPa	200 kPa	300 kPa	400 kPa		
E					0.5		SM	SILTY SAND; fine sand, pale grey, rounded gravel (90mm) and small angular quartz gravel, rootlets	M	L					
							ML	SANDY SILT; fine sand & silt, dark brown to black, some rootlets		MD					
					1.0		GP	SANDY GRAVEL; fine sand, orange-red (upper layer) to medium grained & pale yellow-grey (bottom of pit)							
					1.5										
					2.0			Test pit TP8 terminated at 1.7m							
					2.5										
					3.0										

Sketch

<b>method</b> N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil  <b>penetration</b> 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description based on unified classification system</b>  <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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# Engineering log - Excavation

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *ADW*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:  
 excavation dimensions: 4.2m long 1.6m wide Northing: m datum:

excavation information				material substance										
method	penetration			notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/density index	hand penetrometer			structure and additional observations
	1	2	3								100 kPa	200 kPa	400 kPa	
W					0.5	SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD					
					0.5 - 1.0	GP ML to CL	SANDY GRAVEL; medium to coarse sand, angular, rounded to subangular quartz gravel (50mm), pale grey SILTY CLAY; medium plasticity clay, mottled orange-yellow, some fine silt, rootlets		VSt					
					1.0 - 1.8	ML to CL	SILTY CLAY; medium plasticity clay, pale grey to stained pink-red, low plasticity silt		VSt - H		X	X	X	Remnant defects in the extremely weathered bedrock (i.e joints and bedding)
					1.8		Test pit TP10 terminated at 1.8m							
					2.0									
					2.5									
					3.0									

Sketch

<b>method</b> N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil  <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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# Engineering log - Excavation

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *[Signature]*



equipment type and model:	CAT 325B	Pit Orientation:	Easting:	m	R.L. Surface:
excavation dimensions:	4m long 1.6m wide		Northing:	m	datum:

excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hard penetrometer	structure and additional observations
	1 2 3				RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 kPa	
U					0.5		SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	L		
							SW	GRAVELLY SAND; medium sand with angular to subrounded quartz gravel (5mm to 60mm), pale grey		MD		
					1.0		SM	SILTY SAND; fine to medium sand, dark grey to brown, angular quartz gravel (~40mm)				
							GW to SW	GRAVELLY SAND; medium sand, orange to pale brown, subrounded to angular quartz gravel and rounded cobbles (60mm to 150mm)				
					2.0			Test pit TP11 terminated at 1.9m				
					2.5							
					3.0							

Sketch

<b>method</b> N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	<b>support</b> S shoring N nil  <b>penetration</b> 1 2 3 4  no resistance ranging to refusal  <b>water</b>  water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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