362 Matakana Valley Road Matakana

Geotechnical Investigation Report

Prepared for Three Blokes Limited

October 2017 Ref L20145

Hutchinson
CONSULTING ENGINEERS

Geotechnical Investigation Report

for the

Proposed Development

at

362 Matakana Valley Road
Matakana

Prepared by A. Saveliev
ENGINEER

Ian Hutchinson Consultants Ltd
P O Box 150, Orewa 0946
154 Centreway Road, Orewa 0931

Reviewed by J. Charlwood
ENGINEER

+64 9 426 5702
info@hc.co.nz
www.hc.co.nz

Approved by I. T. Hutchinson
MANAGING DIRECTOR

Date 4th October 2017

Our Ref: L20145

4 October 2017

Three Blokes Limited
PO Box 170
Matakana 0948

Attention: Dean and Kim Munro

Dear Dean and Kim,

RE: GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED DEVELOPMENT AT 362 MATAKANA VALLEY ROAD, MATAKANA (PT ALLOT 51 PSH OF MATAKANA SO 1044)

INTRODUCTION

A Civil and Geotechnical report was prepared by this office ref: LJ12601 dated 13 October 2008 for the Proposed Development at Matakana Valley Road, Matakana following a preliminary geotechnical investigation completed on Tuesday the 16th September 2008.

This office has since re-visited and observed the above site on Tuesday the 12th September 2017 to investigate 'site specific' stability and sub-soil conditions for the proposed development at 362 Matakana Valley Road, Matakana.

SITE LOCATION

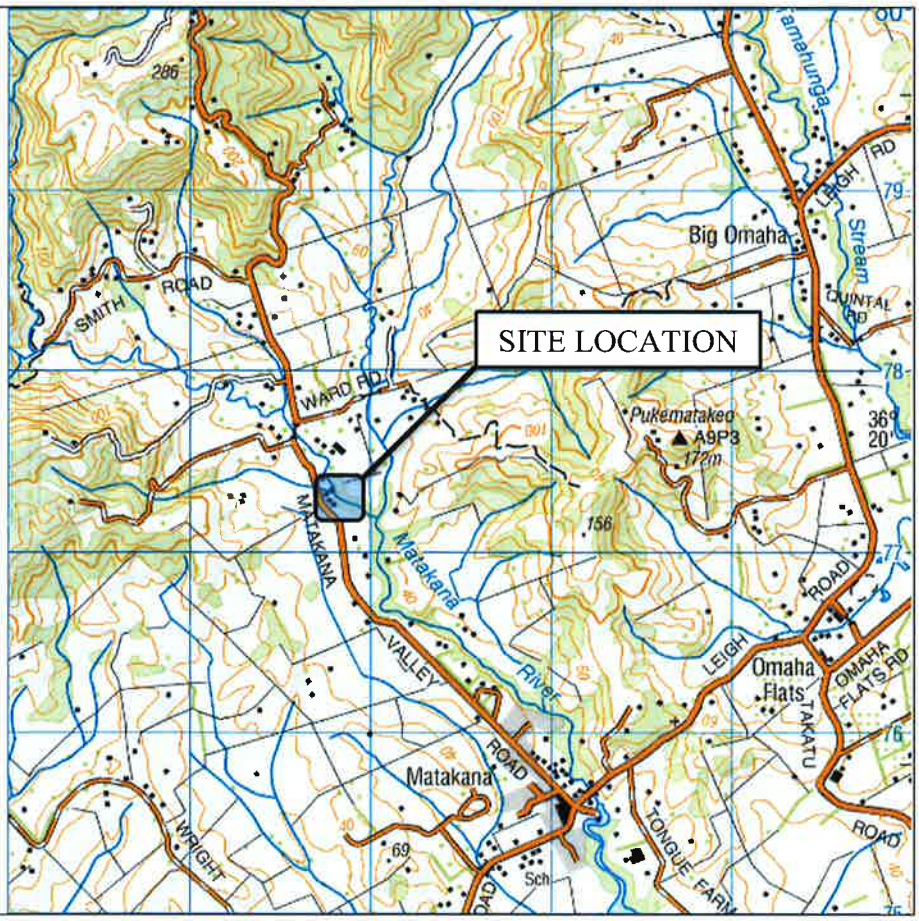
NZ Topo50
Sheet AZ31

Warkworth

Grid
Reference:
528E 773N

GPS Co-
ordinates
(NZTM):

E 1752780
N 5977282



SITE DESCRIPTION

The site is located at 362 Matakana Valley Road, Matakana and is situated on the north eastern side of Matakana Valley Road. The site has a total land area of around 2.7 Ha and comprises an irregular shaped portion of land. The property encompasses a timber sales yard known as the Matakana Sawmill, comprising timber storage and processing sheds.

There are two natural watercourses situated within natural stream gullies that bisects the approximate central portion of the site converging with an upstream tributary of the Matakana River. The existing stream embankments within close proximity to the proposed planning shed location comprise steep slopes of around 30° to 40°.

The vegetation adjacent to the eastern boundaries comprises native bush and exotic tree species. The majority of the proposed development area is covered in hardstand areas and existing timber storage/drying sheds.

SITE INVESTIGATION

The fieldwork carried out on the site involved the drilling of seven hand auger boreholes to a maximum depth of 5.0 metres. Insitu and remoulded shear strengths were recorded utilising a Pilcon shear vane apparatus. Scala Penetrometer tests were conducted from the base of two boreholes until virtual refusal was achieved.

Refer to drawing A3-20145G/02 for borehole locations. A cross section was surveyed through the proposed planning shed building site utilising a clinometer and tape. This section is shown on drawing A3-20145G/03 attached.

OBSERVATIONS

Geology

Reference to the 1:250000 Institute of Geological & Nuclear Sciences Limited Geological Map of New Zealand Map 3 (Auckland Area) and the GNS Science New Zealand Geology Web Map indicate the site is underlain by late Miocene to middle Pleistocene river deposits of the Tauranga Group. This material is commonly described as *"Mainly pumiceous alluvium and colluvium with interbedded peat"*.

The geotechnical investigation encountered material consistent with alluvial Tauranga Group soils.

Sub-surface Conditions

Sub-surface conditions are shown on Cross Section A-A' on drawing A3-20145G/03, on the attached borehole logs and Scala Penetrometer test result sheet. A summary is given below:

- Uncontrolled earthfill was encountered in boreholes 3, 4, 5, 6 and 7 to a depth of around 0.3, 0.9, 0.6, 0.4 and 0.5 metres respectively, below existing ground level.

- Tauranga Group soils, of firm to hard consistency (46kPa to >216kPa) were encountered in boreholes 1, 2, 3, 4, 5, 6 and 7.

- Competent weathered rock was not encountered during the geotechnical investigation to a maximum depth of 7.5 metres, below existing ground level.

- Groundwater was encountered in boreholes 1, 2 and 5 at depths of 3.5, 2.2 and 1.7 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 AS2870:2011 Residential slabs and footings-Construction. Please note that no laboratory testing has been carried out to confirm the soil classification in terms of AS2870:2011.

DISCUSSION

The proposed development will comprise the replacement of a fire damaged planning shed within the approximate same location. The preliminary architectural plans provided by Campbell Registered Architects Ltd indicate the proposed replacement shed will comprise a show room and workshop area with an elevated office and store room with a lunchroom below and will be supported on a reinforced concrete slab-on-grade floor slab. It is proposed to form a level building platform using around 1.5m depth of fill within the north western portion of the proposed planning shed. The fill is proposed to be supported using masonry blockwork.

The client is also proposing to replace two existing drying sheds within the south eastern portion of the site. The geotechnical investigation encompassed three additional boreholes completed within the vicinity of the drying sheds to ascertain the strength and condition of the underlying subsoils. A single borehole was completed within the vicinity of a proposed wastewater disposal field. The soils encountered within the site are considered to be category 5, moderate to slow drainage in terms of TP58; Table 5.1.

Building Foundations

Replacement Planning Shed

During the geotechnical investigation uncontrolled earthfill was encountered in borehole 3 to a depth of around 0.3 metres below existing ground level. An old topsoil layer was encountered at the base of the fill material overlying natural ground. To ensure the propose reinforced concrete slab-on-grade floor slab is not adversely affected as a result of differential foundation settlement, we recommend that all topsoil, non-engineered earthfill and/or soils contaminated with organic materials be completely removed from below any future reinforced concrete slab-on-grade floor slab areas and replaced with engineered earthfill or compacted hardfill.

As a result of the presence of existing steep slopes located within close proximity to the proposed planning shed, all north western (down slope) foundations should be supported on protection piles (bored concrete encased or driven) and designed using the parameters within the recommendations section of this report.

Drying Sheds

During the geotechnical investigation uncontrolled fill material was encountered in boreholes 4, 5 and 7 to a depth of around 0.9, 0.6 and 0.5 metres respectively, below existing ground level. As a precaution against the likelihood of differential foundation settlement having an adverse effect on conventional shallow foundations (i.e strip and/or pad footings) within the uncontrolled fill material, we recommend that all uncontrolled earthfill be removed and re-placed with engineered earthfill or compacted hardfill.

Finished Floor Levels

A review of the latest Auckland Council catchments and hydrology information indicates the proposed replacement planning shed and south eastern drying shed are located within a flood plain and/or flood prone area with a potential 100 year ARI flood level of RL 22.11m. This can be identified on the Auckland Council GIS map (Catchments and Hydrology document) appended to this report.

Council requires that new floor levels be set at 500mm above the 100 year flood level for habitable activities including education, community and care facilities, and 300mm above the 100 year flood level for non-habitable activities such as a garage or storage.

Given an expected 100 year flood level of RL 22.11, the recommended minimum finished flood level for the proposed planning shed and or replacement drying sheds should be set at **RL 22.41m** or above.

RECOMMENDATIONS

1. All stormwater runoff from
   - the building site
   - tank overflows
   - hardstand areas
   - surface and subsoil drainage

   should be collected into a sealed stormwater system and discharged through a suitable scour resistant outlet well clear of the building site and into the existing natural watercourse.

   Concentrated stormwater flows should not be allowed to discharge close to the building(s) or onto sloping ground within the vicinity of the building site. This would be detrimental to foundation conditions and slope stability.

   All pipes at the inlet, between and at the outlet of water tank(s) should have flexible connections.

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. **Building Foundations**

   Replacement Planning Shed

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

   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 AS 2870:2011.

   All foundations should be designed for an ultimate bearing capacity of 300kPa with a strength reduction factor Ø of 0.5, therefore:
   - a maximum dependable bearing pressure of 150kPa.
   - a maximum allowable bearing pressure of 100kPa.

As a result of the presence of existing steep slopes located within close proximity to the proposed planning shed, all north western (down slope) foundations should be supported on protection piles (bored concrete encased or driven) and designed using the parameters below.

Bored concrete encased

- Founded a minimum of 4.0m below cleared ground level.
- An ultimate end bearing capacity of 300kPa.
- An ultimate sidewall adhesion of 36kPa ignoring adhesion over the upper 1000mm of embedment.
- A strength reduction factor Ø of 0.5 should be applied to all ultimate loads.
- Lateral earth pressure of K_o=0.6 acting over three auger pile diameters for the initial 1000mm of embedment with a density of 18kN/m^3.
- Piles should be tapered in length on the return edges of the planning shed.

Driven

All north western (down slope) foundations should be supported on H5B driven timber piles, designed to an appropriate set to support the anticipated building loads using a suitable pile resistance formula.

The piles should be driven to a minimum depth of 4.0m below cleared ground level.

Based on our borehole information and scala penetrometer test results, we anticipate the required set should be achieved from around 6.0m below existing ground level. However, the driving of test piles is advised to ascertain the likely finished pile lengths to attain set.

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

Drying Sheds

All topsoil, non-engineered earthfill and/or soils contaminated with organic materials should be completely removed from below any future reinforced concrete slab-on-grade floor slab areas and replaced with engineered earthfill or compacted hardfill. The existing fill material may be re-compacted under the discretion of a suitably qualified geotechnical engineer provided it is not contaminated with organic materials.

Provided the remedial earthworks operation is undertaken to the required engineering standards and subject, the proposed replacement drying shed sites are considered suitable for foundation design in accordance with NZS 3604:2011 Timber Framed Buildings.

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

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

Should a pole type shed be constructed, the piled foundations should be subject to specific design.

4. 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.

5. All cut batters steeper than a 3H:1V gradient and in excess of 500mm should be retained by a retaining wall designed by a Chartered Professional Engineer who is familiar with the site conditions.

   The retaining walls should be designed using soil parameters:

   - c' = 0kPa
   - ϕ' = 30°
   - S_u'(to calculate pole embedment) = 60kPa
   - γ' = 18kN/m³
   - Timber pole wall active (K_a) horizontal soil loads.
   - Masonry wall at rest (K_o) horizontal soil loads.
   - Embedment depths should be modified for appropriate ground slope below the wall and/or back slope surcharge loading.

6. 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.

   As the result of the potential elevated groundwater levels and/or moisture content within the soils, the earthworks should be carried out over the summer season during period(s) of extended dry weather to ensure the required compaction standards are achieved. To achieve the required compaction standards in the winter condition (or during periods of wet weather) the earth-worked material will most likely require lime drying. As a result of the lime drying it may be necessary to undercut the cut area below finished subgrade level, rework and lime dry this material to ensure the completed building platform, including amenity area has consistent soil properties throughout the platform.

   The cost implications of completing the earthworks during periods of poor weather are likely to be significant.

7. All engineered earthfill batters should be constructed at a gradient no steeper than 4H:1V (approximately 14°). If these gradients cannot be achieved all engineered earthfill batter should be supported with a specifically designed retaining structure.

   The platform should extend a minimum of 1.0m from the edge of the building before being battered.

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

9. All engineered earthfill and/or compacted hardfill placed should not exceed 800mm in thickness. Any fill exceeding 800mm in thickness should comprise lightweight fill material such as Polyrock and/or approved similar.

10. Where brittle exterior cladding such as brick veneer, stucco plaster, solid plaster, block work, styrofoam type cladding or sprayed plaster over harditex systems, etc is proposed, consideration should be given to detail control joints. Control joint spacing should not exceed 3.0 metres either horizontally or vertically and be positioned around doorways, windows and building envelope returns where cracking is most likely to occur.

11. As a result of the potential shrink/swell nature of the underlying soils when slab-on-grade construction is carried out during periods of extended dry weather (i.e. the summer season) excavated floor slab areas should be thoroughly wetted and soaked for a minimum of 48 hours prior to final preparation of the impermeable damp proof course and concrete pouring. This can be achieved with fine spraying the prepared sub-grade with a hose or with heavy spraying of the compacted hardfill under the slab. Rapid construction following excavation and benching is also considered a suitable option.

12. Where using a reinforced waffle raft type concrete floor slab in moderate to highly expansive soil conditions. A minimum of 150mm layer of compacted GAP 65 basecourse should be placed beneath the slab to help minimise potential effects of soil heaving.

13. Wherever possible existing vegetation on slopes should be maintained and new vegetation encouraged. The evapotranspiration and root binding effects of vegetation will help enhance slope stability.

    To reduce the effects of seasonal shrink/swell in expansive soils, site new planting at a distance away from existing/proposed building(s) of at least 1.5 times the mature height of the tree is recommended.

LIMITATION

This report has been prepared solely for the benefit of Three Blokes Limited 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 seven 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.

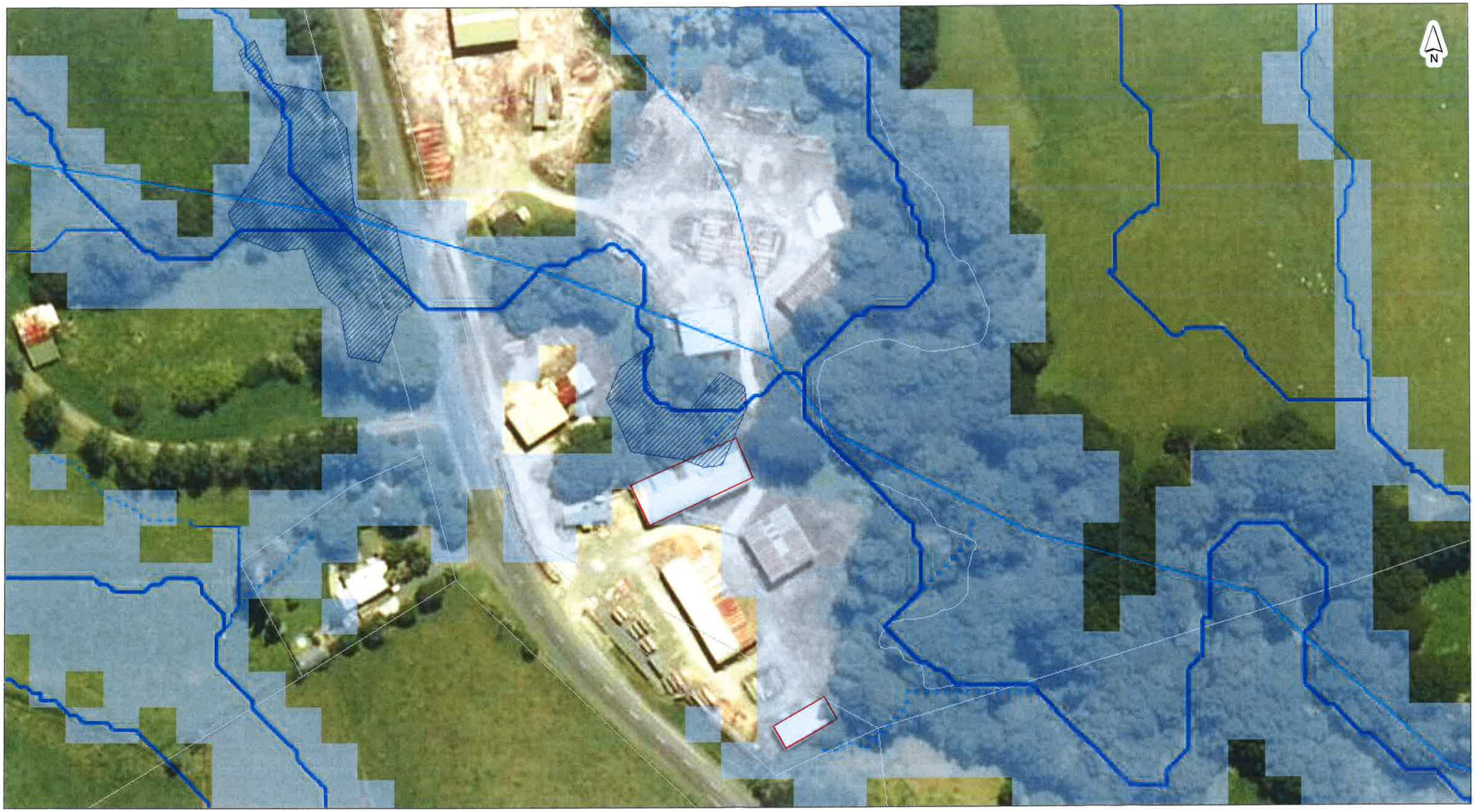
We trust this meets with your approval.

Yours faithfully
IAN HUTCHINSON CONSULTANTS LTD

Prepared by A. Saveliev
ENGINEER

Reviewed by J. Charlwood
ENGINEER

Approved by I. T. Hutchinson
MANAGING DIRECTOR



Catchments and Hydrology

0 10 20 30
Meters

Scale @ A3
= 1:1,000

Date Printed:
4/10/2017

Auckland Council
Te Kaunihera o Tāmaki Makaurau

River Names

River Names

Overland Flow Paths - 3ha and above

Overland Flow Paths - 3ha and above

Overland Flow Paths - 4000m2 to 3ha

Overland Flow Paths - 4000m2 to 3ha

Overland Flow Paths - 2000m2 to 4000m2

Overland Flow Paths - 2000m2 to 4000m2

Overland Flow Paths

Overland Flow Paths

Flood Prone Areas

Flood Prone Areas

Flood Sensitive Area

Flood Sensitive Area

Flood Plains

Flood Plains

Stormwater Catchments

Stormwater Catchments

Rail Stations (8,000)

Rail Stations (8,000)

Railway (2,500)

Railway (2,500)

Auckland Council Boundary

Auckland Council Boundary

Roads (1,000)

Parcels

Parcels

Legend

Date Printed:
4/10/2017

Auckland Council
Te Kaunihera o Tāmaki Makaurau

Hutchinson CONSULTING ENGINEERS

GEOTECHNICAL AND GEOLOGICAL INFORMATION

SOIL STRENGTH CLASSIFICATION (Fine grained cohesive soils)		
TERM	FIELD IDENTIFICATION	SHEAR STRENGTH (kPa)
Very Soft (Vs)	Exudes between fingers when squeezed	<12
Soft (S)	Easily indented by fingers	12–25
Firm (F)	Indented only by strong finger pressure	25–50
Stiff (St)	Cannot be indented by thumb pressure	50–100
Very Stiff (VSt)	Indented by thumbnail	100–200
Hard (H)	Difficult to indent by thumbnail	200–500

SCALA PENETROMETER RESULTS	
TERM	SCALA PENETROMETER (No. of blows/100mm)
Very dense	>17
Dense	7–17
Medium dense	3–7
Loose	1–3
Very loose	0–2

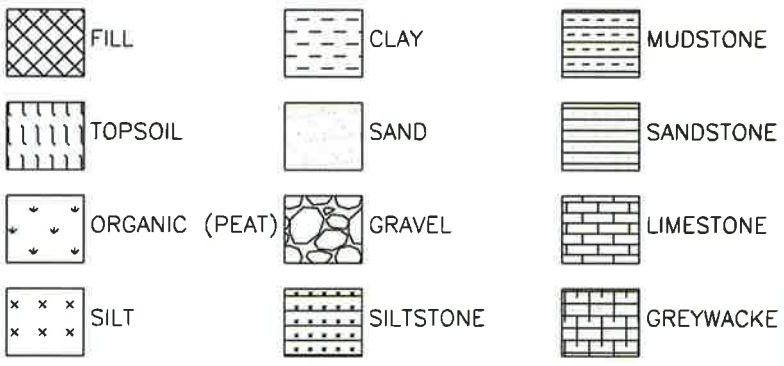
PROPORTIONAL TERMS DEFINITION			
	TERM	% OF SOIL MASS	EXAMPLE
SUBORDINATE FRACTION	(....)y	20–50	Sandy
MAJOR FRACTION	... –	≥50 major constituent	SAND–GRAVEL GRAVEL
MINOR FRACTION	trace ... minor ... some ...	<5 5–12 12–20	trace sand minor sand some sand

IN–SITU STRENGTH TESTING	
V128	Insitu Shear Strength (kPa) corrected to BS:1377
R52	Remoulded Shear Strength (kPa)
UTP	Unable to penetrate
CH	Clegg Hammer

MOISTURE CONDITION
Dry (D)–Soil looks and feels dry; cohesive soils usually hard, powdery or friable, granular soils run freely through hands
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
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
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

PARTICLE SIZE TERMINOLOGY	
SOIL FRACTION	PARTICLE SIZE RANGE
CLAY	<2um
SILT	2–60um
SAND fine medium coarse	0.06–0.2mm 0.2–0.6mm 0.6–2.0mm
GRAVEL fine medium coarse	2.0–6.0mm 6.0–20.0mm 20.0–60.0mm
COBBLES	60.0–200.0mm
BOULDER	>200.0mm

GRAPHIC SYMBOLS



PLASTICITY TERMS DEFINITION	
Non plastic	Sample can't be rolled
Slightly plastic	Sample can be rolled into 3.5mm thread
Moderately plastic	Thread can be bent
Highly plastic	Thread bends alot

COLOURS		
1	2	3
light dark	pinkish reddish yellowish brownish greenish bluish greyish	pink red orange yellow brown green blue white grey black

PARTICLE SHAPE (roundness terms)

*Reproduced from NZ Geotechnical Society Guidelines December 2005

LOG OF BOREHOLE NO: 1

50mm DIAMETER HAND AUGER

Hutchinson CONSULTING ENGINEERS

JOB No: 20145
DATE: 12/09/2017
TESTED BY: AS
SHEAR VANE No: 3613
(SHEAR VANE TESTING BASED ON BS1377)

CLIENT: THREE BLOKES LIMITED
LOCATION: 362 MATAKANA VALLEY ROAD, MATAKANA

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
	slightly to moderately plastic, orange brown, orange streaks, Clayey SILT, trace sand			VSt		D/M		
	light grey streaks, orange brown staining		0.5		V166/R90			
	moderately plastic, mottled light grey and orange, Silty CLAY, trace sand		1.0		V179/R83			
			1.5		V176/R100	M		
	becoming light grey		2.0		V166/R66			
	dark reddish orange patches		2.5		V133/R66			
			3.0		V156/R90			
	slightly plastic, grey, orange staining, Sandy SILT, some clay		3.5	St	V83/R33	W		freewater @ 3.5m
	becoming dark bluish grey					S		
	no sample recovery as a result of soil saturation		4.0	VSt	V133/R43			
			4.5		V156/R50			
	E.O.B. @ 4.6m – (terminated)		5.0					

LOG OF BOREHOLE NO: 2

50mm DIAMETER HAND AUGER

Hutchinson CONSULTING ENGINEERS

JOB No: 20145
DATE: 12/09/2017
TESTED BY: TN
SHEAR VANE No: 3613
(SHEAR VANE TESTING BASED ON BS1377)

CLIENT: THREE BLOKES LIMITED
LOCATION: 362 MATAKANA VALLEY ROAD, MATAKANA

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
	moderately plastic, greyish brown, brown banding, occasional orange inclusions, Clayey SILT			St		M/W		
	moderately to highly plastic, light brown orange staining, Silty CLAY, trace sand		0.5		V70/R23	M		
	becoming light grey, orange staining		1.0		V86/R36			
	orange brown (limonite) patches		1.5	VSt	V133/R63			
	moderately plastic, dark grey, occasional orange brown (limonite) patches, Sandy CLAY, minor silt		2.0	St	V93/R20	W		freewater @ 2.2m
	no sample recovery as a result of soil saturdation		2.5		V93/R23	S		
			3.0	VSt	V109/R33			
	slightly plastic, dark grey, Sandy CLAY		3.5	H	V216+	W		
			4.0	VSt	V186/R80	M		
			4.5	H	V216+			
	E.O.B. @ 5.0m – target depth		5.0		V216+			

LOG OF BOREHOLE NO: 3

50mm DIAMETER HAND AUGER

Hutchinson CONSULTING ENGINEERS

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DATE: 12/09/2017
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SHEAR VANE No: 3613
(SHEAR VANE TESTING BASED ON BS1377)

CLIENT: THREE BLOKES LIMITED
LOCATION: 362 MATAKANA VALLEY ROAD, MATAKANA

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
FILL	moderately plastic, light brown, Clayey SILT			VSt		M		
	slightly plastic, dark brown, SILT (old topsoil layer)							
	moderately plastic, light brown, orange staining, Silty CLAY, trace sand		0.5		V153/R66			
	becoming grey, orange staining		1.0		V129/R60			
	E.O.B. @ 1.0m – (terminated)		1.5					
			2.0					
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

LOG OF BOREHOLE NO: 4

50mm DIAMETER HAND AUGER

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DATE: 12/09/2017
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SHEAR VANE No: 3613
(SHEAR VANE TESTING BASED ON BS1377)

CLIENT: THREE BLOKES LIMITED
LOCATION: 362 MATAKANA VALLEY ROAD, MATAKANA

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
FILL	aggregate			VSt		D		
	non plastic, brown, light grey inclusions, intermixed gravel inclusions, SILT		0.5		V196/R36			
	dark grey		1.0	H	V206/R33			friable 0.8m–1.2m
	moderately plastic, light brown, orange staining, Clayey SILT		1.5	VSt	V149/R70	D/M		
	E.O.B. @ 2.0m – target depth		2.0		V163/R100	M		
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

LOG OF BOREHOLE NO: 5

50mm DIAMETER HAND AUGER

Hutchinson CONSULTING ENGINEERS

JOB No: 20145
DATE: 12/09/2017
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CLIENT: THREE BLOKES LIMITED
LOCATION: 362 MATAKANA VALLEY ROAD, MATAKANA

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
FILL	aggregate			VSt		D/M		
	slightly plastic, brown, black/dark grey patches, intermixed gravel inclusions, Clayey SILT		0.5		V133/R66			
	slightly plastic, dark grey, Clayey SILT		1.0		V116/R73	M		
			1.5		V199/R100			
						W		freewater @ 1.7m
						S		
	E.O.B. @ 2.0m – target depth		2.0		V129/R53			
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

LOG OF BOREHOLE NO: 6

50mm DIAMETER HAND AUGER

Hutchinson CONSULTING ENGINEERS

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CLIENT: THREE BLOKES LIMITED
LOCATION: 362 MATAKANA VALLEY ROAD, MATAKANA

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
FILL	aggregate slightly plastic, brown, dark grey, orange brown inclusions, Clayey SILT			St		D D/M		
	moderately plastic, dark greenish grey, Clayey SILT, some sand		0.5		V50/R17	M		
			1.0	F	V46/R20			
	becoming brownish grey		1.5	St	V83/R53			
	becoming moderately to highly plastic, grey							
	E.O.B. @ 2.0m – target depth		2.0	VSt	V119/R66			
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

LOG OF BOREHOLE NO: 7

50mm DIAMETER HAND AUGER

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CLIENT: THREE BLOKES LIMITED
LOCATION: 362 MATAKANA VALLEY ROAD, MATAKANA

GEOLOGICAL UNIT	SOIL DESCRIPTION	GRAPHIC LOG	DEPTH (m)	CONSISTENCY	SHEAR STRENGTH (kPa)	MOISTURE CONDITION	GROUNDWATER	COMMENTS
FILL	slightly plastic, brown, black inclusions, dark grey patches, Silty CLAY			VSt		D/M		
	moderately plastic, light grey, orange staining, Silty CLAY		0.5		V119/R66			
			1.0		V149/R96	M		
	becoming dark grey							
	moderately plastic, dark bluish grey, Clayey SILT, trace sand		1.5		V182/R83			
			2.0		V189/R50			
	E.O.B. @ 2.0m – target depth		2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

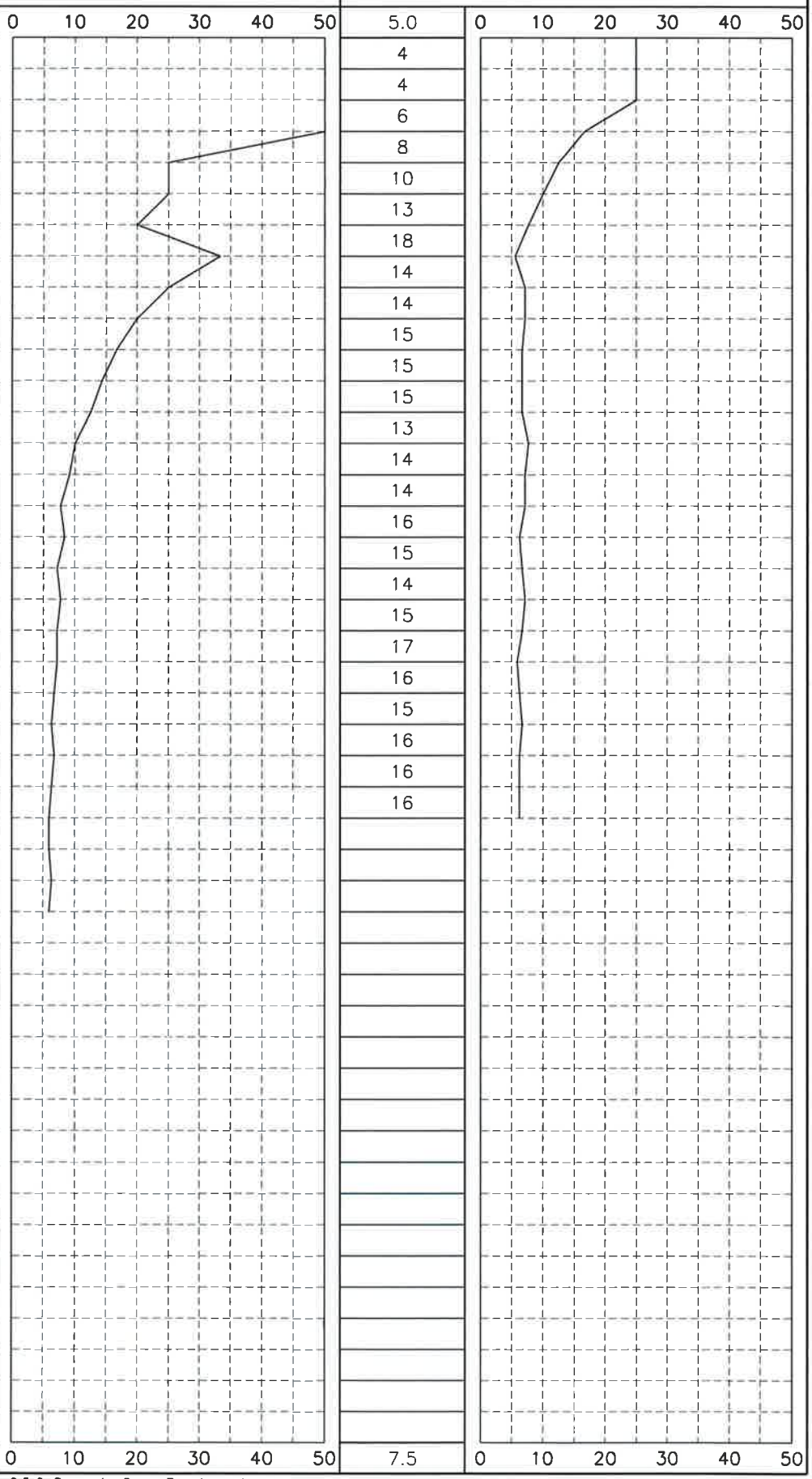
SCALA PENETROMETER TEST RESULTS

Hutchinson CONSULTING ENGINEERS

CLIENT: THREE BLOKES LIMITED
LOCATION: 362 MATAKANA VALLEY ROAD, MATAKANA

JOB No: 20145
DATE: 12/09/2017
TESTED BY: AS/TN

DEPTH OF PENETRATION (mm)	BH1 "e" mm/BLOW	BH2 "e" mm/BLOW
START DEPTH (m):	4.6	5.0
100	1	4
200	2	4
300	2	6
400	4	8
500	4	10
600	5	13
700	3	18
800	4	14
900	5	14
1000	6	15
1100	7	15
1200	8	15
1300	10	13
1400	11	14
1500	13	14
1600	12	16
1700	14	15
1800	13	14
1900	14	15
2000	14	17
2100	15	16
2200	16	15
2300	15	16
2400	16	16
2500	17	16
2600	17	
2700	16	
2800	17	
2900		
3000		
3100		
3200		
3300		
3400		
3500		
3600		
3700		
3800		
3900		
4000		
4100		
4200		
4300		
4400		
4500		
END DEPTH (m):	7.4	7.5



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

No.	Revision	Drawn	Chk.	Appd.	Date
-	-	-	-	-	-

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CONSULTING ENGINEERS
PO Box 150, Orewa 0946
154 Centreway Road, Orewa 0931
Ph: 09 426 5702 www.hc.co.nz

Design	-	-
Drawn	A. SAVELIEV	SEPT 2017
Checked	J. CHARLWOOD	OCT 2017
Approved	I. T. HUTCHINSON	OCT 2017
Scale	1:1500 @ A3	
Scale vert. exag.	-	

Project
THREE BLOKES LIMITED
PROPOSED DEVELOPMENT AT
362 MATAKANA VALLEY ROAD
MATAKANA

Title
EXISTING AERIAL
SITE PLAN

Job No.
A3-20145

Sheet No.
G/01

No.	Revision	Drawn	Chk.	Appd.	Date
-	-	-	-	-	-

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154 Centreway Road, Orewa 0931
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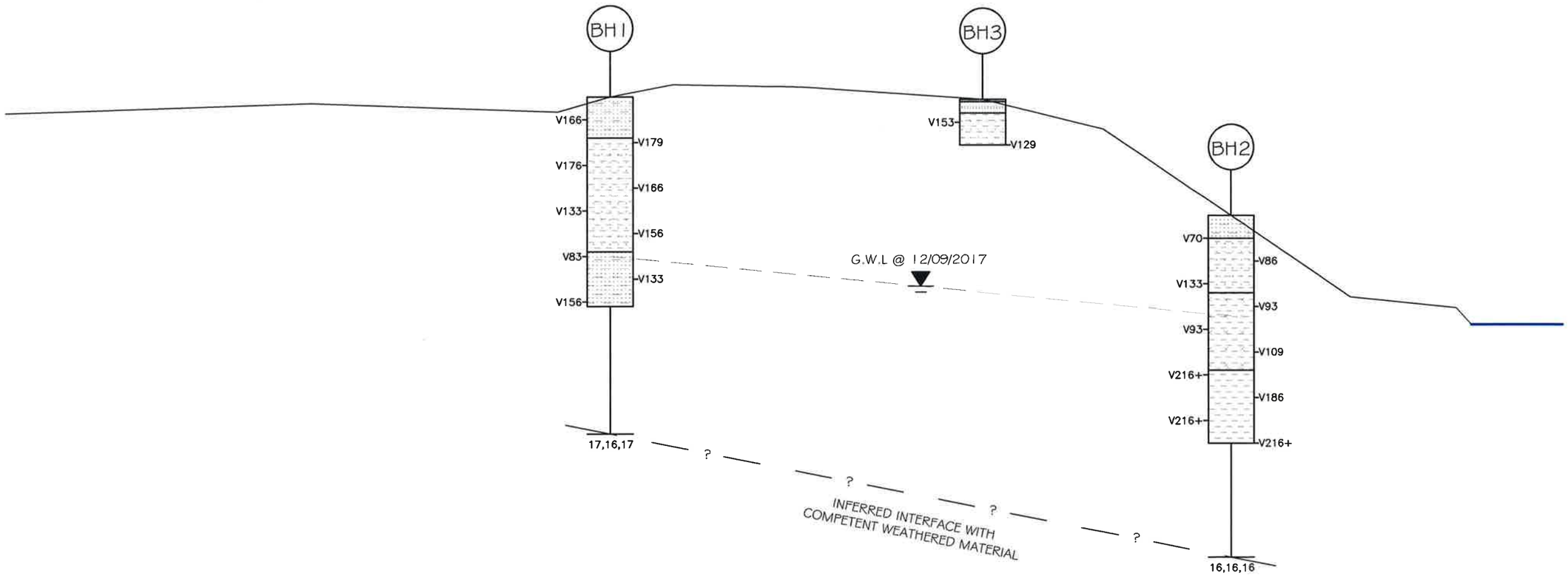
Design	-	-
Drawn	A. SAVELIEV	SEPT 2017
Checked	J. CHARLWOOD	OCT 2017
Approved	I. T. HUTCHINSON	OCT 2017
Scale	1:500 @ A3	
Scale vert. exag.	-	

Project
THREE BLOKES LIMITED
PROPOSED DEVELOPMENT AT
362 MATAKANA VALLEY ROAD
MATAKANA

Title
GEOTECHNICAL INVESTIGATION
SITE PLAN

Job No.
A3-20145

Sheet No.
G/02



CROSS SECTION A - A'

LEGEND

- BH2 — HAND AUGER BOREHOLE
- V100 — SHEAR STRENGTH (kPa)
- SCALA PENETROMETER
- 10,12,15 — LAST 3 SETS OF BLOWS
- 15° — SLOPE ANGLE
- GROUNDWATER LEVEL

NOTE:
ALL AREAS & LEVELS SUBJECT TO FINAL SURVEY.

No.	Revision	Drawn	Chk.	Appd.	Date
-	-	-	-	-	-

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Project
THREE BLOKES LIMITED
PROPOSED DEVELOPMENT AT
362 MATAKANA VALLEY ROAD
MATAKANA

Title
GEOTECHNICAL INVESTIGATION
CROSS SECTION A - A'

Job No.
A3-20145

Sheet No.
G/03