

Ref: 15C 0980  
24 February 2016

Agnes Land Holding  
c/- Tomkinson Group  
PO Box 421,  
Bendigo Vic 3552

Attn: Matt Elliot

**Re: 316-318 High Street, Kangaroo Flat**

At the request of Tomkinson, GTSS conducted a geotechnical investigation for the proposed subdivision pavement at 316-318 High Street, Kangaroo Flat. In addition, a review of boreholes previously conducted at the site was also undertaken to provide comments in regards to suitability for construction at the site.

The investigation included the drilling of 4 boreholes to depths of 1 metres, insitu strength testing and sampling of the material for CBR tests.

Please find attached the engineering logs, test locations and laboratory test reports.

A review of the boreholes by GTS and CVST conducted at the site indicated that there is some uncontrolled fill in the form of Siltstone fill (CVST BH2) as well as some low strength worked alluvial material (sometimes classified as fill). The low strength worked alluvial was evident in BH4 of the pavement investigation where DCPs of 1 were encountered as well as CVST BHs 3 and 4 where soft material was logged. These boreholes indicate that the location of the low strength materials variable throughout the site.

It is noted that the site is highly undulating (possibly more so after tree removal) and earthworks will be required during construction of the subdivision. It is GTS recommendation that to provide suitable allotments, that excavation of the site to levels close to, or at the base of the undulations be conducted. This will allow controlled filling operations across the lots with large earthmoving machinery and without the need to backfill small pockets and depressions. The excavated material (minus the top soil/vegetation zone) generally appears suitable for re-use as controlled fill.

The excavated base should be inspected and proof rolled. Based on the abovementioned boreholes, there is expected to be some soft spots. These would need to be compacted or excavated and backfilled with suitably compacted material. It is not possible to define the extent of these soft spots at this time.

Should you have any queries, please contact the undersigned in our Bendigo office.

Regards,



**Shane Hampton** (BE(Hons))  
**Senior Geotechnical Engineer**



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PO Box 13, Strathdale 3550  
Ph (03) 54414881 Fax (03) 5441 5089

## ENGINEERING BOREHOLE LOG

Borehole no. 1  
Sheet no. 1 of 1  
Job no. 15C 0980

Client : Tomkinson		Date: 7/15/15	
Project : Pavement Investigation		Logged by: TP	
Location : 316-318 High Street, Kangaroo Flat			
Drill model : Gemco HS7	Slope 90 deg	RL surface: <i>not measured</i>	
Hole diameter : 200mm	Bearing - deg	Datum : -	

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density index	Structure, additional observations	Notes Samples Tests	Method	Support
Gravelly Sandy CLAY (CL-Cl), low to medium plasticity, brown/pale brown, fine to coarse sand and gravel	0.25			D	St to VSt	Worked Alluvials			
	0.50						DCP = 18		
	0.75						DCP = 12		
	1.00						DCP = 6		
	1.25						DCP = 9		
	1.50						DCP = 10		
	1.75						DCP = 4		
	2.00						DCP = 4		
Borehole terminated @ 1m							DCP = 4		
							DCP = 6		
							DCP = 6		
							DCP = 6		



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## ENGINEERING BOREHOLE LOG

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Borehole no. 2  
Sheet no. 1 of 1  
Job no. 15C 0980

Client : Tomkinson		Date: 7/15/15	
Project : Pavement Investigation		Logged by: TP	
Location : 316-318 High Street, Kangaroo Flat			
Drill model : Gemco HS7	Slope 90 deg	RL surface: <i>not measured</i>	
Hole diameter : 200mm	Bearing - deg	Datum : -	

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density index	Structure, additional observations	Notes Samples Tests	Method	Support
Gravelly Sandy SILT (ML), grey/brown				D	MD	FILL			
Gravelly Silty CLAY (CI), medium plasticity, pale brown, fine to medium gravel	0.25			M	VSt	FILL			
	0.50						DCP = 7		
	0.75						DCP = 5		
	1.00						DCP = 4		
							DCP = 5		
SILTSTONE, extremely weathered, pale brown	1.25			D to M	M/H		DCP = 5		
	1.50						DCP = 6		
	1.75						DCP = 6		
Borehole terminated @ 1m	2.00						DCP = 8		
							DCP = 25		



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## ENGINEERING BOREHOLE LOG

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Borehole no. 3  
Sheet no. 1 of 1  
Job no. 15C 0980

Client : Tomkinson		Date: 7/15/15							
Project : Pavement Investigation		Logged by: TP							
Location : 316-318 High Street, Kangaroo Flat									
Drill model : Gemco HS7		Slope 90 deg		RL surface: <i>not measured</i>					
Hole diameter : 200mm		Bearing - deg		Datum : -					
Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density index	Structure, additional observations	Notes Samples Tests	Method	Support
Clayey Sandy Gravel (GC), trace of cobbles, fine to coarse sand and gravel	0.25			D	D to MD	Worked Alluvials			
							DCP = 16		
	0.50						DCP = 16		
							DCP = 8		
	0.75						DCP = 5		
							DCP = 8		
	1.00						DCP = 6		
Borehole terminated @ 1m							DCP = 4		
	1.25						DCP = 4		
							DCP = 4		
	1.50								
	1.75								
	2.00								

# ENGINEERING BOREHOLE LOG

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Borehole no. 4  
Sheet no. 1 of 1  
Job no. 15C 0980

Client :	Tomkinson					Date:	7/15/15		
Project :	Pavement Investigation					Logged by:	TP		
Location :	316-318 High Street, Kangaroo Flat								
Drill model :	Gemco HS7		Slope	90 deg		RL surface:	not measured		
Hole diameter :	200mm		Bearing	- deg		Datum :	-		
Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Clayey Sandy GRAVEL (GC), low plasticity, grey/brown	0.25			D	L	Worked Alluvials			
							DCP = 2		
Gravelly Silty CLAY (CI), medium plasticity, brown, grey, red/brown, trace of fine sand	0.50			M	S to F	Worked Alluvials	DCP = 2		
							DCP = 3		
							DCP = 3		
	0.75						DCP = 2		
							DCP = 1		
							DCP = 1		
	1.00						DCP = 1		
Borehole terminated @ 1m							DCP = 1		
							DCP = 2		
	1.25						DCP = 2		
	1.50								
	1.75								
	2.00								



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## California Bearing Ratio Report

**Report For:** Tomkinson  
\*  
**Project:** 316-319 High St

<b>Report Number:</b>	15B1922
<b>Revision No.</b>	0
<b>Test Date:</b>	21/12/2015
<b>Sheet:</b>	1 of 4

**Sample Number:** 15B1922/A  
**Sampling Details:** AS1289 1.2.1 Part 6.5.3  
**Sample Location:** BH1  
**Sample Description:** Silty Gravelly Clay, Pale Brown

### Test Results

Date of Test:	21/12/2015
Laboratory Density Ratio:	98
Laboratory Moisture Ratio:	105
Moisture Content Top 30/40mm: %	12
Compaction Type:	Standard
Number of Layers:	3
% Material retained 19.0mm sieve:	0
Material crushed & reused:	No
Mass of Surcharge: g	5475

### Soaked Sample Information

Period of Soaking (days)	4
Dry Density After Soaking: t/m <sup>3</sup>	1.93
Moisture Content After Soaking: %	12.6
Swell: %	0.0

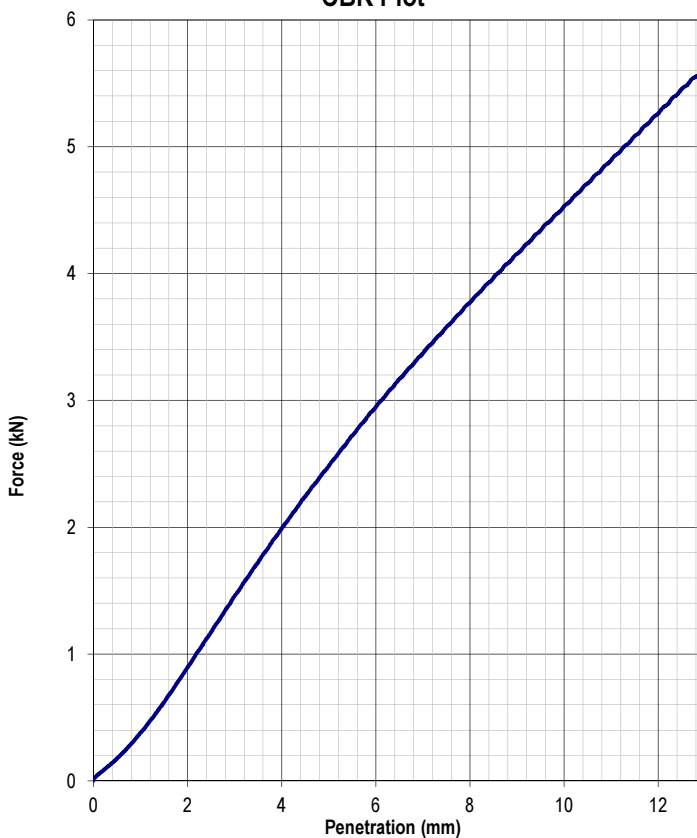
### Maximum dry density / Optimum moisture content

Maximum dry density: t/m <sup>3</sup>	1.97
Optimum moisture content: %	10.1

### CBR Results

Correction (mm)	0.50
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CBR Plot



**CBR Value (%) : 14 @ 5 mm**

- Notes:**
1. Laboratory Test Method: AS1289.2.1.1, 5.1.1 & 6.1.1
  2. This Laboratory shall not be responsible for the correctness or the accuracy of information provided by the client.

**Approved Signatory:**

C.J. Milne

**Date:** 22-Dec-15

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## California Bearing Ratio Report

**Report For:** Tomkinson  
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**Project:** 316-319 High St

<b>Report Number:</b>	15B1922
<b>Revision No.</b>	0
<b>Test Date:</b>	21/12/2015
<b>Sheet:</b>	2 of 4

**Sample Number:** 15B1922/B  
**Sampling Details:** AS1289 1.2.1 Part 6.5.3  
**Sample Location:** BH2  
**Sample Description:** Silty Gravelly Clay, Brown

### Test Results

<b>Date of Test:</b>	21/12/2015
<b>Laboratory Density Ratio:</b>	99
<b>Laboratory Moisture Ratio:</b>	97
<b>Moisture Content Top 30/40mm: %</b>	20
<b>Compaction Type:</b>	Standard
<b>Number of Layers:</b>	3
<b>% Material retained 19.0mm sieve:</b>	0
<b>Material crushed &amp; reused:</b>	No
<b>Mass of Surcharge: g</b>	5513

### Soaked Sample Information

<b>Period of Soaking (days)</b>	4
<b>Dry Density After Soaking: t/m<sup>3</sup></b>	1.78
<b>Moisture Content After Soaking: %</b>	18.2
<b>Swell: %</b>	2.0

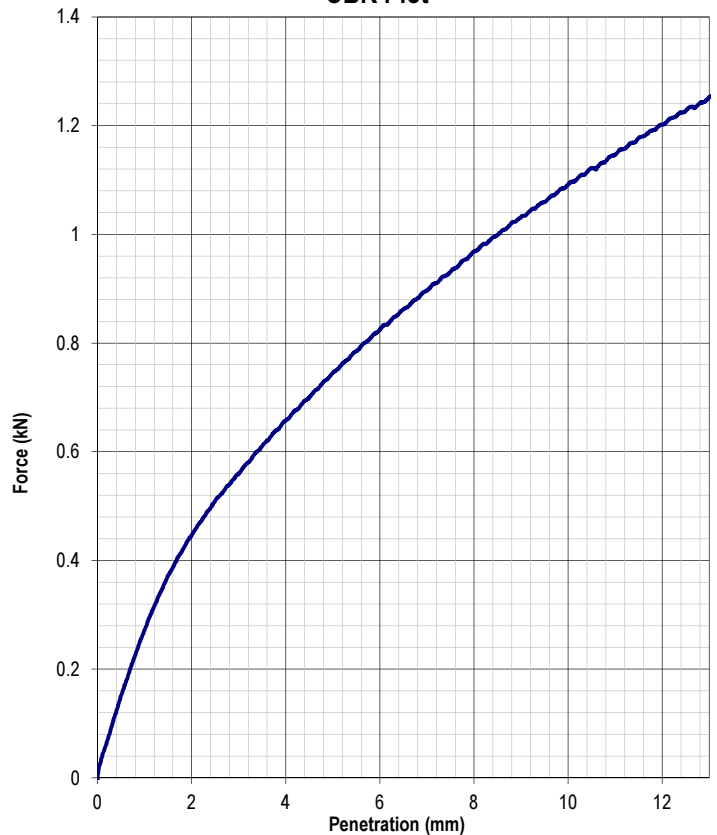
### Maximum dry density / Optimum moisture content

<b>Maximum dry density: t/m<sup>3</sup></b>	1.82
<b>Optimum moisture content: %</b>	15.7

### CBR Results

<b>Correction (mm)</b>	0.00
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CBR Plot



**CBR Value (%) : 4 @ 2.5 mm**

- Notes:**
1. Laboratory Test Method: AS1289.2.1.1, 5.1.1 & 6.1.1
  2. This Laboratory shall not be responsible for the correctness or the accuracy of information provided by the client.

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C.J. Milne

**Date:** 22-Dec-15

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## California Bearing Ratio Report

**Report For:** Tomkinson  
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**Project:** 316-319 High St

<b>Report Number:</b>	15B1922
<b>Revision No.</b>	0
<b>Test Date:</b>	21/12/2015
<b>Sheet:</b>	3 of 4

**Sample Number:** 15B1922/C  
**Sampling Details:** AS1289 1.2.1 Part 6.5.3  
**Sample Location:** BH3  
**Sample Description:** Clayey Gravel, Brown

### Test Results

<b>Date of Test:</b>	21/12/2015
<b>Laboratory Density Ratio:</b>	99
<b>Laboratory Moisture Ratio:</b>	98
<b>Moisture Content Top 30/40mm: %</b>	9
<b>Compaction Type:</b>	Standard
<b>Number of Layers:</b>	3
<b>% Material retained 19.0mm sieve:</b>	0
<b>Material crushed &amp; reused:</b>	No
<b>Mass of Surcharge: g</b>	5513

### Soaked Sample Information

<b>Period of Soaking (days)</b>	4
<b>Dry Density After Soaking: t/m<sup>3</sup></b>	2.17
<b>Moisture Content After Soaking: %</b>	9.4
<b>Swell: %</b>	-0.5

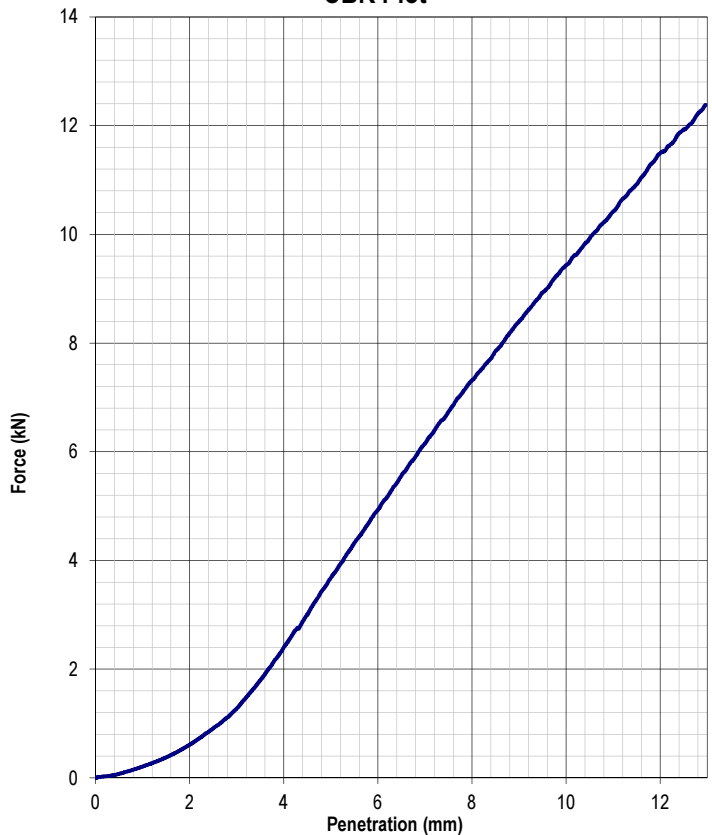
### Maximum dry density / Optimum moisture content

<b>Maximum dry density: t/m<sup>3</sup></b>	2.19
<b>Optimum moisture content: %</b>	8.7

### CBR Results

<b>Correction (mm)</b>	2.17
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CBR Plot



**CBR Value (%) : 30 @ 5 mm**

- Notes:**
1. Laboratory Test Method: AS1289.2.1.1, 5.1.1 & 6.1.1
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**Approved Signatory:**

C.J. Milne

**Date:** 22-Dec-15

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## California Bearing Ratio Report

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**Project:** 316-319 High St

<b>Report Number:</b>	15B1922
<b>Revision No.</b>	0
<b>Test Date:</b>	21/12/2015
<b>Sheet:</b>	4 of 4

**Sample Number:** 15B1922/D  
**Sampling Details:** AS1289 1.2.1 Part 6.5.3  
**Sample Location:** BH4  
**Sample Description:** Silty Gravelly Clay Brown

### Test Results

<b>Date of Test:</b>	21/12/2015
<b>Laboratory Density Ratio:</b>	98
<b>Laboratory Moisture Ratio:</b>	99
<b>Moisture Content Top 30/40mm: %</b>	14
<b>Compaction Type:</b>	Standard
<b>Number of Layers:</b>	3
<b>% Material retained 19.0mm sieve:</b>	0
<b>Material crushed &amp; reused:</b>	No
<b>Mass of Surcharge: g</b>	5472

### Soaked Sample Information

<b>Period of Soaking (days)</b>	4
<b>Dry Density After Soaking: t/m<sup>3</sup></b>	1.93
<b>Moisture Content After Soaking: %</b>	13.8
<b>Swell: %</b>	0.0

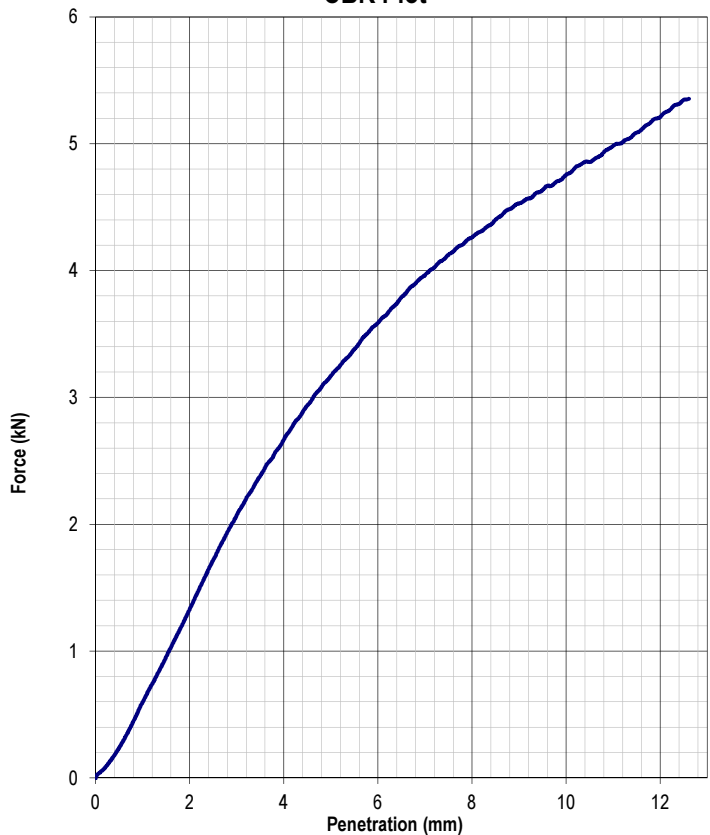
### Maximum dry density / Optimum moisture content

<b>Maximum dry density: t/m<sup>3</sup></b>	1.97
<b>Optimum moisture content: %</b>	11.4

### CBR Results

<b>Correction (mm)</b>	0.25
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CBR Plot



**CBR Value (%) : 17 @ 5 mm**

- Notes:**
1. Laboratory Test Method: AS1289.2.1.1, 5.1.1 & 6.1.1
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