



**REPORT / HAZARD
ASSESSMENT SHEET**

REPORT REGISTER
PRR # 201112
DME:

Report Name	Geotechnical Investigation Report for the Proposed Ablution Block 1334 Sandspit Road, Warkworth (PT Allot 13) for B & V Morrison		Erosion	Soil Instability	Inundation	Contamination	Hazard Mitig
Author	Hutchinson Consulting Engineers						
Date	24 July 2012	Ref: LJ 15567					
ABA	1014136						
RMA							

HAZARD IDENTIFICATION

Property Key to Identify Site	Proposed or Final Plan	Erosion	Soil Instability	Inundation	Contamination	Hazard Mitig	Encumbrance Consent Notice	SED/superV/ S4	Section 73
	Plan Name								
	Date								
	Address / Lot or Site No. on Plan								
1123134	1334 Sandspit Road, Sandspit, Pt Allot 23 Psh Of Mahurangi								

When dealing with proposed plan of subdivision, attach plan to Report/Hazard Assessment Sheet

Erosion

Long term instability / river limits, shoreline (cliff) changes

Soil Instability

FD – Falling Debris / **ES** – Expansive Soils / **OC** – Onerahi Chaos / **NH** – Northern Allochthon
SP – Slope Instability / **SS** – Subsidence / **LF** Liquefaction

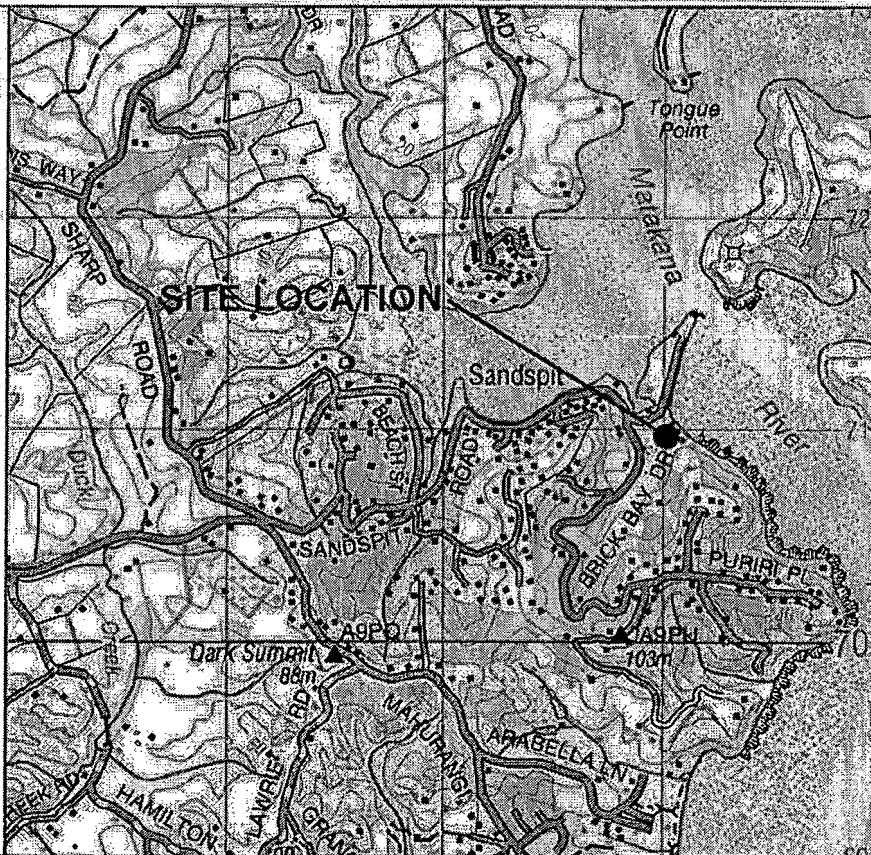
Inundation

FLP – Floodplain / **OLF** – Overland Flowpath / **PND** – Ponding / **SEA** – Storm, Tidal, Sea level rise
MFL – Minimum Floor Level

Hazard Mitigation

SN – Stormwater Neutrality / **DBS** – Defined Buildings Site / **BLR** – Building Line Restriction

Note: All hazard mitigation or SED requirements need to be dealt with by way of a Consent Notice.



SITE DESCRIPTION

The site consists of a 4.148ha lot located on the southern side of Sandspit Road, Warkworth. The site is located on relatively level ground contours. A tributary estuary of the Matakana River is located approximately 30m to the west. The proposed Ablution Block is located within the Sandspit Holiday Park. There is an existing garage and work shop shed located in the position of the proposed Ablution Block.

SITE INVESTIGATION

The fieldwork carried out on the site involved the drilling of two hand auger boreholes to a maximum depth of 2.7 metres. Insitu and remoulded shear strengths were recorded utilising a Pilcon shear vane apparatus. Scala Penetrometer tests were conducted from the base of the boreholes until virtual refusal.

Refer to drawing A3-15567G/01 for borehole locations. A cross section was surveyed through the proposed building site utilising a clinometer and tape. This section is shown on drawing A3-15567G/02 attached.

OBSERVATIONS

Geology

Reference to the 1:250000 Institute of Geological & Nuclear Sciences Limited Geological Map of New Zealand Map 3 (Auckland Area) indicates the site is underlain by Tauranga Group alluvium of Holocene age overlying Pakiri Formation of the Waitemata Group of Miocene age.

This material is described as "*Alluvial/colluvial deposits*" and "*Alternating thick-bedded, volcanic-rich, graded sandstone and siltstone*" respectively.

The Geotechnical investigation encountered alluvial deposits.

Sub-surface Conditions

Sub-surface conditions are shown on Cross Section A-A' on drawing A3-15667G/02 and on the attached borehole logs and Scala Penetrometer test result sheet. A summary is given below:

- Non engineered fill was encountered in boreholes 1 and 2 to a maximum depth of 0.3 and 0.5 metres respectively below existing ground level.
- Tauranga Group alluvium soils, of stiff to hard consistency (56 to 241kPa) were encountered in boreholes 1, 2 and 3.
- Organic peat/sandy soils, of stiff consistency (56 kPa) were encountered in boreholes 1, 2 and 3 to a maximum depth of 1.2, 1.0 and 0.8 metres respectively below existing ground level.

- Competent sandstone/siltstone is inferred to have been encountered in boreholes 1, 2 and 3 at depths of 3.0, 4.8 and 3.8 metres respectively below existing ground level.
- Groundwater in the form of freewater was encountered in boreholes 1, 2 and 3 at depths of 0.5, 0.8 and 0.5 metres respectively, below existing ground level.

Expansive Soils

Based on the visual characteristics of the sub soils encountered in the borehole investigation the soils encountered beneath the building site are considered Site Classification M (moderately expansive) in terms of AS 2870:1996 Residential slabs and footings-Construction. Please note that no laboratory testing has been carried out to confirm the soil classification in terms of AS2870:1996.

Finished Floor Levels

The Auckland Council web stormwater maps (refer to map attached) indicate the majority of the Sandspit Holiday Park is within the zone of potential inundation.

This office has reviewed the Tonkin & Taylor Assessment of Potential Sea levels Due to Storms and Climate Change along Rodney's East Coast Report ref: 22239 dated July 2005 which recommends an inundation risk level in Snells Beach (nearest to Sandspit) of RL 3.2m and a minimum floor level in Snells Beach of RL 3.4m.

The typical ground level of in the location of the proposed Ablution Block is typically 2.5 to 3.0 metres. It is proposed to raise existing ground levels to achieve fall from the Ablution Block to the existing Oxidation Tanks.

DISCUSSION

It is proposed to construct a single storey Ablution Block with a reinforced slab-on-grade floor slab.

The proposed building site is underlain by non-engineered fill and weak alluvial soils. Therefore the proposed Ablution Block will require specific foundation design we have considered two options as outlined below:

Option 1: Remove all non-engineered fill and weak organic alluvial soils to a competent material encountered below typically 0.8 to 1.2m below existing ground level and replace with compacted earthfill and/or hardfill. Providing the weaker materials are completely removed to a competent material and imported fill re-compacted to Engineering standards foundations can be designed with the following parameters.

All strip and/or pad foundations should extend a minimum of 600mm below cleared ground level, following topsoil stripping and benching.

Alternatively, a reinforced stiffened raft or waffle raft type concrete floor slab could be used providing foundations are designed for Site Class M soils in accordance with AS2870:1996.

All foundations should be designed for an ultimate bearing capacity of 300kPa with a strength reduction factor ϕ of 0.5, therefore:

- a maximum dependable bearing pressure of 150kPa.
- a maximum allowable bearing pressure of 100kPa.

Option 2: We recommend all floor slab and load-bearing foundations are to be fully supported on driven piles or bored piles extending into the competent material, typically encountered 3.0 to 3.5 metres below existing ground level.

Due to the elevated ground water level driven timber piles may prove the most practical and economical option. The piles should be driven to a set designed to support the anticipated building loads.

Care should be taken when designing the Ablution Block to limit any potential differential settlement between any associated amenity areas.

The soils encountered beneath the proposed building platform are classified as Class M and also exhibit some undrained shear strengths below 100kPa. The soils fall outside the definition of "good ground" in terms of NZS3604:1999 Timber Framed Buildings. The building platform will require specific foundation design.

RECOMMENDATIONS

We confirm that:

- (a) The land on which the building work is to take place is not subject to, or is not likely to be subject to, instability: and
- (b) The building work itself is not likely to accelerate, worsen, or result in instability of that land or any other property

Subject to the following recommendations:

1. All stormwater runoff from
 - the building site
 - tank overflows
 - hardstand areas
 - surface and subsoil drainageshould be collected into a sealed stormwater system and discharged into the public stormwater system.
2. This office or another Chartered Professional Engineer should be retained by the owner to inspect all earthworks operations and foundation excavations and certify same on completion.

3. **Option 1:** Remove all non-engineered fill and weak organic alluvial soils to a competent material encountered below typically 1.2m below existing ground level and replace with compacted earthfill and/or hardfill. Providing the weaker materials are completely removed to a competent material and a minimum of 1.0 metre outside the building platform and imported fill re-compacted to engineering standards foundations can be designed with the following parameters.

All strip and/or pad foundations should extend a minimum of 600mm below cleared ground level, following topsoil stripping and benching.

Alternatively, a reinforced stiffened raft or waffle raft type concrete floor slab could be used providing foundations are designed for Site Class M soils in accordance with AS2870:1996.

All foundations should be designed for an ultimate bearing capacity of 300kPa with a strength reduction factor ϕ of 0.5, therefore:

- a maximum dependable bearing pressure of 150kPa.
- a maximum allowable bearing pressure of 100kPa.

Option 2: We recommend all floor slab and load-bearing foundations are to be fully supported on driven piles or bored piles extending into the competent material, typically encountered 3.0 to 3.5 metres below existing ground level.

Due to the elevated ground water level driven timber piles may prove the most practical and economical option. The piles should be driven to a set designed to support the anticipated building loads.

We anticipate the required set should be achieved at 3.0 to 3.5m below existing ground level. However the driving of test piles is advised.

All driven timber plies should extend a minimum of 50mm into the base of the foundation/edge beam and be encased in the foundation concrete pour.

6. All topsoil, non-engineered fill and/or soils contaminated with organic materials shall be completely removed from below any future reinforced concrete slab-on-grade floor slab areas prior to placing the compacted hardfill.
7. All buried and overhead services should be accurately located on site prior to the commencement of any construction work and protected during the construction work.
8. A check should be made during the preparation of architectural plans that all foundations are outside the limits of the 45° zone of influence from any service.

If the proposed future foundations are within the limits of the 45° zone of influence, foundation piling (and/or a similar means of compliance) will be required.

9. All services both within the site and/or within the 45° zone of influence should be accurately plotted on the architectural plans indicating all invert and lid levels of both the up and downstream manholes of the pipework.

During the survey, a check should be made to ensure that both inlet and outlet invert levels are attained within manholes, particularly in the event of drop manholes (both internal and external) being evident.

All site survey information should preferably be completed to Lands and Survey Datum.

10. All earthfill should be constructed in accordance with the requirements of NZS 4431:1989. All engineered cohesive earthfill should consist of clean clay soil between 4% below and 2% above optimum moisture content. The fill should be placed in an uncompacted uniform layer (free of lumps exceeding half the layer thickness) not exceeding 200mm in thickness.

Each layer should be compacted using either a heavy sheep's-foot or pad-foot roller to achieve an average undrained shear strength of 140kPa, with no shear strengths less than 100kPa and a maximum of 10% air voids.

Due to the elevated groundwater level and level of soil saturation to achieve the required compaction standard the earthworks should be carried out over the summer season during period(s) of extended dry weather. To achieve the required compaction standard in the winter season the cut (borrow) material may require lime drying.

11. All engineered earthfill batters should be constructed at a gradient no steeper than 3H:1V (approximately 18°).

The entire building platform including amenity areas should comprise engineered earthfill constructed to the above-mentioned standard. The platform should extend a minimum of 1.0m from the edge of the dwelling before being battered.

12. All compacted hardfill placed should consist of GAP 40 (or equivalent, Limestone aggregate is not considered suitable) compacted using a vibrating pedestrian roller in layers not exceeding 150mm in thickness.

LIMITATION

This report has been prepared solely for the benefit of Brian & Vanessa Morrison as our client with respect to the brief. The reliance by other parties on the information or opinions contained in the report shall, without prior review and agreement in writing be at such parties sole risk.

The recommendations and opinions in this report are based on data from three boreholes. The nature and continuity of subsoil conditions away from the borehole positions is inferred and it must be appreciated that actual conditions could vary from the assumed model. Should variations in subsoil conditions from those described in this report be encountered it is essential that Ian Hutchinson Consultants Limited be contacted as it may affect the recommendations and design parameters given in this report.

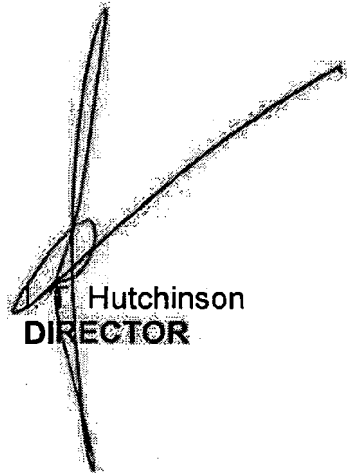
Should you wish to discuss any aspects of the above information, please contact the above office.

We trust this meets with your approval.

Yours faithfully
HUTCHINSON



J. Black
ENGINEER



T. Hutchinson
DIRECTOR

SOIL STRENGTH CLASSIFICATION (Fine grained cohesive soils)			SCALA PENETROMETER RESULTS	
TERM	FIELD IDENTIFICATION	SHEAR STRENGTH (kPa)	TERM	SCALA PENETROMETER (No. of blows/100mm)
Very Soft (Vs)	Exudes between fingers when squeezed	<12	Very dense	>17
Soft (S)	Easily indented by fingers	12–25	Dense	7–17
Firm (F)	Indented only by strong finger pressure	25–50	Medium dense	3–7
Stiff (St)	Cannot be indented by thumb pressure	50–100	Loose	1–3
Very Stiff (Vst)	Indented by thumbnail	100–200	Very loose	0–2
Hard (H)	Difficult to indent by thumbnail	200–500		

PROPORTIONAL TERMS DEFINITION				MOISTURE CONDITION
	TERM	% OF SOIL MASS	EXAMPLE	
SUBORDINATE FRACTION	(<i>in.</i>)y	20–50	Sandy	Dry (D)—Soil looks and feels dry; cohesive soils usually hard, powdery or friable, granular soils run freely through hands
	MAJOR FRACTION	≥50 major constituent	SAND–GRAVEL GRAVEL	Moist (M)—Soil feels cool, darkened in colour; granular soils tend to cohere, cohesive soils usually weakened by moisture presence, but one gets no free water on hands when remoulding
	MINOR FRACTION	trace minor some	trace sand minor sand some sand	Wet (W)—Soil feels cool, darkened in colour; granular soils tend to cohere, cohesive soils usually weakened and free water forms on hands when handling
IN-SITU STRENGTH TESTING				Saturated (S)—Soil feels cool, darkened in colour and free water is present on the sample. Fully saturated refers to the case where the soil is below the water table
V128	Insitu Shear Strength (kPa), corrected to BS:1377			
R52	Remoulded Shear Strength (kPa)			
UTP	Unable to penetrate			
CH	Clegg Hammer			

PARTICLE SIZE TERMINOLOGY		GRAPHIC SYMBOLS		
SOIL FRACTION	PARTICLE SIZE RANGE			
CLAY	<2µm	 FILL	 CLAY	 MUDSTONE
SILT	2–60µm	 TOPSOIL	 SAND	 SANDSTONE
SAND fine	0.06–0.2mm	 ORGANIC (PEAT)	 GRAVEL	 LIMESTONE
medium	0.2–0.6mm			
coarse	0.6–2.0mm			
GRAVEL fine	2.0–6.0mm	 SILT	 SILTSTONE	 GREYWACKE
medium	6.0–20.0mm			
coarse	20.0–60.0mm			
COBBLES	60.0–200.0mm			
BOULDER	>200.0mm			

PLASTICITY TERMS DEFINITION		COLOURS			PARTICLE SHAPE (roundness terms)
		1	2	3	
Non plastic	Sample can't be rolled	light dark	pinkish reddish yellowish brownish greenish bluish greyish	pink red orange yellow brown green blue white grey black	Rounded 
Slightly plastic	Sample can be rolled into 3.5mm thread				Sub-rounded 
Moderately plastic	Thread can be bent				Angular 
Highly plastic	Thread bends alot				Sub-angular 



LOG OF BOREHOLE NO: 1

50mm DIAMETER HAND AUGER

JOB No: 15567
 DATE: 13/06/2012
 TESTED BY: JB
 SHEAR VANE No: 4770
 (SHEAR VANE TESTING BASED ON BS1377)

CLIENT: B. & V. MORRISON
 LOCATION: 1334 SANDSPIT ROAD, WARKWORTH

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
FILL	dark brown, Topsoil, rootlets			Vst		M		
	slightly plastic, yellow brown, brown streaks, dark brown staining, Silty CLAY							
TAUPANGA GROUP	non to slightly plastic, dark brown, black organic peat with tree remains, Clayey SILT with some sand		0.5		V171/R15	S		freewater
	non plastic, dark brown, black, organic stained, SAND with minor clay and minor silt		1.0	St	V56/R11			
	slightly to moderately plastic, bluish grey with brown streaks, Silty CLAY		1.5	Vst	V148/R37	M		
			2.0		V130/R37			
	grey, bluish grey		2.5	H	241+			
	E.O.B. @ 2.7m difficult to auger		2.7		UTP			
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					



LOG OF BOREHOLE NO: 2

50mm DIAMETER HAND AUGER

JOB No: 15567
 DATE: 13/06/2012
 TESTED BY: JB
 SHEAR VANE No: 4770
 (SHEAR VANE TESTING BASED ON BS1377)

CLIENT: B. & V. MORRISON
 LOCATION: 1334 SANDSPIT ROAD, WARKWORTH

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
FILL	aggregate			St		M		
	slightly plastic, brown, yellow brown, Silty CLAY							
TAURANGA GROUP	non plastic, brown, SAND							
	non to slightly plastic, dark brown organic stained, Silty SAND with minor clay		0.5		V56/R11			
	non plastic, brown, yellow brown, occasional shell					S		freewater
	slightly to moderately plastic, grey with orange brown mottles, Silty CLAY		1.0	VSt	V145/R37	M/W		
	bluish grey, orange brown bands		1.5		V148/R56	M		
	E.O.B. @ 2.0m target depth		2.0	H	V223/R56			
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					



LOG OF BOREHOLE NO: 3

50mm DIAMETER HAND AUGER

JOB No: 15567
 DATE: 13/06/2012
 TESTED BY: JB
 SHEAR VANE No: 4770
 (SHEAR VANE TESTING BASED ON BS1377)

CLIENT: B. & V. MORRISON
 LOCATION: 1334 SANDSPIT ROAD WARKWORTH

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
TAURANGA GROUP	dark brown, Topsoil, rootlets non to slightly plastic, dark brown, Silty SAND with some clay, organic stained		0.5	St	V56/R28	W/S		freewater
	non plastic, SAND slightly to moderately plastic, bluish grey, orange brown bands, Silty CLAY		1.0	H	V241+	M/W		
			1.5		V241+			
	E.O.B. @ 1.6m difficult to auger		2.0					
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					



SCALA PENETROMETER TEST RESULTS

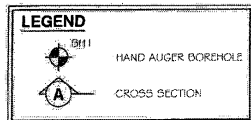
CLIENT: B. & V. MORRISON
 LOCATION: 1334 SANDSPIT ROAD, WARKWORTH

JOB No: 15567
 DATE: 13/06/2012
 TESTED BY: JB

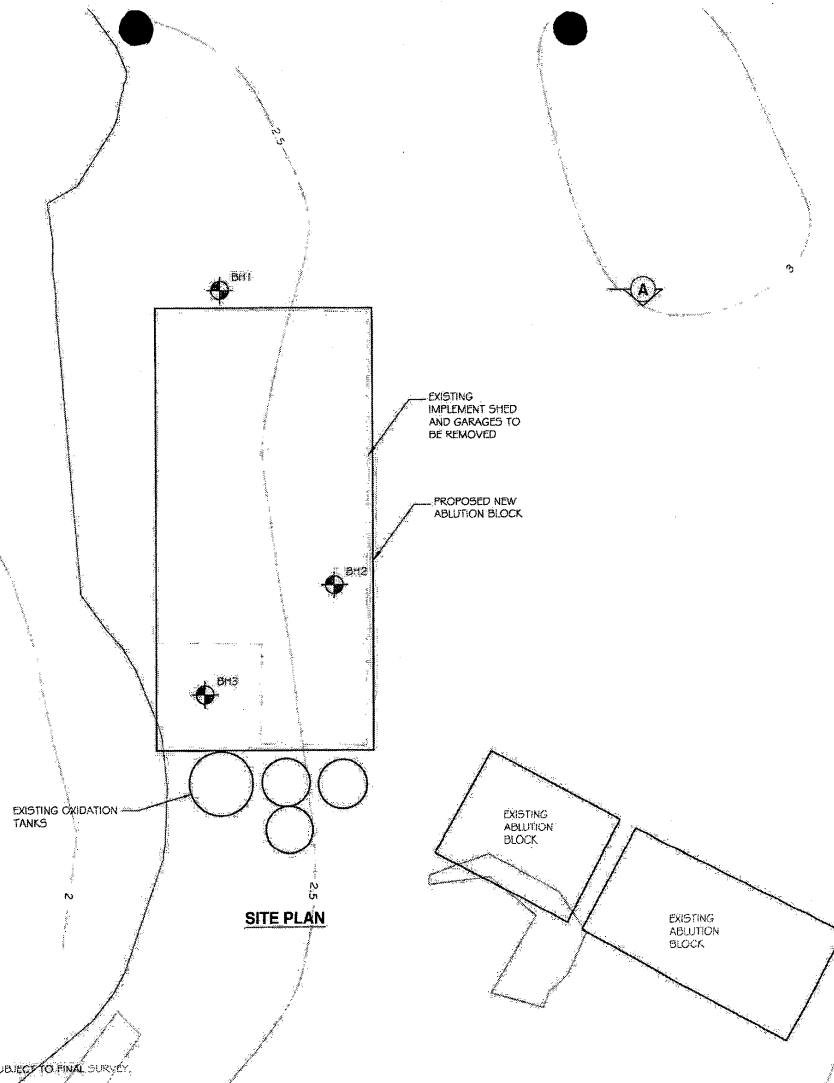
DEPTH OF PENETRATION (mm)	BH1	BH2	BH3				
START DEPTH (m):	2.7	2.0	1.6				
100	11	3	4				
200	20	2	5				
300	20+	2	6				
400		1	3				
500		2	6				
600		3	6				
700		5	7				
800		9	9				
900		15	9				
1000		13	8				
1100		11	14				
1200		19	11				
1300		11	13				
1400		15	13				
1500		15	14				
1600		14	10				
1700		11	10				
1800		11	10				
1900		14	11				
2000		15	15				
2100		14	14				
2200		12	18				
2300		12					
2400		16					
2500		16					
2600		14					
2700		16					
2800		18					
2900							
3000							
3100							
3200							
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3400							
3500							
3600							
3700							
3800							
3900							
4000							
4100							
4200							
4300							
4400							
4500							
END DEPTH (m):	3.0	4.8	3.8				

*Based on test method: NZS4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

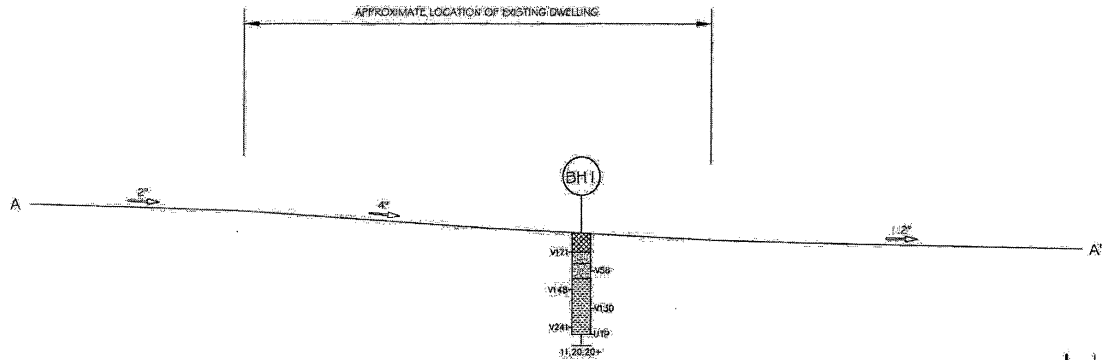
LEGAL DESCRIPTION
PT ALLOT 23
AREA: 4.1460ha



NOTE:
ALL AREAS & LEVELS SUBJECT TO FINAL SURVEY.



REV.	DATE	ITEM
The Design and Drawings shown on this sheet remain the Copyright of Ian Hutchinson Consultants Limited, and are not to be reproduced without their written authority. DO NOT SCALE IF IN DOUBT - ASK		
H Hutchinson CONSULTING ENGINEERS PO Box 150, Ormiston NSW Ground Floor Stan House, 19 Tamarind Ave, Ormiston Ph: 08 406 2702 Fax: 08 406 1855 www.hutcon.nsw		
PROJECT B. & V. MORRISON PROPOSED ABLUTION BLOCK AT 1334 SANDSPIT ROAD SANDSPIT		
DRAWING TITLE GEOTECHNICAL INVESTIGATION SITE PLAN		
SCALE 1:200 @ A3	DATE JUL Y 2012	
DRAWN JB	CHKD RM	
REV		A3 - 15567G/01



CROSS SECTION A-A'

LEGEND

- HAND AUGER BOREHOLE
- SHEAR STRENGTH (kPa)
- SLOPE ANGLE

NOTE:
ALL AREAS & LEVELS SUBJECT TO FINAL SURVEY.

REV.	DATE	ITEM
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PO Box 115, Ormeau QLD Ground Floor Flat 10/11, 28 Tamarine Ave, Ormeau Ph: 08 429 9128 Fax: 08 429 9059 www.hc.co.au		
PROJECT: B. & V. MORRISON PROPOSED ABLUTION BLOCK AT 1334 SANDSPIT ROAD SANDSPIT		
DRAWING TITLE: GEOTECHNICAL INVESTIGATION CROSS SECTION A-A'		
SCALE 1:100 @ A3	DATE JULY 2012	
DRAWN JH	CHECKED JH	
REV.	A3 - 15567G/01	