

H A R R I S O N
G R I E R S O N

WHAREWAKA (2003) LTD

Wharewaka Point Subdivision - Stage 2

Geotechnical Completion Report



April 2006
Reference 1050-014359-01

HARRISON GRIERSON CONSULTANTS LIMITED

Document Control Record

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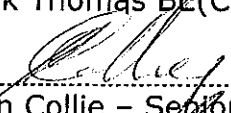
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Date of Issue April 2006

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WHAREWAKA (2003) LTD
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014359-2-AB201 Finished level Contours – Sheet 2 of 2
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1.0 INTRODUCTION

This report is for Lots 43 to 126, and 162 to 179 of DP 363862, comprising Stage 2 of the Wharewaka Point Subdivision, located off Ernest Kemp Rise, Taupo. The report describes the geotechnical aspects of the site, earthworks undertaken to develop the subdivision, and records construction information and building restrictions.

2.0 SITE INVESTIGATIONS

Prior to development, geotechnical investigations were undertaken by Harrison Grierson Consultants Ltd to assess the suitability of the site for development, and the findings were presented in a report (Reference 1). The investigations confirmed that the site is located on Taupo Pumice Alluvium, which comprises medium dense and dense sands and gravels. The soils have good bearing capacity suitable for the erection of buildings with foundations not requiring specific foundation design.

A feature of the site was the large number of boulders present across the site.

3.0 DEVELOPMENT

Earthworks to develop the site for a residential subdivision were undertaken between January 2005 and March 2005 by Advance Earthworks, who were awarded a contract to undertake the earthworks construction for the entire Wharewaka Point Subdivision. The bulk of the earthworks within Stage 2 comprised excavation to form the road subgrades. Cut and fill operations were undertaken on some lots to create the finished contour, however on Lots 94 to 120, and 162 to 173 there were no substantive earthworks undertaken apart from at the fronts of the lots where they were cut to suit the road contour.

In areas where earthworks were undertaken, topsoil was first stripped and stockpiled, and all vegetation and fences cleared. Earthworks, including stripping, cut to fill operations and respreading topsoil was primarily undertaken with motorscrapers. Hydraulic excavators and dump trucks were used in areas where rock had to be undercut from road subgrades and other areas, primarily in Stage 2, and for a limited amount of earthmoving. Compaction of pumice fill was undertaken with a vibratory drum roller. Undercutting of the road subgrades was required in many areas to remove large boulders present, however there was very little undercutting required within the Lot areas.

Earthworks within the lot areas have involved fill depths of up to 2.25m, and cut depths of up to 1.0m. Earthfilling was undertaken to the requirements of NZS 4431.

Drawings 014359-2-AB200 and AB 201 show the finished level contours for the site, while Drawings 014359-2-AB202 and AB203 show the depths of cut and fill over the site.

Recontouring of the adjacent State Highway 1 road reserve was undertaken during construction of the subdivision. Organic soils containing stones and other materials not suitable for building on were placed within the reserve to provide a screening bund. Some of this fill placed in the reserve extends into the rear of Lots 64 to 74.

Along the edge of Lots 67 to 75, some fill was placed over ground that had not had the topsoil completely removed. Test pits have revealed 100mm thickness of topsoil, approximately 1m below the surface.

A retaining wall has been constructed in the north-eastern corner of Lot 59. The wall is a timber pole retaining wall, and was subjected to specific design to allow for a building surcharge of 9kPa behind the wall. A building consent was obtained for the wall, and a Code Compliance Certificate has been obtained for the completed wall.

4.0 TESTING

During construction the Contractor undertook nuclear densometer and scala penetrometer tests to confirm that the required compaction standards were being achieved. The specified compaction level for fill areas was 95% of maximum dry density at optimum moisture content. Scala penetrometer testing was undertaken adjacent to areas where nuclear densometer field tests were undertaken to calibrate the results, with additional scala penetrometer tests being undertaken across the fill areas as a control. The test results show that the specified standard was exceeded throughout.

In addition to the testing undertaken during construction, Harrison Grierson engaged Foundation Engineering to undertake a scala penetrometer test at the centre of each Lot following construction.

The test results are appended to this report.

The tests indicate that the bearing capacity of the soils at each lot is generally suitable for the erection of buildings not requiring specific foundation design, although some of the lots not affected by earthworks had bearing strengths marginally below that required by NZS 3604 in some of the upper soils. At a number of sites rock boulders were hit that curtailed the depth that the penetrometer could extend to.

Organic content tests were undertaken on the three samples from the thin band of organic soils found near the rear of Lots 67 to 74. These tests all showed the organic content to be less than 1%. The low organic content and thinness of the

layer means that any settlements would be very minor, and all within the allowable limits for building foundations. Restrictions on building over these soils are therefore not required.

5.0 BUILDING RESTRICTIONS AND RECOMMENDATIONS

5.1 PRESENCE OF BOULDERS

A number of boulders are present on the site at and just below ground level. It is possible that these boulders may be encountered during building or site contouring, and may need to be removed to enable house foundations to be constructed.

5.2 UNSUITABLE FILL

For Lots 64 to 74, a 3.5m wide building restriction limit has been placed adjacent to the boundary of these lots with the State highway. The affected areas are described as Areas CQ to CX, CZ, and DA to DC on DP 363862. The area contains topsoil, organic and other soils that have spilled over from recontouring activities undertaken on the adjacent highway road reserve. Any building constructed within these areas must be either founded on the underlying natural pumice soils, or have the unsuitable soils undercut and removed, and backfilled with a compacted hardfill.

5.3 LOT 59 RETAINING WALL

The retaining wall constructed on the eastern and part of the northern boundary of this lot has been designed for a surcharge of 9kPa. This should be sufficient for most residential dwellings, however if any building is proposed to be constructed closer to the rear face of the wall than the vertical height of the wall, a Chartered Professional Engineer experienced in Structural Engineering must check the affect of the building on the capacity of the wall. The affected area is the triangular portion of Area Q on DP 363862, adjacent to the eastern boundary of Lot 59.

6.0 CONCLUSIONS

Prior to development the site was in pasture. Earthworks have been carried out to form the road alignments for the subdivision, and cut and filling operations have been undertaken on some lots to form the finished contour. Cuts of up to 1.0m below the original contour, and fills of up to 2.25m have been undertaken within the Lot areas. The earthworks have all been carried out in a controlled manner, with appropriate testing of fill undertaken during construction.

All sites are suitable for the erection thereon of residential buildings not requiring specific design in accordance with NZS 3604:1999 and related documents.

The following restrictions and notes apply to the development:

- a) Boulders are present on the site at and just below ground level. It is possible that these boulders may be encountered during building or site contouring, and may need to be removed to enable house foundations to be constructed.
- b) For Lots 64 to 74, within areas labelled CQ to CX, CZ, and DA to DC on DP 363862, the upper soils contain topsoil, organic and other soils that have spilled over from recontouring activities undertaken on the adjacent highway road reserve. Buildings constructed within these areas must be either founded on the underlying natural pumice soils, or have the unsuitable soils undercut and removed, and backfilled with a compacted hardfill.
- c) The retaining wall constructed on the eastern and part of the northern boundary of Lot 59 has been designed for a surcharge of 9kPa. For any building constructed within the triangular portion of Area Q on DP 363862, adjacent to the eastern boundary of Lot 59, a Chartered Professional Engineer experienced in Structural Engineering must check the affect of the building on the capacity of the wall.

A Statement on the Suitability of the Land For Building is appended as Appendix 1 of this report.

7.0 LIMITATIONS

This report has been prepared for the particular project described to us and its extent is limited to the scope of work agreed between the client and Harrison Grierson Consultants Limited. No responsibility is accepted by Harrison Grierson Consultants Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.

Topsoil depths may vary across the lots, and no guarantee is given as to the depth of topsoil present. Owners should make their own assessment of topsoil depths across each lot prior to commencement of building.

This report does not preclude the necessity for routine foundation inspections at the time of construction of any dwelling.

This report is for the use by Wharewaka (2003) Ltd only, and should not be used or relied upon by any other person or entity or for any other project.

8.0 REFERENCES

1. "Wharewaka Point (2003) Ltd, Wharewaka Point, Taupo. Geotechnical Investigation" Harrison Grierson Consultants Ltd, August 2004, Reference 09.14359.1

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APPENDIX 1

Statement of Professional Opinion as to Geotechnical Suitability of Land for Building

STATEMENT OF PROFESSIONAL OPINION AS TO THE
GEOTECHNICAL SUITABILITY OF LAND FOR BUILDING

To : Taupo District Council

DEVELOPMENT: Wharewaka Point Subdivision – Stage 2

OWNER: Wharewaka (2003) Ltd

LOCATION: Ernest Kemp Rise, Taupo

I Mark Rhys Thomas of Harrison Grierson Consultants Ltd
(full name)
PO Box 1199, Tauranga
(name and address of firm)

Hereby confirm that;

- 1) I am a professional person, appropriately qualified with experience in geotechnical engineering to ascertain the suitability of the land for building development and was retained as the Soils Engineer to the above development.
- 2) An appropriate level of site investigation and construction supervision has been carried out under my direction and is described in my development evaluation report dated: April 2006
- 3) In my professional opinion, not to be construed as a guarantee, I consider that;
 - a) The earth fills shown on the attached Plan Nos. 014359-2-AB202 and AB203 have been placed in accordance with the earthworks design for this project.
 - b) The completed works give due regard to all land slope and foundation stability considerations.
 - c) The filled ground is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZS 3604 and related documents, providing that:
 - i) The Areas marked CQ to CX, CZ, and DA to DC on Lots 64 to 74 contain unsuitable fill, which must be either removed and backfilled with a compacted hardfill, or have foundations extending to the underlying natural soils.
 - ii) Any building constructed within the eastern portion of Area Q of Lot 59 must have the structural capacity of the retaining wall checked by a Chartered Professional Engineer experienced in structural engineering.
 - d) The original ground not affected by filling is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZS 3604 and related documents providing that:
 - i) Boulders are present in many areas on the site at or just below ground level. These boulders may be encountered during building, and may need to be removed.
- 4) This professional opinion is furnished to the Council and the subdividing owner for their purposes alone, on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection for any dwelling.

Signed 

Date 18/04/06

APPENDIX 2

Test Results on Completed Development

SCALAPENETROMETER RESULT SHEET

Date tested 20-Mar-06

CLIENT:

NB safety factor 1.6 -- 5.

Tested by PSP

PROJECT: WHAREWAKA

depending on soil type

Printed

						penetration blow type - mm/sec								Kpa
Reading	Blows	difl	Pen/blow	Bearing	Depth	3	7	13	20	30	50	60+	CBR	
LOT 43														
1.60	0	NEW			0.00 m									
1.50	3	0.100	33 mm	98 kPa	0.10 m	+++++++								
1.40	2	0.100	50 mm	68 kPa	0.20 m	+++++								
1.30	6	0.100	17 mm	175 kPa	0.30 m	+++++								
1.20	9	0.100	11 mm	238 kPa	0.40 m	+++++								
1.10	17	0.100	6 mm	340 kPa	0.50 m	+++++								
1.00	10	0.100	10 mm	250 kPa	0.60 m	+++++								
0.90	11	0.100	9 mm	275 kPa	0.70 m	+++++								
0.80	11	0.100	9 mm	275 kPa	0.80 m	+++++								
0.70	12	0.100	8 mm	275 kPa	0.90 m	+++++								
0.60	11	0.100	9 mm	275 kPa	1.00 m	+++++								
0.50	11	0.100	9 mm	275 kPa	1.10 m	+++++								
0.40	10	0.100	10 mm	250 kPa	1.20 m	+++++								
0.30	9	0.100	11 mm	238 kPa	1.30 m	+++++								
0.20	9	0.100	11 mm	238 kPa	1.40 m	+++++								
0.10	8	0.100	13 mm	225 kPa	1.50 m	+++++								
0.00	8	0.100	12 mm	225 kPa	1.60 m	+++++								
LOT 44														
1.60	0				0.00 m									
1.50	4	0.100	25 mm	135 kPa	0.10 m	+++++++								
1.40	9	0.100	11 mm	238 kPa	0.20 m	+++++								
1.30	9	0.100	11 mm	238 kPa	0.30 m	+++++								
1.20	8	0.100	13 mm	225 kPa	0.40 m	+++++								
1.10	8	0.100	13 mm	225 kPa	0.50 m	+++++								
1.00	6	0.100	17 mm	175 kPa	0.60 m	+++++								
0.90	7	0.100	14 mm	200 kPa	0.70 m	+++++								
0.80	7	0.100	14 mm	200 kPa	0.80 m	+++++								
0.70	8	0.100	13 mm	225 kPa	0.90 m	+++++								
0.60	9	0.100	11 mm	238 kPa	1.00 m	+++++								
0.50	11	0.100	9 mm	275 kPa	1.10 m	+++++								
0.40	9	0.100	11 mm	238 kPa	1.20 m	+++++								
0.30	7	0.100	14 mm	200 kPa	1.30 m	+++++								
0.20	7	0.100	14 mm	200 kPa	1.40 m	+++++								
0.10	8	0.100	13 mm	225 kPa	1.50 m	+++++								
0.00	9	0.100	11 mm	238 kPa	1.60 m	+++++								
LOT 45														
1.60	0				0.00 m									
1.50	3	0.100	33 mm	98 kPa	0.10 m	+++++++								
1.40	4	0.100	25 mm	135 kPa	0.20 m	+++++++								
1.30	8	0.100	13 mm	225 kPa	0.30 m	+++++								
1.20	8	0.100	13 mm	225 kPa	0.40 m	+++++								
1.10	8	0.100	13 mm	225 kPa	0.50 m	+++++								
1.00	12	0.100	8 mm	275 kPa	0.60 m	+++++								
0.90	8	0.100	13 mm	225 kPa	0.70 m	+++++								
0.80	6	0.100	17 mm	175 kPa	0.80 m	+++++								
0.70	6	0.100	17 mm	175 kPa	0.90 m	+++++								
0.60	4	0.100	25 mm	135 kPa	1.00 m	+++++								
0.50	3	0.100	33 mm	98 kPa	1.10 m	+++++								
0.40	3	0.100	33 mm	98 kPa	1.20 m	+++++								
0.30	2	0.100	50 mm	68 kPa	1.30 m	+++++								
0.20	2	0.100	50 mm	68 kPa	1.40 m	+++++								
0.10	4	0.100	25 mm	135 kPa	1.50 m	+++++								
0.00	6	0.100	17 mm	175 kPa	1.60 m	+++++								

File No 1050 014359 01

Date tested 20-Mar-06

NB safety factor 1.6 -- 5.

Tested by PSP

depending on soil type

Printed

PROLOG							depending on soil type										Printed				
Reading		Blows	diff	Pen/blow	Bearing	Depth	50	100	150	200	250	300	350	400	450	Kpa					
							3	7	13	20	30	50	60+	CBR							
LOT 46																					
1.60	0					0.00 m															
1.50	4	0.100	25 mm	135 kPa	0.10 m	+++++															
1.40	8	0.100	13 mm	225 kPa	0.20 m	+++++															
1.30	7	0.100	14 mm	200 kPa	0.30 m	+++++															
1.20	6	0.100	17 mm	175 kPa	0.40 m	+++++															
1.10	7	0.100	14 mm	200 kPa	0.50 m	+++++															
1.00	8	0.100	13 mm	225 kPa	0.60 m	+++++															
0.90	10	0.100	10 mm	250 kPa	0.70 m	+++++															
0.80	11	0.100	9 mm	275 kPa	0.80 m	+++++															
0.70	12	0.100	8 mm	275 kPa	0.90 m	+++++															
0.60	10	0.100	10 mm	250 kPa	1.00 m	+++++															
0.50	9	0.100	11 mm	238 kPa	1.10 m	+++++															
0.40	7	0.100	14 mm	200 kPa	1.20 m	+++++															
0.30	8	0.100	13 mm	225 kPa	1.30 m	+++++															
0.20	13	0.100	8 mm	275 kPa	1.40 m	+++++															
0.10	8	0.100	13 mm	225 kPa	1.50 m	+++++															
0.00	8	0.100	12 mm	225 kPa	1.60 m	+++++															
LOT 74																					
1.60	0					0.00 m															
1.50	4	0.100	25 mm	135 kPa	0.10 m	+++++															
1.40	8	0.100	13 mm	225 kPa	0.20 m	+++++															
1.30	12	0.100	8 mm	275 kPa	0.30 m	+++++															
1.20	11	0.100	9 mm	275 kPa	0.40 m	+++++															
1.10	8	0.100	13 mm	225 kPa	0.50 m	+++++															
1.00	8	0.100	13 mm	225 kPa	0.60 m	+++++															
0.90	7	0.100	14 mm	200 kPa	0.70 m	+++++															
0.80	6	0.100	17 mm	175 kPa	0.80 m	+++++															
0.70	6	0.100	17 mm	175 kPa	0.90 m	+++++															
0.60	8	0.100	13 mm	225 kPa	1.00 m	+++++															
0.50	10	0.100	10 mm	250 kPa	1.10 m	+++++															
0.40	5	0.100	20 mm	160 kPa	1.20 m	+++++															
0.30	5	0.100	20 mm	160 kPa	1.30 m	+++++															
0.20	10	0.100	10 mm	250 kPa	1.40 m	+++++															
0.10	8	0.100	13 mm	225 kPa	1.50 m	+++++															
0.00	8	0.100	12 mm	225 kPa	1.60 m	+++++															
LOT 75																					
1.20	0					0.00 m															
1.10	2	0.100	50 mm	68 kPa	0.10 m	+++++															
1.00	6	0.100	17 mm	175 kPa	0.20 m	+++++															
0.90	13	0.100	8 mm	275 kPa	0.30 m	+++++															
0.80	8	0.100	13 mm	225 kPa	0.40 m	+++++															
0.70	9	0.100	11 mm	238 kPa	0.50 m	+++++															
0.60	9	0.100	11 mm	238 kPa	0.60 m	+++++															
0.50	7	0.100	14 mm	200 kPa	0.70 m	+++++															
0.40	4	0.100	25 mm	135 kPa	0.80 m	+++++															
0.30	5	0.100	20 mm	160 kPa	0.90 m	+++++															
0.20	4	0.100	25 mm	135 kPa	1.00 m	+++++															
0.10	20	0.100	5 mm	430 kPa	1.10 m	+++++															
0.00	ROCK	0.100	#VALUE!	#VALUE!	1.20 m																



FOUNDATION
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141 Cameron Road
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PENETROMETER
PENETRATION RESISTANCE
(Scala)

Client **Harrison Grierson Consultants Limited**

Technician **JWC**

Job No **12536**

Project **Wharewaka Point Subdivision**

District **Taupo**

Date **12.12.05**

Test Area **Stage Two**

Time

Level Tested (eg Subgrade):

Material Tested:

Lot No	46	47	48	49	50	51	52	53	54	55	Test No
Road											Road
Chainage											Chainage
Side											Side
Depth (mm)	Blows Per 100mm of Penetration										Depth (mm)
100	3	3	2	3	5	4	2	2	3	5	100
200	10	10	4	9	8	8	6	12	9	9	200
300	9	11	5	12	7	6	5	15	14	14	300
400	8	14	11	12	12	11	7	12	16	16	400
500	7	14	8	20	12	16	9	8	21	13	500
600	8	16	6	19	11	16	10	8	18	12	600
700	10	15	7		12	18	11	12	26	11	700
800	11	12	5		14		14	12		17	800
900	12	16	3		16		16	18		18	900
1000	10		5		12			17		21	1000
1100	11		7		11			16		24	1100
1200	12		7		12			14			1200
1300	16		8		9			18			1300
1400	18		9		8			22			1400
1500	17		8		12			20			1500



**FOUNDATION
ENGINEERING**

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**PENETROMETER
PENETRATION RESISTANCE**
(Scala)

Client **Harrison Grierson Consultants Limited**

Technician **JWC**

Job No **12536**

Project **Wharewaka Point Subdivision**

District **Taupo**

Date **12.12.05**

Test Area **Stage Two**

Time

Level Tested (eg Subgrade):

Material Tested:

Lot No	56	57	58	59	60	61	62	63	64	65	Test No
Road											Road
Chainage											Chainage
Side											Side
Depth (mm)	Blows Per 100mm of Penetration										Depth (mm)
100	5	5	3	4	5	3	2	4	3	4	100
200	12	10	9	8	9	6	8	6	9	6	200
300	14	8	7	12	11	12	8	11	7	12	300
400	16	8	6	12	11	13	12	17	6	12	400
500	16	11	12	10	10	12	14	18	11	10	500
600	18	9	13	11	11	16	14	12	10	18	600
700	14	12	13	14	11	18	19	19	10	19	700
800	17	13	16	13	14		17	22	11	16	800
900			17	18	16		12		16	12	900
1000			18		16		16		18		1000
1100			18		19		19		21		1100
1200					17		18		19		1200
1300					15				24		1300
1400					19						1400
1500					23						1500



PENETROMETER
PENETRATION RESISTANCE
(Scala)

Job No 12536

Date 12.12.05

Time

Material Tested:

[illegible]



FOUNDATION
ENGINEERING

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PENETROMETER
PENETRATION RESISTANCE
(Scala)

Client **Harrison Grierson Consultants Limited**

Technician **JWC**

Job No **12536**

Project **Wharewaka Point Subdivision**

District **Taupo**

Date **12.12.05**

Test Area **Stage Two**

Time

Level Tested (eg Subgrade):

Material Tested:

Lot No	76	77	78	79	80	81	82	83	84	85	Test No
Road											Road
Chainage											Chainage
Side											Side
Depth (mm)	Blows Per 100mm of Penetration										Depth (mm)
100	3	5	2	3	3	4	4	4	6	3	100
200	5	6	8	9	9	7	7	4	14	8	200
300	8	11	14	12	11	13	11	6	12	12	300
400	6	9	13	15	9	19	12	6	16	16	400
500	12	14	15	17	13	12	16	11	14	14	500
600	14	15	17	14	11	12	12	9	15	18	600
700		13	16	19	10	14	16	11	18	12	700
800		18	18	21	11	17	18	12	17	16	800
900		17	17	16	12	14	13	16	23	22	900
1000			17	17	17	16	15	17	18	18	1000
1100			16	18	19	13	18	18	22	24	1100
1200				20	17	19	18	19	24		1200
1300				24	20	20	17	24			1300
1400					26	20	20				1400
1500						18	19				1500



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PENETROMETER
PENETRATION RESISTANCE
(Scala)

Client **Harrison Grierson Consultants Limited**

Technician **JWC**

Job No **12536**

Project **Wharewaka Point Subdivision**

District **Taupo**

Date **12.12.05**

Test Area **Stage Two**

Time

Level Tested (eg Subgrade):

Material Tested:

Lot No	86	87	88	89	90	91	92	93	94	95	Test No
Road											Road
Chainage											Chainage
Side											Side
Depth (mm)	Blows Per 100mm of Penetration										Depth (mm)
100	4	3	3	2	4	6	3	3	2	3	100
200	12	4	6	8	5	8	7	9	3	6	200
300	18	7	8	11	9	7	7	17	4	8	300
400	19	20	14	15	16	14	6	12	4	12	400
500	20	19	11	15	13	14	14	21	6	14	500
600	22	26	15	12	15	15	23	21	6	13	600
700	24		18	19	18	13	28	18	5	16	700
800			16	17	18	11		19	5	18	800
900			17		17	15		21	7	18	900
1000			20		20	18		19	14	21	1000
1100			21		24	19		23	20	24	1100
1200			24			17		21	19		1200
1300						16		24	21		1300
1400						19			18		1400
1500						23			24		1500



**FOUNDATION
ENGINEERING**

141 Cameron Road
Tauranga
Ph +64 7 571 6081

**PENETROMETER
PENETRATION RESISTANCE**
(Scala)

Client Harrison Grierson Consultants Limited

Technician JWC

Job No 12536

Project Wharewaka Point Subdivision

District Taupo

Date 12.12.05

Test Area Stage Two

Time

Level Tested (eg Subgrade):

Material Tested:

Lot No	96	97	98	99	100	101	102	103	104	105	Test No
Road											Road
Chainage											Chainage
Side											Side
Depth (mm)	Blows Per 100mm of Penetration										Depth (mm)
100	2	6	3	6	2	3	2	2	1	4	100
200	6	6	4	4	4	7	3	3	6	8	200
300	8	8	6	8	7	9	6	4	4	12	300
400	14	14	9	11	10	9	7	9	3	18	400
500	11	9	9	10	9	11	11	8	7	22	500
600	16	12	11	10	9	12	12	8	11		600
700	12	17	9	16	14	17	10	10	12		700
800	15	18	16	17	10	19	9	9	14		800
900	19	16	17	16	13	19	11	7	16		900
1000	19	21	18	18	14	21	12	10	12		1000
1100	17	17	19	18	16	22	15	12	18		1100
1200	23	18	21	24	21	26	16	14	12		1200
1300	24	24	21		22		12	16	14		1300
1400			20				17	17	16		1400
1500			19				17	20	14		1500



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District Taupo

Date 12.12.05

Test Area Stage Two

Time

Level Tested (eg Subgrade):

Material Tested:

Lot No	106	107	108	109	110	111	112	113	114	115	Test No
Road											Road
Chainage											Chainage
Side											Side
Depth (mm)	Blows Per 100mm of Penetration										Depth (mm)
100	3	1	2	4	3	3	2	3	2	2	100
200	4	7	4	9	4	3	6	4	3	7	200
300	6	9	6	8	5	6	8	8	5	7	300
400	8	11	11	12	6	7	8	6	6	15	400
500	10	15	12	16	6	6	9	11	6	19	500
600	9	18	14	18	12	9	8	12	9	21	600
700	12	20	15	21	14	8	10	10	7		700
800	11		18		16	12	9	10	12		800
900	14		17			11	12	12	16		900
1000	14		21			13	14	12			1000
1100	18					18	16	16			1100
1200							17	15			1200
1300							16	17			1300
1400								21			1400
1500								26			1500



PENETROMETER
PENETRATION RESISTANCE
(Scala)

Job No 12536

Date **12.12.05**

Time

Material Tested:

[illegible]



PENETROMETER
PENETRATION RESISTANCE
(Scale)

Job No 12536

Date **12.12.05**

Time

Material Tested:

[illegible]



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**PENETROMETER
PENETRATION RESISTANCE**
(Scala)

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Technician **JWC**

Job No **12536**

Project **Wharewaka Point Subdivision**

District **Taupo**

Date **12.12.05**

Test Area **Stage Two**

Time

Level Tested (eg Subgrade):

Material Tested:

Lot No	162	163	164	165	166	167	168	169	170	171	Test No
Road											Road
Chainage											Chainage
Side											Side
Depth (mm)	Blows Per 100mm of Penetration										Depth (mm)
100	2	2	2	2	4	4	3	4	6	10	100
200	3	3	2.5	3	7	4	6	10	4	19	200
300	2	4	3	4	14	10	4	14	4	17	300
400	2	3	4	3	17	12	5	10	5	16	400
500	3	5	5	6	14	11	10	14	10	17	500
600	1.5	4	6	7	15	8	12	17	11	21	600
700	2	6	6	7	12	6	13	12	12	18	700
800	2	4	7	8	14	14	9	16	10	19	800
900	17	4	8	12	17	14	11	13	17	23	900
1000	22	3	24	15	11	18	17	19	16	24	1000
1100	25	5	28	11	14	8	16	21	18	19	1100
1200	30	14		15	24	8	18	20	21	26	1200
1300		12		13		14	15	17			1300
1400		18		9		24	23	22			1400
1500		13		7		20	28	28			1500



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District **Taupo**

Date **12.12.05**

Test Area **Stage Two**

Time

Level Tested (eg Subgrade):

Material Tested:

Lot No	172	173	174	175	176	177	178	179			Test No
Road											Road
Chainage											Chainage
Side											Side
Depth (mm)	Blows Per 100mm of Penetration										Depth (mm)
100	6	8	5	6	3	6	3	6			100
200	10	18	10	14	5	7	8	7			200
300	12	24	12	10	9	8	5	8			300
400	12	11	12	7	12	6	12	16			400
500	14	12	13	6	13	14	9	12			500
600	11	10	16	15	12	11	14	11			600
700	14	10	12	18	18	9	11	14			700
800	15	7	10	20	16	16	15	13			800
900	15	7	15	18	19	13	18	18			900
1000	16	10	14	24	14	12	19	15			1000
1100	12	10	17		17	18	17	17			1100
1200	21	18	19		16	16	14	12			1200
1300	22	21	22		24	19	17	18			1300
1400			17			21	13	18			1400
1500			16				19	17			1500

DRAWINGS

