



Site Classification to AS2870-2011 - Residential Slabs and Footings

1. Introduction

Strata Geoscience and Environmental Pty Ltd was commissioned to provide a Site Classification to AS2870-2011 for:

Site Details and Key Investigation Outcomes	
Site Address	Unit 1 13-15 Barr Street Lady Barron
Property Owner/Client	CBM Sustainable Design
Development	New dwelling
Date of Investigation	13/9/21
Key Geotechnical Limitations to Site Development	Reactive soil phases, potential for abnormal soil moisture gradients, potential for colluvial and bedrock outcroppings
Key Recommendations	Site drainage around foundations recommended
Site Classification to AS2870-2011	Class M
Subsidiary Site Classification to AS2870-2011 (TO BE USED FOR PLUMBING DESIGN SEE APPENDIX 3)	NA
Site Classification to AS4055- 2012	N2

2. Scope

It is the scope of this investigation to consider geotechnical factors affecting the current development plan (if available). Namely;

- Geotechnical Drilling of minimum 1 Bore (s) to 1.8 m or refusal (whichever first) with logging, sampling and in-situ testing as required
- Site Classification to AS2870-2011 Residential Slabs and Footings.

The above scope has been determined in consultation with the Client and is subject to time and budgetary considerations. Geotechnical investigations are informative processes and further works may be required depending upon the findings of the results of this investigation.

3. Site Investigation

Please refer to Appendices for the results of field/laboratory investigation (where relevant) including site photographs, bore logs, bearing capacity and other relevant data.

4. Interpretation

Geotechnical Parameter	Results
General Comments	FLAT SITE, UNIT SITED IN CLEAR AREA REMOVED FROM EXISTING VEGETATION
Site Geology (MRT Tas 1:250000)	Dgaas
Geotechnical Risks:	
<i>Slope Instability</i>	Not mapped hazard band (DPAC 2023) accessed via LISTMAP).
<i>Soft/Collapsing Soil</i>	Recommend maximum 75kPa working bearing pressures at a minimum 600mm or refusal.
<i>Groundsurface Movement</i>	Slight-Moderate (variability anticipated over the site).
<i>Erosion Potential</i>	Soils may be sensitive to wind and water erosion. Risks to be controlled by a soil and water management plan.
<i>Surface Water</i>	Not observed
<i>Shallow Groundwater/Perched Water</i>	Not encountered- localised seasonal groundwater tables known to existed in localised landscape- upslope interceptor drain age around foundations required.
<i>Uncontrolled Fill/Disturbed Soils</i>	None observed
<i>Impacting Vegetation (Onsite or on adjacent sites)</i>	Trees onsite warranting design consideration
<i>Proposed or recent removal of building/structures</i>	Unknown
<i>Proposed or recent removal of trees</i>	Large trees to be removed as discussed above
<i>Excavation Difficulties</i>	Possible – near surface granite floaters and bedrock known to occur in localised landscape.
<i>Bulk Earthworks (Completed/partially completed/not proposed)</i>	None

5. Recommended Foundation Design Parameters

- The following foundation design parameters are recommended:

	Recommended Footing Designs		
	Slab	Pad/Strip	Pier/Pile Footings
Founding material ^{*1}	UNDISTUBED DENSE SANDS	UNDISTUBED DENSE SANDS	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK
Recommended Minimum Founding Depth (mm or m)	MIN 600MM	MIN 600MM	PIER/PILE SUPPORPTED MIN 1200MM OR REFUSAL
Max Allowable Bearing Pressure (kPa)	75	75	75
Indicative Soil Ys (mm)	20-40mm	20-40mm	20-40mm

^{*1} Where depth to bedrock is given it is a guide only and will vary over the proposed development area(s). Refusal in geotechnical bores may be different than that of larger construction machinery and this may need to be factored into foundation design and contractor quotations.

It must be emphasised that in classifying the site, Strata Geoscience and Environmental P/L did not place sole reliance on the soil bore logs as a means of being an absolute representation of all subsurface features and conditions over the site. Any persons relying upon this document must not assume that subsurface conditions across the entire site will be identical to that represented in the bore logs.

Relevant information and guidance used in classifying the site includes several or all of the following:

1. Publications from Standards Australia, CSIRO, Foundation and Footings Society, Australian Geomechanics Society.
2. Well established and relevant knowledge of the behaviour of local soils and processes affecting soil behaviour (eg ephemeral springs, perched water tables, unstable slopes, collapsing soils, vegetation, etc).
3. The broad experience of the site classifier.
4. Specific investigations from nearby areas.
5. Past Performance of existing structures and foundations (where relevant and known)
6. Engineering Assessment of likely characteristic ground surface movement (γ_s) based upon estimated I_{pt} values and/or laboratory derived I_{ss} values where relevant.

6. Construction Recommendations

6.1 Pre Construction

- **Results of this investigation MUST be confirmed when specific development plans are finalised. Failure to ensure this will void the classifications and recommendations contained within this report.**
- **Design depth to refusal for bored pier/driven pile designs may show variability over the site and may need to be considered in any contractor quotation. Construction machinery will show different depths to refusal that what is indicated in this investigation.**
- **Test pitting/piling with construction machinery is recommended before construction commences to determine excavatability of refusing substrate (if found).**
- **Screw piles should be driven to a minimum depth as nominated by the foundation designer to ensure lateral stability of each pile. Test piling at all corners of each building must occur to ensure this.**
- **This investigation did not determine rock strength parameters of the refusing substrate (if found) and therefore no comment is made about the excavatability of rock at depth. Hard rock may be encountered which may be difficult to excavate and would therefore increase the costs associated with bulk earthworks.**
- **Rocks may be liberated from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sort from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations.**

- **Where rock is encountered the in relation to the Foundation Recommendations the following terms should be noted as per AS2870-2011 Residential Slabs and Footings**
 - **Rock Outcrops** - Where a footing or edge beam encounters a single local rock outcrop over a length less than 1 m, the depth of the footing or edge beam may be reduced by up to one-third, provided the amount of top and bottom reinforcement is doubled and extended 500 mm past the section with reduced depth. Alternatively, the footing may be stepped or raised, provided the structural stiffness is preserved as per AS2870-2011 Clause 3.1.6.
 - **Partial Rock Outcrops** - Where part of the footing is on rock and part is on soil, provision for movement at the change between the two types of foundation shall be made by articulation of the superstructure or strengthening of the footing system. On Reactive Sites (M, H1 and H2) where part of the footing is on rock and part is on soil, the design shall be in accordance with engineering principles as per AS2870-2011 Clause 3.1.7.
 - **Design for complete rock foundation** - Where the edge beam or footing is to be founded entirely on rock, the footing or beam may be replaced by a levelling pad of concrete or mortar as per AS2870-2011 Clause 3.1.8.
- **Abnormal moisture conditions as defined in AS2870-2011 Clause 1.3.3 (a-d) MUST be considered in the design of competent footings. Without such consideration distresses of foundations may occur and result in non acceptable performance as defined in AS2870-2011 Clause 1.3.1.**
- **Uncontrolled Fill** - Any FILLING that does not meet the requirements of AS2870- 2011 Clause 2.5.3(b). This clause allows up to 0.8m of uncontrolled SAND FILL and up to 0.4m of uncontrolled CLAY FILL without impacting on the above site classification following that all foundations are founded on the natural soils through the filling.
- **Rolled Fill** - Consists of material compacted in layers by repeated rolling with an excavator or similar equipment. The depth of rolled fill shall not exceed 0.6m compacted in layers of not more than 0.3m thick for sand material or 0.3m compacted in layers of not more than 0.15m thick for other materials as per AS2870-2011 Clause 6.4.2(b).
- **Controlled Fill** – Fill that will be required to support structures or associated pavements, or for which engineering properties are to be controlled – Refer to AS2870-2011 Clauses 2.5.3, 2.5.3(a), and 6.4.2(a) – i.e. where a specification has been provided on the type, quality, and compaction requirements for filling at a site and the earthworks have been deemed compliant or have complied with the requirements of the specification.
- The recommendations of CSIRO Building Technology File 18 be adopted.
- An apron of paving around the building perimeter sloping away from foundations with a minimum fall of 1:60 be considered for Class M, H-1, H-2, E and P sites.

6.2 During Construction

Throughout construction it is highly recommended that:

- Inspection of the natural soil surface after footings excavation but prior to construction is required by Strata Geoscience and Environmental in accordance with Appendix D of AS 2870-2011. Failure to comply with this recommendation will void all classifications and recommendations contained in this report. The site classification may be changed at this time depending upon the nature of the founding surface which is dependant in part on foundation design.
- **Site cutting should be avoided if possible and if it occurs below 500mmbgs occurs then reclassification MUST be commissioned.**
- **Fill MUST NOT be used as a founding substrate.**
- All earthworks onsite must follow the recommendations of AS 3798-2007.
- Consideration should be given to drainage and sediment control on site during and after construction. Specifically upslope interceptor drainage must be placed around footings areas and downpipes must be directed away from discharging into founding areas.
- All colluvial rocks and boulders in founding zones should be removed
- All large trees near the building envelope must be removed. If construction takes place in summer or autumn then moisture conditions should be stabilised by soaking of dry areas around the former tree.
- Shrinkage cracking is almost inevitable in concrete slabs and is associated with the drying process. Therefore care must be taken where brittle or sensitive floor coverings are proposed, or where a polished slab is planned. The risk of damage can be reduced by not installing floor coverings until after shrinkage has occurred, which can take in excess of 3 months, or by using flexible mortars and appropriate sheeting material.
- Vertical barriers to prevent root incursions around founding zones should be considered in areas where gardens are to be established near foundations.

6.3 Post Construction

After construction, there are certain practices that the owner/occupier should be aware of to prevent excessive foundation movements. The owner will be responsible for any damage or loss associated with disregard for the recommendations contained in CSIRO Building Technology Files 18 "Foundation Maintenance and Footings Performances: A Homeowners Guide" available through CSIRO.

It is furthermore recommended that:

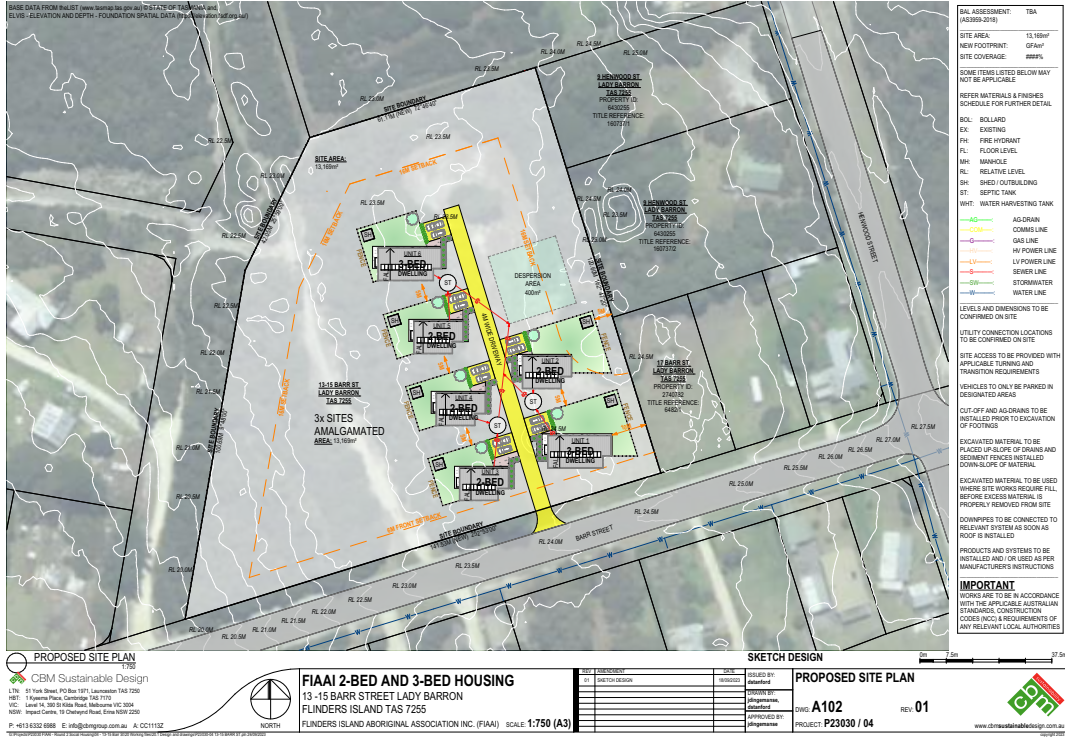
- Gardens or large shrubs or trees must not be established immediately adjacent to foundations
- Garden beds or lawn near foundations must not be excessively watered.
- Leaking underground services and downpipes or gutters must be fixed immediately.



S Nielsen MEngSc CPSS
Director
Strata Geoscience and Environmental Pty Ltd
E:sven@strataconsulting.com.au

Appendix 1 Site Photos





PROPOSED SITE PLAN
7/20
CBM Sustainable Design
LTD, 51 Park Street, PO Box 1971, Launceston TAS 7250
MELB: 15 Evans Street, Carnegie VIC 3163
VIC: Level 15, 385 St Kilda Road, Melbourne VIC 3204
NSW: 1000 George Street, Sydney NSW 2000
P: +613 6322 8868 E: info@cbmgps.com.au A: CC1113Z

FIAAI 2-BED AND 3-BED HOUSING
13-15 BARR STREET LADY BARRON
FLINDERS ISLAND TAS 7255
FLINDERS ISLAND ABORIGINAL ASSOCIATION INC. (FIAAI) SCALE: 1:750 (A3)

NO.	DESCRIPTION	DATE	DESIGNED BY	CHECKED BY
1	PRELIMINARY			
2	REVISED			
3	REVISED			
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Appendix 2 Indicative Bore Logs

strata <small>Geoscience and Environmental P/L</small>		<i>Indicative Profile Log</i>						BH01													
Client:							Coords:														
Project:							Bearing: Dip:														
Drill Type:							RL SEE WS														
Drilling Mot:							Logged by:														
Fluid:							Date:														
RL	Depth (mm)	Graphic Log	Material Description	Soil		Rock	Weathering		Frac. Spacing		Sampling and In-situ Testing	Test Results and Comments									
				V. Soft/Loose	Soft/Loose	Firm/Dense	Stiff/Dense	V. Stiff/Dense	Very Low	Low			Medium	High	Very High	Ext. Highly High	FW	MW	SW	FS	FR
			BROWNISH GREY SAND (SM) LOOSE			NP															
			TRENDING GREY SAND (SP) LOOSE			NP															
	1000		TRENDING MEDIUM DENSE LOWER BOUNDARY UNDEFINED																		
	1300		BORE TERMINATED AT 1.3 M																		

Geotechnical Terms and Symbols

The following information is intended to assist in the interpretation of terms and symbols used in geotechnical borehole logs, test pit logs and reports issued by or for the Queensland Department of Transport and Main Roads (TMR). More detailed information relating to specific test methods is available in the TMR Materials Testing Manual (MTM) and the relevant Australian Standards.

Soil Descriptions

Description and Classification of Soils for Geotechnical Purposes: Refer to AS1726-1993 (Appendix A).

The following chart (adapted from AS1726-1993, Appendix A, Table A1) is based on the Unified Soil Classification System (USCS).

Major Divisions	Particle size mm	USCS Group Symbol	Typical Names	Laboratory Classification						
COARSE GRAINED SOILS (more than half of material less than 63 mm & larger than 0.075 mm)	BOULDERS	— 200		% < 0.075 mm (Z)	Plasticity of fine fraction	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{(D_{10} \times D_{60})}$	NOTES		
	COBBLES	— 63								
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	coarse	— 20	GW	Well graded gravels and gravel-sand mixtures, little or no fines	0-5	—	>4	Between 1 and 3	(1) Identify fines by the method given for fine-grained soils. (2) Borderline classifications occur when the percentage of fines (fraction smaller than 0.075 mm size) is greater than 5% and less than 12%. Borderline classifications require the use of SP-SM, GW-GC.
		medium	— 5	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels	0-5	—	Falls to comply with above		
		fine	— 2.36	GM	Silty gravels, gravel-sand-silt mixtures (1)	12-50	Below 'A' line or $PI < 4$	—	—	
				GC	Clayey gravels, gravel-sand-clay mixtures (1)	12-50	Above 'A' line and $PI > 7$	—	—	
	SANDS (more than half of coarse fraction is smaller than 2.36 mm)	coarse	— 0.6	SW	Well graded sands and gravelly sands, little or no fines	0-5	—	>6	Between 1 and 3	
		medium	— 0.2	SP	Poorly graded sands and gravelly sands, little or no fines	0-5	—	Falls to comply with above		
		fine	0.075	SM	Silty sands, sand silt mixtures (1)	12-50	Below 'A' line or $PI < 4$	—	—	
				SC	Clayey sands, sand-clay mixtures (1)	12-50	Above 'A' line and $PI > 7$	—	—	
	FINE GRAINED SOILS (more than half of material less than 63 mm & smaller than 0.075 mm)	SILTS & CLAYS (Liquid Limit $\leq 50\%$)	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity						
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays						
OL			Organic silts and clays of low plasticity							
SILTS & CLAYS (Liquid Limit $> 50\%$)		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts							
		CH	Inorganic clays of high plasticity, fat clays							
		OH	Organic silts and clays of high plasticity							
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils							

Use the gradation curve of material passing 63 mm for classification of fractions according to the criteria given in Major Divisions.

Plasticity Chart
For classification of fine grained soils and fine fraction of coarse grained soils.

Geotechnical Terms and Symbols

Soil Colour: Is described in the moist condition using black, white, grey, red, brown, orange, yellow, green or blue. Borderline cases can be described as a combination of two colours, with the weaker followed by the stronger. Modifiers such as pale, dark or mottled, can be used as necessary. Where colour consists of a primary colour with secondary mottling, it should be described as follows:
(Primary) mottled (Secondary). Refer to AS 1726-1993, A2.4 and A3.3.

Soil Moisture Condition: Is based on the appearance and feel of soil. Refer to AS 1726-1993, A2.5.

Term	Description
Dry	Cohesive soils; hard and friable or powdery, well dry of plastic limit. Granular soils; cohesionless and free-running.
Moist	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water forms on hands when handling. Granular soils tend to cohere and free water forms on hands when handling.

Consistency of Cohesive Soils: May be estimated using simple field tests, or described in terms of a strength scale. In the field, the undrained shear strength (s_u) can be assessed using a simple field tool appropriate for cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A4.

Consistency - Essentially Cohesive Soils						Soil Particle Sizes	
Term	Field Guide	Symbol	SPT "N" Value	Undrained Shear Strength s_u (kPa)	Unconfined Compressive Strength q_u (kPa)	Term	Size Range
Very soft	Oozes between fingers when squeezed in hand.	VS	0-2	<12	<25	BOULDERS	>200 mm
Soft	Easily moulded with fingers.	S	2-4	12-25	25-50	COBBLES	63-200 mm
Firm	Can be moulded by strong pressure of fingers.	F	4-8	25-50	50-100	Coarse GRAVEL	20-63 mm
Stiff	Not possible to mould with fingers.	St	8-15	50-100	100-200	Medium GRAVEL	6-20 mm
Very stiff		VSt	15-30	100-200	200-400	Fine GRAVEL	2.36-6 mm
Hard	Can be indented with difficulty by thumb nail.	H	>30	>200	>400	Coarse SAND	0.6-2.36 mm
						Medium SAND	0.2-0.6 mm
						Fine SAND	0.075-0.2 mm
						SILT	0.002-0.075 mm
						CLAY	<0.002 mm

Note: SPT - N to q_u , correlation from Terzaghi and Peck, 1967. (General guide only).

Consistency of Non-Cohesive Soils: Is described in terms of the density index, as defined in AS 1289.0-2000. This can be assessed using a field tool appropriate for non-cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A5; BS5930-1999, p117.

Consistency - Essentially Non-Cohesive Soils				
Term	Symbol	SPT N Value	Field Guide	Density Index (%)
Very loose	VL	0-4	Foot imprints readily	0-15
Loose	L	4-10	Shovels Easily	15-35
Medium dense	MD	10-30	Shovelling difficult	35-65
Dense	D	30-50	Pick required	65-85
Very dense	VD	>50	Picking difficult	85-100

Standard Penetration Test (SPT): Refer to AS 1289.6.3.1-2004. Example report formats for SPT results are shown below:

Test Report	Penetration Resistance (N)	Explanation / Comment
4, 7, 11	N=18	Full penetration; N is reported on engineering borehole log
18, 27, 32	N=59	Full penetration; N is reported on engineering borehole log
4, 18, 30/15 mm	N is not reported	30 blows causes less than 100 mm penetration (3 rd interval) – test discontinued
30/80 mm	N is not reported	30 blows causes less than 100 mm penetration (1 st interval) – test discontinued
rw	N<1	Rod weight only causes full penetration
hw	N<1	Hammer and rod weight only causes full penetration
hb	N is not reported	Hammer bouncing for 5 consecutive blows with no measurable penetration – test discontinued

Rock Descriptions

Refer to AS 1726-1993 (Appendix A3.3) for the description and classification of rock material composition, including:

- (a) Rock type (Table A6, (a) and (b))
- (b) Grain size
- (c) Texture and fabric
- (d) Colour (describe as per soil).

The condition of a rock material refers to its weathering characteristics, strength characteristics and rock mass properties. Refer to AS 1726-1993 (Appendix A3 Tables A8, A9 and A10).

Weathering Condition (Degree of Weathering):

The degree of weathering is a continuum from fresh rock to soil. Boundaries between weathering grades may be abrupt or gradational.

Rock Material Weathering Classification		
Weathering Grade	Symbol	Definition
Residual Soil	RS	Soil-like material developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the material has not been significantly transported.
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water, but substance fabric and rock structure still recognisable.
Highly Weathered Rock	HW	Strong discolouration is evident throughout the rock mass, often with significant change in the constituent minerals. The intact rock strength is generally much weaker than that of the fresh rock.
Moderately Weathered Rock	MW	Modest discolouration is evident throughout the rock fabric, often with some change in the constituent minerals. The intact rock strength is usually noticeably weaker than that of the fresh rock.
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh Rock	FR	Rock shows no sign of decomposition or staining.

Notes:

- Minor variations within broader weathering grade zones will be noted on the engineering borehole logs.
- Extremely weathered rock is described in terms of soil engineering properties.
- Weathering may be pervasive throughout the rock mass, or may penetrate inwards from discontinuities to some extent.
- The 'Distinctly Weathered (DW)' class as defined in AS 1726-1993 is divided to incorporate HW and MW in the above table. The symbol DW should not be used.

Strength Condition (Intact Rock Strength):

Strength of Rock Material			
(Based on Point Load Strength Index, corrected to 50 mm diameter – $I_{p(50)}$. Field guide used if no tests available. Refer to AS 4133.4.1-2007.			
Term	Symbol	Point Load Index (MPa) $I_{p(50)}$	Field Guide to Strength
Extremely Low	EL	≤ 0.03	Easily remoulded by hand to a material with soil properties.
Very Low	VL	> 0.03 ≤ 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low	L	> 0.1 ≤ 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	> 0.3 ≤ 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	> 1 ≤ 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	> 3 ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High	EH	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:

- These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.
- Anisotropy of rock material samples may affect the field assessment of strength.

Geotechnical Terms and Symbols

Discontinuity Description: Refer to AS 1726-1993, Table A10.

Anisotropic Fabric		Roughness (e.g. Planar, Smooth is abbreviated FI / Sm) Class				Other		
BED	Bedding	Stepped (Stp)	Rough or Irregular (Ro)		I	Cl	Clay	
FOL	Foliation		Smooth (Sm)		II	Fe	Iron	
LIN	Mineral Inclusion		Slacksided (Sl)		III	Co	Coal	
Defect Type		Undulating (Un)	Rough (Ro)		IV	Carb	Carbonaceous	
LP	Lamination Parting		Smooth (Sm)		V	Sinf	Soil Infill Zone	
BP	Bedding Parting		Slacksided (Sl)		VI	Qz	Quartz	
FP	Cleavage / Foliation Parting	Planar (Pl)	Rough (Ro)		VII	CA	Calcite	
J, Js	Joint, Joints		Smooth (Sm)		VIII	Chl	Chlorite	
SZ	Sheared Zone		Slacksided (Sl)		IX	Py	Pyrite	
CZ	Crushed Zone	Aperture		Infilling		Int	Intersecting	
BZ	Broken Zone	Closed	CD	No visible coating or infill	Clean	Cn	Inc	Incipient
HFZ	Highly Fractured Zone	Open	OP	Surfaces discoloured by mineral/s	Stain	St	DI	Drilling Induced
AZ	Alteration Zone	Filled	FL	Visible mineral or soil infill <1mm	Veneer	Vr	H	Horizontal
VN	Vein	Tight	TI	Visible mineral or soil infill >1mm	Coating	Ct	V	Vertical

Note: Describe 'Zones' and 'Coatings' in terms of composition and thickness (mm).

Discontinuity Spacing: On the geotechnical borehole log, a graphical representation of defect spacing vs depth is shown. This representation takes into account all the natural rock defects occurring within a given depth interval, excluding breaks induced by the drilling / handling of core. Refer to AS 1726-1993, B85930-1999.

Defect Spacing			Bedding Thickness (Sedimentary Rock Stratification)		Defect Spacing in 3D	
Spacing/Width (mm)	Descriptor	Symbol	Descriptor	Spacing/Width (mm)	Term	Description
			Thinly Laminated	< 6	Blocky	Equidimensional
<20	Extremely Close	EC	Thickly Laminated	6 – 20	Tabular	Thickness much less than length or width
20 – 60	Very Close	VC	Very Thinly Bedded	20 – 60	Columnar	Height much greater than cross section
60 – 200	Close	C	Thinly Bedded	60 – 200		
200 – 600	Medium	M	Medium Bedded	200 – 600		
600 – 2000	Wide	W	Thickly Bedded	600 – 2000		
2000 – 6000	Very Wide	VW	Very Thickly Bedded	> 2000		
>6000	Extremely Wide	EW				

Defect Persistence (areal extent)	
Trace length of defect given in metres	

Symbols

The list below provides an explanation of terms and symbols used on the geotechnical borehole, test pit and penetrometer logs.

Test Results				Test Symbols	
PI	Plasticity Index	I_p	Effective Cohesion	DCP	Dynamic Cone Penetrometer
LL	Liquid Limit	w_L	Undrained Cohesion	SPT	Standard Penetration Test
LI	Liquidity Index	I_L	Residual Cohesion	CPTu	Cone Penetrometer (Piezocone) Test
DD	Dry Density	ρ_d	Effective Angle of Internal Friction	PANDA	Variable Energy DCP
WD	Wet Density	ρ_w	Undrained Angle of Internal Friction	PP	Pocket Penetrometer Test
LS	Linear Shrinkage	ρ_{sh}	Residual Angle of Internal Friction	U50	Undisturbed Sample 50 mm (nominal diameter)
MC	Moisture Content	w	Coefficient of Consolidation	U100	Undisturbed Sample 100mm (nominal diameter)
OC	Organic Content	m_v	Coefficient of Volume Compressibility	UCS	Uniaxial Compressive Strength
WPI	Weighted Plasticity Index	C_u	Coefficient of Secondary Compression	Pm	Pressuremeter

Geotechnical Terms and Symbols

Test Results				Test Symbols	
WLS	Weighted Linear Shrinkage	e	Voids Ratio	FBV	Field Shear Vane
DoS	Degree of Saturation	S_w	Constant Volume Friction Angle	DST	Direct Shear Test
APD	Apparent Particle Density	q_b / q_c	Piezocene Tip Resistance (corrected / uncorrected)	PR	Penetration Rate
s_u	Undrained Shear Strength	q_u	PANDA Cone Resistance	A	Point Load Test (axial)
q_u	Unconfined Compressive Strength	I_{pm}	Point Load Strength Index	D	Point Load Test (diametral)
R	Total Core Recovery	RQD	Rock Quality Designation	L	Point Load Test (irregular lump)

 28/11/13	Groundwater level on the date shown	 Water Inflow	 Water Outflow
--	-------------------------------------	--	---

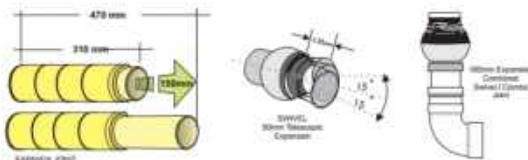
Appendix 3 Site Classification and Plumbing Specifications

Table SP 01 - SOIL CLASSIFICATION, DIFFERENTIAL MOVEMENT, GRADE, ANGLE, JOINTS LOCATION & DRAWING No'S. CHART.

AS2870-2011 SOIL CLASSIFICATION	ON SITE SOIL CONDITIONS	DIFFERENTIAL MOVEMENT	SEWER & Stormwater GRADE	SWIVEL * (50mm Expansion)	SWIVEL/COMBO * (100mm Expansion)	EXPANDA JOINTS *	CREEP SLOPE SITES	DRAWING NUMBER
A	Most Sand & Rock sites	0 - 10mm	1:60 Minimum	Not necessary	Not necessary	Not necessary	These are termed P sites and are referred to in Drawing SP 105	N/a
S	Slightly reactive Soils	10 - 20mm						N/a
M	Moderately reactive soils	20 - 40mm						SP 100 & SP 101
H1	Highly reactive soils	40 - 60mm	1:40 Minimum	As per AS3500.5 using 2 units outside and an Expansion Joint at every riser	As necessary using either or both Bend or Straight units	At Junctions within 1 mtr of internal building footprint and every 6 mtrs. As per Differential Movement See AS2032-2006 Clause 6.4.2.2-4 for suspension requirements		SP 102
H2	Very highly reactive soils	60 - 75mm						SP 102A
E	Extremely reactive soils	75 + mm						SP 102A
P	Soils affected by Abnormal moisture and conditions	From 20 + mm					As per Differential Movement	Not applicable to suspended sub-floors

NOTE: Engineer or local Authority details take precedence over this chart.

To be read in conjunction with Storm Plastics drawings shown.



GRADE RATIO	FALL IN 10 mtrs	ANGLE	GRADE %
1:100	100 mm	.57	1.0
1:80	125 mm	.71	1.25
1:60	167 mm	.95	1.65
1:50	200 mm	1.14	2.0
1:40	250 mm	1.43	2.5

* Unless specified otherwise, these joints are to be set at 50% of total telescopic movement.

Jan. 2015, WPC

Appendix 4 Form 55

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Owner /Agent
 Address
 Suburb/postcode

Qualified person details:

Qualified person:
 Address: Phone No:
 Fax No:
 Licence No: Email address:

Qualifications and Insurance details: (description from Column 3 of the Director of Building Control's Determination)

Speciality area of expertise: (description from Column 4 of the Director of Building Control's Determination)

Details of work:

Address: Lot No:
 Certificate of title No:
 The assessable item related to this certificate: (description of the assessable item being certified)
 Assessable item includes –
 - a material;
 - a design
 - a form of construction
 - a document
 - testing of a component, building system or plumbing system
 - an inspection, or assessment, performed

Certificate details:

Certificate type: (description from Column 1 of Schedule 1 of the Director of Building Control's Determination)

This certificate is in relation to the above assessable item, at any stage, as part of - (tick one)
 building work, plumbing work or plumbing installation or demolition work:
 Or

a building, temporary structure or plumbing installation:

In issuing this certificate the following matters are relevant –

Documents:

SR05397

Relevant
calculations:

SEE REPORT WHERE RELEVANT

References:

Substance of Certificate: (what it is that is being certified)

AS2870-2011 ASSESSMENT


Scope and/or Limitations

SEE RECOMMENDATIONS AND WELL AS TERMS AND CONDITIONS CONTAINED WITHIN THE RELEVANT REPORT, ESPECIALLY NOTING:

1. ENGINEERING AND ARCHITECTURAL PLANS TO BE SUBMITTED TO STRATA FOR RATIFICATION AGAINST REPORT RECOMMENDATIONS PRIOR TO CONSTRUCTION. FAILURE TO ENSURE THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT
2. FOUNDING SURFACE INSPECTION OF ALL EXCAVATIONS PRIOR TO FOUNDATION CONSTRUCTION BY STRATA IS MANDATORY AND FAILING TO COMMISSION THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT. THIS IS TO ENSURE THAT ALL FOUNDATIONS ARE TAKEN TO RECOMMENDED FOUNDING SUBSTRATE AND NOT SOFT TOPSOILS OR UNCONTROLLED FILL (WHERE PRESENT)
3. IF SITE CUTTING BEYOND 500MM OCCURS THEN THE SITE MUST BE RECLASSIFIED IN CONSULTATION WITH STRATA.
4. FORM VALID FOR 2 YEARS FROM THE DATE BELOW.

I certify the matters described in this certificate.

Qualified person: *Signed:* *Certificate No:* *Date:*

S NIELSEN 

SR05397

27/9/23



Appendix 5 Terms and Conditions

Scope of Work

These Terms and Conditions apply to any services provided to you ("the Client") by Strata Geoscience and Environmental Pty Ltd ("Strata"). By continuing to instruct Strata to act after receiving the Terms and Conditions or by using this report and its findings for design and/or permit application processes and not objecting to any of the Terms and Conditions the Client agrees to be bound by these Terms and Conditions, and any other terms and conditions supplied by Strata from time to time at Strata's sole and absolute discretion. The scope of the services provided to the Client by Strata is limited to the services and specified purpose agreed between Strata and the Client and set out in the correspondence to which this document is enclosed or annexed ("the Services"). Strata does not purport to advise beyond the Services.

Third Parties

The Services are supplied to the Client for the sole benefit of the Client and must not be relied upon by any person or entity other than the Client. Strata is not responsible or liable to any third party. All parties other than the Client are advised to seek their own advice before proceeding with any course of action.

Provision of Information

The Client is responsible for the provision of all legal, survey and other particulars concerning the site on which Strata is providing the Services, including particulars of existing structures and services and features for the site and for adjoining sites and structures. The Client is also responsible for the provision of specialised services not provided by Strata. If Strata obtains these particulars or specialised services on the instruction of the Client, Strata does so as agent of the Client and at the Client's expense. Strata is not obliged to confirm the accuracy and completeness of information supplied by the Client or any third party service provider. The Client is responsible for the accuracy and completeness of all particulars or services provided by the Client or obtained on the Client's behalf. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person or entity resulting from the failure of the Client or third party to provide accurate and complete information. In the event additional information becomes available to the Client, the Client must inform Strata in writing of that information as soon as possible. Further advice will be provided at the Client's cost. Any report is prepared on the assumption that the instructions and information supplied to Strata has been provided in good faith and is all of the information relevant to the provision of the Services by Strata. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if Strata has been supplied with insufficient, incorrect, incomplete, false or misleading information.

Integrity

Any report provided by Strata presents the findings of the site assessment. While all reasonable care is taken when conducting site investigations and reporting to the Client, Strata does not warrant that the information contained in any report is free from errors or omissions. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from errors in a report. Any report should be read in its entirety, inclusive of any summary and annexures. Strata does not accept any responsibility where part of any report is relied upon without reference to the full report.

Project Specific Criteria

Any report provided by Strata will be prepared on the basis of unique project development plans which apply only to the site that is being investigated. Reports provided by Strata do not apply to any project other than that originally specified by the Client to Strata. The Report must not be used or relied upon if any changes to the project are made. The Client should engage Strata to further advise on the effect of any change to the project. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever where any change to the project is made without obtaining a further written report from Strata. Changes to the project may include, but are not limited to, changes to the investigated site or neighbouring sites, for instance, variation of the location of proposed building envelopes/footprints, changes to building design which may impact upon building settlement or slope stability, or changes to earthworks, including removal (site cutting) or deposition of sediments or rock from the site.

Classification to AS2870-2011

It must be emphasised that the site classification to AS2870-2011 and recommendations referred to in this report are based solely on the observed soil profile at the time of the investigation for this report and account has been taken of Clause 2.1.1 of AS2870 - 2011. Other abnormal moisture conditions as defined in AS2870 - 2011 Clause 1.3.3 (a) (b) (c) and (d) may need to be considered in the design of the structure. Without designing for the possibility of all abnormal moisture conditions as defined in Clause 1.3.3, distresses will occur and may result in non "acceptable probabilities of serviceability and safety of the building during its design life", as defined in AS2870 - 2011, Clause 1.3.1. Furthermore the classification is preliminary in nature and needs verification at the founding surface inspection phase. The classification may be changed at this time based upon the nature of the founding surface over the entire footprint of the project area. Any costs associated with a change in the site classification are to be incurred by the client. Furthermore any costs associated with delayed works associated with a founding surface inspection or a change in classification are to be borne by the client. Where founding surface inspections are not commissioned the classifications contained within this report are void. Classification is based upon a range of expected ground surface movement as indicated in AS2870-2011. Where the range of movement exceeds the stipulations for the nominated classification Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person.

Slope Instability Risks

Where comment, modelling or treatment options are suggested to limit the risk of slope instability Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from actual slope instability or mass movement over the site at any point over the design life of any structures or neighbouring structures.

Subsurface Variations with Time

Any report provided by Strata is based upon subsurface conditions encountered at the time of the investigation. Conditions can and do change significantly and unexpectedly over a short period of time. For example groundwater levels may fluctuate over time, affecting latent soil bearing capacity and ex-situ/insitu fill sediments may be placed/removed from the site. Changes to the subsurface conditions that were encountered at the time of the investigation void all recommendations made by Strata in any report. Strata is not liable, and

accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any change to the subsurface conditions that were encountered at the time of the investigation. In the event of a delay in the commencement of a project or if additional information becomes available to the Client about a change in conditions becomes available to the Client, the Client should engage Strata to make a further investigation to ensure that the conditions initially encountered still exist. Further advice will be provided at the Client's cost. Without limiting the generality of the above statement, Strata does not accept liability where any report is relied upon after three months from the date of the report, (unless otherwise provided in the report or required by the Australian Standard which the report purports to comply with), or the date when the Client becomes aware of any change in condition. Any report should be reviewed regularly to ensure that it continues to be accurate and further advice requested from Strata where applicable.

Interpretation

Site investigation identifies subsurface conditions only at the discrete points of geotechnical drilling, and at the time of drilling. All data received from the geotechnical drilling is interpreted to report to the Client about overall site conditions as well as their anticipated impact upon the specific project. Actual site conditions may vary from those inferred to exist as it is virtually impossible to provide a definitive subsurface profile which accounts for all the possible variability inherent in earth materials. Soil depths and composition can vary due to natural and anthropogenic processes. This is particularly pertinent to some weathered sedimentary geologies or colluvial/alluvial clast deposits which may show significant variability in depth to refusal over a development area. Furthermore where rocky profiles are encountered no comment is made about the potential size of liberated rocks from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sought from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations. Rock incongruities such as joints, dips or faults may also result in subsurface variability. Variability may lead to differences between the design depth of bored/driven piers compared with the actual depth of individual piers constructed onsite. It may also affect the founding depth of conventional strip, pier and beam or slab footings, which may result in increased costs associated with excavation (particularly of rock) or materials costs of foundations. Founding surface inspections should be commissioned by the Client prior to foundation construction to verify the results of initial site characterisation and failure to insure this will void the classifications and recommendations contained within this report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any variation from the site conditions inferred to exist.

Strata is not responsible for the interpretation of site data or report findings by other parties, including parties involved in the design and construction process. The Client must seek advice from Strata about the interpretation of the site data or report.

Report Recommendations

Any report recommendations provided by Strata are only preliminary. A report is based upon 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 earthworks and/or foundation construction is almost complete. Where variations in conditions are encountered, Strata should be engaged to provide further advice. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if the results of selective point sampling are not indicative of actual conditions throughout an area or if the Client becomes aware of variations in conditions and does not engage Strata for further advice.

Geo-environmental Considerations

Strata does not consider site contamination, unless the Client specifically instructs Strata to consider the site contamination in writing. If a request is made by the Client to consider site contamination, Strata will provide additional terms and conditions that will apply to the engagement.

Copyright and Use of Documents

Copyright in all drawings, reports, specifications, calculations and other documents provided by Strata or its employees in connection with the Services remain vested in Strata. The Client has a licence to use the documents for the purpose of completing the project. However, the Client must not otherwise use the documents, make copies of the documents or amend the documents unless express approval in writing is given in advance by Strata. The Client must not publish or allow to be published, in whole or in part, any document provided by Strata or the name or professional affiliations of Strata, without first obtaining the written consent of Strata as to the form and context in which it is to appear.

If, during the course of providing the Services, Strata develops, discovers or first reduces to practice a concept, product or process which is capable of being patented then such concept, product or process is and remains the property of Strata and:

- (i) the Client must not use, infringe or otherwise appropriate the same other than for the purpose of the project without first obtaining the written consent of Strata; and
- (ii) the Client is entitled to a royalty free licence to use the same during the life of the works comprising the project.

Digital Copies of Report

If any report is provided to the Client in an electronic copy except directly from Strata, the Client should verify the report contents with Strata to ensure they have not been altered in any way from the original provide by Strata.



Site Classification to AS2870-2011 - Residential Slabs and Footings

1. Introduction

Strata Geoscience and Environmental Pty Ltd was commissioned to provide a Site Classification to AS2870-2011 for:

Site Details and Key Investigation Outcomes	
Site Address	Unit 2 13-15 Barr Street Lady Barron
Property Owner/Client	CBM Sustainable Design
Development	New dwelling
Date of Investigation	13/9/21
Key Geotechnical Limitations to Site Development	Reactive soil phases, potential for abnormal soil moisture gradients, potential for colluvial and bedrock outcroppings
Key Recommendations	Site drainage around foundations recommended
Site Classification to AS2870-2011	Class M
Subsidiary Site Classification to AS2870-2011 (TO BE USED FOR PLUMBING DESIGN SEE APPENDIX 3)	NA
Site Classification to AS4055- 2012	N2

2. Scope

It is the scope of this investigation to consider geotechnical factors affecting the current development plan (if available). Namely;

- Geotechnical Drilling of minimum 1 Bore (s) to 1.8 m or refusal (whichever first) with logging, sampling and in-situ testing as required
- Site Classification to AS2870-2011 Residential Slabs and Footings.

The above scope has been determined in consultation with the Client and is subject to time and budgetary considerations. Geotechnical investigations are informative processes and further works may be required depending upon the findings of the results of this investigation.

3. Site Investigation

Please refer to Appendices for the results of field/laboratory investigation (where relevant) including site photographs, bore logs, bearing capacity and other relevant data.

4. Interpretation

Geotechnical Parameter	Results
General Comments	FLAT SITE, UNIT SITED IN CLEAR AREA REMOVED FROM EXISTING VEGETATION
Site Geology (MRT Tas 1:250000)	Dgaas
Geotechnical Risks:	
<i>Slope Instability</i>	Not mapped hazard band (DPAC 2023) accessed via LISTMAP).
<i>Soft/Collapsing Soil</i>	Recommend maximum 75kPa working bearing pressures at a minimum 600mm or refusal.
<i>Groundsurface Movement</i>	Slight-Moderate (variability anticipated over the site).
<i>Erosion Potential</i>	Soils may be sensitive to wind and water erosion. Risks to be controlled by a soil and water management plan.
<i>Surface Water</i>	Not observed
<i>Shallow Groundwater/Perched Water</i>	Not encountered- localised seasonal groundwater tables known to existed in localised landscape- upslope interceptor drain age around foundations required.
<i>Uncontrolled Fill/Disturbed Soils</i>	None observed
<i>Impacting Vegetation (Onsite or on adjacent sites)</i>	Trees onsite warranting design consideration
<i>Proposed or recent removal of building/structures</i>	Unknown
<i>Proposed or recent removal of trees</i>	Large trees to be removed as discussed above
<i>Excavation Difficulties</i>	Possible – near surface granite floaters and bedrock known to occur in localised landscape.
<i>Bulk Earthworks (Completed/partially completed/not proposed)</i>	None

5. Recommended Foundation Design Parameters

- The following foundation design parameters are recommended:

	Recommended Footing Designs		
	Slab	Pad/Strip	Pier/Pile Footings
Founding material ^{*1}	UNDISTUBED DENSE SANDS	UNDISTUBED DENSE SANDS	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK
Recommended Minimum Founding Depth (mm or m)	MIN 600MM	MIN 600MM	PIER/PILE SUPPORPTED MIN 1200MM OR REFUSAL
Max Allowable Bearing Pressure (kPa)	75	75	75
Indicative Soil Ys (mm)	20-40mm	20-40mm	20-40mm

^{*1} Where depth to bedrock is given it is a guide only and will vary over the proposed development area(s). Refusal in geotechnical bores may be different than that of larger construction machinery and this may need to be factored into foundation design and contractor quotations.

It must be emphasised that in classifying the site, Strata Geoscience and Environmental P/L did not place sole reliance on the soil bore logs as a means of being an absolute representation of all subsurface features and conditions over the site. Any persons relying upon this document must not assume that subsurface conditions across the entire site will be identical to that represented in the bore logs.

Relevant information and guidance used in classifying the site includes several or all of the following:

1. Publications from Standards Australia, CSIRO, Foundation and Footings Society, Australian Geomechanics Society.
2. Well established and relevant knowledge of the behaviour of local soils and processes affecting soil behaviour (eg ephemeral springs, perched water tables, unstable slopes, collapsing soils, vegetation, etc).
3. The broad experience of the site classifier.
4. Specific investigations from nearby areas.
5. Past Performance of existing structures and foundations (where relevant and known)
6. Engineering Assessment of likely characteristic ground surface movement (γ_s) based upon estimated I_{pt} values and/or laboratory derived I_{ss} values where relevant.

6. Construction Recommendations

6.1 Pre Construction

- **Results of this investigation MUST be confirmed when specific development plans are finalised. Failure to ensure this will void the classifications and recommendations contained within this report.**
- **Design depth to refusal for bored pier/driven pile designs may show variability over the site and may need to be considered in any contractor quotation. Construction machinery will show different depths to refusal that what is indicated in this investigation.**
- **Test pitting/piling with construction machinery is recommended before construction commences to determine excavatability of refusing substrate (if found).**
- **Screw piles should be driven to a minimum depth as nominated by the foundation designer to ensure lateral stability of each pile. Test piling at all corners of each building must occur to ensure this.**
- **This investigation did not determine rock strength parameters of the refusing substrate (if found) and therefore no comment is made about the excavatability of rock at depth. Hard rock may be encountered which may be difficult to excavate and would therefore increase the costs associated with bulk earthworks.**
- **Rocks may be liberated from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sort from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations.**

- **Where rock is encountered the in relation to the Foundation Recommendations the following terms should be noted as per AS2870-2011 Residential Slabs and Footings**
 - **Rock Outcrops** - Where a footing or edge beam encounters a single local rock outcrop over a length less than 1 m, the depth of the footing or edge beam may be reduced by up to one-third, provided the amount of top and bottom reinforcement is doubled and extended 500 mm past the section with reduced depth. Alternatively, the footing may be stepped or raised, provided the structural stiffness is preserved as per AS2870-2011 Clause 3.1.6.
 - **Partial Rock Outcrops** - Where part of the footing is on rock and part is on soil, provision for movement at the change between the two types of foundation shall be made by articulation of the superstructure or strengthening of the footing system. On Reactive Sites (M, H1 and H2) where part of the footing is on rock and part is on soil, the design shall be in accordance with engineering principles as per AS2870-2011 Clause 3.1.7.
 - **Design for complete rock foundation** - Where the edge beam or footing is to be founded entirely on rock, the footing or beam may be replaced by a levelling pad of concrete or mortar as per AS2870-2011 Clause 3.1.8.
- **Abnormal moisture conditions as defined in AS2870-2011 Clause 1.3.3 (a-d) MUST be considered in the design of competent footings. Without such consideration distresses of foundations may occur and result in non acceptable performance as defined in AS2870-2011 Clause 1.3.1.**
- **Uncontrolled Fill** - Any FILLING that does not meet the requirements of AS2870- 2011 Clause 2.5.3(b). This clause allows up to 0.8m of uncontrolled SAND FILL and up to 0.4m of uncontrolled CLAY FILL without impacting on the above site classification following that all foundations are founded on the natural soils through the filling.
- **Rolled Fill** - Consists of material compacted in layers by repeated rolling with an excavator or similar equipment. The depth of rolled fill shall not exceed 0.6m compacted in layers of not more than 0.3m thick for sand material or 0.3m compacted in layers of not more than 0.15m thick for other materials as per AS2870-2011 Clause 6.4.2(b).
- **Controlled Fill** – Fill that will be required to support structures or associated pavements, or for which engineering properties are to be controlled – Refer to AS2870-2011 Clauses 2.5.3, 2.5.3(a), and 6.4.2(a) – i.e. where a specification has been provided on the type, quality, and compaction requirements for filling at a site and the earthworks have been deemed compliant or have complied with the requirements of the specification.
- The recommendations of CSIRO Building Technology File 18 be adopted.
- An apron of paving around the building perimeter sloping away from foundations with a minimum fall of 1:60 be considered for Class M, H-1, H-2, E and P sites.

6.2 During Construction

Throughout construction it is highly recommended that:

- Inspection of the natural soil surface after footings excavation but prior to construction is required by Strata Geoscience and Environmental in accordance with Appendix D of AS 2870-2011. Failure to comply with this recommendation will void all classifications and recommendations contained in this report. The site classification may be changed at this time depending upon the nature of the founding surface which is dependant in part on foundation design.
- **Site cutting should be avoided if possible and if it occurs below 500mm bgs occurs then reclassification MUST be commissioned.**
- **Fill MUST NOT be used as a founding substrate.**
- All earthworks onsite must follow the recommendations of AS 3798-2007.
- Consideration should be given to drainage and sediment control on site during and after construction. Specifically upslope interceptor drainage must be placed around footings areas and downpipes must be directed away from discharging into founding areas.
- All colluvial rocks and boulders in founding zones should be removed
- All large trees near the building envelope must be removed. If construction takes place in summer or autumn then moisture conditions should be stabilised by soaking of dry areas around the former tree.
- Shrinkage cracking is almost inevitable in concrete slabs and is associated with the drying process. Therefore care must be taken where brittle or sensitive floor coverings are proposed, or where a polished slab is planned. The risk of damage can be reduced by not installing floor coverings until after shrinkage has occurred, which can take in excess of 3 months, or by using flexible mortars and appropriate sheeting material.
- Vertical barriers to prevent root incursions around founding zones should be considered in areas where gardens are to be established near foundations.

6.3 Post Construction

After construction, there are certain practices that the owner/occupier should be aware of to prevent excessive foundation movements. The owner will be responsible for any damage or loss associated with disregard for the recommendations contained in CSIRO Building Technology Files 18 "Foundation Maintenance and Footings Performances: A Homeowners Guide" available through CSIRO.

It is furthermore recommended that:

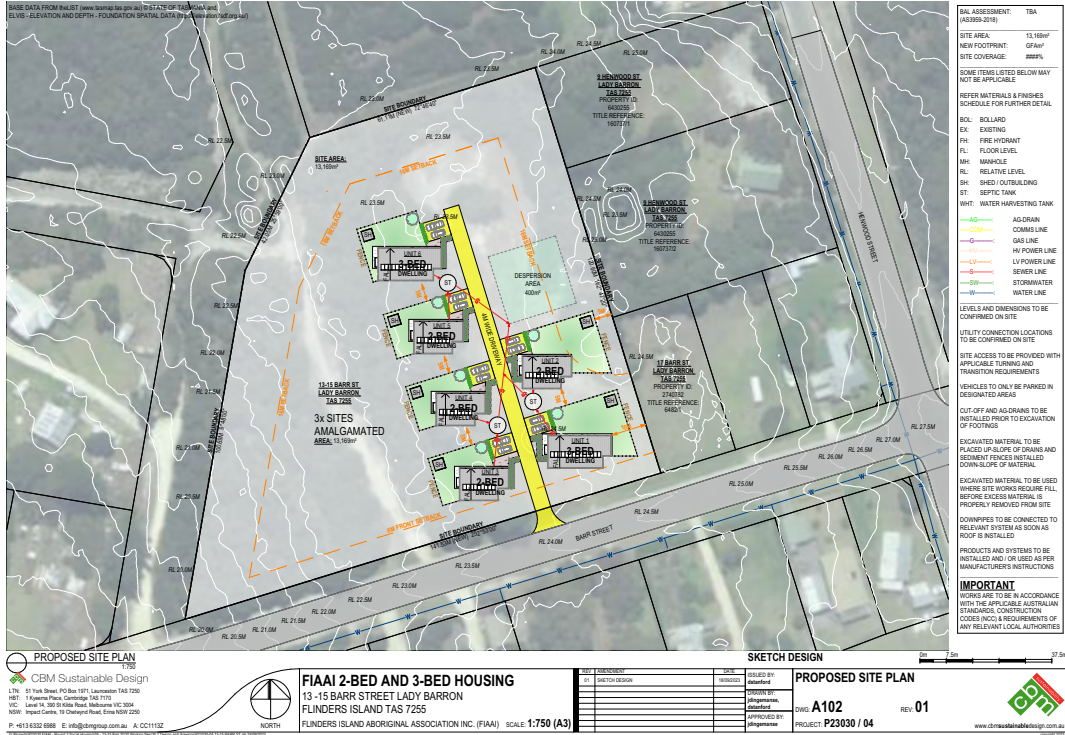
- Gardens or large shrubs or trees must not be established immediately adjacent to foundations
- Garden beds or lawn near foundations must not be excessively watered.
- Leaking underground services and downpipes or gutters must be fixed immediately.




S Nielsen MEngSc CPSS
Director
Strata Geoscience and Environmental Pty Ltd
E:sven@strataconsulting.com.au

Appendix 1 Site Photos





Appendix 2 Indicative Bore Logs

 strata <small>SCIENCE. TECHNOLOGY. ENVIRONMENT.</small>		Indicative Profile Log					BH01														
Client:							Coord's:														
Project:							Bearing: Dip:														
Drill Type:							RL SEE WS														
Drilling Met:							Logged by:														
Fluid:							Date:														
RL	Depth (mm)	Graphic Log	Material Description	Soil			Rock			Weathering			Frac. Spacing			Sampling and Test/Testing	Test Results and Comments				
				Very Loose	Soft to Loose	Firm to Dense	Very Low	Low	Medium	High	Very High	Extremely High	FW	MM	SW			FS	PR	0.01	0.05
			BROWNISH GREY SAND (SM) LOOSE			NP															
			TRENDING GREY SAND (SP) LOOSE			NP															
	900		TRENDING MEDIUM DENSE																		
			GRADUAL REFUSAL																		
	1500																				
	2000																				
	2500																				
	3000																				
	3500																				
	4000																				
	4500																				
	5000																				
	5500																				
	6000																				
			BORE TERMINATED AT 1.6 M																		
	6500																				

Geotechnical Terms and Symbols

The following information is intended to assist in the interpretation of terms and symbols used in geotechnical borehole logs, test pit logs and reports issued by or for the Queensland Department of Transport and Main Roads (TMR). More detailed information relating to specific test methods is available in the TMR Materials Testing Manual (MTM) and the relevant Australian Standards.

Soil Descriptions

Description and Classification of Soils for Geotechnical Purposes: Refer to AS1726-1993 (Appendix A).

The following chart (adapted from AS1726-1993, Appendix A, Table A1) is based on the Unified Soil Classification System (USCS).

Major Divisions	Particle size mm	USCS Group Symbol	Typical Names	Laboratory Classification				NOTES		
COARSE GRAINED SOILS (more than half of material less than 63 mm & larger than 0.075 mm)	BOULDERS	— 200		% < 0.075 mm (2)	Plasticity of fine fraction	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{(D_{10} \times D_{60})}$			
	COBBLES	— 63								
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	coarse	— 20	GW	Well graded gravels and gravel-sand mixtures, little or no fines	0-5	—	>4	Between 1 and 3	(1) Identify fines by the method given for fine-grained soils.
		medium	— 5	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels	0-5	—	Fails to comply with above		
		fine	— 2.36	GM	Silty gravels, gravel-sand-silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	
				GC	Clayey gravels, gravel-sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	(2) Borderline classifications occur when the percentage of fines (fraction smaller than 0.075 mm size) is greater than 5% and less than 12%. Borderline classifications require the use of SP-SM, GW-GC.
	SANDS (more than half of coarse fraction is smaller than 2.36 mm)	coarse	— 0.6	SW	Well graded sands and gravelly sands, little or no fines	0-5	—	>6	Between 1 and 3	
		medium	— 0.2	SP	Poorly graded sands and gravelly sands, little or no fines	0-5	—	Fails to comply with above		
		fine	0.075	SM	Silty sands, sand silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	
				SC	Clayey sands, sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	
	FINE GRAINED SOILS (more than half of material less than 63 mm & smaller than 0.075 mm)	SILTS & CLAYS (Liquid Limit $\leq 50\%$)	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity						
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays						
OL			Organic silts and clays of low plasticity							
SILTS & CLAYS (Liquid Limit $> 50\%$)		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts							
		CH	Inorganic clays of high plasticity, fat clays							
		OH	Organic silts and clays of high plasticity							
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils						

Use the gradation curve of material passing 63 mm for classification of fractions according to the criteria given in Major Divisions.

Plasticity Chart

For classification of fine grained soils and fine fraction of coarse grained soils.

The Plasticity Chart plots Plastic Index (PI) on the y-axis (0 to 60) against Liquid Limit (LL) on the x-axis (0 to 100). The chart is divided into three vertical regions: Low (LL < 40), Medium (40 < LL < 60), and High (LL > 60). A diagonal line represents the 'A-line' (PI = LL - 0.73) and another diagonal line represents the 'U-line' (PI = 0.73(LL - 20)). The region between the A-line and U-line is labeled 'CL' (low plasticity clay) and 'CH' (high plasticity clay). The region below the A-line is labeled 'ML' (low plasticity silt) and 'MH' (high plasticity silt). The region below the U-line is labeled 'OL' (low plasticity organic silt) and 'OH' (high plasticity organic silt). The region below the A-line and to the right of the U-line is labeled 'PT' (peat and other highly organic soils). The region above the U-line is labeled 'MILOI' (marginally inorganic low organic silt/clay) and 'MIOHI' (marginally inorganic high organic silt/clay).

Geotechnical Terms and Symbols

Soil Colour: Is described in the moist condition using black, white, grey, red, brown, orange, yellow, green or blue. Borderline cases can be described as a combination of two colours, with the weaker followed by the stronger. Modifiers such as pale, dark or mottled, can be used as necessary. Where colour consists of a primary colour with secondary mottling, it should be described as follows:
(Primary) mottled (Secondary). Refer to AS 1726-1993, A2.4 and A3.3.

Soil Moisture Condition: Is based on the appearance and feel of soil. Refer to AS 1726-1993, A2.5.

Term	Description
Dry	Cohesive soils; hard and friable or powdery, well dry of plastic limit. Granular soils; cohesionless and free-running.
Moist	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water forms on hands when handling. Granular soils tend to cohere and free water forms on hands when handling.

Consistency of Cohesive Soils: May be estimated using simple field tests, or described in terms of a strength scale. In the field, the undrained shear strength (s_u) can be assessed using a simple field tool appropriate for cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A4.

Consistency - Essentially Cohesive Soils						Soil Particle Sizes	
Term	Field Guide	Symbol	SPT "N" Value	Undrained Shear Strength s_u (kPa)	Unconfined Compressive Strength q_u (kPa)	Term	Size Range
Very soft	Oozes between fingers when squeezed in hand.	VS	0-2	<12	<25	BOULDERS	>200 mm
Soft	Easily moulded with fingers.	S	2-4	12-25	25-50	COBBLES	63-200 mm
Firm	Can be moulded by strong pressure of fingers.	F	4-8	25-50	50-100	Coarse GRAVEL	20-63 mm
Stiff	Not possible to mould with fingers.	St	8-15	50-100	100-200	Medium GRAVEL	6-20 mm
Very stiff		VSt	15-30	100-200	200-400	Fine GRAVEL	2.36-6 mm
Hard	Can be indented with difficulty by thumb nail.	H	>30	>200	>400	Coarse SAND	0.6-2.36 mm
						Medium SAND	0.2-0.6 mm
						Fine SAND	0.075-0.2 mm
						SILT	0.002-0.075 mm
						CLAY	<0.002 mm

Note: SPT - N to q_u correlation from Terzaghi and Peck, 1967. (General guide only).

Consistency of Non-Cohesive Soils: Is described in terms of the density index, as defined in AS 1289.0-2000. This can be assessed using a field tool appropriate for non-cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A5; BS5930-1999, p117.

Consistency - Essentially Non-Cohesive Soils				
Term	Symbol	SPT N Value	Field Guide	Density Index (%)
Very loose	VL	0-4	Foot imprints readily	0-15
Loose	L	4-10	Shovels Easily	15-35
Medium dense	MD	10-30	Shovelling difficult	35-65
Dense	D	30-50	Pick required	65-85
Very dense	VD	>50	Picking difficult	85-100

Standard Penetration Test (SPT): Refer to AS 1289.6.3.1-2004. Example report formats for SPT results are shown below:

Test Report	Penetration Resistance (N)	Explanation / Comment
4, 7, 11	N=18	Full penetration; N is reported on engineering borehole log
18, 27, 32	N=59	Full penetration; N is reported on engineering borehole log
4, 18, 30/15 mm	N is not reported	30 blows causes less than 100 mm penetration (3 rd interval) – test discontinued
30/80 mm	N is not reported	30 blows causes less than 100 mm penetration (1 st interval) – test discontinued
rw	N<1	Rod weight only causes full penetration
hw	N<1	Hammer and rod weight only causes full penetration
hb	N is not reported	Hammer bouncing for 5 consecutive blows with no measurable penetration – test discontinued

Rock Descriptions

Refer to AS 1726-1993 (Appendix A3.3) for the description and classification of rock material composition, including:

- (a) Rock type (Table A6, (a) and (b))
- (b) Grain size
- (c) Texture and fabric
- (d) Colour (describe as per soil).

The condition of a rock material refers to its weathering characteristics, strength characteristics and rock mass properties. Refer to AS 1726-1993 (Appendix A3 Tables A8, A9 and A10).

Weathering Condition (Degree of Weathering):

The degree of weathering is a continuum from fresh rock to soil. Boundaries between weathering grades may be abrupt or gradational.

Rock Material Weathering Classification		
Weathering Grade	Symbol	Definition
Residual Soil	RS	Soil-like material developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the material has not been significantly transported.
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water, but substance fabric and rock structure still recognisable.
Highly Weathered Rock	HW	Strong discolouration is evident throughout the rock mass, often with significant change in the constituent minerals. The intact rock strength is generally much weaker than that of the fresh rock.
Moderately Weathered Rock	MW	Modest discolouration is evident throughout the rock fabric, often with some change in the constituent minerals. The intact rock strength is usually noticeably weaker than that of the fresh rock.
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh Rock	FR	Rock shows no sign of decomposition or staining.

Notes:

- Minor variations within broader weathering grade zones will be noted on the engineering borehole logs.
- Extremely weathered rock is described in terms of soil engineering properties.
- Weathering may be pervasive throughout the rock mass, or may penetrate inwards from discontinuities to some extent.
- The 'Distinctly Weathered (DW)' class as defined in AS 1726-1993 is divided to incorporate HW and MW in the above table. The symbol DW should not be used.

Strength Condition (Intact Rock Strength):

Strength of Rock Material			
(Based on Point Load Strength Index, corrected to 50 mm diameter – $I_{p(50)}$. Field guide used if no tests available. Refer to AS 4133.4.1-2007.			
Term	Symbol	Point Load Index (MPa) $I_{p(50)}$	Field Guide to Strength
Extremely Low	EL	≤ 0.03	Easily remoulded by hand to a material with soil properties.
Very Low	VL	> 0.03 ≤ 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low	L	> 0.1 ≤ 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	> 0.3 ≤ 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	> 1 ≤ 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	> 3 ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High	EH	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:

- These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.
- Anisotropy of rock material samples may affect the field assessment of strength.

Geotechnical Terms and Symbols

Discontinuity Description: Refer to AS 1726-1993, Table A10.

Anisotropic Fabric		Roughness (e.g. Planar, Smooth is abbreviated FI / Sm) Class				Other		
BED	Bedding	Stepped (Stp)	Rough or Irregular (Ro)		I	Cly	Clay	
FOL	Foliation		Smooth (Sm)		II	Fe	Iron	
LIN	Mineral Inclusion		Slacksided (Sl)		III	Co	Coal	
Defect Type		Undulating (Un)	Rough (Ro)		IV	Carb	Carbonaceous	
LP	Lamination Parting		Smooth (Sm)		V	Sinf	Soil Infill Zone	
BP	Bedding Parting		Slacksided (Sl)		VI	Qz	Quartz	
FP	Cleavage / Foliation Parting	Planar (Pl)	Rough (Ro)		VII	CA	Calcite	
J, Js	Joint, Joints		Smooth (Sm)		VIII	Chl	Chlorite	
SZ	Sheared Zone		Slacksided (Sl)		IX	Py	Pyrite	
CZ	Crushed Zone	Aperture		Infilling		Int	Intersecting	
BZ	Broken Zone	Closed	CD	No visible coating or infill	Clean	Cn	Inc	Incipient
HFZ	Highly Fractured Zone	Open	OP	Surfaces discoloured by mineral/s	Stain	St	DI	Drilling Induced
AZ	Alteration Zone	Filled	FL	Visible mineral or soil infill <1mm	Veneer	Vr	H	Horizontal
VN	Vein	Tight	TI	Visible mineral or soil infill >1mm	Coating	Ct	V	Vertical

Note: Describe 'Zones' and 'Coatings' in terms of composition and thickness (mm).

Discontinuity Spacing: On the geotechnical borehole log, a graphical representation of defect spacing vs depth is shown. This representation takes into account all the natural rock defects occurring within a given depth interval, excluding breaks induced by the drilling / handling of core. Refer to AS 1726-1993, B85930-1999.

Defect Spacing			Bedding Thickness (Sedimentary Rock Stratification)		Defect Spacing in 3D	
Spacing/Width (mm)	Descriptor	Symbol	Descriptor	Spacing/Width (mm)	Term	Description
			Thinly Laminated	< 6	Blocky	Equidimensional
<20	Extremely Close	EC	Thickly Laminated	6 – 20	Tabular	Thickness much less than length or width
20 – 60	Very Close	VC	Very Thinly Bedded	20 – 60	Columnar	Height much greater than cross section
60 – 200	Close	C	Thinly Bedded	60 – 200	Defect Persistence (areal extent)	
200 – 600	Medium	M	Medium Bedded	200 – 600		
600 – 2000	Wide	W	Thickly Bedded	600 – 2000		
2000 – 6000	Very Wide	VW	Very Thickly Bedded	> 2000		
>6000	Extremely Wide	EW				
Trace length of defect given in metres						

Symbols

The list below provides an explanation of terms and symbols used on the geotechnical borehole, test pit and penetrometer logs.

Test Results				Test Symbols	
PI	Plasticity Index	I_p	Effective Cohesion	DCP	Dynamic Cone Penetrometer
LL	Liquid Limit	w_L	Undrained Cohesion	SPT	Standard Penetration Test
LI	Liquidity Index	I_L	Residual Cohesion	CPTu	Cone Penetrometer (Piezocone) Test
DD	Dry Density	ρ_d	Effective Angle of Internal Friction	PANDA	Variable Energy DCP
WD	Wet Density	ρ_w	Undrained Angle of Internal Friction	PP	Pocket Penetrometer Test
LS	Linear Shrinkage	ρ_{sh}	Residual Angle of Internal Friction	U50	Undisturbed Sample 50 mm (nominal diameter)
MC	Moisture Content	w	Coefficient of Consolidation	U100	Undisturbed Sample 100mm (nominal diameter)
OC	Organic Content	m_v	Coefficient of Volume Compressibility	UCS	Uniaxial Compressive Strength
WPI	Weighted Plasticity Index	C_u	Coefficient of Secondary Compression	Pm	Pressuremeter

Geotechnical Terms and Symbols

Test Results				Test Symbols	
WLS	Weighted Linear Shrinkage	e	Voids Ratio	FSV	Field Shear Vane
DoS	Degree of Saturation	W_w	Constant Volume Friction Angle	DST	Direct Shear Test
APD	Apparent Particle Density	q_t / q_c	Piezocene Tip Resistance (corrected / uncorrected)	PR	Penetration Rate
s_u	Undrained Shear Strength	q_u	PANDA Cone Resistance	A	Point Load Test (axial)
q_u	Unconfined Compressive Strength	I_{pm}	Point Load Strength Index	D	Point Load Test (diametral)
R	Total Core Recovery	RQD	Rock Quality Designation	L	Point Load Test (irregular lump)

 28/11/13	Groundwater level on the date shown	 Water Inflow	 Water Outflow
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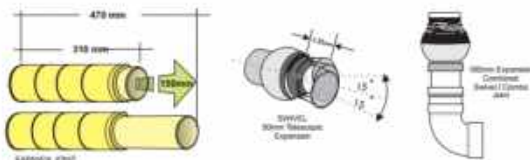
Appendix 3 Site Classification and Plumbing Specifications

Table SP 01 - SOIL CLASSIFICATION, DIFFERENTIAL MOVEMENT, GRADE, ANGLE, JOINTS LOCATION & DRAWING No'S. CHART.

AS2870-2011 SOIL CLASSIFICATION	ON SITE SOIL CONDITIONS	DIFFERENTIAL MOVEMENT	SEWER & Stormwater GRADE	SWIVEL * (50mm Expansion)	SWIVEL/COMBO * (100mm Expansion)	EXPANDA JOINTS *	CREEP SLOPE SITES	DRAWING NUMBER
A	Most Sand & Rock sites	0 - 10mm	1:60 Minimum	Not necessary	Not necessary	Not necessary	These are termed P sites and are referred to in Drawing SP 105	N/a
S	Slightly reactive Soils	10 - 20mm						N/a
M	Moderately reactive soils	20 - 40mm						SP 100 & SP 101
H1	Highly reactive soils	40 - 60mm	1:40 Minimum	As per AS3500.5 using 2 units outside and an Expansion Joint at every riser Not applicable to suspended sub-floors	As necessary using either or both Bend or Straight units ...unless suspended from slab	At Junctions within 1 mtr of internal building footprint and every 6 mtrs. As per Differential Movement See AS2032-2006 Clause 6.4.2.2-4 for suspension requirements	SP 102	SP 102A
H2	Very highly reactive soils	60 - 75mm						SP 102A
E	Extremely reactive soils	75 + mm						SP 102A
P	Soils affected by Abnormal moisture and conditions	From 20 + mm						As per Differential Movement

NOTE: Engineer or local Authority details take precedence over this chart.

To be read in conjunction with Storm Plastics drawings shown.



* Unless specified otherwise, these joints are to be set at 50% of total telescopic movement.

GRADE RATIO	FALL IN 10 mtrs	ANGLE	GRADE %
1:100	100 mm	.57	1.0
1:80	125 mm	.71	1.25
1:60	167 mm	.95	1.65
1:50	200 mm	1.14	2.0
1:40	250 mm	1.43	2.5

Jan. 2015, WPC

Appendix 4 Form 55

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Owner /Agent
 Address
 Suburb/postcode

Qualified person details:

Qualified person:
 Address: Phone No:
 Fax No:
 Licence No: Email address:

Qualifications and Insurance details: (description from Column 3 of the Director of Building Control's Determination)

Speciality area of expertise: (description from Column 4 of the Director of Building Control's Determination)

Details of work:

Address: Lot No:
 Certificate of title No:
 The assessable item related to this certificate: (description of the assessable item being certified)
 Assessable item includes –
 - a material;
 - a design
 - a form of construction
 - a document
 - testing of a component, building system or plumbing system
 - an inspection, or assessment, performed

Certificate details:

Certificate type: (description from Column 1 of Schedule 1 of the Director of Building Control's Determination)

This certificate is in relation to the above assessable item, at any stage, as part of - (tick one)
 building work, plumbing work or plumbing installation or demolition work:
 Or

a building, temporary structure or plumbing installation:

In issuing this certificate the following matters are relevant –

Documents:

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Relevant
calculations:

SEE REPORT WHERE RELEVANT

References:

Substance of Certificate: (what it is that is being certified)

AS2870-2011 ASSESSMENT

Scope and/or Limitations

SEE RECOMMENDATIONS AND WELL AS TERMS AND CONDITIONS CONTAINED WITHIN THE RELEVANT REPORT, ESPECIALLY NOTING:

1. ENGINEERING AND ARCHITECTURAL PLANS TO BE SUBMITTED TO STRATA FOR RATIFICATION AGAINST REPORT RECOMMENDATIONS PRIOR TO CONSTRUCTION. FAILURE TO ENSURE THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT
2. FOUNDING SURFACE INSPECTION OF ALL EXCAVATIONS PRIOR TO FOUNDATION CONSTRUCTION BY STRATA IS MANDATORY AND FAILING TO COMMISSION THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT. THIS IS TO ENSURE THAT ALL FOUNDATIONS ARE TAKEN TO RECOMMENDED FOUNDING SUBSTRATE AND NOT SOFT TOPSOILS OR UNCONTROLLED FILL (WHERE PRESENT)
3. IF SITE CUTTING BEYOND 500MM OCCURS THEN THE SITE MUST BE RECLASSIFIED IN CONSULTATION WITH STRATA.
4. FORM VALID FOR 2 YEARS FROM THE DATE BELOW.

I certify the matters described in this certificate.

Qualified person: Signed: Certificate No: Date:

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27/9/23



Appendix 5 Terms and Conditions

Scope of Work

These Terms and Conditions apply to any services provided to you ("the Client") by Strata Geoscience and Environmental Pty Ltd ("Strata"). By continuing to instruct Strata to act after receiving the Terms and Conditions or by using this report and its findings for design and/or permit application processes and not objecting to any of the Terms and Conditions the Client agrees to be bound by these Terms and Conditions, and any other terms and conditions supplied by Strata from time to time at Strata's sole and absolute discretion. The scope of the services provided to the Client by Strata is limited to the services and specified purpose agreed between Strata and the Client and set out in the correspondence to which this document is enclosed or annexed ("the Services"). Strata does not purport to advise beyond the Services.

Third Parties

The Services are supplied to the Client for the sole benefit of the Client and must not be relied upon by any person or entity other than the Client. Strata is not responsible or liable to any third party. All parties other than the Client are advised to seek their own advice before proceeding with any course of action.

Provision of Information

The Client is responsible for the provision of all legal, survey and other particulars concerning the site on which Strata is providing the Services, including particulars of existing structures and services and features for the site and for adjoining sites and structures. The Client is also responsible for the provision of specialised services not provided by Strata. If Strata obtains these particulars or specialised services on the instruction of the Client, Strata does so as agent of the Client and at the Client's expense. Strata is not obliged to confirm the accuracy and completeness of information supplied by the Client or any third party service provider. The Client is responsible for the accuracy and completeness of all particulars or services provided by the Client or obtained on the Client's behalf. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person or entity resulting from the failure of the Client or third party to provide accurate and complete information. In the event additional information becomes available to the Client, the Client must inform Strata in writing of that information as soon as possible. Further advice will be provided at the Client's cost. Any report is prepared on the assumption that the instructions and information supplied to Strata has been provided in good faith and is all of the information relevant to the provision of the Services by Strata. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if Strata has been supplied with insufficient, incorrect, incomplete, false or misleading information.

Integrity

Any report provided by Strata presents the findings of the site assessment. While all reasonable care is taken when conducting site investigations and reporting to the Client, Strata does not warrant that the information contained in any report is free from errors or omissions. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from errors in a report. Any report should be read in its entirety, inclusive of any summary and annexures. Strata does not accept any responsibility where part of any report is relied upon without reference to the full report.

Project Specific Criteria

Any report provided by Strata will be prepared on the basis of unique project development plans which apply only to the site that is being investigated. Reports provided by Strata do not apply to any project other than that originally specified by the Client to Strata. The Report must not be used or relied upon if any changes to the project are made. The Client should engage Strata to further advise on the effect of any change to the project. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever where any change to the project is made without obtaining a further written report from Strata. Changes to the project may include, but are not limited to, changes to the investigated site or neighbouring sites, for instance, variation of the location of proposed building envelopes/footprints, changes to building design which may impact upon building settlement or slope stability, or changes to earthworks, including removal (site cutting) or deposition of sediments or rock from the site.

Classification to AS2870-2011

It must be emphasised that the site classification to AS2870-2011 and recommendations referred to in this report are based solely on the observed soil profile at the time of the investigation for this report and account has been taken of Clause 2.1.1 of AS2870 - 2011. Other abnormal moisture conditions as defined in AS2870 - 2011 Clause 1.3.3 (a) (b) (c) and (d) may need to be considered in the design of the structure. Without designing for the possibility of all abnormal moisture conditions as defined in Clause 1.3.3, distresses will occur and may result in non "acceptable probabilities of serviceability and safety of the building during its design life", as defined in AS2870 - 2011, Clause 1.3.1. Furthermore the classification is preliminary in nature and needs verification at the founding surface inspection phase. The classification may be changed at this time based upon the nature of the founding surface over the entire footprint of the project area. Any costs associated with a change in the site classification are to be incurred by the client. Furthermore any costs associated with delayed works associated with a founding surface inspection or a change in classification are to be borne by the client. Where founding surface inspections are not commissioned the classifications contained within this report are void. Classification is based upon a range of expected ground surface movement as indicated in AS2870-2011. Where the range of movement exceeds the stipulations for the nominated classification Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person.

Slope Instability Risks

Where comment, modelling or treatment options are suggested to limit the risk of slope instability Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from actual slope instability or mass movement over the site at any point over the design life of any structures or neighbouring structures.

Subsurface Variations with Time

Any report provided by Strata is based upon subsurface conditions encountered at the time of the investigation. Conditions can and do change significantly and unexpectedly over a short period of time. For example groundwater levels may fluctuate over time, affecting latent soil bearing capacity and ex-situ/insitu fill sediments may be placed/removed from the site. Changes to the subsurface conditions that were encountered at the time of the investigation void all recommendations made by Strata in any report. Strata is not liable, and

accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any change to the subsurface conditions that were encountered at the time of the investigation. In the event of a delay in the commencement of a project or if additional information becomes available to the Client about a change in conditions becomes available to the Client, the Client should engage Strata to make a further investigation to ensure that the conditions initially encountered still exist. Further advice will be provided at the Client's cost. Without limiting the generality of the above statement, Strata does not accept liability where any report is relied upon after three months from the date of the report, (unless otherwise provided in the report or required by the Australian Standard which the report purports to comply with), or the date when the Client becomes aware of any change in condition. Any report should be reviewed regularly to ensure that it continues to be accurate and further advice requested from Strata where applicable.

Interpretation

Site investigation identifies subsurface conditions only at the discrete points of geotechnical drilling, and at the time of drilling. All data received from the geotechnical drilling is interpreted to report to the Client about overall site conditions as well as their anticipated impact upon the specific project. Actual site conditions may vary from those inferred to exist as it is virtually impossible to provide a definitive subsurface profile which accounts for all the possible variability inherent in earth materials. Soil depths and composition can vary due to natural and anthropogenic processes. This is particularly pertinent to some weathered sedimentary geologies or colluvial/alluvial clast deposits which may show significant variability in depth to refusal over a development area. Furthermore where rocky profiles are encountered no comment is made about the potential size of liberated rocks from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sought from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations. Rock incongruities such as joints, dips or faults may also result in subsurface variability. Variability may lead to differences between the design depth of bored/driven piers compared with the actual depth of individual piers constructed onsite. It may also affect the founding depth of conventional strip, pier and beam or slab footings, which may result in increased costs associated with excavation (particularly of rock) or materials costs of foundations. Founding surface inspections should be commissioned by the Client prior to foundation construction to verify the results of initial site characterisation and failure to insure this will void the classifications and recommendations contained within this report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any variation from the site conditions inferred to exist.

Strata is not responsible for the interpretation of site data or report findings by other parties, including parties involved in the design and construction process. The Client must seek advice from Strata about the interpretation of the site data or report.

Report Recommendations

Any report recommendations provided by Strata are only preliminary. A report is based upon 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 earthworks and/or foundation construction is almost complete. Where variations in conditions are encountered, Strata should be engaged to provide further advice. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if the results of selective point sampling are not indicative of actual conditions throughout an area or if the Client becomes aware of variations in conditions and does not engage Strata for further advice.

Geo-environmental Considerations

Strata does not consider site contamination, unless the Client specifically instructs Strata to consider the site contamination in writing. If a request is made by the Client to consider site contamination, Strata will provide additional terms and conditions that will apply to the engagement.

Copyright and Use of Documents

Copyright in all drawings, reports, specifications, calculations and other documents provided by Strata or its employees in connection with the Services remain vested in Strata. The Client has a licence to use the documents for the purpose of completing the project. However, the Client must not otherwise use the documents, make copies of the documents or amend the documents unless express approval in writing is given in advance by Strata. The Client must not publish or allow to be published, in whole or in part, any document provided by Strata or the name or professional affiliations of Strata, without first obtaining the written consent of Strata as to the form and context in which it is to appear.

If, during the course of providing the Services, Strata develops, discovers or first reduces to practice a concept, product or process which is capable of being patented then such concept, product or process is and remains the property of Strata and:

- (i) the Client must not use, infringe or otherwise appropriate the same other than for the purpose of the project without first obtaining the written consent of Strata; and
- (ii) the Client is entitled to a royalty free licence to use the same during the life of the works comprising the project.

Digital Copies of Report

If any report is provided to the Client in an electronic copy except directly from Strata, the Client should verify the report contents with Strata to ensure they have not been altered in any way from the original provide by Strata.



Site Classification to AS2870-2011 - Residential Slabs and Footings

1. Introduction

Strata Geoscience and Environmental Pty Ltd was commissioned to provide a Site Classification to AS2870-2011 for:

Site Details and Key Investigation Outcomes	
Site Address	Unit 3 13-15 Barr Street Lady Barron
Property Owner/Client	CBM Sustainable Design
Development	New dwelling
Date of Investigation	13/9/21
Key Geotechnical Limitations to Site Development	Uncontrolled fill (from future site clearing), reactive soil phases, potential for abnormal soil moisture gradients, potential for colluvial and bedrock outcroppings
Key Recommendations	Site drainage around deepened foundations recommended
Site Classification to AS2870-2011	Class P – ALERT TO TREES WITHIN ZONE OF INFLUENCE OF FUTURE FOUNDATIONS AND UNCONTROLLED FILL/DISTURBED PROFILES
Subsidiary Site Classification to AS2870-2011 (TO BE USED FOR PLUMBING DESIGN SEE APPENDIX 3)	Class M
Site Classification to AS4055- 2012	N2

2. Scope

It is the scope of this investigation to consider geotechnical factors affecting the current development plan (if available). Namely;

- Geotechnical Drilling of minimum 1 Bore (s) to 1.8 m or refusal (whichever first) with logging, sampling and in-situ testing as required
- Site Classification to AS2870-2011 Residential Slabs and Footings.

The above scope has been determined in consultation with the Client and is subject to time and budgetary considerations. Geotechnical investigations are informative processes and further works may be required depending upon the findings of the results of this investigation.

3. Site Investigation

Please refer to Appendices for the results of field/laboratory investigation (where relevant) including site photographs, bore logs, bearing capacity and other relevant data.

4. Interpretation

Geotechnical Parameter	Results
General Comments	FLAT SITE, ACCESS RESTRICTED GIVEN VEGETATION COVER. LARGE TREES REQUIRING REMOVAL (SEE SITE PHOTOS). SITE DEVEGETATION WILL CAUSE FUTURE DISTURBED GROUND SURFACE. TARGET DEPTH OF FOUNDATIONS MAY BE REVIEWED SUBJECT TO A POST DEMOLITION ASSESSMENT.
Site Geology (MRT Tas 1:250000)	Dgaas
Geotechnical Risks:	
<i>Slope Instability</i>	Not mapped hazard band (DPAC 2023) accessed via LISTMAP).
<i>Soft/Collapsing Soil</i>	Recommend maximum 100kPa working bearing pressures at a minimum 2000mm or refusal.
<i>Groundsurface Movement</i>	Slight-Moderate (variability anticipated over the site).
<i>Erosion Potential</i>	Soils may be sensitive to wind and water erosion. Risks to be controlled by a soil and water management plan.
<i>Surface Water</i>	Not observed
<i>Shallow Groundwater/Perched Water</i>	Not encountered- localised seasonal groundwater tables known to exist in localised landscape- upslope interceptor drain age around foundations required.
<i>Uncontrolled Fill/Disturbed Soils</i>	Uncontrolled fill will be caused through site de-vegetation. FILL MUST NOT BE USED AS A FOUNDING SUBSTRATE. A POST DEMOLITION ASSESSMENT MAY REDUCE TARGET DEPTH OF FOUNDATIONS. Furthermore, ex-situ uncontrolled fill observed onsite (see site photos).
<i>Impacting Vegetation (Onsite or on adjacent sites)</i>	Trees onsite warranting design consideration
<i>Proposed or recent removal of building/structures</i>	Unknown
<i>Proposed or recent removal of trees</i>	Large trees to be removed as discussed above
<i>Excavation Difficulties</i>	Possible – near surface granite floaters and bedrock known to occur in localised landscape.
<i>Bulk Earthworks (Completed/partially completed/not proposed)</i>	None

5. Recommended Foundation Design Parameters

- The following foundation design parameters are recommended:

Recommended Footing Designs			
	Slab	Pad/Strip	Pier/Pile Footings
Founding material ^{*1}	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK
Recommended Minimum Founding Depth (mm or m)	PIER/PILE SUPPOPTED MIN 2000MM OR REFUSAL	PIER/PILE SUPPOPTED MIN 2000MM OR REFUSAL	PIER/PILE SUPPOPTED MIN 2000MM OR REFUSAL
Max Allowable Bearing Pressure (kPa)	100	100	100
Indicative Soil Ys (mm)	20-40mm	20-40mm	20-40mm

^{*1} Where depth to bedrock is given it is a guide only and will vary over the proposed development area(s). Refusal in geotechnical bores may be different than that of larger construction machinery and this may need to be factored into foundation design and contractor quotations.

It must be emphasised that in classifying the site, Strata Geoscience and Environmental P/L did not place sole reliance on the soil bore logs as a means of being an absolute representation of all subsurface features and conditions over the site. Any persons relying upon this document must not assume that subsurface conditions across the entire site will be identical to that represented in the bore logs.

Relevant information and guidance used in classifying the site includes several or all of the following:

- Publications from Standards Australia, CSIRO, Foundation and Footings Society, Australian Geomechanics Society.
- Well established and relevant knowledge of the behaviour of local soils and processes affecting soil behaviour (eg ephemeral springs, perched water tables, unstable slopes, collapsing soils, vegetation, etc).
- The broad experience of the site classifier.
- Specific investigations from nearby areas.
- Past Performance of existing structures and foundations (where relevant and known)
- Engineering Assessment of likely characteristic ground surface movement (ys) based upon estimated I_{pt} values and/or laboratory derived I_{ss} values where relevant.

6. Construction Recommendations

6.1 Pre Construction

- Results of this investigation **MUST** be confirmed when specific development plans are finalised. Failure to ensure this will void the classifications and recommendations contained within this report.
- Design depth to refusal for bored pier/driven pile designs may show variability over the site and may need to be considered in any contractor quotation. Construction machinery will show different depths to refusal that what is indicated in this investigation.
- Test pitting/piling with construction machinery is recommended before construction commences to determine excavatability of refusing substrate (if found).
- Screw piles should be driven to a minimum depth as nominated by the foundation designer to ensure lateral stability of each pile. Test piling at all corners of each building must occur to ensure this.
- This investigation did not determine rock strength parameters of the refusing substrate (if found) and therefore no comment is made about the excavatability of rock at depth. Hard rock may be encountered which may be difficult to excavate and would therefore increase the costs associated with bulk earthworks.
- Rocks may be liberated from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sort from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations.
- Where rock is encountered the in relation to the Foundation Recommendations the following terms should be noted as per AS2870-2011 Residential Slabs and Footings
 - **Rock Outcrops** - Where a footing or edge beam encounters a single local rock outcrop over a length less than 1 m, the depth of the footing or edge beam may be reduced by up to one-third, provided the amount of top and bottom reinforcement is doubled and extended 500 mm past the section with reduced depth. Alternatively, the footing may be stepped or raised, provided the structural stiffness is preserved as per AS2870-2011 Clause 3.1.6.
 - **Partial Rock Outcrops** - Where part of the footing is on rock and part is on soil, provision for movement at the change between the two types of foundation shall be made by articulation of the superstructure or strengthening of the footing system. On Reactive Sites (M, H1 and H2) where part of the footing is on rock and part is on soil, the design shall be in accordance with engineering principles as per AS2870-2011 Clause 3.1.7.
 - **Design for complete rock foundation** - Where the edge beam or footing is to be founded entirely on rock, the footing or beam may be replaced by a levelling pad of concrete or mortar as per AS2870-2011 Clause 3.1.8.

- **Abnormal moisture conditions as defined in AS2870-2011 Clause 1.3.3 (a-d) MUST be considered in the design of competent footings. Without such consideration distresses of foundations may occur and result in non acceptable performance as defined in AS2870-2011 Clause 1.3.1.**
- **Uncontrolled Fill** - Any FILLING that does not meet the requirements of AS2870- 2011 Clause 2.5.3(b). This clause allows up to 0.8m of uncontrolled SAND FILL and up to 0.4m of uncontrolled CLAY FILL without impacting on the above site classification following that all foundations are founded on the natural soils through the filling.
- **Rolled Fill** - Consists of material compacted in layers by repeated rolling with an excavator or similar equipment. The depth of rolled fill shall not exceed 0.6m compacted in layers of not more than 0.3m thick for sand material or 0.3m compacted in layers of not more than 0.15m thick for other materials as per AS2870-2011 Clause 6.4.2(b).
- **Controlled Fill** – Fill that will be required to support structures or associated pavements, or for which engineering properties are to be controlled – Refer to AS2870-2011 Clauses 2.5.3, 2.5.3(a), and 6.4.2(a) – i.e. where a specification has been provided on the type, quality, and compaction requirements for filling at a site and the earthworks have been deemed compliant or have complied with the requirements of the specification.
- The recommendations of CSIRO Building Technology File 18 be adopted.
- An apron of paving around the building perimeter sloping away from foundations with a minimum fall of 1:60 be considered for Class M, H-1, H-2, E and P sites.

6.2 During Construction

Throughout construction it is highly recommended that:

- Inspection of the natural soil surface after footings excavation but prior to construction is required by Strata Geoscience and Environmental in accordance with Appendix D of AS 2870-2011. Failure to comply with this recommendation will void all classifications and recommendations contained in this report. The site classification may be changed at this time depending upon the nature of the founding surface which is dependant in part on foundation design.
- **Site cutting should be avoided if possible and if it occurs below 500mmbgs occurs then reclassification MUST be commissioned.**
- **Fill MUST NOT be used as a founding substrate.**
- All earthworks onsite must follow the recommendations of AS 3798-2007.
- Consideration should be given to drainage and sediment control on site during and after construction. Specifically upslope interceptor drainage must be placed around footings areas and downpipes must be directed away from discharging into founding areas.
- All colluvial rocks and boulders in founding zones should be removed
- All large trees near the building envelope must be removed. If construction takes place in summer or autumn then moisture conditions should be stabilised by soaking of dry areas around the former tree.
- Shrinkage cracking is almost inevitable in concrete slabs and is associated with the drying process. Therefore care must be taken

where brittle or sensitive floor coverings are proposed, or where a polished slab is planned. The risk of damage can be reduced by not installing floor coverings until after shrinkage has occurred, which can take in excess of 3 months, or by using flexible mortars and appropriate sheeting material.

- Vertical barriers to prevent root incursions around founding zones should be considered in areas where gardens are to be established near foundations.

6.3 Post Construction

After construction, there are certain practices that the owner/occupier should be aware of to prevent excessive foundation movements. The owner will be responsible for any damage or loss associated with disregard for the recommendations contained in CSIRO Building Technology Files 18 "Foundation Maintenance and Footings Performances: A Homeowners Guide" available through CSIRO.

It is furthermore recommended that:

- Gardens or large shrubs or trees must not be established immediately adjacent to foundations
- Garden beds or lawn near foundations must not be excessively watered.
- Leaking underground services and downpipes or gutters must be fixed immediately.



S Nielsen MEngSc CPSS
Director
Strata Geoscience and Environmental Pty Ltd
E: sven@strataconsulting.com.au

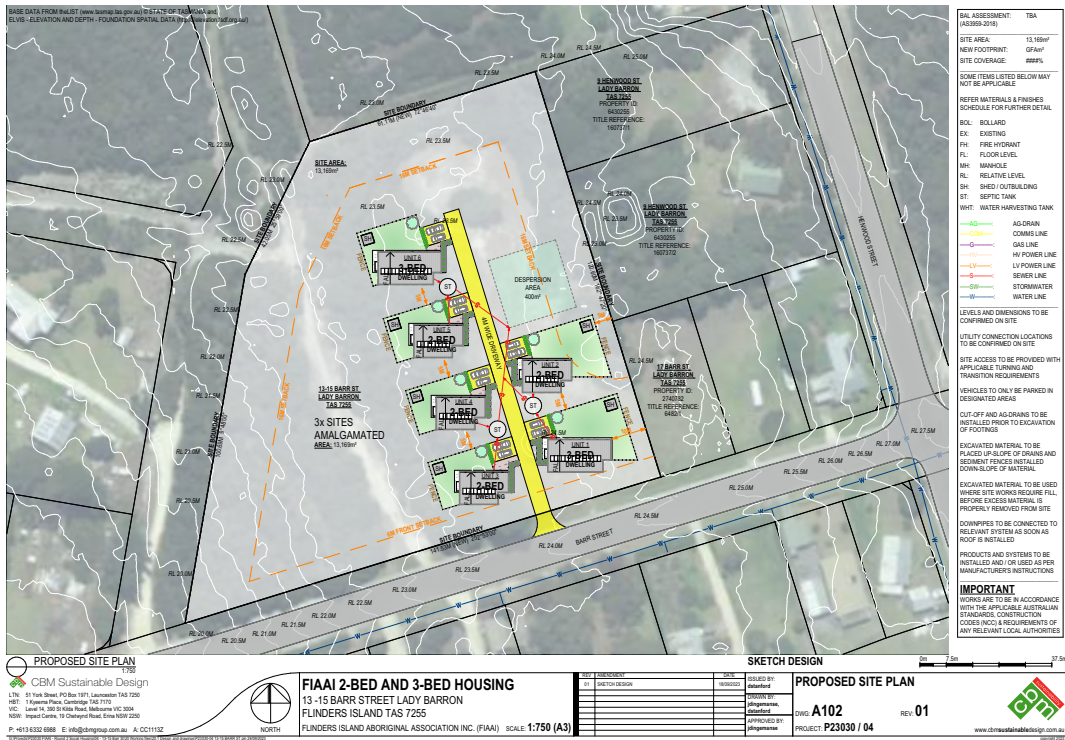
Appendix 1 Site Photos












Appendix 2 Indicative Bore Logs

 strata <small>Geoscience and Environmental</small>		Indicative Profile Log					BH01	
Client:							Coords:	
Project:								
Drill Type:							Bearing: Dip:	
Drilling Mot:							RL SEE WS	
Fluid:							Logged by:	
							Date:	
RL	Depth (mm)	Graphic Log	Material Description	Soil	Rock	Weathering	Frac. Spacing	Sampling and Test Testing
				Very Loose Soft Loose Firm/Loose Stiff/Dense Very Stiff/Dense Very Low Low Medium High Very High Extremely High	Medium High Very High Extremely High	FW MW SW FS FR	U.05 U.1 U.5	TYPE TDDSC
			BROWNISH GREY SAND (SM) LOOSE	NP				
			TRENDING GREY SAND (SP) LOOSE	NP				
900			TRENDING MEDIUM DENSE, LOWER BOUNDARY UNDEFINED					
1000								
1500								
2000								
2500								
3000								
3500								
4000								
4500								
5000								
5500								
6000								
6500								
7000								
7500								
8000								
				BORE TERMINATED AT 1.3 M				
8500								
9000								

Geotechnical Terms and Symbols

The following information is intended to assist in the interpretation of terms and symbols used in geotechnical borehole logs, test pit logs and reports issued by or for the Queensland Department of Transport and Main Roads (TMR). More detailed information relating to specific test methods is available in the TMR Materials Testing Manual (MTM) and the relevant Australian Standards.

Soil Descriptions

Description and Classification of Soils for Geotechnical Purposes: Refer to AS1726-1993 (Appendix A).

The following chart (adapted from AS1726-1993, Appendix A, Table A1) is based on the Unified Soil Classification System (USCS).

Major Divisions	Particle size mm	USCS Group Symbol	Typical Names	Laboratory Classification				NOTES	
COARSE GRAINED SOILS (more than half of material less than 63 mm & larger than 0.075 mm)	BOULDERS _____200			% < 0.075 mm (2)	Plasticity of fine fraction	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{(D_{10} \times D_{60})}$		
	COBBLES _____63								
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	coarse _____20	GW	Well graded gravels and gravel-sand mixtures, little or no fines	0-5	—	>4	Between 1 and 3	(1) Identify fines by the method given for fine-grained soils.
		medium _____5	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels	0-5	—	Fails to comply with above		
		fine _____2.36	GM	Silty gravels, gravel-sand-silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	(2) Borderline classifications occur when the percentage of fines (fraction smaller than 0.075 mm size) is greater than 5% and less than 12%. Borderline classifications require the use of SP-SM, GW-GC.
			GC	Clayey gravels, gravel-sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	
	SANDS (more than half of coarse fraction is smaller than 2.36 mm)	coarse _____0.6	SW	Well graded sands and gravelly sands, little or no fines	0-5	—	>6	Between 1 and 3	
		medium _____0.2	SP	Poorly graded sands and gravelly sands, little or no fines	0-5	—	Fails to comply with above		
		fine 0.075	SM	Silty sands, sand silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	
			SC	Clayey sands, sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	
	FINE GRAINED SOILS (more than half of material less than 63 mm & smaller than 0.075 mm)	SILTS & CLAYS (Liquid Limit $\leq 50\%$)	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity					
			CL CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays					
OL			Organic silts and clays of low plasticity						
SILTS & CLAYS (Liquid Limit $> 50\%$)		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts						
		CH	Inorganic clays of high plasticity, fat clays						
		OH	Organic silts and clays of high plasticity						
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils						

Use the gradation curve of material passing 63 mm for classification of fractions according to the criteria given in Major Divisions.

Plasticity Chart

For classification of fine grained soils and fine fraction of coarse grained soils.

Geotechnical Terms and Symbols

Soil Colour: Is described in the moist condition using black, white, grey, red, brown, orange, yellow, green or blue. Borderline cases can be described as a combination of two colours, with the weaker followed by the stronger. Modifiers such as pale, dark or mottled, can be used as necessary. Where colour consists of a primary colour with secondary mottling, it should be described as follows:
(Primary) mottled (Secondary). Refer to AS 1726-1993, A2.4 and A3.3.

Soil Moisture Condition: Is based on the appearance and feel of soil. Refer to AS 1726-1993, A2.5.

Term	Description
Dry	Cohesive soils; hard and friable or powdery, well dry of plastic limit. Granular soils; cohesionless and free-running.
Moist	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water forms on hands when handling. Granular soils tend to cohere and free water forms on hands when handling.

Consistency of Cohesive Soils: May be estimated using simple field tests, or described in terms of a strength scale. In the field, the undrained shear strength (s_u) can be assessed using a simple field tool appropriate for cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A4.

Consistency - Essentially Cohesive Soils						Soil Particle Sizes	
Term	Field Guide	Symbol	SPT N_{60} Value	Undrained Shear Strength s_u (kPa)	Unconfined Compressive Strength q_u (kPa)	Term	Size Range
Very soft	Oozes between fingers when squeezed in hand.	VS	0-2	<12	<25	BOULDERS	>200 mm
Soft	Easily moulded with fingers.	S	2-4	12-25	25-50	COBBLES	63-200 mm
Firm	Can be moulded by strong pressure of fingers.	F	4-8	25-50	50-100	Coarse GRAVEL	20-63 mm
Stiff	Not possible to mould with fingers.	St	8-15	50-100	100-200	Medium GRAVEL	6-20 mm
Very stiff		VSt	15-30	100-200	200-400	Fine GRAVEL	2.36-6 mm
Hard	Can be indented with difficulty by thumb nail.	H	>30	>200	>400	Coarse SAND	0.6-2.36 mm
						Medium SAND	0.2-0.6 mm
						Fine SAND	0.075-0.2 mm
						SILT	0.002-0.075 mm
						CLAY	<0.002 mm

Note: SPT - N to q_u correlation from Terzaghi and Peck, 1967. (General guide only).

Consistency of Non-Cohesive Soils: Is described in terms of the density index, as defined in AS 1289.0-2000. This can be assessed using a field tool appropriate for non-cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A5; BS5930-1999, p117.

Consistency - Essentially Non-Cohesive Soils				
Term	Symbol	SPT N Value	Field Guide	Density Index (%)
Very loose	VL	0-4	Foot imprints readily	0-15
Loose	L	4-10	Shovels Easily	15-35
Medium dense	MD	10-30	Shovelling difficult	35-65
Dense	D	30-50	Pick required	65-85
Very dense	VD	>50	Picking difficult	85-100

Standard Penetration Test (SPT): Refer to AS 1289.6.3.1-2004. Example report formats for SPT results are shown below:

Test Report	Penetration Resistance (N)	Explanation / Comment
4, 7, 11	N=18	Full penetration; N is reported on engineering borehole log
18, 27, 32	N=59	Full penetration; N is reported on engineering borehole log
4, 18, 30/15 mm	N is not reported	30 blows causes less than 100 mm penetration (3 rd interval) – test discontinued
30/80 mm	N is not reported	30 blows causes less than 100 mm penetration (1 st interval) – test discontinued
rw	N<1	Rod weight only causes full penetration
hw	N<1	Hammer and rod weight only causes full penetration
hb	N is not reported	Hammer bouncing for 5 consecutive blows with no measurable penetration – test discontinued

Rock Descriptions

Refer to AS 1726-1993 (Appendix A3.3) for the description and classification of rock material composition, including:

- (a) Rock type (Table A6, (a) and (b))
- (b) Grain size
- (c) Texture and fabric
- (d) Colour (describe as per soil).

The condition of a rock material refers to its weathering characteristics, strength characteristics and rock mass properties. Refer to AS 1726-1993 (Appendix A3 Tables A8, A9 and A10).

Weathering Condition (Degree of Weathering):

The degree of weathering is a continuum from fresh rock to soil. Boundaries between weathering grades may be abrupt or gradational.

Rock Material Weathering Classification		
Weathering Grade	Symbol	Definition
Residual Soil	RS	Soil-like material developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the material has not been significantly transported.
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water, but substance fabric and rock structure still recognisable.
Highly Weathered Rock	HW	Strong discolouration is evident throughout the rock mass, often with significant change in the constituent minerals. The intact rock strength is generally much weaker than that of the fresh rock.
Moderately Weathered Rock	MW	Modest discolouration is evident throughout the rock fabric, often with some change in the constituent minerals. The intact rock strength is usually noticeably weaker than that of the fresh rock.
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh Rock	FR	Rock shows no sign of decomposition or staining.

Notes:

- Minor variations within broader weathering grade zones will be noted on the engineering borehole logs.
- Extremely weathered rock is described in terms of soil engineering properties.
- Weathering may be pervasive throughout the rock mass, or may penetrate inwards from discontinuities to some extent.
- The 'Distinctly Weathered (DW)' class as defined in AS 1726-1993 is divided to incorporate HW and MW in the above table. The symbol DW should not be used.

Strength Condition (Intact Rock Strength):

Strength of Rock Material			
(Based on Point Load Strength Index, corrected to 50 mm diameter – $I_{p(50)}$. Field guide used if no tests available. Refer to AS 4133.4.1-2007.			
Term	Symbol	Point Load Index (MPa) $I_{p(50)}$	Field Guide to Strength
Extremely Low	EL	≤ 0.03	Easily remoulded by hand to a material with soil properties.
Very Low	VL	> 0.03 ≤ 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low	L	> 0.1 ≤ 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	> 0.3 ≤ 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	> 1 ≤ 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	> 3 ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High	EH	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:

- These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.
- Anisotropy of rock material samples may affect the field assessment of strength.

Geotechnical Terms and Symbols

Discontinuity Description: Refer to AS 1726-1993, Table A10.

Anisotropic Fabric		Roughness (e.g. Planar, Smooth is abbreviated FI / Sm) Class				Other	
BED	Bedding	Stepped (Stp)	Rough or Irregular (Ro)		I	Cly	Clay
FOL	Foliation		Smooth (Sm)		II	Fe	Iron
LIN	Mineral Inclusion		Slickensided (Sl)		III	Co	Coal
Defect Type		Undulating (Un)	Rough (Ro)		IV	Carb	Carbonaceous
LP	Lamination Parting		Smooth (Sm)		V	Sinf	Soil Infill Zone
BP	Bedding Parting		Slickensided (Sl)		VI	Qz	Quartz
FP	Cleavage / Foliation Parting	Planar (Pl)	Rough (Ro)		VII	CA	Calcite
J, Js	Joint, Joints		Smooth (Sm)		VIII	Chl	Chlorite
SZ	Sheared Zone		Slickensided (Sl)		IX	Py	Pyrite
CZ	Crushed Zone	Aperture		Infilling		Int	Intersecting
BZ	Broken Zone	Closed	CD	No visible coating or infill		Clean	Cn
HFZ	Highly Fractured Zone	Open	OP	Surfaces discoloured by mineral/s		Stain	St
AZ	Alteration Zone	Filled	FL	Visible mineral or soil infill <1mm		Veneer	Vr
VN	Vein	Tight	TI	Visible mineral or soil infill >1mm		Coating	Ct
						Inc	Incipient
						DI	Drilling Induced
						H	Horizontal
						V	Vertical

Note: Describe 'Zones' and 'Coatings' in terms of composition and thickness (mm).

Discontinuity Spacing: On the geotechnical borehole log, a graphical representation of defect spacing vs depth is shown. This representation takes into account all the natural rock defects occurring within a given depth interval, excluding breaks induced by the drilling / handling of core. Refer to AS 1726-1993, B85930-1999.

Defect Spacing			Bedding Thickness (Sedimentary Rock Stratification)		Defect Spacing in 3D	
Spacing/Width (mm)	Descriptor	Symbol	Descriptor	Spacing/Width (mm)	Term	Description
			Thinly Laminated	< 6	Blocky	Equidimensional
<20	Extremely Close	EC	Thickly Laminated	6 – 20	Tabular	Thickness much less than length or width
20 – 60	Very Close	VC	Very Thinly Bedded	20 – 60	Columnar	Height much greater than cross section
60 – 200	Close	C	Thinly Bedded	60 – 200		
200 – 600	Medium	M	Medium Bedded	200 – 600		
600 – 2000	Wide	W	Thickly Bedded	600 – 2000		
2000 – 6000	Very Wide	VW	Very Thickly Bedded	> 2000		
>6000	Extremely Wide	EW				

Defect Persistence (areal extent)	
Trace length of defect given in metres	

Symbols

The list below provides an explanation of terms and symbols used on the geotechnical borehole, test pit and penetrometer logs.

Test Results				Test Symbols	
PI	Plasticity Index	I_p	Effective Cohesion	DCP	Dynamic Cone Penetrometer
LL	Liquid Limit	w_L	Undrained Cohesion	SPT	Standard Penetration Test
LI	Liquidity Index	I_L	Residual Cohesion	CPTu	Cone Penetrometer (Piezocone) Test
DD	Dry Density	ρ_d	Effective Angle of Internal Friction	PANDA	Variable Energy DCP
WD	Wet Density	ρ_w	Undrained Angle of Internal Friction	PP	Pocket Penetrometer Test
LS	Linear Shrinkage	ρ_{sh}	Residual Angle of Internal Friction	U50	Undisturbed Sample 50 mm (nominal diameter)
MC	Moisture Content	w	Coefficient of Consolidation	U100	Undisturbed Sample 100mm (nominal diameter)
OC	Organic Content	m_v	Coefficient of Volume Compressibility	UCS	Uniaxial Compressive Strength
WPI	Weighted Plasticity Index	C_u	Coefficient of Secondary Compression	Pm	Pressuremeter

Geotechnical Terms and Symbols

Test Results				Test Symbols	
WLS	Weighted Linear Shrinkage	e	Voids Ratio	FBV	Field Shear Vane
DoS	Degree of Saturation	W_w	Constant Volume Friction Angle	DST	Direct Shear Test
APD	Apparent Particle Density	q_t / q_c	Piezocene Tip Resistance (corrected / uncorrected)	PR	Penetration Rate
s_u	Undrained Shear Strength	q_u	PANDA Cone Resistance	A	Point Load Test (axial)
q_u	Unconfined Compressive Strength	I_{pm}	Point Load Strength Index	D	Point Load Test (diametral)
R	Total Core Recovery	RQD	Rock Quality Designation	L	Point Load Test (irregular lump)

 28/11/13	Groundwater level on the date shown	 Water Inflow	 Water Outflow
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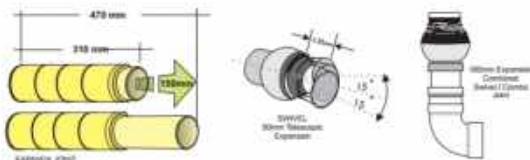
Appendix 3 Site Classification and Plumbing Specifications

Table SP 01 - SOIL CLASSIFICATION, DIFFERENTIAL MOVEMENT, GRADE, ANGLE, JOINTS LOCATION & DRAWING No'S. CHART.

AS2870-2011 SOIL CLASSIFICATION	ON SITE SOIL CONDITIONS	DIFFERENTIAL MOVEMENT	SEWER & Stormwater GRADE	SWIVEL * (50mm Expansion)	SWIVEL/COMBO * (100mm Expansion)	EXPANDA JOINTS *	CREEP SLOPE SITES	DRAWING NUMBER
A	Most Sand & Rock sites	0 - 10mm	1:60 Minimum	Not necessary	Not necessary	Not necessary	These are termed P sites and are referred to in Drawing SP 105	N/a
S	Slightly reactive Soils	10 - 20mm						N/a
M	Moderately reactive soils	20 - 40mm						SP 100 & SP 101
H1	Highly reactive soils	40 - 60mm	1:40 Minimum	As per AS3500.5 using 2 units outside and an Expansion Joint at every riser Not applicable to suspended sub-floors	As necessary using either or both Bend or Straight units ...unless suspended from slab	At Junctions within 1 mtr of internal building footprint and every 6 mtrs. As per Differential Movement See AS2032-2006 Clause 6.4.2.2-4 for suspension requirements	SP 102	SP 102A
H2	Very highly reactive soils	60 - 75mm						SP 102A
E	Extremely reactive soils	75 + mm						SP 102A
P	Soils affected by Abnormal moisture and conditions	From 20 + mm						As per Differential Movement

NOTE: Engineer or local Authority details take precedence over this chart.

To be read in conjunction with Storm Plastics drawings shown.



* Unless specified otherwise, these joints are to be set at 50% of total telescopic movement.

GRADE RATIO	FALL IN 10 mtrs	ANGLE	GRADE %
1:100	100 mm	.57	1.0
1:80	125 mm	.71	1.25
1:60	167 mm	.95	1.65
1:50	200 mm	1.14	2.0
1:40	250 mm	1.43	2.5

Apr. 2015, WPC

Appendix 4 Form 55

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Owner /Agent
 Address
 Suburb/postcode

Qualified person details:

Qualified person:
 Address: Phone No:
 Fax No:
 Licence No: Email address:

Qualifications and Insurance details: (description from Column 3 of the Director of Building Control's Determination)

Speciality area of expertise: (description from Column 4 of the Director of Building Control's Determination)

Details of work:

Address: Lot No:
 Certificate of title No:
 The assessable item related to this certificate: (description of the assessable item being certified)
 Assessable item includes –
 - a material;
 - a design
 - a form of construction
 - a document
 - testing of a component, building system or plumbing system
 - an inspection, or assessment, performed

Certificate details:

Certificate type: (description from Column 1 of Schedule 1 of the Director of Building Control's Determination)

This certificate is in relation to the above assessable item, at any stage, as part of - (tick one)
 building work, plumbing work or plumbing installation or demolition work:
 Or

a building, temporary structure or plumbing installation:

In issuing this certificate the following matters are relevant –

Documents:

SR05392

Relevant
calculations:

SEE REPORT WHERE RELEVANT

References:

Substance of Certificate: (what it is that is being certified)

AS2870-2011 ASSESSMENT

Scope and/or Limitations

SEE RECOMMENDATIONS AND WELL AS TERMS AND CONDITIONS CONTAINED WITHIN THE RELEVANT REPORT, ESPECIALLY NOTING:

1. ENGINEERING AND ARCHITECTURAL PLANS TO BE SUBMITTED TO STRATA FOR RATIFICATION AGAINST REPORT RECOMMENDATIONS PRIOR TO CONSTRUCTION. FAILURE TO ENSURE THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT
2. FOUNDING SURFACE INSPECTION OF ALL EXCAVATIONS PRIOR TO FOUNDATION CONSTRUCTION BY STRATA IS MANDATORY AND FAILING TO COMMISSION THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT. THIS IS TO ENSURE THAT ALL FOUNDATIONS ARE TAKEN TO RECOMMENDED FOUNDING SUBSTRATE AND NOT SOFT TOPSOILS OR UNCONTROLLED FILL (WHERE PRESENT)
3. IF SITE CUTTING BEYOND 500MM OCCURS THEN THE SITE MUST BE RECLASSIFIED IN CONSULTATION WITH STRATA.
4. FORM VALID FOR 2 YEARS FROM THE DATE BELOW.

I certify the matters described in this certificate.

Qualified person: *Signed:* *Certificate No:* *Date:*

S NIELSEN 

SR05392

27/9/23



Appendix 5 Terms and Conditions

Scope of Work

These Terms and Conditions apply to any services provided to you ("the Client") by Strata Geoscience and Environmental Pty Ltd ("Strata"). By continuing to instruct Strata to act after receiving the Terms and Conditions or by using this report and its findings for design and/or permit application processes and not objecting to any of the Terms and Conditions the Client agrees to be bound by these Terms and Conditions, and any other terms and conditions supplied by Strata from time to time at Strata's sole and absolute discretion. The scope of the services provided to the Client by Strata is limited to the services and specified purpose agreed between Strata and the Client and set out in the correspondence to which this document is enclosed or annexed ("the Services"). Strata does not purport to advise beyond the Services.

Third Parties

The Services are supplied to the Client for the sole benefit of the Client and must not be relied upon by any person or entity other than the Client. Strata is not responsible or liable to any third party. All parties other than the Client are advised to seek their own advice before proceeding with any course of action.

Provision of Information

The Client is responsible for the provision of all legal, survey and other particulars concerning the site on which Strata is providing the Services, including particulars of existing structures and services and features for the site and for adjoining sites and structures. The Client is also responsible for the provision of specialised services not provided by Strata. If Strata obtains these particulars or specialised services on the instruction of the Client, Strata does so as agent of the Client and at the Client's expense. Strata is not obliged to confirm the accuracy and completeness of information supplied by the Client or any third party service provider. The Client is responsible for the accuracy and completeness of all particulars or services provided by the Client or obtained on the Client's behalf. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person or entity resulting from the failure of the Client or third party to provide accurate and complete information. In the event additional information becomes available to the Client, the Client must inform Strata in writing of that information as soon as possible. Further advice will be provided at the Client's cost. Any report is prepared on the assumption that the instructions and information supplied to Strata has been provided in good faith and is all of the information relevant to the provision of the Services by Strata. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if Strata has been supplied with insufficient, incorrect, incomplete, false or misleading information.

Integrity

Any report provided by Strata presents the findings of the site assessment. While all reasonable care is taken when conducting site investigations and reporting to the Client, Strata does not warrant that the information contained in any report is free from errors or omissions. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from errors in a report. Any report should be read in its entirety, inclusive of any summary and annexures. Strata does not accept any responsibility where part of any report is relied upon without reference to the full report.

Project Specific Criteria

Any report provided by Strata will be prepared on the basis of unique project development plans which apply only to the site that is being investigated. Reports provided by Strata do not apply to any project other than that originally specified by the Client to Strata. The Report must not be used or relied upon if any changes to the project are made. The Client should engage Strata to further advise on the effect of any change to the project. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever where any change to the project is made without obtaining a further written report from Strata. Changes to the project may include, but are not limited to, changes to the investigated site or neighbouring sites, for instance, variation of the location of proposed building envelopes/footprints, changes to building design which may impact upon building settlement or slope stability, or changes to earthworks, including removal (site cutting) or deposition of sediments or rock from the site.

Classification to AS2870-2011

It must be emphasised that the site classification to AS2870-2011 and recommendations referred to in this report are based solely on the observed soil profile at the time of the investigation for this report and account has been taken of Clause 2.1.1 of AS2870 - 2011. Other abnormal moisture conditions as defined in AS2870 - 2011 Clause 1.3.3 (a) (b) (c) and (d) may need to be considered in the design of the structure. Without designing for the possibility of all abnormal moisture conditions as defined in Clause 1.3.3, distresses will occur and may result in non "acceptable probabilities of serviceability and safety of the building during its design life", as defined in AS2870 - 2011, Clause 1.3.1. Furthermore the classification is preliminary in nature and needs verification at the founding surface inspection phase. The classification may be changed at this time based upon the nature of the founding surface over the entire footprint of the project area. Any costs associated with a change in the site classification are to be incurred by the client. Furthermore any costs associated with delayed works associated with a founding surface inspection or a change in classification are to be borne by the client. Where founding surface inspections are not commissioned the classifications contained within this report are void. Classification is based upon a range of expected ground surface movement as indicated in AS2870-2011. Where the range of movement exceeds the stipulations for the nominated classification Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person.

Slope Instability Risks

Where comment, modelling or treatment options are suggested to limit the risk of slope instability Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from actual slope instability or mass movement over the site at any point over the design life of any structures or neighbouring structures.

Subsurface Variations with Time

Any report provided by Strata is based upon subsurface conditions encountered at the time of the investigation. Conditions can and do change significantly and unexpectedly over a short period of time. For example groundwater levels may fluctuate over time, affecting latent soil bearing capacity and ex-situ/insitu fill sediments may be placed/removed from the site. Changes to the subsurface conditions that were encountered at the time of the investigation void all recommendations made by Strata in any report. Strata is not liable, and

accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any change to the subsurface conditions that were encountered at the time of the investigation. In the event of a delay in the commencement of a project or if additional information becomes available to the Client about a change in conditions becomes available to the Client, the Client should engage Strata to make a further investigation to ensure that the conditions initially encountered still exist. Further advice will be provided at the Client's cost. Without limiting the generality of the above statement, Strata does not accept liability where any report is relied upon after three months from the date of the report, (unless otherwise provided in the report or required by the Australian Standard which the report purports to comply with), or the date when the Client becomes aware of any change in condition. Any report should be reviewed regularly to ensure that it continues to be accurate and further advice requested from Strata where applicable.

Interpretation

Site investigation identifies subsurface conditions only at the discrete points of geotechnical drilling, and at the time of drilling. All data received from the geotechnical drilling is interpreted to report to the Client about overall site conditions as well as their anticipated impact upon the specific project. Actual site conditions may vary from those inferred to exist as it is virtually impossible to provide a definitive subsurface profile which accounts for all the possible variability inherent in earth materials. Soil depths and composition can vary due to natural and anthropogenic processes. This is particularly pertinent to some weathered sedimentary geologies or colluvial/alluvial clast deposits which may show significant variability in depth to refusal over a development area. Furthermore where rocky profiles are encountered no comment is made about the potential size of liberated rocks from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sought from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations. Rock incongruities such as joints, dips or faults may also result in subsurface variability. Variability may lead to differences between the design depth of bored/driven piers compared with the actual depth of individual piers constructed onsite. It may also affect the founding depth of conventional strip, pier and beam or slab footings, which may result in increased costs associated with excavation (particularly of rock) or materials costs of foundations. Founding surface inspections should be commissioned by the Client prior to foundation construction to verify the results of initial site characterisation and failure to insure this will void the classifications and recommendations contained within this report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any variation from the site conditions inferred to exist.

Strata is not responsible for the interpretation of site data or report findings by other parties, including parties involved in the design and construction process. The Client must seek advice from Strata about the interpretation of the site data or report.

Report Recommendations

Any report recommendations provided by Strata are only preliminary. A report is based upon 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 earthworks and/or foundation construction is almost complete. Where variations in conditions are encountered, Strata should be engaged to provide further advice. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if the results of selective point sampling are not indicative of actual conditions throughout an area or if the Client becomes aware of variations in conditions and does not engage Strata for further advice.

Geo-environmental Considerations

Strata does not consider site contamination, unless the Client specifically instructs Strata to consider the site contamination in writing. If a request is made by the Client to consider site contamination, Strata will provide additional terms and conditions that will apply to the engagement.

Copyright and Use of Documents

Copyright in all drawings, reports, specifications, calculations and other documents provided by Strata or its employees in connection with the Services remain vested in Strata. The Client has a licence to use the documents for the purpose of completing the project. However, the Client must not otherwise use the documents, make copies of the documents or amend the documents unless express approval in writing is given in advance by Strata. The Client must not publish or allow to be published, in whole or in part, any document provided by Strata or the name or professional affiliations of Strata, without first obtaining the written consent of Strata as to the form and context in which it is to appear.

If, during the course of providing the Services, Strata develops, discovers or first reduces to practice a concept, product or process which is capable of being patented then such concept, product or process is and remains the property of Strata and:

- (i) the Client must not use, infringe or otherwise appropriate the same other than for the purpose of the project without first obtaining the written consent of Strata; and
- (ii) the Client is entitled to a royalty free licence to use the same during the life of the works comprising the project.

Digital Copies of Report

If any report is provided to the Client in an electronic copy except directly from Strata, the Client should verify the report contents with Strata to ensure they have not been altered in any way from the original provide by Strata.



Site Classification to AS2870-2011 - Residential Slabs and Footings

1. Introduction

Strata Geoscience and Environmental Pty Ltd was commissioned to provide a Site Classification to AS2870-2011 for:

Site Details and Key Investigation Outcomes	
Site Address	Unit 4 13-15 Barr Street Lady Barron
Property Owner/Client	CBM Sustainable Design
Development	New dwelling
Date of Investigation	13/9/21
Key Geotechnical Limitations to Site Development	Uncontrolled fill (from future site clearing), reactive soil phases, potential for abnormal soil moisture gradients, potential for colluvial and bedrock outcroppings
Key Recommendations	Site drainage around deepened foundations recommended
Site Classification to AS2870-2011	Class P – ALERT TO TREES WITHIN ZONE OF INFLUENCE OF FUTURE FOUNDATIONS AND UNCONTROLLED FILL/DISTURBED PROFILES
Subsidiary Site Classification to AS2870-2011 (TO BE USED FOR PLUMBING DESIGN SEE APPENDIX 3)	Class M
Site Classification to AS4055- 2012	N2

2. Scope

It is the scope of this investigation to consider geotechnical factors affecting the current development plan (if available). Namely;

- Geotechnical Drilling of minimum 1 Bore (s) to 1.8 m or refusal (whichever first) with logging, sampling and in-situ testing as required
- Site Classification to AS2870-2011 Residential Slabs and Footings.

The above scope has been determined in consultation with the Client and is subject to time and budgetary considerations. Geotechnical investigations are informative processes and further works may be required depending upon the findings of the results of this investigation.

3. Site Investigation

Please refer to Appendices for the results of field/laboratory investigation (where relevant) including site photographs, bore logs, bearing capacity and other relevant data.

4. Interpretation

Geotechnical Parameter	Results
General Comments	FLAT SITE, ACCESS RESTRICTED GIVEN VEGETATION COVER. LARGE TREES REQUIRING REMOVAL (SEE SITE PHOTOS). SITE DEVEGETATION WILL CAUSE FUTURE DISTURBED GROUND SURFACE. TARGET DEPTH OF FOUNDATIONS MAY BE REVIEWED SUBJECT TO A POST DEMOLITION ASSESSMENT.
Site Geology (MRT Tas 1:250000)	Dgaas
Geotechnical Risks:	
Slope Instability	Not mapped hazard band (DPAC 2023) accessed via LISTMAP).
Soft/Collapsing Soil	Recommend maximum 100kPa working bearing pressures at a minimum 2000mm or refusal.
Groundsurface Movement	Slight-Moderate (variability anticipated over the site).
Erosion Potential	Soils may be sensitive to wind and water erosion. Risks to be controlled by a soil and water management plan.
Surface Water	Not observed
Shallow Groundwater/Perched Water	Not encountered- localised seasonal groundwater tables known to exist in localised landscape- upslope interceptor drain age around foundations required.
Uncontrolled Fill/Disturbed Soils	Uncontrolled fill will be caused through site de-vegetation. FILL MUST NOT BE USED AS A FOUNDING SUBSTRATE. A POST DEMOLITION ASSESSMENT MAY REDUCE TARGET DEPTH OF FOUNDATIONS. Furthermore, ex-situ uncontrolled fill observed onsite (see site photos).
Impacting Vegetation (Onsite or on adjacent sites)	Trees onsite warranting design consideration
Proposed or recent removal of building/structures	Unknown
Proposed or recent removal of trees	Large trees to be removed as discussed above
Excavation Difficulties	Possible – near surface granite floaters and bedrock known to occur in localised landscape.
Bulk Earthworks (Completed/partially completed/not proposed)	None

5. Recommended Foundation Design Parameters

- The following foundation design parameters are recommended:

Recommended Footing Designs			
	Slab	Pad/Strip	Pier/Pile Footings
Founding material ^{*1}	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK
Recommended Minimum Founding Depth (mm or m)	PIER/PILE SUPPOPTED MIN 2000MM OR REFUSAL	PIER/PILE SUPPOPTED MIN 2000MM OR REFUSAL	PIER/PILE SUPPOPTED MIN 2000MM OR REFUSAL
Max Allowable Bearing Pressure (kPa)	100	100	100
Indicative Soil Ys (mm)	20-40mm	20-40mm	20-40mm

^{*1} Where depth to bedrock is given it is a guide only and will vary over the proposed development area(s). Refusal in geotechnical bores may be different than that of larger construction machinery and this may need to be factored into foundation design and contractor quotations.

It must be emphasised that in classifying the site, Strata Geoscience and Environmental P/L did not place sole reliance on the soil bore logs as a means of being an absolute representation of all subsurface features and conditions over the site. Any persons relying upon this document must not assume that subsurface conditions across the entire site will be identical to that represented in the bore logs.

Relevant information and guidance used in classifying the site includes several or all of the following:

- Publications from Standards Australia, CSIRO, Foundation and Footings Society, Australian Geomechanics Society.
- Well established and relevant knowledge of the behaviour of local soils and processes affecting soil behaviour (eg ephemeral springs, perched water tables, unstable slopes, collapsing soils, vegetation, etc).
- The broad experience of the site classifier.
- Specific investigations from nearby areas.
- Past Performance of existing structures and foundations (where relevant and known)
- Engineering Assessment of likely characteristic ground surface movement (ys) based upon estimated Ipt values and/or laboratory derived Iss values where relevant.

6. Construction Recommendations

6.1 Pre Construction

- Results of this investigation **MUST** be confirmed when specific development plans are finalised. Failure to ensure this will void the classifications and recommendations contained within this report.
- Design depth to refusal for bored pier/driven pile designs may show variability over the site and may need to be considered in any contractor quotation. Construction machinery will show different depths to refusal that what is indicated in this investigation.
- Test pitting/piling with construction machinery is recommended before construction commences to determine excavatability of refusing substrate (if found).
- Screw piles should be driven to a minimum depth as nominated by the foundation designer to ensure lateral stability of each pile. Test piling at all corners of each building must occur to ensure this.
- This investigation did not determine rock strength parameters of the refusing substrate (if found) and therefore no comment is made about the excavatability of rock at depth. Hard rock may be encountered which may be difficult to excavate and would therefore increase the costs associated with bulk earthworks.
- Rocks may be liberated from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sort from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations.
- Where rock is encountered the in relation to the Foundation Recommendations the following terms should be noted as per AS2870-2011 Residential Slabs and Footings
 - **Rock Outcrops** - Where a footing or edge beam encounters a single local rock outcrop over a length less than 1 m, the depth of the footing or edge beam may be reduced by up to one-third, provided the amount of top and bottom reinforcement is doubled and extended 500 mm past the section with reduced depth. Alternatively, the footing may be stepped or raised, provided the structural stiffness is preserved as per AS2870-2011 Clause 3.1.6.
 - **Partial Rock Outcrops** - Where part of the footing is on rock and part is on soil, provision for movement at the change between the two types of foundation shall be made by articulation of the superstructure or strengthening of the footing system. On Reactive Sites (M, H1 and H2) where part of the footing is on rock and part is on soil, the design shall be in accordance with engineering principles as per AS2870-2011 Clause 3.1.7.
 - **Design for complete rock foundation** - Where the edge beam or footing is to be founded entirely on rock, the footing or beam may be replaced by a levelling pad of concrete or mortar as per AS2870-2011 Clause 3.1.8.

- **Abnormal moisture conditions as defined in AS2870-2011 Clause 1.3.3 (a-d) MUST be considered in the design of competent footings. Without such consideration distresses of foundations may occur and result in non acceptable performance as defined in AS2870-2011 Clause 1.3.1.**
- **Uncontrolled Fill** - Any FILLING that does not meet the requirements of AS2870- 2011 Clause 2.5.3(b). This clause allows up to 0.8m of uncontrolled SAND FILL and up to 0.4m of uncontrolled CLAY FILL without impacting on the above site classification following that all foundations are founded on the natural soils through the filling.
- **Rolled Fill** - Consists of material compacted in layers by repeated rolling with an excavator or similar equipment. The depth of rolled fill shall not exceed 0.6m compacted in layers of not more than 0.3m thick for sand material or 0.3m compacted in layers of not more than 0.15m thick for other materials as per AS2870-2011 Clause 6.4.2(b).
- **Controlled Fill** – Fill that will be required to support structures or associated pavements, or for which engineering properties are to be controlled – Refer to AS2870-2011 Clauses 2.5.3, 2.5.3(a), and 6.4.2(a) – i.e. where a specification has been provided on the type, quality, and compaction requirements for filling at a site and the earthworks have been deemed compliant or have complied with the requirements of the specification.
- The recommendations of CSIRO Building Technology File 18 be adopted.
- An apron of paving around the building perimeter sloping away from foundations with a minimum fall of 1:60 be considered for Class M, H-1, H-2, E and P sites.

6.2 During Construction

Throughout construction it is highly recommended that:

- Inspection of the natural soil surface after footings excavation but prior to construction is required by Strata Geoscience and Environmental in accordance with Appendix D of AS 2870-2011. Failure to comply with this recommendation will void all classifications and recommendations contained in this report. The site classification may be changed at this time depending upon the nature of the founding surface which is dependant in part on foundation design.
- **Site cutting should be avoided if possible and if it occurs below 500mmbgs occurs then reclassification MUST be commissioned.**
- **Fill MUST NOT be used as a founding substrate.**
- All earthworks onsite must follow the recommendations of AS 3798-2007.
- Consideration should be given to drainage and sediment control on site during and after construction. Specifically upslope interceptor drainage must be placed around footings areas and downpipes must be directed away from discharging into founding areas.
- All colluvial rocks and boulders in founding zones should be removed
- All large trees near the building envelope must be removed. If construction takes place in summer or autumn then moisture conditions should be stabilised by soaking of dry areas around the former tree.
- Shrinkage cracking is almost inevitable in concrete slabs and is associated with the drying process. Therefore care must be taken

where brittle or sensitive floor coverings are proposed, or where a polished slab is planned. The risk of damage can be reduced by not installing floor coverings until after shrinkage has occurred, which can take in excess of 3 months, or by using flexible mortars and appropriate sheeting material.

- Vertical barriers to prevent root incursions around founding zones should be considered in areas where gardens are to be established near foundations.

6.3 Post Construction

After construction, there are certain practices that the owner/occupier should be aware of to prevent excessive foundation movements. The owner will be responsible for any damage or loss associated with disregard for the recommendations contained in CSIRO Building Technology Files 18 "Foundation Maintenance and Footings Performances: A Homeowners Guide" available through CSIRO.

It is furthermore recommended that:

- Gardens or large shrubs or trees must not be established immediately adjacent to foundations
- Garden beds or lawn near foundations must not be excessively watered.
- Leaking underground services and downpipes or gutters must be fixed immediately.



S Nielsen MEngSc CPSS
Director
Strata Geoscience and Environmental Pty Ltd
E: sven@strataconsulting.com.au

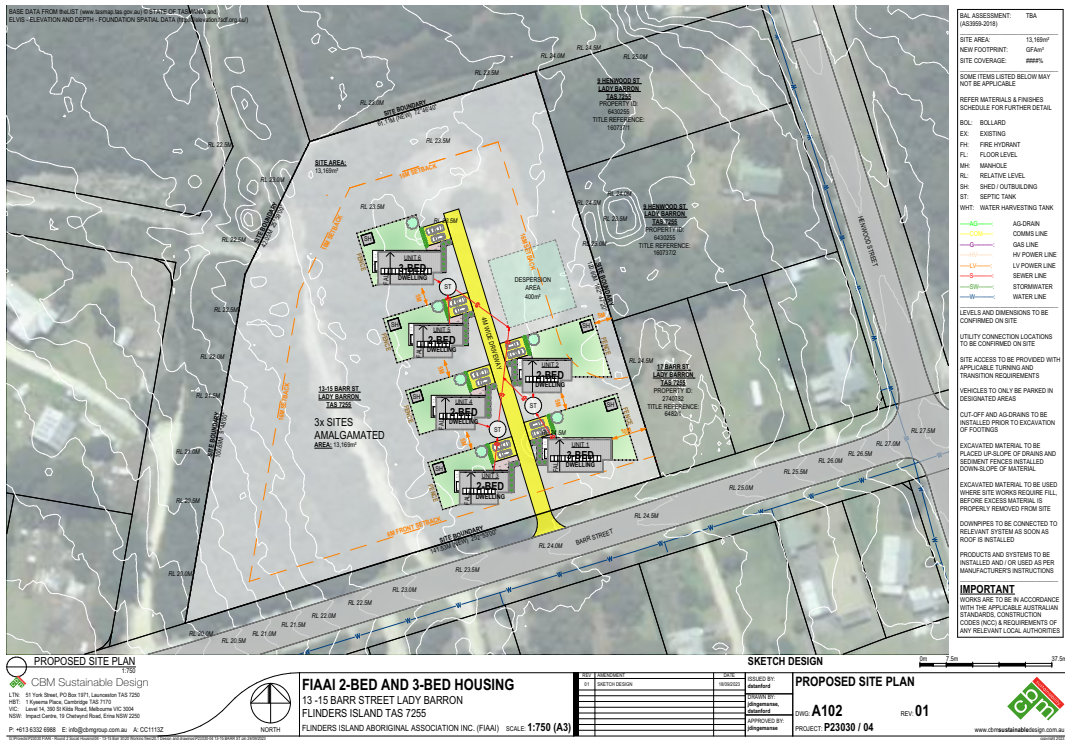
Appendix 1 Site Photos











Appendix 2 Indicative Bore Logs

strata <small>Geoscience and Environmental</small>		Indicative Profile Log				BH01			
Client:		Coords:							
Project:		Bearing: Dip:							
Drill Type:		RL SEE WS							
Drilling Mot:		Logged by:							
Fluid:		Date:							
RL	Depth (mm)	Graphic Log	Material Description	Soil	Rock	Weathering	Frac. Spacing	Sampling and Tests	Test Results and Comments
				Very Loose Loose Firm Stiff Very Stiff Dense	Low Medium High Very High Extremely High	FW MW SW FS FR	U.05 U.1 0.5	Type TDS	
			BROWNISH GREY SAND (SM) LOOSE	NP					
			TRENDING GREY SAND (SP) LOOSE	NP					
	900		TRENDING MEDIUM DENSE						
	1000								
	1500		TRENDING CLAYEY SAND (SC) GRAVEL INCLUSIONS						
	2000								
	2500								
	3000								
	3500								
	4000								
	4500								
	5000								
	5500								
	6000								
	6500								
	7000								
	7500								
	8000								
	8500								
	9000								
			BORE TERMINATED AT 1.3 M						

Geotechnical Terms and Symbols

The following information is intended to assist in the interpretation of terms and symbols used in geotechnical borehole logs, test pit logs and reports issued by or for the Queensland Department of Transport and Main Roads (TMR). More detailed information relating to specific test methods is available in the TMR Materials Testing Manual (MTM) and the relevant Australian Standards.

Soil Descriptions

Description and Classification of Soils for Geotechnical Purposes: Refer to AS1726-1993 (Appendix A).

The following chart (adapted from AS1726-1993, Appendix A, Table A1) is based on the Unified Soil Classification System (USCS).

Major Divisions	Particle size mm	USCS Group Symbol	Typical Names	Laboratory Classification				NOTES		
COARSE GRAINED SOILS (more than half of material less than 63 mm & larger than 0.075 mm)	BOULDERS	— 200		% < 0.075 mm (2)	Plasticity of fine fraction	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{(D_{10} \times D_{60})}$			
	COBBLES	— 63								
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	coarse	— 20	GW	Well graded gravels and gravel-sand mixtures, little or no fines	0-5	—	>4	Between 1 and 3	(1) Identify fines by the method given for fine-grained soils.
		medium	— 5	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels	0-5	—	Fails to comply with above		
		fine	— 2.36	GM	Silty gravels, gravel-sand-silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	
				GC	Clayey gravels, gravel-sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	(2) Borderline classifications occur when the percentage of fines (fraction smaller than 0.075 mm size) is greater than 5% and less than 12%. Borderline classifications require the use of SP-SM, GW-GC.
	SANDS (more than half of coarse fraction is smaller than 2.36 mm)	coarse	— 0.6	SW	Well graded sands and gravelly sands, little or no fines	0-5	—	>6	Between 1 and 3	
		medium	— 0.2	SP	Poorly graded sands and gravelly sands, little or no fines	0-5	—	Fails to comply with above		
		fine	0.075	SM	Silty sands, sand silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	
				SC	Clayey sands, sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	
	FINE GRAINED SOILS (more than half of material less than 63 mm & smaller than 0.075 mm)	SILTS & CLAYS (Liquid Limit $\leq 50\%$)	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity						
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays						
OL			Organic silts and clays of low plasticity							
SILTS & CLAYS (Liquid Limit $> 50\%$)		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts							
		CH	Inorganic clays of high plasticity, fat clays							
		OH	Organic silts and clays of high plasticity							
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils						

Use the gradation curve of material passing 63 mm for classification of fractions according to the criteria given in Major Divisions.

Plasticity Chart
For classification of fine grained soils and fine fraction of coarse grained soils.

The Plasticity Chart plots Plastic Index (PI) on the y-axis (0 to 60) against Liquid Limit (LL) on the x-axis (0 to 100). The chart is divided into three vertical regions: Low (LL < 40), Medium (40 < LL < 60), and High (LL > 60). A diagonal line labeled 'A' (PI = LL - 20) and a horizontal line labeled 'U' (PI = 10) define the upper boundary for classification. Below the 'A' line, the regions are labeled CL (Low Plasticity Clay), CH (High Plasticity Clay), OL (Low Plasticity Organic Clay), and OH (High Plasticity Organic Clay). A region below the 'U' line is labeled MILOI (Inorganic Low Plasticity Organic Inorganic). The chart also includes a 'COB' (Coarse Organic Bound) region at the bottom left.

Geotechnical Terms and Symbols

Soil Colour: Is described in the moist condition using black, white, grey, red, brown, orange, yellow, green or blue. Borderline cases can be described as a combination of two colours, with the weaker followed by the stronger. Modifiers such as pale, dark or mottled, can be used as necessary. Where colour consists of a primary colour with secondary mottling, it should be described as follows:
(Primary) mottled (Secondary). Refer to AS 1726-1993, A2.4 and A3.3.

Soil Moisture Condition: Is based on the appearance and feel of soil. Refer to AS 1726-1993, A2.5.

Term	Description
Dry	Cohesive soils; hard and friable or powdery, well dry of plastic limit. Granular soils; cohesionless and free-running.
Moist	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water forms on hands when handling. Granular soils tend to cohere and free water forms on hands when handling.

Consistency of Cohesive Soils: May be estimated using simple field tests, or described in terms of a strength scale. In the field, the undrained shear strength (s_u) can be assessed using a simple field tool appropriate for cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A4.

Consistency - Essentially Cohesive Soils						Soil Particle Sizes	
Term	Field Guide	Symbol	SPT "N" Value	Undrained Shear Strength s_u (kPa)	Unconfined Compressive Strength q_u (kPa)	Term	Size Range
Very soft	Oozes between fingers when squeezed in hand.	VS	0-2	<12	<25	BOULDERS	>200 mm
Soft	Easily moulded with fingers.	S	2-4	12-25	25-50	COBBLES	63-200 mm
Firm	Can be moulded by strong pressure of fingers.	F	4-8	25-50	50-100	Coarse GRAVEL	20-63 mm
Stiff	Not possible to mould with fingers.	St	8-15	50-100	100-200	Medium GRAVEL	6-20 mm
Very stiff		VSt	15-30	100-200	200-400	Fine GRAVEL	2.36-6 mm
Hard	Can be indented with difficulty by thumb nail.	H	>30	>200	>400	Coarse SAND	0.6-2.36 mm
						Medium SAND	0.2-0.6 mm
						Fine SAND	0.075-0.2 mm
						SILT	0.002-0.075 mm
						CLAY	<0.002 mm

Note: SPT - N to q_u , correlation from Terzaghi and Peck, 1967. (General guide only).

Consistency of Non-Cohesive Soils: Is described in terms of the density index, as defined in AS 1289.0-2000. This can be assessed using a field tool appropriate for non-cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A5; BS5930-1999, p117.

Consistency - Essentially Non-Cohesive Soils				
Term	Symbol	SPT N Value	Field Guide	Density Index (%)
Very loose	VL	0-4	Foot imprints readily	0-15
Loose	L	4-10	Shovels Easily	15-35
Medium dense	MD	10-30	Shovelling difficult	35-65
Dense	D	30-50	Pick required	65-85
Very dense	VD	>50	Picking difficult	85-100

Standard Penetration Test (SPT): Refer to AS 1289.5.3.1-2004. Example report formats for SPT results are shown below:

Test Report	Penetration Resistance (N)	Explanation / Comment
4, 7, 11	N=18	Full penetration; N is reported on engineering borehole log
18, 27, 32	N=59	Full penetration; N is reported on engineering borehole log
4, 18, 30/15 mm	N is not reported	30 blows causes less than 100 mm penetration (3 rd interval) – test discontinued
30/80 mm	N is not reported	30 blows causes less than 100 mm penetration (1 st interval) – test discontinued
rw	N<1	Rod weight only causes full penetration
hw	N<1	Hammer and rod weight only causes full penetration
hb	N is not reported	Hammer bouncing for 5 consecutive blows with no measurable penetration – test discontinued

Rock Descriptions

Refer to AS 1726-1993 (Appendix A3.3) for the description and classification of rock material composition, including:

- (a) Rock type (Table A6, (a) and (b))
- (b) Grain size
- (c) Texture and fabric
- (d) Colour (describe as per soil).

The condition of a rock material refers to its weathering characteristics, strength characteristics and rock mass properties. Refer to AS 1726-1993 (Appendix A3 Tables A8, A9 and A10).

Weathering Condition (Degree of Weathering):

The degree of weathering is a continuum from fresh rock to soil. Boundaries between weathering grades may be abrupt or gradational.

Rock Material Weathering Classification		
Weathering Grade	Symbol	Definition
Residual Soil	RS	Soil-like material developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the material has not been significantly transported.
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water, but substance fabric and rock structure still recognisable.
Highly Weathered Rock	HW	Strong discolouration is evident throughout the rock mass, often with significant change in the constituent minerals. The intact rock strength is generally much weaker than that of the fresh rock.
Moderately Weathered Rock	MW	Modest discolouration is evident throughout the rock fabric, often with some change in the constituent minerals. The intact rock strength is usually noticeably weaker than that of the fresh rock.
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh Rock	FR	Rock shows no sign of decomposition or staining.

Notes:

- Minor variations within broader weathering grade zones will be noted on the engineering borehole logs.
- Extremely weathered rock is described in terms of soil engineering properties.
- Weathering may be pervasive throughout the rock mass, or may penetrate inwards from discontinuities to some extent.
- The 'Distinctly Weathered (DW)' class as defined in AS 1726-1993 is divided to incorporate HW and MW in the above table. The symbol DW should not be used.

Strength Condition (Intact Rock Strength):

Strength of Rock Material			
(Based on Point Load Strength Index, corrected to 50 mm diameter – $I_{p(50)}$. Field guide used if no tests available. Refer to AS 4133.4.1-2007.			
Term	Symbol	Point Load Index (MPa) $I_{p(50)}$	Field Guide to Strength
Extremely Low	EL	≤ 0.03	Easily remoulded by hand to a material with soil properties.
Very Low	VL	> 0.03 ≤ 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low	L	> 0.1 ≤ 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	> 0.3 ≤ 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	> 1 ≤ 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	> 3 ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High	EH	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:

- These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.
- Anisotropy of rock material samples may affect the field assessment of strength.

Geotechnical Terms and Symbols

Discontinuity Description: Refer to AS 1726-1993, Table A10.

Anisotropic Fabric		Roughness (e.g. Planar, Smooth is abbreviated FI / Sm) Class				Other	
BED	Bedding	Stepped (Stp)	Rough or Irregular (Ro)		I	Cly	Clay
FOL	Foliation		Smooth (Sm)		II	Fe	Iron
LIN	Mineral Inclusion		Slacksided (Sl)		III	Co	Coal
Defect Type		Undulating (Un)	Rough (Ro)		IV	Carb	Carbonaceous
LP	Lamination Parting		Smooth (Sm)		V	Sinf	Soil Infill Zone
BP	Bedding Parting		Slacksided (Sl)		VI	Qz	Quartz
FP	Cleavage / Foliation Parting	Planar (Pl)	Rough (Ro)		VII	CA	Calcite
J, Js	Joint, Joints		Smooth (Sm)		VIII	Chl	Chlorite
SZ	Sheared Zone		Slacksided (Sl)		IX	Py	Pyrite
CZ	Crushed Zone	Aperture		Infilling		Int	Intersecting
BZ	Broken Zone	Closed	CD	No visible coating or infill		Clean	Cn
HFZ	Highly Fractured Zone	Open	OP	Surfaces discoloured by mineral/s		Stain	St
AZ	Alteration Zone	Filled	FL	Visible mineral or soil infill <1mm		Veneer	Vr
VN	Vein	Tight	TI	Visible mineral or soil infill >1mm		Coating	Ct
						Inc	Incipient
						DI	Drilling Induced
						H	Horizontal
						V	Vertical

Note: Describe 'Zones' and 'Coatings' in terms of composition and thickness (mm).

Discontinuity Spacing: On the geotechnical borehole log, a graphical representation of defect spacing vs depth is shown. This representation takes into account all the natural rock defects occurring within a given depth interval, excluding breaks induced by the drilling / handling of core. Refer to AS 1726-1993, B85930-1999.

Defect Spacing			Bedding Thickness (Sedimentary Rock Stratification)		Defect Spacing in 3D	
Spacing/Width (mm)	Descriptor	Symbol	Descriptor	Spacing/Width (mm)	Term	Description
			Thinly Laminated	< 6	Blocky	Equidimensional
<20	Extremely Close	EC	Thickly Laminated	6 – 20	Tabular	Thickness much less than length or width
20 – 60	Very Close	VC	Very Thinly Bedded	20 – 60	Columnar	Height much greater than cross section
60 – 200	Close	C	Thinly Bedded	60 – 200		
200 – 600	Medium	M	Medium Bedded	200 – 600		
600 – 2000	Wide	W	Thickly Bedded	600 – 2000		
2000 – 6000	Very Wide	VW	Very Thickly Bedded	> 2000		
>6000	Extremely Wide	EW				

Defect Persistence (areal extent)	
Trace length of defect given in metres	

Symbols

The list below provides an explanation of terms and symbols used on the geotechnical borehole, test pit and penetrometer logs.

Test Results				Test Symbols	
PI	Plasticity Index	I_p	Effective Cohesion	DCP	Dynamic Cone Penetrometer
LL	Liquid Limit	w_L	Undrained Cohesion	SPT	Standard Penetration Test
LI	Liquidity Index	I_L	Residual Cohesion	CPTu	Cone Penetrometer (Piezocone) Test
DD	Dry Density	ρ_d	Effective Angle of Internal Friction	PANDA	Variable Energy DCP
WD	Wet Density	ρ_w	Undrained Angle of Internal Friction	PP	Pocket Penetrometer Test
LS	Linear Shrinkage	ρ_{sh}	Residual Angle of Internal Friction	U50	Undisturbed Sample 50 mm (nominal diameter)
MC	Moisture Content	w	Coefficient of Consolidation	U100	Undisturbed Sample 100mm (nominal diameter)
OC	Organic Content	m_v	Coefficient of Volume Compressibility	UCS	Uniaxial Compressive Strength
WPI	Weighted Plasticity Index	C_u	Coefficient of Secondary Compression	Pm	Pressuremeter

Geotechnical Terms and Symbols

Test Results				Test Symbols	
WLS	Weighted Linear Shrinkage	e	Voids Ratio	FSV	Field Shear Vane
DoS	Degree of Saturation	W_w	Constant Volume Friction Angle	DST	Direct Shear Test
APD	Apparent Particle Density	q_t / q_c	Piezcone Tip Resistance (corrected / uncorrected)	PR	Penetration Rate
s_u	Undrained Shear Strength	q_u	PANDA Cone Resistance	A	Point Load Test (axial)
q_u	Unconfined Compressive Strength	I_{pm}	Point Load Strength Index	D	Point Load Test (diametral)
R	Total Core Recovery	RQD	Rock Quality Designation	L	Point Load Test (irregular lump)

 28/11/13	Groundwater level on the date shown	 Water Inflow	 Water Outflow
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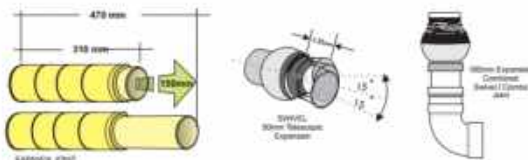
Appendix 3 Site Classification and Plumbing Specifications

Table SP 01 - SOIL CLASSIFICATION, DIFFERENTIAL MOVEMENT, GRADE, ANGLE, JOINTS LOCATION & DRAWING No'S. CHART.

AS2870-2011 SOIL CLASSIFICATION	ON SITE SOIL CONDITIONS	DIFFERENTIAL MOVEMENT	SEWER & Stormwater GRADE	SWIVEL * (50mm Expansion)	SWIVEL/COMBO * (100mm Expansion)	EXPANDA JOINTS *	CREEP SLOPE SITES	DRAWING NUMBER
A	Most Sand & Rock sites	0 - 10mm	1:60 Minimum	Not necessary	Not necessary	Not necessary	These are termed P sites and are referred to in Drawing SP 105	N/a
S	Slightly reactive Soils	10 - 20mm						N/a
M	Moderately reactive soils	20 - 40mm						SP 100 & SP 101
H1	Highly reactive soils	40 - 60mm	1:40 Minimum	As per AS3500.5 using 2 units outside and an Expansion Joint at every riser Not applicable to suspended sub-floors	As necessary using either or both Bend or Straight units ...unless suspended from slab	At Junctions within 1 mtr of internal building footprint and every 6 mtrs. As per Differential Movement See AS2032-2006 Clause 6.4.2.2-4 for suspension requirements	SP 102	SP 102A
H2	Very highly reactive soils	60 - 75mm						SP 102A
E	Extremely reactive soils	75 + mm						SP 102A
P	Soils affected by Abnormal moisture and conditions	From 20 + mm						As per Differential Movement

NOTE: Engineer or local Authority details take precedence over this chart.

To be read in conjunction with Storm Plastics drawings shown.



* Unless specified otherwise, these joints are to be set at 50% of total telescopic movement.

GRADE RATIO	FALL IN 10 mtrs	ANGLE	GRADE %
1:100	100 mm	.57	1.0
1:80	125 mm	.71	1.25
1:60	167 mm	.95	1.65
1:50	200 mm	1.14	2.0
1:40	250 mm	1.43	2.5

Apr. 2015, WPC

Appendix 4 Form 55

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Owner /Agent
 Address
 Suburb/postcode

Qualified person details:

Qualified person:
 Address: Phone No:
 Fax No:
 Licence No: Email address:

Qualifications and Insurance details: *(description from Column 3 of the Director of Building Control's Determination)*

Speciality area of expertise: *(description from Column 4 of the Director of Building Control's Determination)*

Details of work:

Address: Lot No:
 Certificate of title No:
 The assessable item related to this certificate: *(description of the assessable item being certified)*
 Assessable item includes –
 - a material;
 - a design
 - a form of construction
 - a document
 - testing of a component, building system or plumbing system
 - an inspection, or assessment, performed

Certificate details:

Certificate type: *(description from Column 1 of Schedule 1 of the Director of Building Control's Determination)*

This certificate is in relation to the above assessable item, at any stage, as part of - (tick one)
 building work, plumbing work or plumbing installation or demolition work:
 Or

a building, temporary structure or plumbing installation:

In issuing this certificate the following matters are relevant –

Documents:	SR05393
Relevant calculations:	SEE REPORT WHERE RELEVANT
References:	

Substance of Certificate: (what it is that is being certified)

AS2870-2011 ASSESSMENT

Scope and/or Limitations

SEE RECOMMENDATIONS AND WELL AS TERMS AND CONDITIONS CONTAINED WITHIN THE RELEVANT REPORT, ESPECIALLY NOTING:

1. ENGINEERING AND ARCHITECTURAL PLANS TO BE SUBMITTED TO STRATA FOR RATIFICATION AGAINST REPORT RECOMMENDATIONS PRIOR TO CONSTRUCTION. FAILURE TO ENSURE THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT
2. FOUNDING SURFACE INSPECTION OF ALL EXCAVATIONS PRIOR TO FOUNDATION CONSTRUCTION BY STRATA IS MANDATORY AND FAILING TO COMMISSION THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT. THIS IS TO ENSURE THAT ALL FOUNDATIONS ARE TAKEN TO RECOMMENDED FOUNDING SUBSTRATE AND NOT SOFT TOPSOILS OR UNCONTROLLED FILL (WHERE PRESENT)
3. IF SITE CUTTING BEYOND 500MM OCCURS THEN THE SITE MUST BE RECLASSIFIED IN CONSULTATION WITH STRATA.
4. FORM VALID FOR 2 YEARS FROM THE DATE BELOW.

I certify the matters described in this certificate.

Qualified person: *Signed:* *Certificate No:* *Date:*

S NIELSEN 

SR05393

27/9/23



Appendix 5 Terms and Conditions

Scope of Work

These Terms and Conditions apply to any services provided to you ("the Client") by Strata Geoscience and Environmental Pty Ltd ("Strata"). By continuing to instruct Strata to act after receiving the Terms and Conditions or by using this report and its findings for design and/or permit application processes and not objecting to any of the Terms and Conditions the Client agrees to be bound by these Terms and Conditions, and any other terms and conditions supplied by Strata from time to time at Strata's sole and absolute discretion. The scope of the services provided to the Client by Strata is limited to the services and specified purpose agreed between Strata and the Client and set out in the correspondence to which this document is enclosed or annexed ("the Services"). Strata does not purport to advise beyond the Services.

Third Parties

The Services are supplied to the Client for the sole benefit of the Client and must not be relied upon by any person or entity other than the Client. Strata is not responsible or liable to any third party. All parties other than the Client are advised to seek their own advice before proceeding with any course of action.

Provision of Information

The Client is responsible for the provision of all legal, survey and other particulars concerning the site on which Strata is providing the Services, including particulars of existing structures and services and features for the site and for adjoining sites and structures. The Client is also responsible for the provision of specialised services not provided by Strata. If Strata obtains these particulars or specialised services on the instruction of the Client, Strata does so as agent of the Client and at the Client's expense. Strata is not obliged to confirm the accuracy and completeness of information supplied by the Client or any third party service provider. The Client is responsible for the accuracy and completeness of all particulars or services provided by the Client or obtained on the Client's behalf. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person or entity resulting from the failure of the Client or third party to provide accurate and complete information. In the event additional information becomes available to the Client, the Client must inform Strata in writing of that information as soon as possible. Further advice will be provided at the Client's cost. Any report is prepared on the assumption that the instructions and information supplied to Strata has been provided in good faith and is all of the information relevant to the provision of the Services by Strata. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if Strata has been supplied with insufficient, incorrect, incomplete, false or misleading information.

Integrity

Any report provided by Strata presents the findings of the site assessment. While all reasonable care is taken when conducting site investigations and reporting to the Client, Strata does not warrant that the information contained in any report is free from errors or omissions. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from errors in a report. Any report should be read in its entirety, inclusive of any summary and annexures. Strata does not accept any responsibility where part of any report is relied upon without reference to the full report.

Project Specific Criteria

Any report provided by Strata will be prepared on the basis of unique project development plans which apply only to the site that is being investigated. Reports provided by Strata do not apply to any project other than that originally specified by the Client to Strata. The Report must not be used or relied upon if any changes to the project are made. The Client should engage Strata to further advise on the effect of any change to the project. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever where any change to the project is made without obtaining a further written report from Strata. Changes to the project may include, but are not limited to, changes to the investigated site or neighbouring sites, for instance, variation of the location of proposed building envelopes/footprints, changes to building design which may impact upon building settlement or slope stability, or changes to earthworks, including removal (site cutting) or deposition of sediments or rock from the site.

Classification to AS2870-2011

It must be emphasised that the site classification to AS2870-2011 and recommendations referred to in this report are based solely on the observed soil profile at the time of the investigation for this report and account has been taken of Clause 2.1.1 of AS2870 - 2011. Other abnormal moisture conditions as defined in AS2870 - 2011 Clause 1.3.3 (a) (b) (c) and (d) may need to be considered in the design of the structure. Without designing for the possibility of all abnormal moisture conditions as defined in Clause 1.3.3, distresses will occur and may result in non "acceptable probabilities of serviceability and safety of the building during its design life", as defined in AS2870 - 2011, Clause 1.3.1. Furthermore the classification is preliminary in nature and needs verification at the founding surface inspection phase. The classification may be changed at this time based upon the nature of the founding surface over the entire footprint of the project area. Any costs associated with a change in the site classification are to be incurred by the client. Furthermore any costs associated with delayed works associated with a founding surface inspection or a change in classification are to be borne by the client. Where founding surface inspections are not commissioned the classifications contained within this report are void. Classification is based upon a range of expected ground surface movement as indicated in AS2870-2011. Where the range of movement exceeds the stipulations for the nominated classification Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person.

Slope Instability Risks

Where comment, modelling or treatment options are suggested to limit the risk of slope instability Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from actual slope instability or mass movement over the site at any point over the design life of any structures or neighbouring structures.

Subsurface Variations with Time

Any report provided by Strata is based upon subsurface conditions encountered at the time of the investigation. Conditions can and do change significantly and unexpectedly over a short period of time. For example groundwater levels may fluctuate over time, affecting latent soil bearing capacity and ex-situ/insitu fill sediments may be placed/removed from the site. Changes to the subsurface conditions that were encountered at the time of the investigation void all recommendations made by Strata in any report. Strata is not liable, and

accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any change to the subsurface conditions that were encountered at the time of the investigation. In the event of a delay in the commencement of a project or if additional information becomes available to the Client about a change in conditions becomes available to the Client, the Client should engage Strata to make a further investigation to ensure that the conditions initially encountered still exist. Further advice will be provided at the Client's cost. Without limiting the generality of the above statement, Strata does not accept liability where any report is relied upon after three months from the date of the report, (unless otherwise provided in the report or required by the Australian Standard which the report purports to comply with), or the date when the Client becomes aware of any change in condition. Any report should be reviewed regularly to ensure that it continues to be accurate and further advice requested from Strata where applicable.

Interpretation

Site investigation identifies subsurface conditions only at the discrete points of geotechnical drilling, and at the time of drilling. All data received from the geotechnical drilling is interpreted to report to the Client about overall site conditions as well as their anticipated impact upon the specific project. Actual site conditions may vary from those inferred to exist as it is virtually impossible to provide a definitive subsurface profile which accounts for all the possible variability inherent in earth materials. Soil depths and composition can vary due to natural and anthropogenic processes. This is particularly pertinent to some weathered sedimentary geologies or colluvial/alluvial clast deposits which may show significant variability in depth to refusal over a development area. Furthermore where rocky profiles are encountered no comment is made about the potential size of liberated rocks from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sought from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations. Rock incongruities such as joints, dips or faults may also result in subsurface variability. Variability may lead to differences between the design depth of bored/driven piers compared with the actual depth of individual piers constructed onsite. It may also affect the founding depth of conventional strip, pier and beam or slab footings, which may result in increased costs associated with excavation (particularly of rock) or materials costs of foundations. Founding surface inspections should be commissioned by the Client prior to foundation construction to verify the results of initial site characterisation and failure to insure this will void the classifications and recommendations contained within this report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any variation from the site conditions inferred to exist.

Strata is not responsible for the interpretation of site data or report findings by other parties, including parties involved in the design and construction process. The Client must seek advice from Strata about the interpretation of the site data or report.

Report Recommendations

Any report recommendations provided by Strata are only preliminary. A report is based upon 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 earthworks and/or foundation construction is almost complete. Where variations in conditions are encountered, Strata should be engaged to provide further advice. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if the results of selective point sampling are not indicative of actual conditions throughout an area or if the Client becomes aware of variations in conditions and does not engage Strata for further advice.

Geo-environmental Considerations

Strata does not consider site contamination, unless the Client specifically instructs Strata to consider the site contamination in writing. If a request is made by the Client to consider site contamination, Strata will provide additional terms and conditions that will apply to the engagement.

Copyright and Use of Documents

Copyright in all drawings, reports, specifications, calculations and other documents provided by Strata or its employees in connection with the Services remain vested in Strata. The Client has a licence to use the documents for the purpose of completing the project. However, the Client must not otherwise use the documents, make copies of the documents or amend the documents unless express approval in writing is given in advance by Strata. The Client must not publish or allow to be published, in whole or in part, any document provided by Strata or the name or professional affiliations of Strata, without first obtaining the written consent of Strata as to the form and context in which it is to appear.

If, during the course of providing the Services, Strata develops, discovers or first reduces to practice a concept, product or process which is capable of being patented then such concept, product or process is and remains the property of Strata and:

- (i) the Client must not use, infringe or otherwise appropriate the same other than for the purpose of the project without first obtaining the written consent of Strata; and
- (ii) the Client is entitled to a royalty free licence to use the same during the life of the works comprising the project.

Digital Copies of Report

If any report is provided to the Client in an electronic copy except directly from Strata, the Client should verify the report contents with Strata to ensure they have not been altered in any way from the original provide by Strata.



Site Classification to AS2870-2011 - Residential Slabs and Footings

1. Introduction

Strata Geoscience and Environmental Pty Ltd was commissioned to provide a Site Classification to AS2870-2011 for:

Site Details and Key Investigation Outcomes	
Site Address	Unit 5 13-15 Barr Street Lady Barron
Property Owner/Client	CBM Sustainable Design
Development	New dwelling
Date of Investigation	13/9/21
Key Geotechnical Limitations to Site Development	Uncontrolled fill (from future site clearing), reactive soil phases, potential for abnormal soil moisture gradients, potential for colluvial and bedrock outcroppings
Key Recommendations	Site drainage around deepened foundations recommended
Site Classification to AS2870-2011	Class P – ALERT TO TREES WITHIN ZONE OF INFLUENCE OF FUTURE FOUNDATIONS AND UNCONTROLLED FILL/DISTURBED PROFILES
Subsidiary Site Classification to AS2870-2011 (TO BE USED FOR PLUMBING DESIGN SEE APPENDIX 3)	Class M
Site Classification to AS4055- 2012	N2

2. Scope

It is the scope of this investigation to consider geotechnical factors affecting the current development plan (if available). Namely;

- Geotechnical Drilling of minimum 1 Bore (s) to 1.8 m or refusal (whichever first) with logging, sampling and in-situ testing as required
- Site Classification to AS2870-2011 Residential Slabs and Footings.

The above scope has been determined in consultation with the Client and is subject to time and budgetary considerations. Geotechnical investigations are informative processes and further works may be required depending upon the findings of the results of this investigation.

3. Site Investigation

Please refer to Appendices for the results of field/laboratory investigation (where relevant) including site photographs, bore logs, bearing capacity and other relevant data.

4. Interpretation

Geotechnical Parameter	Results
General Comments	FLAT SITE, ACCESS RESTRICTED GIVEN VEGETATION COVER. LARGE TREES REQUIRING REMOVAL (SEE SITE PHOTOS). SITE DEVEGETATION WILL CAUSE FUTURE DISTURBED GROUND SURFACE. TARGET DEPTH OF FOUNDATIONS MAY BE REVIEWED SUBJECT TO A POST DEMOLITION ASSESSMENT.
Site Geology (MRT Tas 1:250000)	Dgaas
Geotechnical Risks:	
<i>Slope Instability</i>	Not mapped hazard band (DPAC 2023) accessed via LISTMAP).
<i>Soft/Collapsing Soil</i>	Recommend maximum 100kPa working bearing pressures at a minimum 2000mm or refusal.
<i>Groundsurface Movement</i>	Slight-Moderate (variability anticipated over the site).
<i>Erosion Potential</i>	Soils may be sensitive to wind and water erosion. Risks to be controlled by a soil and water management plan.
<i>Surface Water</i>	Not observed
<i>Shallow Groundwater/Perched Water</i>	Not encountered- localised seasonal groundwater tables known to exist in localised landscape- upslope interceptor drain age around foundations required.
<i>Uncontrolled Fill/Disturbed Soils</i>	Uncontrolled fill will be caused through site de-vegetation. FILL MUST NOT BE USED AS A FOUNDING SUBSTRATE. A POST DEMOLITION ASSESSMENT MAY REDUCE TARGET DEPTH OF FOUNDATIONS. Furthermore, ex-situ uncontrolled fill observed onsite (see site photos).
<i>Impacting Vegetation (Onsite or on adjacent sites)</i>	Trees onsite warranting design consideration
<i>Proposed or recent removal of building/structures</i>	Unknown
<i>Proposed or recent removal of trees</i>	Large trees to be removed as discussed above
<i>Excavation Difficulties</i>	Possible – near surface granite floaters and bedrock known to occur in localised landscape.
<i>Bulk Earthworks (Completed/partially completed/not proposed)</i>	None

5. Recommended Foundation Design Parameters

- The following foundation design parameters are recommended:

Recommended Footing Designs			
	Slab	Pad/Strip	Pier/Pile Footings
Founding material ^{*1}	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK
Recommended Minimum Founding Depth (mm or m)	PIER/PILE SUPPOPTED MIN 2000MM OR REFUSAL	PIER/PILE SUPPOPTED MIN 2000MM OR REFUSAL	PIER/PILE SUPPOPTED MIN 2000MM OR REFUSAL
Max Allowable Bearing Pressure (kPa)	100	100	100
Indicative Soil Ys (mm)	20-40mm	20-40mm	20-40mm

^{*1} Where depth to bedrock is given it is a guide only and will vary over the proposed development area(s). Refusal in geotechnical bores may be different than that of larger construction machinery and this may need to be factored into foundation design and contractor quotations.

It must be emphasised that in classifying the site, Strata Geoscience and Environmental P/L did not place sole reliance on the soil bore logs as a means of being an absolute representation of all subsurface features and conditions over the site. Any persons relying upon this document must not assume that subsurface conditions across the entire site will be identical to that represented in the bore logs.

Relevant information and guidance used in classifying the site includes several or all of the following:

- Publications from Standards Australia, CSIRO, Foundation and Footings Society, Australian Geomechanics Society.
- Well established and relevant knowledge of the behaviour of local soils and processes affecting soil behaviour (eg ephemeral springs, perched water tables, unstable slopes, collapsing soils, vegetation, etc).
- The broad experience of the site classifier.
- Specific investigations from nearby areas.
- Past Performance of existing structures and foundations (where relevant and known)
- Engineering Assessment of likely characteristic ground surface movement (ys) based upon estimated Ipt values and/or laboratory derived Iss values where relevant.

6. Construction Recommendations

6.1 Pre Construction

- Results of this investigation **MUST** be confirmed when specific development plans are finalised. Failure to ensure this will void the classifications and recommendations contained within this report.
- Design depth to refusal for bored pier/driven pile designs may show variability over the site and may need to be considered in any contractor quotation. Construction machinery will show different depths to refusal that what is indicated in this investigation.
- Test pitting/piling with construction machinery is recommended before construction commences to determine excavatability of refusing substrate (if found).
- Screw piles should be driven to a minimum depth as nominated by the foundation designer to ensure lateral stability of each pile. Test piling at all corners of each building must occur to ensure this.
- This investigation did not determine rock strength parameters of the refusing substrate (if found) and therefore no comment is made about the excavatability of rock at depth. Hard rock may be encountered which may be difficult to excavate and would therefore increase the costs associated with bulk earthworks.
- Rocks may be liberated from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sort from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations.
- Where rock is encountered the in relation to the Foundation Recommendations the following terms should be noted as per AS2870-2011 Residential Slabs and Footings
 - **Rock Outcrops** - Where a footing or edge beam encounters a single local rock outcrop over a length less than 1 m, the depth of the footing or edge beam may be reduced by up to one-third, provided the amount of top and bottom reinforcement is doubled and extended 500 mm past the section with reduced depth. Alternatively, the footing may be stepped or raised, provided the structural stiffness is preserved as per AS2870-2011 Clause 3.1.6.
 - **Partial Rock Outcrops** - Where part of the footing is on rock and part is on soil, provision for movement at the change between the two types of foundation shall be made by articulation of the superstructure or strengthening of the footing system. On Reactive Sites (M, H1 and H2) where part of the footing is on rock and part is on soil, the design shall be in accordance with engineering principles as per AS2870-2011 Clause 3.1.7.
 - **Design for complete rock foundation** - Where the edge beam or footing is to be founded entirely on rock, the footing or beam may be replaced by a levelling pad of concrete or mortar as per AS2870-2011 Clause 3.1.8.

- **Abnormal moisture conditions as defined in AS2870-2011 Clause 1.3.3 (a-d) MUST be considered in the design of competent footings. Without such consideration distresses of foundations may occur and result in non acceptable performance as defined in AS2870-2011 Clause 1.3.1.**
- **Uncontrolled Fill** - Any FILLING that does not meet the requirements of AS2870- 2011 Clause 2.5.3(b). This clause allows up to 0.8m of uncontrolled SAND FILL and up to 0.4m of uncontrolled CLAY FILL without impacting on the above site classification following that all foundations are founded on the natural soils through the filling.
- **Rolled Fill** - Consists of material compacted in layers by repeated rolling with an excavator or similar equipment. The depth of rolled fill shall not exceed 0.6m compacted in layers of not more than 0.3m thick for sand material or 0.3m compacted in layers of not more than 0.15m thick for other materials as per AS2870-2011 Clause 6.4.2(b).
- **Controlled Fill** – Fill that will be required to support structures or associated pavements, or for which engineering properties are to be controlled – Refer to AS2870-2011 Clauses 2.5.3, 2.5.3(a), and 6.4.2(a) – i.e. where a specification has been provided on the type, quality, and compaction requirements for filling at a site and the earthworks have been deemed compliant or have complied with the requirements of the specification.
- The recommendations of CSIRO Building Technology File 18 be adopted.
- An apron of paving around the building perimeter sloping away from foundations with a minimum fall of 1:60 be considered for Class M, H-1, H-2, E and P sites.

6.2 During Construction

Throughout construction it is highly recommended that:

- Inspection of the natural soil surface after footings excavation but prior to construction is required by Strata Geoscience and Environmental in accordance with Appendix D of AS 2870-2011. Failure to comply with this recommendation will void all classifications and recommendations contained in this report. The site classification may be changed at this time depending upon the nature of the founding surface which is dependant in part on foundation design.
- **Site cutting should be avoided if possible and if it occurs below 500mmbgs occurs then reclassification MUST be commissioned.**
- **Fill MUST NOT be used as a founding substrate.**
- All earthworks onsite must follow the recommendations of AS 3798-2007.
- Consideration should be given to drainage and sediment control on site during and after construction. Specifically upslope interceptor drainage must be placed around footings areas and downpipes must be directed away from discharging into founding areas.
- All colluvial rocks and boulders in founding zones should be removed
- All large trees near the building envelope must be removed. If construction takes place in summer or autumn then moisture conditions should be stabilised by soaking of dry areas around the former tree.
- Shrinkage cracking is almost inevitable in concrete slabs and is associated with the drying process. Therefore care must be taken

where brittle or sensitive floor coverings are proposed, or where a polished slab is planned. The risk of damage can be reduced by not installing floor coverings until after shrinkage has occurred, which can take in excess of 3 months, or by using flexible mortars and appropriate sheeting material.

- Vertical barriers to prevent root incursions around founding zones should be considered in areas where gardens are to be established near foundations.

6.3 Post Construction

After construction, there are certain practices that the owner/occupier should be aware of to prevent excessive foundation movements. The owner will be responsible for any damage or loss associated with disregard for the recommendations contained in CSIRO Building Technology Files 18 "Foundation Maintenance and Footings Performances: A Homeowners Guide" available through CSIRO.

It is furthermore recommended that:

- Gardens or large shrubs or trees must not be established immediately adjacent to foundations
- Garden beds or lawn near foundations must not be excessively watered.
- Leaking underground services and downpipes or gutters must be fixed immediately.



S Nielsen MEngSc CPSS
Director
Strata Geoscience and Environmental Pty Ltd
E:sven@strataconsulting.com.au

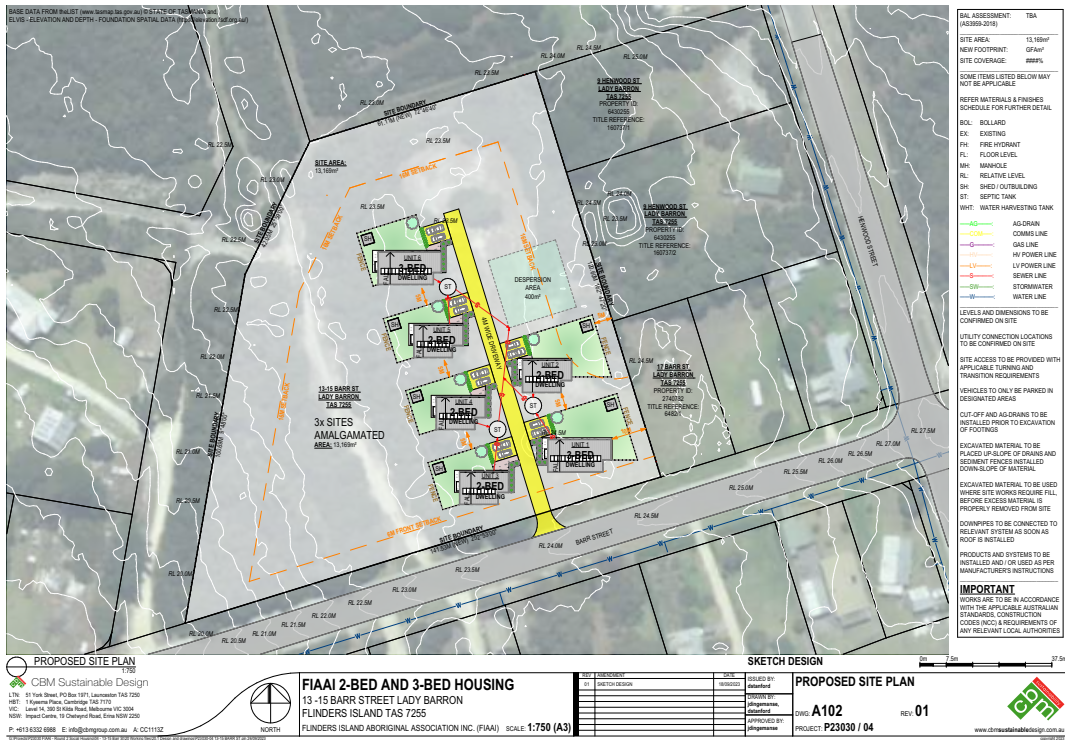
Appendix 1 Site Photos












Appendix 2 Indicative Bore Logs

 strata <small>Geoscience and Environmental</small>		Indicative Profile Log					BH01	
Client:							Coords:	
Project:							Bearing: Dip:	
Drill Type:							RL SEE WS	
Drilling Mot:							Logged by:	
Fluid:							Date:	
RL	Depth (mm)	Graphic Log	Material Description	Soil	Rock	Weathering	Fract. Spacing	Sampling and tests Testing
				Very Loose Soft Loose Firm Loose Stiff Loose Very Stiff Loose Very Dense Stiff Dense Firm Dense Medium High Very High Extremely High	Low Medium High Very High Extremely High	FW MW SW FS FR	0.01 0.05 0.1 0.5	TYPE RESULTS
			BROWNISH GREY SAND (SM) LOOSE	NP				Test Results and Comments
			TRENDING GREY SAND (SP) LOOSE	NP				
	900		TRENDING MEDIUM DENSE					
	1000		TRENDING GRAVELLY SAND (SG) DENSE, NEAR REFUSAL					
	1500							
	2000							
	2500							
	3000							
	3500							
	4000							
	4500							
	5000							
	5500							
	6000							
	6500							
	7000							
	7500							
	8000							
	8500							
	9000							
				BORE TERMINATED AT 1.3 M				

Geotechnical Terms and Symbols

The following information is intended to assist in the interpretation of terms and symbols used in geotechnical borehole logs, test pit logs and reports issued by or for the Queensland Department of Transport and Main Roads (TMR). More detailed information relating to specific test methods is available in the TMR Materials Testing Manual (MTM) and the relevant Australian Standards.

Soil Descriptions

Description and Classification of Soils for Geotechnical Purposes: Refer to AS1726-1993 (Appendix A).

The following chart (adapted from AS1726-1993, Appendix A, Table A1) is based on the Unified Soil Classification System (USCS).

Major Divisions	Particle size mm	USCS Group Symbol	Typical Names	Laboratory Classification				NOTES		
COARSE GRAINED SOILS (more than half of material less than 63 mm & larger than 0.075 mm)	BOULDERS	— 200		% < 0.075 mm (2)	Plasticity of fine fraction	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{(D_{10} \times D_{60})}$			
	COBBLES	— 63								
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	coarse	— 20	GW	Well graded gravels and gravel-sand mixtures, little or no fines	0-5	—	>4	Between 1 and 3	(1) Identify fines by the method given for fine-grained soils.
		medium	— 5	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels	0-5	—	Fails to comply with above		
		fine	— 2.36	GM	Silty gravels, gravel-sand-silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	
				GC	Clayey gravels, gravel-sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	(2) Borderline classifications occur when the percentage of fines (fraction smaller than 0.075 mm size) is greater than 5% and less than 12%. Borderline classifications require the use of SP-SM, GW-GC.
	SANDS (more than half of coarse fraction is smaller than 2.36 mm)	coarse	— 0.6	SW	Well graded sands and gravelly sands, little or no fines	0-5	—	>6	Between 1 and 3	
		medium	— 0.2	SP	Poorly graded sands and gravelly sands, little or no fines	0-5	—	Fails to comply with above		
		fine	0.075	SM	Silty sands, sand silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	
				SC	Clayey sands, sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	
	FINE GRAINED SOILS (more than half of material less than 63 mm & smaller than 0.075 mm)	SILTS & CLAYS (Liquid Limit $\leq 50\%$)	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity						
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays						
OL			Organic silts and clays of low plasticity							
SILTS & CLAYS (Liquid Limit $> 50\%$)		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts							
		CH	Inorganic clays of high plasticity, fat clays							
		OH	Organic silts and clays of high plasticity							
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils						

Use the gradation curve of material passing 63 mm for classification of fractions according to the criteria given in Major Divisions.

Plasticity Chart
For classification of fine grained soils and fine fraction of coarse grained soils.

The Plasticity Chart plots Plastic Index (PI) on the y-axis (0 to 60) against Liquid Limit (LL) on the x-axis (0 to 100). The chart is divided into three vertical regions: Low (LL < 40), Medium (40 < LL < 60), and High (LL > 60). Two diagonal lines are shown: the 'A' line (PI = LL - 0.73) and the 'U' line (PI = 2.5 - 0.0075 LL). The region between the A and U lines is divided into CL (low plasticity), CH (high plasticity), ML (low plasticity), and MH (high plasticity). The region below the U line is labeled UGCL (underconsolidated clayey gravelly clays).

Geotechnical Terms and Symbols

Soil Colour: Is described in the moist condition using black, white, grey, red, brown, orange, yellow, green or blue. Borderline cases can be described as a combination of two colours, with the weaker followed by the stronger. Modifiers such as pale, dark or mottled, can be used as necessary. Where colour consists of a primary colour with secondary mottling, it should be described as follows:
(Primary) mottled (Secondary). Refer to AS 1726-1993, A2.4 and A3.3.

Soil Moisture Condition: Is based on the appearance and feel of soil. Refer to AS 1726-1993, A2.5.

Term	Description
Dry	Cohesive soils; hard and friable or powdery, well dry of plastic limit. Granular soils; cohesionless and free-running.
Moist	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water forms on hands when handling. Granular soils tend to cohere and free water forms on hands when handling.

Consistency of Cohesive Soils: May be estimated using simple field tests, or described in terms of a strength scale. In the field, the undrained shear strength (s_u) can be assessed using a simple field tool appropriate for cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A4.

Consistency - Essentially Cohesive Soils						Soil Particle Sizes	
Term	Field Guide	Symbol	SPT "N" Value	Undrained Shear Strength s_u (kPa)	Unconfined Compressive Strength q_u (kPa)	Term	Size Range
Very soft	Oozes between fingers when squeezed in hand.	VS	0-2	<12	<25	BOULDERS	>200 mm
Soft	Easily moulded with fingers.	S	2-4	12-25	25-50	COBBLES	63-200 mm
Firm	Can be moulded by strong pressure of fingers.	F	4-8	25-50	50-100	Coarse GRAVEL	20-63 mm
Stiff	Not possible to mould with fingers.	St	8-15	50-100	100-200	Medium GRAVEL	6-20 mm
Very stiff		VSt	15-30	100-200	200-400	Fine GRAVEL	2.36-6 mm
Hard	Can be indented with difficulty by thumb nail.	H	>30	>200	>400	Coarse SAND	0.6-2.36 mm
						Medium SAND	0.2-0.6 mm
						Fine SAND	0.075-0.2 mm
						SILT	0.002-0.075 mm
						CLAY	<0.002 mm

Note: SPT - N to q_u correlation from Terzaghi and Peck, 1967. (General guide only).

Consistency of Non-Cohesive Soils: Is described in terms of the density index, as defined in AS 1289.0-2000. This can be assessed using a field tool appropriate for non-cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A5; BS5930-1999, p117.

Consistency - Essentially Non-Cohesive Soils				
Term	Symbol	SPT N Value	Field Guide	Density Index (%)
Very loose	VL	0-4	Foot imprints readily	0-15
Loose	L	4-10	Shovels Easily	15-35
Medium dense	MD	10-30	Shovelling difficult	35-65
Dense	D	30-50	Pick required	65-85
Very dense	VD	>50	Picking difficult	85-100

Standard Penetration Test (SPT): Refer to AS 1289.6.3.1-2004. Example report formats for SPT results are shown below:

Test Report	Penetration Resistance (N)	Explanation / Comment
4, 7, 11	N=18	Full penetration; N is reported on engineering borehole log
18, 27, 32	N=59	Full penetration; N is reported on engineering borehole log
4, 18, 30/15 mm	N is not reported	30 blows causes less than 100 mm penetration (3 rd interval) – test discontinued
30/80 mm	N is not reported	30 blows causes less than 100 mm penetration (1 st interval) – test discontinued
rw	N<1	Rod weight only causes full penetration
hw	N<1	Hammer and rod weight only causes full penetration
hb	N is not reported	Hammer bouncing for 5 consecutive blows with no measurable penetration – test discontinued

Rock Descriptions

Refer to AS 1726-1993 (Appendix A3.3) for the description and classification of rock material composition, including:

- (a) Rock type (Table A6, (a) and (b))
- (b) Grain size
- (c) Texture and fabric
- (d) Colour (describe as per soil).

The condition of a rock material refers to its weathering characteristics, strength characteristics and rock mass properties. Refer to AS 1726-1993 (Appendix A3 Tables A8, A9 and A10).

Weathering Condition (Degree of Weathering):

The degree of weathering is a continuum from fresh rock to soil. Boundaries between weathering grades may be abrupt or gradational.

Rock Material Weathering Classification		
Weathering Grade	Symbol	Definition
Residual Soil	RS	Soil-like material developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the material has not been significantly transported.
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water, but substance fabric and rock structure still recognisable.
Highly Weathered Rock	HW	Strong discolouration is evident throughout the rock mass, often with significant change in the constituent minerals. The intact rock strength is generally much weaker than that of the fresh rock.
Moderately Weathered Rock	MW	Modest discolouration is evident throughout the rock fabric, often with some change in the constituent minerals. The intact rock strength is usually noticeably weaker than that of the fresh rock.
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh Rock	FR	Rock shows no sign of decomposition or staining.

Notes:

1. Minor variations within broader weathering grade zones will be noted on the engineering borehole logs.
2. Extremely weathered rock is described in terms of soil engineering properties.
3. Weathering may be pervasive throughout the rock mass, or may penetrate inwards from discontinuities to some extent.
4. The 'Distinctly Weathered (DW)' class as defined in AS 1726-1993 is divided to incorporate HW and MW in the above table. The symbol DW should not be used.

Strength Condition (Intact Rock Strength):

Strength of Rock Material			
(Based on Point Load Strength Index, corrected to 50 mm diameter – $I_{p(50)}$. Field guide used if no tests available. Refer to AS 4133.4.1-2007.			
Term	Symbol	Point Load Index (MPa) $I_{p(50)}$	Field Guide to Strength
Extremely Low	EL	≤ 0.03	Easily remoulded by hand to a material with soil properties.
Very Low	VL	> 0.03 ≤ 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low	L	> 0.1 ≤ 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	> 0.3 ≤ 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	> 1 ≤ 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	> 3 ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High	EH	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:

1. These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.
2. Anisotropy of rock material samples may affect the field assessment of strength.

Geotechnical Terms and Symbols

Discontinuity Description: Refer to AS 1726-1993, Table A10.

Anisotropic Fabric		Roughness (e.g. Planar, Smooth is abbreviated P / Sm) Class				Other		
BED	Bedding	Stepped (Stp)	Rough or Irregular (Ro)		I	Cly	Clay	
FOL	Foliation		Smooth (Sm)		II	Fe	Iron	
LIN	Mineral Inclusion		Slacksided (Sl)		III	Co	Coal	
Defect Type		Undulating (Un)	Rough (Ro)		IV	Carb	Carbonaceous	
LP	Lamination Parting		Smooth (Sm)		V	Sinf	Soil Infill Zone	
BP	Bedding Parting		Slacksided (Sl)		VI	Qz	Quartz	
FP	Cleavage / Foliation Parting	Planar (P)	Rough (Ro)		VII	CA	Calcite	
J, Js	Joint, Joints		Smooth (Sm)		VIII	Chl	Chlorite	
SZ	Sheared Zone		Slacksided (Sl)		IX	Py	Pyrite	
CZ	Crushed Zone	Aperture		Infilling		Int	Intersecting	
BZ	Broken Zone	Closed	CD	No visible coating or infill	Clean	Cn	Inc	Incipient
HFZ	Highly Fractured Zone	Open	OP	Surfaces discoloured by mineral/s	Stain	St	DI	Drilling Induced
AZ	Alteration Zone	Filled	FL	Visible mineral or soil infill <1mm	Veneer	Vr	H	Horizontal
VN	Vein	Tight	TI	Visible mineral or soil infill >1mm	Coating	Ct	V	Vertical

Note: Describe 'Zones' and 'Coatings' in terms of composition and thickness (mm).

Discontinuity Spacing: On the geotechnical borehole log, a graphical representation of defect spacing vs depth is shown. This representation takes into account all the natural rock defects occurring within a given depth interval, excluding breaks induced by the drilling / handling of core. Refer to AS 1726-1993, B85930-1999.

Defect Spacing			Bedding Thickness (Sedimentary Rock Stratification)		Defect Spacing in 3D	
Spacing/Width (mm)	Descriptor	Symbol	Descriptor	Spacing/Width (mm)	Term	Description
			Thinly Laminated	< 6	Blocky	Equidimensional
<20	Extremely Close	EC	Thickly Laminated	6 – 20	Tabular	Thickness much less than length or width
20 – 60	Very Close	VC	Very Thinly Bedded	20 – 60	Columnar	Height much greater than cross section
60 – 200	Close	C	Thinly Bedded	60 – 200		
200 – 600	Medium	M	Medium Bedded	200 – 600		
600 – 2000	Wide	W	Thickly Bedded	600 – 2000		
2000 – 6000	Very Wide	VW	Very Thickly Bedded	> 2000		
>6000	Extremely Wide	EW				

Defect Persistence (areal extent)	
Trace length of defect given in metres	

Symbols

The list below provides an explanation of terms and symbols used on the geotechnical borehole, test pit and penetrometer logs.

Test Results			Test Symbols	
PI	Plasticity Index	I_p	DCP	Dynamic Cone Penetrometer
LL	Liquid Limit	w_L	SPT	Standard Penetration Test
LI	Liquidity Index	I_L	CPTu	Cone Penetrometer (Piezocone) Test
DD	Dry Density	ρ_d	PANDA	Variable Energy DCP
WD	Wet Density	ρ_w	PP	Pocket Penetrometer Test
LS	Linear Shrinkage	ρ_{sh}	U50	Undisturbed Sample 50 mm (nominal diameter)
MC	Moisture Content	w	U100	Undisturbed Sample 100mm (nominal diameter)
OC	Organic Content	m_v	UCS	Uniaxial Compressive Strength
WPI	Weighted Plasticity Index	C_u	Pm	Pressuremeter

Geotechnical Terms and Symbols

Test Results				Test Symbols	
WLS	Weighted Linear Shrinkage	e	Voids Ratio	FSV	Field Shear Vane
DoS	Degree of Saturation	W_w	Constant Volume Friction Angle	DST	Direct Shear Test
APD	Apparent Particle Density	q_t / q_c	Piezocene Tip Resistance (corrected / uncorrected)	PR	Penetration Rate
s_u	Undrained Shear Strength	q_u	PANDA Cone Resistance	A	Point Load Test (axial)
q_u	Unconfined Compressive Strength	$I_{p(50)}$	Point Load Strength Index	D	Point Load Test (diametral)
R	Total Core Recovery	RQD	Rock Quality Designation	L	Point Load Test (irregular lump)

 28/11/13	Groundwater level on the date shown		Water Inflow		Water Outflow
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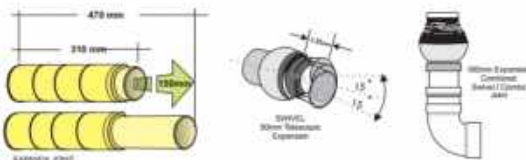
Appendix 3 Site Classification and Plumbing Specifications

Table SP 01 - SOIL CLASSIFICATION, DIFFERENTIAL MOVEMENT, GRADE, ANGLE, JOINTS LOCATION & DRAWING No'S. CHART.

AS2870-2011 SOIL CLASSIFICATION	ON SITE SOIL CONDITIONS	DIFFERENTIAL MOVEMENT	SEWER & Stormwater GRADE	SWIVEL * (50mm Expansion)	SWIVEL/COMBO * (100mm Expansion)	EXPANDA JOINTS *	CREEP SLOPE SITES	DRAWING NUMBER
A	Most Sand & Rock sites	0 - 10mm	1:60 Minimum	Not necessary	Not necessary	Not necessary	These are termed P sites and are referred to in Drawing SP 105	N/a
S	Slightly reactive Soils	10 - 20mm						N/a
M	Moderately reactive soils	20 - 40mm						SP 100 & SP 101
H1	Highly reactive soils	40 - 60mm	1:40 Minimum	As per AS3500.5 using 2 units outside and an Expansion Joint at every riser	As necessary using either or both Bend or Straight units	At Junctions within 1 mtr of internal building footprint and every 6 mtrs. As per Differential Movement See AS2032-2006 Clause 6.4.2.2-4 for suspension requirements		SP 102
H2	Very highly reactive soils	60 - 75mm						SP 102A
E	Extremely reactive soils	75 + mm						SP 102A
P	Soils affected by Abnormal moisture and conditions	From 20 + mm					As per Differential Movement	Not applicable to suspended sub-floors

NOTE: Engineer or local Authority details take precedence over this chart.

To be read in conjunction with Storm Plastics drawings shown.



* Unless specified otherwise, these joints are to be set at 50% of total telescopic movement.

GRADE RATIO	FALL IN 10 mtrs	ANGLE	GRADE %
1:100	100 mm	.57	1.0
1:80	125 mm	.71	1.25
1:60	167 mm	.95	1.65
1:50	200 mm	1.14	2.0
1:40	250 mm	1.43	2.5

Apr. 2015, WPC

Appendix 4 Form 55

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Owner /Agent
 Address
 Suburb/postcode

Qualified person details:

Qualified person:
 Address: Phone No:
 Fax No:
 Licence No: Email address:

Qualifications and Insurance details: *(description from Column 3 of the Director of Building Control's Determination)*

Speciality area of expertise: *(description from Column 4 of the Director of Building Control's Determination)*

Details of work:

Address: Lot No:
 Certificate of title No:
 The assessable item related to this certificate: *(description of the assessable item being certified)*
 Assessable item includes –
 - a material;
 - a design
 - a form of construction
 - a document
 - testing of a component, building system or plumbing system
 - an inspection, or assessment, performed

Certificate details:

Certificate type: *(description from Column 1 of Schedule 1 of the Director of Building Control's Determination)*

This certificate is in relation to the above assessable item, at any stage, as part of - (tick one)
 building work, plumbing work or plumbing installation or demolition work:
 Or

a building, temporary structure or plumbing installation:

In issuing this certificate the following matters are relevant –

Documents:	SR05394
Relevant calculations:	SEE REPORT WHERE RELEVANT
References:	

Substance of Certificate: (what it is that is being certified)

AS2870-2011 ASSESSMENT

Scope and/or Limitations

SEE RECOMMENDATIONS AND WELL AS TERMS AND CONDITIONS CONTAINED WITHIN THE RELEVANT REPORT, ESPECIALLY NOTING:

1. ENGINEERING AND ARCHITECTURAL PLANS TO BE SUBMITTED TO STRATA FOR RATIFICATION AGAINST REPORT RECOMMENDATIONS PRIOR TO CONSTRUCTION. FAILURE TO ENSURE THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT
2. FOUNDING SURFACE INSPECTION OF ALL EXCAVATIONS PRIOR TO FOUNDATION CONSTRUCTION BY STRATA IS MANDATORY AND FAILING TO COMMISSION THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT. THIS IS TO ENSURE THAT ALL FOUNDATIONS ARE TAKEN TO RECOMMENDED FOUNDING SUBSTRATE AND NOT SOFT TOPSOILS OR UNCONTROLLED FILL (WHERE PRESENT)
3. IF SITE CUTTING BEYOND 500MM OCCURS THEN THE SITE MUST BE RECLASSIFIED IN CONSULTATION WITH STRATA.
4. FORM VALID FOR 2 YEARS FROM THE DATE BELOW.

I certify the matters described in this certificate.

Qualified person: *Signed:* *Certificate No:* *Date:*

S NIELSEN 

SR05394

27/9/23



Appendix 5 Terms and Conditions

Scope of Work

These Terms and Conditions apply to any services provided to you ("the Client") by Strata Geoscience and Environmental Pty Ltd ("Strata"). By continuing to instruct Strata to act after receiving the Terms and Conditions or by using this report and its findings for design and/or permit application processes and not objecting to any of the Terms and Conditions the Client agrees to be bound by these Terms and Conditions, and any other terms and conditions supplied by Strata from time to time at Strata's sole and absolute discretion. The scope of the services provided to the Client by Strata is limited to the services and specified purpose agreed between Strata and the Client and set out in the correspondence to which this document is enclosed or annexed ("the Services"). Strata does not purport to advise beyond the Services.

Third Parties

The Services are supplied to the Client for the sole benefit of the Client and must not be relied upon by any person or entity other than the Client. Strata is not responsible or liable to any third party. All parties other than the Client are advised to seek their own advice before proceeding with any course of action.

Provision of Information

The Client is responsible for the provision of all legal, survey and other particulars concerning the site on which Strata is providing the Services, including particulars of existing structures and services and features for the site and for adjoining sites and structures. The Client is also responsible for the provision of specialised services not provided by Strata. If Strata obtains these particulars or specialised services on the instruction of the Client, Strata does so as agent of the Client and at the Client's expense. Strata is not obliged to confirm the accuracy and completeness of information supplied by the Client or any third party service provider. The Client is responsible for the accuracy and completeness of all particulars or services provided by the Client or obtained on the Client's behalf. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person or entity resulting from the failure of the Client or third party to provide accurate and complete information. In the event additional information becomes available to the Client, the Client must inform Strata in writing of that information as soon as possible. Further advice will be provided at the Client's cost. Any report is prepared on the assumption that the instructions and information supplied to Strata has been provided in good faith and is all of the information relevant to the provision of the Services by Strata. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if Strata has been supplied with insufficient, incorrect, incomplete, false or misleading information.

Integrity

Any report provided by Strata presents the findings of the site assessment. While all reasonable care is taken when conducting site investigations and reporting to the Client, Strata does not warrant that the information contained in any report is free from errors or omissions. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from errors in a report. Any report should be read in its entirety, inclusive of any summary and annexures. Strata does not accept any responsibility where part of any report is relied upon without reference to the full report.

Project Specific Criteria

Any report provided by Strata will be prepared on the basis of unique project development plans which apply only to the site that is being investigated. Reports provided by Strata do not apply to any project other than that originally specified by the Client to Strata. The Report must not be used or relied upon if any changes to the project are made. The Client should engage Strata to further advise on the effect of any change to the project. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever where any change to the project is made without obtaining a further written report from Strata. Changes to the project may include, but are not limited to, changes to the investigated site or neighbouring sites, for instance, variation of the location of proposed building envelopes/footprints, changes to building design which may impact upon building settlement or slope stability, or changes to earthworks, including removal (site cutting) or deposition of sediments or rock from the site.

Classification to AS2870-2011

It must be emphasised that the site classification to AS2870-2011 and recommendations referred to in this report are based solely on the observed soil profile at the time of the investigation for this report and account has been taken of Clause 2.1.1 of AS2870 - 2011. Other abnormal moisture conditions as defined in AS2870 - 2011 Clause 1.3.3 (a) (b) (c) and (d) may need to be considered in the design of the structure. Without designing for the possibility of all abnormal moisture conditions as defined in Clause 1.3.3, distresses will occur and may result in non "acceptable probabilities of serviceability and safety of the building during its design life", as defined in AS2870 - 2011, Clause 1.3.1. Furthermore the classification is preliminary in nature and needs verification at the founding surface inspection phase. The classification may be changed at this time based upon the nature of the founding surface over the entire footprint of the project area. Any costs associated with a change in the site classification are to be incurred by the client. Furthermore any costs associated with delayed works associated with a founding surface inspection or a change in classification are to be borne by the client. Where founding surface inspections are not commissioned the classifications contained within this report are void. Classification is based upon a range of expected ground surface movement as indicated in AS2870-2011. Where the range of movement exceeds the stipulations for the nominated classification Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person.

Slope Instability Risks

Where comment, modelling or treatment options are suggested to limit the risk of slope instability Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from actual slope instability or mass movement over the site at any point over the design life of any structures or neighbouring structures.

Subsurface Variations with Time

Any report provided by Strata is based upon subsurface conditions encountered at the time of the investigation. Conditions can and do change significantly and unexpectedly over a short period of time. For example groundwater levels may fluctuate over time, affecting latent soil bearing capacity and ex-situ/insitu fill sediments may be placed/removed from the site. Changes to the subsurface conditions that were encountered at the time of the investigation void all recommendations made by Strata in any report. Strata is not liable, and

accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any change to the subsurface conditions that were encountered at the time of the investigation. In the event of a delay in the commencement of a project or if additional information becomes available to the Client about a change in conditions becomes available to the Client, the Client should engage Strata to make a further investigation to ensure that the conditions initially encountered still exist. Further advice will be provided at the Client's cost. Without limiting the generality of the above statement, Strata does not accept liability where any report is relied upon after three months from the date of the report, (unless otherwise provided in the report or required by the Australian Standard which the report purports to comply with), or the date when the Client becomes aware of any change in condition. Any report should be reviewed regularly to ensure that it continues to be accurate and further advice requested from Strata where applicable.

Interpretation

Site investigation identifies subsurface conditions only at the discrete points of geotechnical drilling, and at the time of drilling. All data received from the geotechnical drilling is interpreted to report to the Client about overall site conditions as well as their anticipated impact upon the specific project. Actual site conditions may vary from those inferred to exist as it is virtually impossible to provide a definitive subsurface profile which accounts for all the possible variability inherent in earth materials. Soil depths and composition can vary due to natural and anthropogenic processes. This is particularly pertinent to some weathered sedimentary geologies or colluvial/alluvial clast deposits which may show significant variability in depth to refusal over a development area. Furthermore where rocky profiles are encountered no comment is made about the potential size of liberated rocks from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sought from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations. Rock incongruities such as joints, dips or faults may also result in subsurface variability. Variability may lead to differences between the design depth of bored/driven piers compared with the actual depth of individual piers constructed onsite. It may also affect the founding depth of conventional strip, pier and beam or slab footings, which may result in increased costs associated with excavation (particularly of rock) or materials costs of foundations. Founding surface inspections should be commissioned by the Client prior to foundation construction to verify the results of initial site characterisation and failure to insure this will void the classifications and recommendations contained within this report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any variation from the site conditions inferred to exist.

Strata is not responsible for the interpretation of site data or report findings by other parties, including parties involved in the design and construction process. The Client must seek advice from Strata about the interpretation of the site data or report.

Report Recommendations

Any report recommendations provided by Strata are only preliminary. A report is based upon 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 earthworks and/or foundation construction is almost complete. Where variations in conditions are encountered, Strata should be engaged to provide further advice. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if the results of selective point sampling are not indicative of actual conditions throughout an area or if the Client becomes aware of variations in conditions and does not engage Strata for further advice.

Geo-environmental Considerations

Strata does not consider site contamination, unless the Client specifically instructs Strata to consider the site contamination in writing. If a request is made by the Client to consider site contamination, Strata will provide additional terms and conditions that will apply to the engagement.

Copyright and Use of Documents

Copyright in all drawings, reports, specifications, calculations and other documents provided by Strata or its employees in connection with the Services remain vested in Strata. The Client has a licence to use the documents for the purpose of completing the project. However, the Client must not otherwise use the documents, make copies of the documents or amend the documents unless express approval in writing is given in advance by Strata. The Client must not publish or allow to be published, in whole or in part, any document provided by Strata or the name or professional affiliations of Strata, without first obtaining the written consent of Strata as to the form and context in which it is to appear.

If, during the course of providing the Services, Strata develops, discovers or first reduces to practice a concept, product or process which is capable of being patented then such concept, product or process is and remains the property of Strata and:

- (i) the Client must not use, infringe or otherwise appropriate the same other than for the purpose of the project without first obtaining the written consent of Strata; and
- (ii) the Client is entitled to a royalty free licence to use the same during the life of the works comprising the project.

Digital Copies of Report

If any report is provided to the Client in an electronic copy except directly from Strata, the Client should verify the report contents with Strata to ensure they have not been altered in any way from the original provide by Strata.



Site Classification to AS2870-2011 - Residential Slabs and Footings

1. Introduction

Strata Geoscience and Environmental Pty Ltd was commissioned to provide a Site Classification to AS2870-2011 for:

Site Details and Key Investigation Outcomes	
Site Address	Unit 6 13-15 Barr Street Lady Barron
Property Owner/Client	CBM Sustainable Design
Development	New dwelling
Date of Investigation	13/9/21
Key Geotechnical Limitations to Site Development	Reactive soil phases, potential for abnormal soil moisture gradients, potential for colluvial and bedrock outcroppings
Key Recommendations	Site drainage around foundations recommended
Site Classification to AS2870-2011	Class M
Subsidiary Site Classification to AS2870-2011 (TO BE USED FOR PLUMBING DESIGN SEE APPENDIX 3)	NA
Site Classification to AS4055- 2012	N2

2. Scope

It is the scope of this investigation to consider geotechnical factors affecting the current development plan (if available). Namely;

- Geotechnical Drilling of minimum 1 Bore (s) to 1.8 m or refusal (whichever first) with logging, sampling and in-situ testing as required
- Site Classification to AS2870-2011 Residential Slabs and Footings.

The above scope has been determined in consultation with the Client and is subject to time and budgetary considerations. Geotechnical investigations are informative processes and further works may be required depending upon the findings of the results of this investigation.

3. Site Investigation

Please refer to Appendices for the results of field/laboratory investigation (where relevant) including site photographs, bore logs, bearing capacity and other relevant data.

4. Interpretation

Geotechnical Parameter	Results
General Comments	FLAT SITE, UNIT SITED IN CLEAR AREA REMOVED FROM EXISTING VEGETATION
Site Geology (MRT Tas 1:250000)	Dgaas
Geotechnical Risks:	
<i>Slope Instability</i>	Not mapped hazard band (DPAC 2023) accessed via LISTMAP).
<i>Soft/Collapsing Soil</i>	Recommend maximum 75kPa working bearing pressures at a minimum 600mm or refusal.
<i>Groundsurface Movement</i>	Slight-Moderate (variability anticipated over the site).
<i>Erosion Potential</i>	Soils may be sensitive to wind and water erosion. Risks to be controlled by a soil and water management plan.
<i>Surface Water</i>	Not observed
<i>Shallow Groundwater/Perched Water</i>	Not encountered- localised seasonal groundwater tables known to existed in localised landscape- upslope interceptor drain age around foundations required.
<i>Uncontrolled Fill/Disturbed Soils</i>	None observed
<i>Impacting Vegetation (Onsite or on adjacent sites)</i>	Trees onsite warranting design consideration
<i>Proposed or recent removal of building/structures</i>	Unknown
<i>Proposed or recent removal of trees</i>	Large trees to be removed as discussed above
<i>Excavation Difficulties</i>	Possible – near surface granite floaters and bedrock known to occur in localised landscape.
<i>Bulk Earthworks (Completed/partially completed/not proposed)</i>	None

5. Recommended Foundation Design Parameters

- The following foundation design parameters are recommended:

	Recommended Footing Designs		
	Slab	Pad/Strip	Pier/Pile Footings
Founding material ^{*1}	UNDISTUBED DENSE SANDS	UNDISTUBED DENSE SANDS	UNDISTUBED DENSE SANDS (SM/SP) /CLAYEY SANDS (SC)/ ROCK
Recommended Minimum Founding Depth (mm or m)	MIN 600MM	MIN 600MM	PIER/PILE SUPPORPTED MIN 1200MM OR REFUSAL
Max Allowable Bearing Pressure (kPa)	75	75	75
Indicative Soil Ys (mm)	20-40mm	20-40mm	20-40mm

^{*1} Where depth to bedrock is given it is a guide only and will vary over the proposed development area(s). Refusal in geotechnical bores may be different than that of larger construction machinery and this may need to be factored into foundation design and contractor quotations.

It must be emphasised that in classifying the site, Strata Geoscience and Environmental P/L did not place sole reliance on the soil bore logs as a means of being an absolute representation of all subsurface features and conditions over the site. Any persons relying upon this document must not assume that subsurface conditions across the entire site will be identical to that represented in the bore logs.

Relevant information and guidance used in classifying the site includes several or all of the following:

1. Publications from Standards Australia, CSIRO, Foundation and Footings Society, Australian Geomechanics Society.
2. Well established and relevant knowledge of the behaviour of local soils and processes affecting soil behaviour (eg ephemeral springs, perched water tables, unstable slopes, collapsing soils, vegetation, etc).
3. The broad experience of the site classifier.
4. Specific investigations from nearby areas.
5. Past Performance of existing structures and foundations (where relevant and known)
6. Engineering Assessment of likely characteristic ground surface movement (γ_s) based upon estimated I_{pt} values and/or laboratory derived I_{ss} values where relevant.

6. Construction Recommendations

6.1 Pre Construction

- **Results of this investigation MUST be confirmed when specific development plans are finalised. Failure to ensure this will void the classifications and recommendations contained within this report.**
- **Design depth to refusal for bored pier/driven pile designs may show variability over the site and may need to be considered in any contractor quotation. Construction machinery will show different depths to refusal that what is indicated in this investigation.**
- **Test pitting/piling with construction machinery is recommended before construction commences to determine excavatability of refusing substrate (if found).**
- **Screw piles should be driven to a minimum depth as nominated by the foundation designer to ensure lateral stability of each pile. Test piling at all corners of each building must occur to ensure this.**
- **This investigation did not determine rock strength parameters of the refusing substrate (if found) and therefore no comment is made about the excavatability of rock at depth. Hard rock may be encountered which may be difficult to excavate and would therefore increase the costs associated with bulk earthworks.**
- **Rocks may be liberated from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sort from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations.**

- **Where rock is encountered the in relation to the Foundation Recommendations the following terms should be noted as per AS2870-2011 Residential Slabs and Footings**
 - **Rock Outcrops** - Where a footing or edge beam encounters a single local rock outcrop over a length less than 1 m, the depth of the footing or edge beam may be reduced by up to one-third, provided the amount of top and bottom reinforcement is doubled and extended 500 mm past the section with reduced depth. Alternatively, the footing may be stepped or raised, provided the structural stiffness is preserved as per AS2870-2011 Clause 3.1.6.
 - **Partial Rock Outcrops** - Where part of the footing is on rock and part is on soil, provision for movement at the change between the two types of foundation shall be made by articulation of the superstructure or strengthening of the footing system. On Reactive Sites (M, H1 and H2) where part of the footing is on rock and part is on soil, the design shall be in accordance with engineering principles as per AS2870-2011 Clause 3.1.7.
 - **Design for complete rock foundation** - Where the edge beam or footing is to be founded entirely on rock, the footing or beam may be replaced by a levelling pad of concrete or mortar as per AS2870-2011 Clause 3.1.8.
- **Abnormal moisture conditions as defined in AS2870-2011 Clause 1.3.3 (a-d) MUST be considered in the design of competent footings. Without such consideration distresses of foundations may occur and result in non acceptable performance as defined in AS2870-2011 Clause 1.3.1.**
- **Uncontrolled Fill** - Any FILLING that does not meet the requirements of AS2870- 2011 Clause 2.5.3(b). This clause allows up to 0.8m of uncontrolled SAND FILL and up to 0.4m of uncontrolled CLAY FILL without impacting on the above site classification following that all foundations are founded on the natural soils through the filling.
- **Rolled Fill** - Consists of material compacted in layers by repeated rolling with an excavator or similar equipment. The depth of rolled fill shall not exceed 0.6m compacted in layers of not more than 0.3m thick for sand material or 0.3m compacted in layers of not more than 0.15m thick for other materials as per AS2870-2011 Clause 6.4.2(b).
- **Controlled Fill** – Fill that will be required to support structures or associated pavements, or for which engineering properties are to be controlled – Refer to AS2870-2011 Clauses 2.5.3, 2.5.3(a), and 6.4.2(a) – i.e. where a specification has been provided on the type, quality, and compaction requirements for filling at a site and the earthworks have been deemed compliant or have complied with the requirements of the specification.
- The recommendations of CSIRO Building Technology File 18 be adopted.
- An apron of paving around the building perimeter sloping away from foundations with a minimum fall of 1:60 be considered for Class M, H-1, H-2, E and P sites.

6.2 During Construction

Throughout construction it is highly recommended that:

- Inspection of the natural soil surface after footings excavation but prior to construction is required by Strata Geoscience and Environmental in accordance with Appendix D of AS 2870-2011. Failure to comply with this recommendation will void all classifications and recommendations contained in this report. The site classification may be changed at this time depending upon the nature of the founding surface which is dependant in part on foundation design.
- **Site cutting should be avoided if possible and if it occurs below 500mmbgs occurs then reclassification MUST be commissioned.**
- **Fill MUST NOT be used as a founding substrate.**
- All earthworks onsite must follow the recommendations of AS 3798-2007.
- Consideration should be given to drainage and sediment control on site during and after construction. Specifically upslope interceptor drainage must be placed around footings areas and downpipes must be directed away from discharging into founding areas.
- All colluvial rocks and boulders in founding zones should be removed
- All large trees near the building envelope must be removed. If construction takes place in summer or autumn then moisture conditions should be stabilised by soaking of dry areas around the former tree.
- Shrinkage cracking is almost inevitable in concrete slabs and is associated with the drying process. Therefore care must be taken where brittle or sensitive floor coverings are proposed, or where a polished slab is planned. The risk of damage can be reduced by not installing floor coverings until after shrinkage has occurred, which can take in excess of 3 months, or by using flexible mortars and appropriate sheeting material.
- Vertical barriers to prevent root incursions around founding zones should be considered in areas where gardens are to be established near foundations.

6.3 Post Construction

After construction, there are certain practices that the owner/occupier should be aware of to prevent excessive foundation movements. The owner will be responsible for any damage or loss associated with disregard for the recommendations contained in CSIRO Building Technology Files 18 "Foundation Maintenance and Footings Performances: A Homeowners Guide" available through CSIRO.

It is furthermore recommended that:

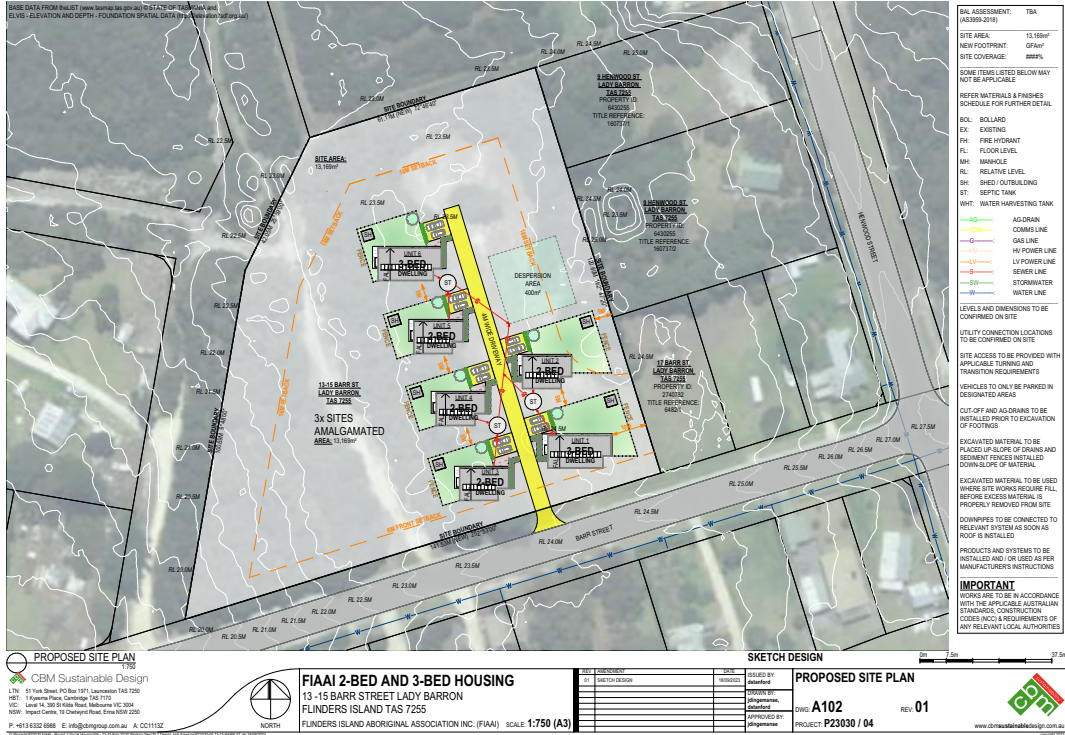
- Gardens or large shrubs or trees must not be established immediately adjacent to foundations
- Garden beds or lawn near foundations must not be excessively watered.
- Leaking underground services and downpipes or gutters must be fixed immediately.



S Nielsen MEngSc CPSS
Director
Strata Geoscience and Environmental Pty Ltd
E:sven@strataconsulting.com.au

Appendix 1 Site Photos





Appendix 2 Indicative Bore Logs

strata <small>ENVIRONMENTAL & GEOTECHNICAL</small>		Indicative Profile Log										BH01							
Client:												Coord's:							
Project:												Bearing: Dip:							
Drill Type:												RL SEE WS							
Drilling Met:												Logged by:							
Fluid:												Date:							
RL	Depth (mm)	Graphic Log	Material Description	Soil			Rock			Weathering			Frac. Spacing		Sampling and Test/Testing	Test Results and Comments			
				Very Loose	Soft to Loose	Firm to Dense	Very Low	Low	Medium	High	Very High	Extremely High	FW	MM			SW	FS	PR
			BROWNISH GREY SAND (SM) LOOSE				NP												
			TRENDING GREY SAND (SP) LOOSE				NP												
	900		TRENDING MEDIUM DENSE GRADUAL REFUSAL																
	1000																		
	1500																		
	2000																		
	2500																		
	3000																		
	3500																		
	4000																		
	4500																		
	5000																		
	5500																		
	6000																		
			BORE TERMINATED AT 1.6 M																

Geotechnical Terms and Symbols

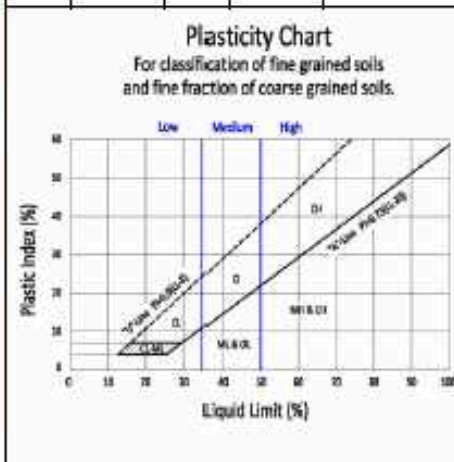
The following information is intended to assist in the interpretation of terms and symbols used in geotechnical borehole logs, test pit logs and reports issued by or for the Queensland Department of Transport and Main Roads (TMR). More detailed information relating to specific test methods is available in the TMR Materials Testing Manual (MTM) and the relevant Australian Standards.

Soil Descriptions

Description and Classification of Soils for Geotechnical Purposes: Refer to AS1726-1993 (Appendix A).

The following chart (adapted from AS1726-1993, Appendix A, Table A1) is based on the Unified Soil Classification System (USCS).

Major Divisions	Particle size mm	USCS Group Symbol	Typical Names	Laboratory Classification				NOTES	
COARSE GRAINED SOILS (more than half of material less than 63 mm & larger than 0.075 mm)	BOULDERS	—		% < 0.075 mm (2)	Plasticity of fine fraction	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{(D_{10} \times D_{60})}$		
	COBBLES	— 200 — 63							
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	coarse	GW	Well graded gravels and gravel-sand mixtures, little or no fines	0-5	—	>4	Between 1 and 3	(1) Identify fines by the method given for fine-grained soils.
		— 20	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels	0-5	—	Fails to comply with above		
		medium	GM	Silty gravels, gravel-sand-silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	
		— 5 fine — 2.36	GC	Clayey gravels, gravel-sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	
	SANDS (more than half of coarse fraction is smaller than 2.36 mm)	coarse	SW	Well graded sands and gravelly sands, little or no fines	0-5	—	>6	Between 1 and 3	(2) Borderline classifications occur when the percentage of fines (fraction smaller than 0.075 mm size) is greater than 5% and less than 12%. Borderline classifications require the use of SP-SM, GW-GC.
		— 0.6	SP	Poorly graded sands and gravelly sands, little or no fines	0-5	—	Fails to comply with above		
		medium	SM	Silty sands, sand silt mixtures (1)	12-50	Below 'A' line or $P_i < 4$	—	—	
		— 0.2 fine 0.075	SC	Clayey sands, sand-clay mixtures (1)	12-50	Above 'A' line and $P_i > 7$	—	—	
	FINE GRAINED SOILS (more than half of material less than 63 mm & smaller than 0.075 mm)	SILTS & CLAYS (Liquid Limit $\leq 50\%$)	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity					
CL CI			Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays						
OL			Organic silts and clays of low plasticity						
SILTS & CLAYS (Liquid Limit $> 50\%$)		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts						
		CH	Inorganic clays of high plasticity, fat clays						
		OH	Organic silts and clays of high plasticity						
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils						



Geotechnical Terms and Symbols

Soil Colour: Is described in the moist condition using black, white, grey, red, brown, orange, yellow, green or blue. Borderline cases can be described as a combination of two colours, with the weaker followed by the stronger. Modifiers such as pale, dark or mottled, can be used as necessary. Where colour consists of a primary colour with secondary mottling, it should be described as follows:
(Primary) mottled (Secondary). Refer to AS 1726-1993, A2.4 and A3.3.

Soil Moisture Condition: Is based on the appearance and feel of soil. Refer to AS 1726-1993, A2.5.

Term	Description
Dry	Cohesive soils; hard and friable or powdery, well dry of plastic limit. Granular soils; cohesionless and free-running.
Moist	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water forms on hands when handling. Granular soils tend to cohere and free water forms on hands when handling.

Consistency of Cohesive Soils: May be estimated using simple field tests, or described in terms of a strength scale. In the field, the undrained shear strength (s_u) can be assessed using a simple field tool appropriate for cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A4.

Consistency - Essentially Cohesive Soils						Soil Particle Sizes	
Term	Field Guide	Symbol	SPT N_{60} Value	Undrained Shear Strength s_u (kPa)	Unconfined Compressive Strength q_u (kPa)	Term	Size Range
Very soft	Oozes between fingers when squeezed in hand.	VS	0-2	<12	<25	BOULDERS	>200 mm
Soft	Easily moulded with fingers.	S	2-4	12-25	25-50	COBBLES	63-200 mm
Firm	Can be moulded by strong pressure of fingers.	F	4-8	25-50	50-100	Coarse GRAVEL	20-63 mm
Stiff	Not possible to mould with fingers.	St	8-15	50-100	100-200	Medium GRAVEL	6-20 mm
Very stiff		VSt	15-30	100-200	200-400	Fine GRAVEL	2.36-6 mm
Hard	Can be indented with difficulty by thumb nail.	H	>30	>200	>400	Coarse SAND	0.6-2.36 mm
						Medium SAND	0.2-0.6 mm
						Fine SAND	0.075-0.2 mm
						SILT	0.002-0.075 mm
						CLAY	<0.002 mm

Note: SPT - N to q_u , correlation from Terzaghi and Peck, 1967. (General guide only).

Consistency of Non-Cohesive Soils: Is described in terms of the density index, as defined in AS 1289.0-2000. This can be assessed using a field tool appropriate for non-cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A5; BS5930-1999, p117.

Consistency - Essentially Non-Cohesive Soils				
Term	Symbol	SPT N Value	Field Guide	Density Index (%)
Very loose	VL	0-4	Foot imprints readily	0-15
Loose	L	4-10	Shovels Easily	15-35
Medium dense	MD	10-30	Shovelling difficult	35-65
Dense	D	30-50	Pick required	65-85
Very dense	VD	>50	Picking difficult	85-100

Standard Penetration Test (SPT): Refer to AS 1289.6.3.1-2004. Example report formats for SPT results are shown below:

Test Report	Penetration Resistance (N)	Explanation / Comment
4, 7, 11	N=18	Full penetration; N is reported on engineering borehole log
18, 27, 32	N=59	Full penetration; N is reported on engineering borehole log
4, 18, 30/15 mm	N is not reported	30 blows causes less than 100 mm penetration (3 rd interval) – test discontinued
30/80 mm	N is not reported	30 blows causes less than 100 mm penetration (1 st interval) – test discontinued
rw	N<1	Rod weight only causes full penetration
hw	N<1	Hammer and rod weight only causes full penetration
hb	N is not reported	Hammer bouncing for 5 consecutive blows with no measurable penetration – test discontinued

Rock Descriptions

Refer to AS 1726-1993 (Appendix A3.3) for the description and classification of rock material composition, including:

- (a) Rock type (Table A6, (a) and (b))
- (b) Grain size
- (c) Texture and fabric
- (d) Colour (describe as per soil).

The condition of a rock material refers to its weathering characteristics, strength characteristics and rock mass properties. Refer to AS 1726-1993 (Appendix A3 Tables A8, A9 and A10).

Weathering Condition (Degree of Weathering):

The degree of weathering is a continuum from fresh rock to soil. Boundaries between weathering grades may be abrupt or gradational.

Rock Material Weathering Classification		
Weathering Grade	Symbol	Definition
Residual Soil	RS	Soil-like material developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the material has not been significantly transported.
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water, but substance fabric and rock structure still recognisable.
Highly Weathered Rock	HW	Strong discolouration is evident throughout the rock mass, often with significant change in the constituent minerals. The intact rock strength is generally much weaker than that of the fresh rock.
Moderately Weathered Rock	MW	Modest discolouration is evident throughout the rock fabric, often with some change in the constituent minerals. The intact rock strength is usually noticeably weaker than that of the fresh rock.
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh Rock	FR	Rock shows no sign of decomposition or staining.

Notes:

1. Minor variations within broader weathering grade zones will be noted on the engineering borehole logs.
2. Extremely weathered rock is described in terms of soil engineering properties.
3. Weathering may be pervasive throughout the rock mass, or may penetrate inwards from discontinuities to some extent.
4. The 'Distinctly Weathered (DW)' class as defined in AS 1726-1993 is divided to incorporate HW and MW in the above table. The symbol DW should not be used.

Strength Condition (Intact Rock Strength):

Strength of Rock Material			
(Based on Point Load Strength Index, corrected to 50 mm diameter – $I_{p(50)}$. Field guide used if no tests available. Refer to AS 4133.4.1-2007.			
Term	Symbol	Point Load Index (MPa) $I_{p(50)}$	Field Guide to Strength
Extremely Low	EL	≤ 0.03	Easily remoulded by hand to a material with soil properties.
Very Low	VL	> 0.03 ≤ 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low	L	> 0.1 ≤ 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	> 0.3 ≤ 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	> 1 ≤ 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	> 3 ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High	EH	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:

1. These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.
2. Anisotropy of rock material samples may affect the field assessment of strength.

Geotechnical Terms and Symbols

Discontinuity Description: Refer to AS 1726-1993, Table A10.

Anisotropic Fabric		Roughness (e.g. Planar, Smooth is abbreviated FI / Sm) Class				Other		
BED	Bedding	Stepped (Stp)	Rough or Irregular (Ro)		I	Cly	Clay	
FOL	Foliation		Smooth (Sm)		II	Fe	Iron	
LIN	Mineral Inclusion		Slacksided (Sl)		III	Co	Coal	
Defect Type		Undulating (Un)	Rough (Ro)		IV	Carb	Carbonaceous	
LP	Lamination Parting		Smooth (Sm)		V	Sinf	Soil Infill Zone	
BP	Bedding Parting		Slacksided (Sl)		VI	Qz	Quartz	
FP	Cleavage / Foliation Parting	Planar (Pl)	Rough (Ro)		VII	CA	Calcite	
J, Js	Joint, Joints		Smooth (Sm)		VIII	Chl	Chlorite	
SZ	Sheared Zone		Slacksided (Sl)		IX	Py	Pyrite	
CZ	Crushed Zone	Aperture		Infilling		Int	Intersecting	
BZ	Broken Zone	Closed	CD	No visible coating or infill	Clean	Cn	Inc	Incipient
HFZ	Highly Fractured Zone	Open	OP	Surfaces discoloured by mineral/s	Stain	St	DI	Drilling Induced
AZ	Alteration Zone	Filled	FL	Visible mineral or soil infill <1mm	Veneer	Vr	H	Horizontal
VN	Vein	Tight	TI	Visible mineral or soil infill >1mm	Coating	Ct	V	Vertical

Note: Describe 'Zones' and 'Coatings' in terms of composition and thickness (mm).

Discontinuity Spacing: On the geotechnical borehole log, a graphical representation of defect spacing vs depth is shown. This representation takes into account all the natural rock defects occurring within a given depth interval, excluding breaks induced by the drilling / handling of core. Refer to AS 1726-1993, B85930-1999.

Defect Spacing			Bedding Thickness (Sedimentary Rock Stratification)		Defect Spacing in 3D	
Spacing/Width (mm)	Descriptor	Symbol	Descriptor	Spacing/Width (mm)	Term	Description
			Thinly Laminated	< 6	Blocky	Equidimensional
<20	Extremely Close	EC	Thickly Laminated	6 – 20	Tabular	Thickness much less than length or width
20 – 60	Very Close	VC	Very Thinly Bedded	20 – 60	Columnar	Height much greater than cross section
60 – 200	Close	C	Thinly Bedded	60 – 200	Defect Persistence (areal extent)	
200 – 600	Medium	M	Medium Bedded	200 – 600	Trace length of defect given in metres	
600 – 2000	Wide	W	Thickly Bedded	600 – 2000		
2000 – 6000	Very Wide	VW	Very Thickly Bedded	> 2000		
>6000	Extremely Wide	EW				

Symbols

The list below provides an explanation of terms and symbols used on the geotechnical borehole, test pit and penetrometer logs.

Test Results			Test Symbols	
PI	Plasticity Index	I_p	DCP	Dynamic Cone Penetrometer
LL	Liquid Limit	w_L	SPT	Standard Penetration Test
LI	Liquidity Index	I_L	CPTu	Cone Penetrometer (Piezocone) Test
DD	Dry Density	ρ_d	PANDA	Variable Energy DCP
WD	Wet Density	ρ_w	PP	Pocket Penetrometer Test
LS	Linear Shrinkage	ρ_{sh}	U50	Undisturbed Sample 50 mm (nominal diameter)
MC	Moisture Content	w	U100	Undisturbed Sample 100mm (nominal diameter)
OC	Organic Content	m_v	UCS	Uniaxial Compressive Strength
WPI	Weighted Plasticity Index	C_u	Pm	Pressuremeter

Geotechnical Terms and Symbols

Test Results				Test Symbols	
WLS	Weighted Linear Shrinkage	e	Voids Ratio	FBV	Field Shear Vane
DoS	Degree of Saturation	W_w	Constant Volume Friction Angle	DST	Direct Shear Test
APD	Apparent Particle Density	q_t / q_c	Piezocene Tip Resistance (corrected / uncorrected)	PR	Penetration Rate
s_u	Undrained Shear Strength	q_u	PANDA Cone Resistance	A	Point Load Test (axial)
q_u	Unconfined Compressive Strength	I_{pm}	Point Load Strength Index	D	Point Load Test (diametral)
R	Total Core Recovery	RQD	Rock Quality Designation	L	Point Load Test (irregular lump)

 28/11/13	Groundwater level on the date shown	 Water Inflow	 Water Outflow
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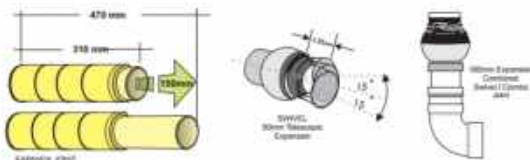
Appendix 3 Site Classification and Plumbing Specifications

Table SP 01 - SOIL CLASSIFICATION, DIFFERENTIAL MOVEMENT, GRADE, ANGLE, JOINTS LOCATION & DRAWING No'S. CHART.

AS2870-2011 SOIL CLASSIFICATION	ON SITE SOIL CONDITIONS	DIFFERENTIAL MOVEMENT	SEWER & Stormwater GRADE	SWIVEL * (50mm Expansion)	SWIVEL/COMBO * (100mm Expansion)	EXPANDA JOINTS *	CREEP SLOPE SITES	DRAWING NUMBER
A	Most Sand & Rock sites	0 - 10mm	1:60 Minimum	Not necessary	Not necessary	Not necessary	These are termed P sites and are referred to in Drawing SP 105	N/a
S	Slightly reactive Soils	10 - 20mm						N/a
M	Moderately reactive soils	20 - 40mm						SP 100 & SP 101
H1	Highly reactive soils	40 - 60mm	1:40 Minimum	As per AS3500.5 using 2 units outside and an Expansion Joint at every riser Not applicable to suspended sub-floors	As necessary using either or both Bend or Straight units ...unless suspended from slab	At Junctions within 1 mtr of internal building footprint and every 6 mtrs. As per Differential Movement See AS2032-2006 Clause 6.4.2.2-4 for suspension requirements	SP 102	SP 102A
H2	Very highly reactive soils	60 - 75mm						SP 102A
E	Extremely reactive soils	75 + mm						SP 102A
P	Soils affected by Abnormal moisture and conditions	From 20 + mm						As per Differential Movement

NOTE: Engineer or local Authority details take precedence over this chart.

To be read in conjunction with Storm Plastics drawings shown.



* Unless specified otherwise, these joints are to be set at 50% of total telescopic movement.

GRADE RATIO	FALL IN 10 mtrs	ANGLE	GRADE %
1:100	100 mm	.57	1.0
1:80	125 mm	.71	1.25
1:60	167 mm	.95	1.65
1:50	200 mm	1.14	2.0
1:40	250 mm	1.43	2.5

Jan. 2015, WPC

Appendix 4 Form 55

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Owner /Agent
 Address
 Suburb/postcode

Qualified person details:

Qualified person:
 Address: Phone No:
 Fax No:
 Licence No: Email address:

Qualifications and Insurance details: *(description from Column 3 of the Director of Building Control's Determination)*

Speciality area of expertise: *(description from Column 4 of the Director of Building Control's Determination)*

Details of work:

Address: Lot No:
 Certificate of title No:
 The assessable item related to this certificate: *(description of the assessable item being certified)*
 Assessable item includes –
 - a material;
 - a design
 - a form of construction
 - a document
 - testing of a component, building system or plumbing system
 - an inspection, or assessment, performed

Certificate details:

Certificate type: *(description from Column 1 of Schedule 1 of the Director of Building Control's Determination)*

This certificate is in relation to the above assessable item, at any stage, as part of - *(tick one)*
 building work, plumbing work or plumbing installation or demolition work:
 Or

a building, temporary structure or plumbing installation:

In issuing this certificate the following matters are relevant –

Documents:

SR05396

Relevant
calculations:

SEE REPORT WHERE RELEVANT

References:

Substance of Certificate: (what it is that is being certified)

AS2870-2011 ASSESSMENT

Scope and/or Limitations

SEE RECOMMENDATIONS AND WELL AS TERMS AND CONDITIONS CONTAINED WITHIN THE RELEVANT REPORT, ESPECIALLY NOTING:

1. ENGINEERING AND ARCHITECTUAL PLANS TO BE SUBMITTED TO STRATA FOR RATIFICATION AGAINST REPORT RECOMMENDATIONS PRIOR TO CONSTRUCTION. FAILURE TO ENSURE THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT
2. FOUNDING SURFACE INSPECTION OF ALL EXCAVATIONS PRIOR TO FOUNDATION CONSTRUCTION BY STRATA IS MANDATORY AND FAILING TO COMMISSION THIS WILL VOID ALL CLASSIFICATIONS AND RECOMMENDATIONS CONTAINED IN THE REPORT. THIS IS TO ENSURE THAT ALL FOUNDATIONS ARE TAKEN TO RECOMMENDED FOUNDING SUBSTRATE AND NOT SOFT TOPSOILS OR UNCONTROLLED FILL (WHERE PRESENT)
3. IF SITE CUTTING BEYOND 500MM OCCURS THEN THE SITE MUST BE RECLASSIFIED IN CONSULTATION WITH STRATA.
4. FORM VALID FOR 2 YEARS FROM THE DATE BELOW.

I certify the matters described in this certificate.

Qualified person: Signed: Certificate No: Date:

S NIELSEN		SR05396	27/9/23
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Appendix 5 Terms and Conditions

Scope of Work

These Terms and Conditions apply to any services provided to you ("the Client") by Strata Geoscience and Environmental Pty Ltd ("Strata"). By continuing to instruct Strata to act after receiving the Terms and Conditions or by using this report and its findings for design and/or permit application processes and not objecting to any of the Terms and Conditions the Client agrees to be bound by these Terms and Conditions, and any other terms and conditions supplied by Strata from time to time at Strata's sole and absolute discretion. The scope of the services provided to the Client by Strata is limited to the services and specified purpose agreed between Strata and the Client and set out in the correspondence to which this document is enclosed or annexed ("the Services"). Strata does not purport to advise beyond the Services.

Third Parties

The Services are supplied to the Client for the sole benefit of the Client and must not be relied upon by any person or entity other than the Client. Strata is not responsible or liable to any third party. All parties other than the Client are advised to seek their own advice before proceeding with any course of action.

Provision of Information

The Client is responsible for the provision of all legal, survey and other particulars concerning the site on which Strata is providing the Services, including particulars of existing structures and services and features for the site and for adjoining sites and structures. The Client is also responsible for the provision of specialised services not provided by Strata. If Strata obtains these particulars or specialised services on the instruction of the Client, Strata does so as agent of the Client and at the Client's expense. Strata is not obliged to confirm the accuracy and completeness of information supplied by the Client or any third party service provider. The Client is responsible for the accuracy and completeness of all particulars or services provided by the Client or obtained on the Client's behalf. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person or entity resulting from the failure of the Client or third party to provide accurate and complete information. In the event additional information becomes available to the Client, the Client must inform Strata in writing of that information as soon as possible. Further advice will be provided at the Client's cost. Any report is prepared on the assumption that the instructions and information supplied to Strata has been provided in good faith and is all of the information relevant to the provision of the Services by Strata. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if Strata has been supplied with insufficient, incorrect, incomplete, false or misleading information.

Integrity

Any report provided by Strata presents the findings of the site assessment. While all reasonable care is taken when conducting site investigations and reporting to the Client, Strata does not warrant that the information contained in any report is free from errors or omissions. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from errors in a report. Any report should be read in its entirety, inclusive of any summary and annexures. Strata does not accept any responsibility where part of any report is relied upon without reference to the full report.

Project Specific Criteria

Any report provided by Strata will be prepared on the basis of unique project development plans which apply only to the site that is being investigated. Reports provided by Strata do not apply to any project other than that originally specified by the Client to Strata. The Report must not be used or relied upon if any changes to the project are made. The Client should engage Strata to further advise on the effect of any change to the project. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever where any change to the project is made without obtaining a further written report from Strata. Changes to the project may include, but are not limited to, changes to the investigated site or neighbouring sites, for instance, variation of the location of proposed building envelopes/footprints, changes to building design which may impact upon building settlement or slope stability, or changes to earthworks, including removal (site cutting) or deposition of sediments or rock from the site.

Classification to AS2870-2011

It must be emphasised that the site classification to AS2870-2011 and recommendations referred to in this report are based solely on the observed soil profile at the time of the investigation for this report and account has been taken of Clause 2.1.1 of AS2870 - 2011. Other abnormal moisture conditions as defined in AS2870 - 2011 Clause 1.3.3 (a) (b) (c) and (d) may need to be considered in the design of the structure. Without designing for the possibility of all abnormal moisture conditions as defined in Clause 1.3.3, distresses will occur and may result in non "acceptable probabilities of serviceability and safety of the building during its design life", as defined in AS2870 - 2011, Clause 1.3.1. Furthermore the classification is preliminary in nature and needs verification at the founding surface inspection phase. The classification may be changed at this time based upon the nature of the founding surface over the entire footprint of the project area. Any costs associated with a change in the site classification are to be incurred by the client. Furthermore any costs associated with delayed works associated with a founding surface inspection or a change in classification are to be borne by the client. Where founding surface inspections are not commissioned the classifications contained within this report are void. Classification is based upon a range of expected ground surface movement as indicated in AS2870-2011. Where the range of movement exceeds the stipulations for the nominated classification Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person.

Slope Instability Risks

Where comment, modelling or treatment options are suggested to limit the risk of slope instability Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from actual slope instability or mass movement over the site at any point over the design life of any structures or neighbouring structures.

Subsurface Variations with Time

Any report provided by Strata is based upon subsurface conditions encountered at the time of the investigation. Conditions can and do change significantly and unexpectedly over a short period of time. For example groundwater levels may fluctuate over time, affecting latent soil bearing capacity and ex-situ/insitu fill sediments may be placed/removed from the site. Changes to the subsurface conditions that were encountered at the time of the investigation void all recommendations made by Strata in any report. Strata is not liable, and

accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any change to the subsurface conditions that were encountered at the time of the investigation. In the event of a delay in the commencement of a project or if additional information becomes available to the Client about a change in conditions becomes available to the Client, the Client should engage Strata to make a further investigation to ensure that the conditions initially encountered still exist. Further advice will be provided at the Client's cost. Without limiting the generality of the above statement, Strata does not accept liability where any report is relied upon after three months from the date of the report, (unless otherwise provided in the report or required by the Australian Standard which the report purports to comply with), or the date when the Client becomes aware of any change in condition. Any report should be reviewed regularly to ensure that it continues to be accurate and further advice requested from Strata where applicable.

Interpretation

Site investigation identifies subsurface conditions only at the discrete points of geotechnical drilling, and at the time of drilling. All data received from the geotechnical drilling is interpreted to report to the Client about overall site conditions as well as their anticipated impact upon the specific project. Actual site conditions may vary from those inferred to exist as it is virtually impossible to provide a definitive subsurface profile which accounts for all the possible variability inherent in earth materials. Soil depths and composition can vary due to natural and anthropogenic processes. This is particularly pertinent to some weathered sedimentary geologies or colluvial/alluvial clast deposits which may show significant variability in depth to refusal over a development area. Furthermore where rocky profiles are encountered no comment is made about the potential size of liberated rocks from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sought from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations. Rock incongruities such as joints, dips or faults may also result in subsurface variability. Variability may lead to differences between the design depth of bored/driven piers compared with the actual depth of individual piers constructed onsite. It may also affect the founding depth of conventional strip, pier and beam or slab footings, which may result in increased costs associated with excavation (particularly of rock) or materials costs of foundations. Founding surface inspections should be commissioned by the Client prior to foundation construction to verify the results of initial site characterisation and failure to insure this will void the classifications and recommendations contained within this report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any variation from the site conditions inferred to exist.

Strata is not responsible for the interpretation of site data or report findings by other parties, including parties involved in the design and construction process. The Client must seek advice from Strata about the interpretation of the site data or report.

Report Recommendations

Any report recommendations provided by Strata are only preliminary. A report is based upon 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 earthworks and/or foundation construction is almost complete. Where variations in conditions are encountered, Strata should be engaged to provide further advice. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if the results of selective point sampling are not indicative of actual conditions throughout an area or if the Client becomes aware of variations in conditions and does not engage Strata for further advice.

Geo-environmental Considerations

Strata does not consider site contamination, unless the Client specifically instructs Strata to consider the site contamination in writing. If a request is made by the Client to consider site contamination, Strata will provide additional terms and conditions that will apply to the engagement.

Copyright and Use of Documents

Copyright in all drawings, reports, specifications, calculations and other documents provided by Strata or its employees in connection with the Services remain vested in Strata. The Client has a licence to use the documents for the purpose of completing the project. However, the Client must not otherwise use the documents, make copies of the documents or amend the documents unless express approval in writing is given in advance by Strata. The Client must not publish or allow to be published, in whole or in part, any document provided by Strata or the name or professional affiliations of Strata, without first obtaining the written consent of Strata as to the form and context in which it is to appear.

If, during the course of providing the Services, Strata develops, discovers or first reduces to practice a concept, product or process which is capable of being patented then such concept, product or process is and remains the property of Strata and:

- (i) the Client must not use, infringe or otherwise appropriate the same other than for the purpose of the project without first obtaining the written consent of Strata; and
- (ii) the Client is entitled to a royalty free licence to use the same during the life of the works comprising the project.

Digital Copies of Report

If any report is provided to the Client in an electronic copy except directly from Strata, the Client should verify the report contents with Strata to ensure they have not been altered in any way from the original provide by Strata.