Tonkin & Taylor

T&T Ref: 82860.100
19 December 2012

Wine Growers of Ara
c/- TM Co
2 Cob Cottage Road
RD4
Blenheim 7274

Attention: Tim Smit

Dear Tim

Preliminary Geotechnical Assessment of Proposed Winery Building, Ara Winery, Waihopai Valley

Introduction

As requested, we have undertaken a preliminary geotechnical assessment of a proposed winery building at the Ara Winery property, Waihopai Valley, Renwick. This assessment is undertaken to see if there are any significant geotechnical issues in developing the site.

We inspected the site on 8 November 2012 in the company of Mr Tim Smit and Mr Jeff Clarke. Mr Clarke provided background information and confirmed the approximate extents of the proposed development.

Background

We understand that a new winery complex is proposed at the Ara Property in Marlborough. Concept drawings for the winery are shown on Smart Alliance Ltd Drawings SK01 Rev 2 – Plan dated March 2012m, and SK05 Rev 1 – Sections, dated May 2012.

We understand that the winery will include plinth mounted wine tanks with sizes ranging from 5,000 to 240,000 litres. The large tanks and main cellar portal footings will have the most significant loadings.

Ara Wines have requested that we prepare a preliminary geotechnical report to assess whether or not there are any geotechnical considerations relating to the proposed location that would prevent it being constructed or make it prohibitively expensive.

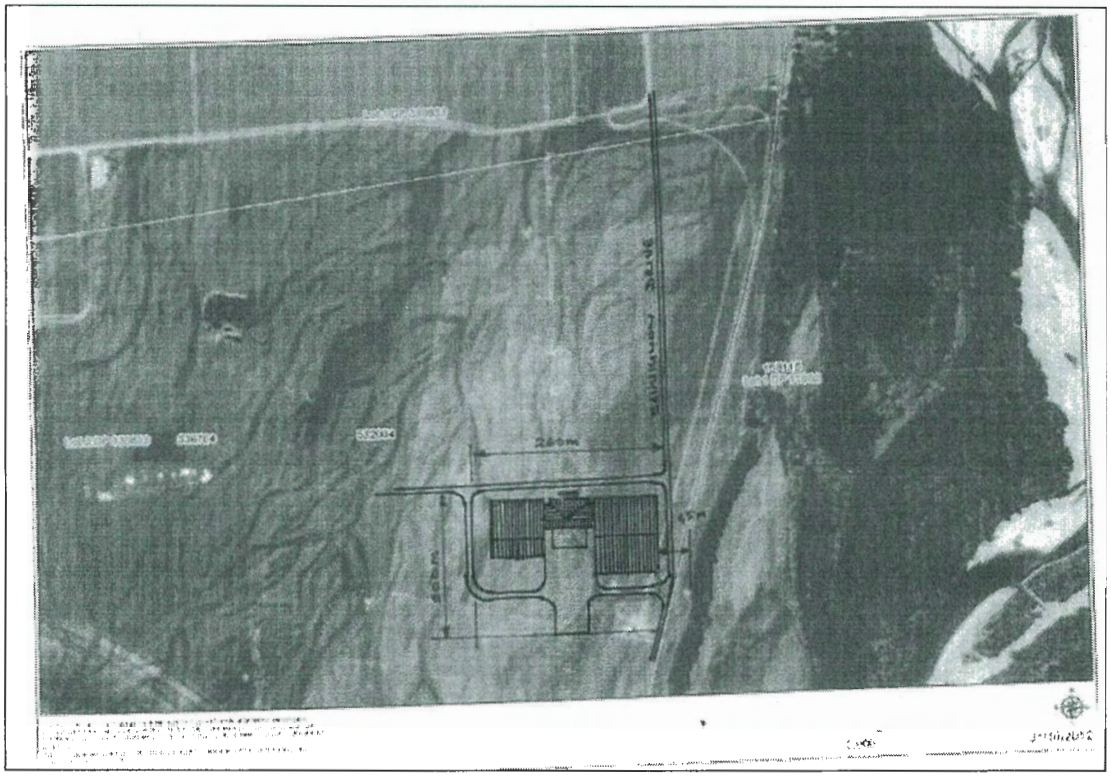


Figure 1 Proposed Winery Location (untitled sketch supplied by client)

Scope of Work

In order to prepare this report, we have undertaken the following works:

1. A review of available geotechnical information for the site from sources including published maps and Tonkin & Taylor Ltd files held in our Wellington and Auckland Offices.
2. A geotechnical inspection of the site, including:
    - Inspection of the site footprint and its surrounds;
    - Inspection of the adjacent terrace riser exposures, particularly exposures on a track leading down to the lower terrace;
3. Excavation of 6 test pits to a maximum depth of 2.7m within the approximate footprint of the proposed complex. The pits were aligned in approximately a straight line, trending 290/110° across the approximate building footprint. The test pits were aligned SE/NW to pick up subtle changes in topographic profile created by remnant channels trending approximately NE/SW. The investigations were also completed on the NW side of the footprint to allow the digger to track onto other works on the western side of the site.

Site Description

The proposed winery site is located on a flat alluvial terrace. The terrace is grassed at the proposed site it is used for arable farming. Slight variations in the surface topography (i.e. lower lying areas) indicate the location old channels that have eroded the terrace surface in the past.

To the east of the proposed winery site, there is a terrace riser. This is a 10-15 high, 30-35° slope defining the boundary between the older (higher level) and younger (lower level) alluvial terraces.

Photograph 1 Flat upper terrace with sloping terrace riser to right

Site Geology

Published Site Geology

The site is located on an old alluvial terrace on the western side of the Waihopai River. The geology of the site is shown on the geological Qmap for Wellington and Marlborough Regions[1], with the surrounding area to the west shown on the Qmap for Nelson[2].

On the Wellington-Marlborough Qmap, the geology of the site is shown as Q2a alluvium.

This is described as "Poorly to moderately sorted gravel with minor sand or silt underlying aggradational and degradational terraces (Q2a); includes minor fan gravel".

The surrounding hill slopes comprise Pleistocene and Tertiary age (c. 1.8 million year old) Hillersden Gravel comprising "clay bound gravel comprising predominantly quartzofeldspathic sandstone clasts".

The Wairau Fault runs NE/SW across the northern boundary of the site. The Wairau Fault is an active, "Major" fault with a slip rate of 3-5mm/year and single event displacement of 5-7m (horizontally). It has a reoccurrence interval of 1000-2300 years, and is last thought to have ruptured more than 800

[1] Begg, J.G., Johnston, M.R. (compilers) 2000. Geology of the Wellington Area. Institute of Geological & Nuclear Sciences 1:250,000 geological map 10. 1 sheet + 64p. Lower Hutt, New Zealand: Institute of Geological & Nuclear Sciences Ltd.
[2] Rattenbury, M.S., Cooper, R.A, Johnston, M.R (compilers) 1998. Geology of the Nelson area. Institute of Geological & Nuclear Sciences 1:250 000 geological map 9. 1 sheet + 67 p. Lower Hutt, New Zealand: Institute of Geological and Nuclear Sciences Limited.

years ago. Each rupture can create an earthquake magnitude of approximately Mw 7.2-7.7 (Begg et al). The Wairau Fault is located approximately 3.1km north of the proposed site.

A concealed inactive splinter fault is inferred to run in a NE/SW direction down the western side of the valley near the base of the hill slope approximately 1.9km to the west of the proposed site (to the left of the area shown in Figure 2 below).

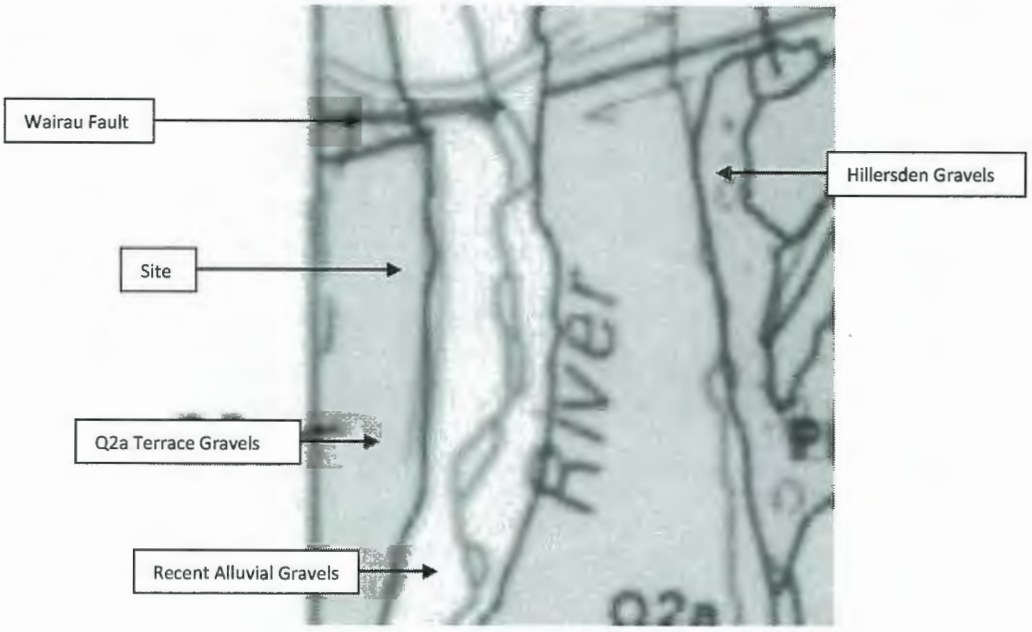


Figure 2 Site Geology (taken from Begg et al 2000)

Site Geology

Previous Investigations in surrounding area

T & T have completed geotechnical investigations and have monitored earthworks in the area to the west of the site. Geotechnical investigations comprising multiple test pits and one borehole were undertaken along the proposed alignment of the Bankhouse canal and at Lake Pinot. This is located on the western side of the terrace, at the base of the hillslopes approximately 2km west of the site.

These indicate the terrace deposits consists of predominantly gravel material with layers of silty sandy gravel and thin beds of silt. The gravels are dense to very dense and part of the Bankhouse Flats Gravels group. The interbedded silts are likely the result of historic flood events.

Recent Investigations at proposed winery site

We completed 6 test pits at the site on 8 November 2012. The test pit locations are shown in Figure 3 attached. The test pit logs are also attached. Based on our observations and the 6 No test pits, the typical soil profile at the site is summarised in Table 1.

Table 1 – Indicative Soil Profile

Material	Range in depth to top of layer (m)	Thickness of Layer (m)	Description
Topsoil	Surface	0.15-0.2m	Dry, dark brown SILT, gravely SILT and silty GRAVEL (gravel content is variable)
Loess	0.15-0.2m	0.2-0.8m	Dry, light brown, fine SILT. Locally mottled grey / orange. No loess encountered in 4 of the 6 test pits.
Alluvium	0.2-0.8m	>2.5m	Grey brown, moist and wet (after c. 0.85m) silty, sandy, fine to coarse GRAVEL with cobbles and less frequent boulders. The gravel is well graded, tightly packed (medium dense / dense) with fresh, sub rounded greywacke. The gravels are relatively uniform with minor variations in gravel sizes between beds Approximately the top 0.5m is more silty, becoming sandy below. No silt or sand layers were encountered within the gravels below the upper surface mantle. Gravels not bottomed out.

Note: Material boundaries are horizontal

The materials are described on the test pit logs, and are shown in the photographs below.

Based on our investigations, the surface soil profile is considered to be variable.

Where the ground profile is slightly elevated, more silt is present (i.e. TP3). Where the ground profile is lower, much of the silt is removed. The lower lying ground is likely to represent the location of stream channels that previously ran across the terrace surface. These channels would have stripped the silt mantle.

The silty upper 0.5m of the alluvium is likely to indicate loess or alluvial silt soils washed / infiltrated into the upper gravel alluvium.

As part of this investigation we also inspected the exposures on the terrace riser. The geology was observed in discontinuous exposures on the slope face and down an access track. The exposed geology was consistent with what was observed in the test pits. There was no evidence of any loose sand or silt layers within the gravels.

The track exposes approximately 20-30% of the soil profile.

Photograph 2 Soil profile at the proposed site (TP3)

Photograph 3 Typical appearance of alluvial gravels (TP1)

Photograph 4 Typical alluvial gravels (TP4)

Photograph 5 Example alluvial gravel exposure on terrace riser face

Geotechnical Considerations

Based on our observations and test pits, we do not consider that there are any geotechnical constraints on this site that would represent a fatal flaw for the proposed complex (i.e. a geotechnical condition that could prevent the winery site from being developed).

The gravels which underlie the subsurface topsoil, loess silt are uniform and relatively dense down to at least 2.7m below ground level and would make a satisfactory foundation when prepared (i.e. rolled etc). Observations of the exposures in the terrace riser also indicate that there are no weak or loose silty or sandy layers within the top 10-15m of the terrace.

A small number of geotechnical hazards are worth noting for the record. A qualitative risk assessment has been carried out on these hazards. Risk is defined as a combination of likelihood and consequence. The following tables are based on the AGS (2000) Landslide Risk Management Concepts and Guidelines.

Table 2 provides an explanation of the likelihood categories, whilst Table 3 explains the consequences (also based on the AGS 2000). Table 4 and 5 provide the rationale for the risk ratings.

These geotechnical hazards, along with an assessment of their likelihood and consequences, and measures that can be taken to mitigate the issues are summarised in Table 6 below.

Table 2 - Measures of Likelihood

Descriptor	Description	Annual Probability of Occurrence	
Almost Certain	The event is on-going, or is expected to occur during the next year	100%	< 1 year
Very Likely	The event is expected to occur.	20% to 100%	1-5 years
Likely	The event is expected to occur under somewhat adverse conditions	5% to 20%	5-20 years
Possible	The event is expected to occur under adverse conditions	1 to 5%	20-100 years
Unlikely	The event is expected to occur under high to extreme conditions	0.2 to 1%	100-500 years
Rare	The event could occur under extreme conditions	Less than 0.2%	>500 years

Table 3 - Measures of Consequence

Descriptor	Description
Catastrophic	Structure completely destroyed or large scale damage requiring major engineering works for stabilisation
Major	Extensive damage to most of the structure, or extending beyond site boundaries requiring significant stabilisation works.
Medium	Moderate damage to some of the structure, or significant part of site requiring large stabilisation works.
Minor	Limited damage to part of the structure, or part of site requiring some reinstatement / stabilisation works.
Insignificant	Little Damage

Table 4: Risk Matrix

		Consequences to Property/Assets				
		1: Catastrophic	2: Major	4: Medium	5: Minor	6: Insignificant
Likelihood	A – Almost Certain	VH	VH	H	H	M
	B – Very Likely	VH	H	H	M	L
	C – Likely	VH	H	M	L	L
	D – Possible	H	H	L	L	VL
	E – Unlikely	H	M	L	VL	VL
	F –Rare	M	L	VL	VL	VL

Table 5: Risk Level Implications

Risk Level		Implications for Risk Management
VH	Very High Risk	Detailed investigation, design, planning and implementation of treatment options to reduce risk to acceptable levels: May involve very high costs.
H	High Risk	Detailed investigation, design, planning and implementation of treatment options to reduce risk to acceptable levels.
M	Moderate Risk	Broadly tolerable provided treatment plan is implemented to maintain or reduce risks, may require investigation and planning of treatment options.
L	Low Risk	Acceptable. Treatment requirements to be defined to maintain or reduce risk
VL	Very Low Risk	Acceptable. Manage by normal maintenance procedures

Table 6: Geotechnical considerations, likelihood, consequences and mitigation measures

Geotechnical Consideration	Likelihood	Consequence	Risk Rating	Mitigation
Small scale shallow instability in surface soils on edge of terrace riser.	Possible	**Insignificant.** Unlikely to affect access road to winery (Sauvignon Drive) (refer Figure 3 for location), other roads or land within the property boundary as the riser edge is over 10m from the property boundary and the winery building will be 45m back from the riser edge.	Very Low	None required.
Large scale deeper instability on terrace riser slope due to major storms	Rare	**Insignificant.** Unlikely to affect access road (Sauvignon Drive) or land within the property boundary	Very Low	None required.

Large scale deeper instability on terrace riser slope due to major earthquake	Unlikely	**Insignificant.** Unlikely to affect access road (Sauvignon Drive) or land within the property boundary	Very Low	None required.
Liquefaction of alluvium below proposed platform in major earthquake	Rare	**Insignificant.** No liquefiable soils identified below building platform during these investigations. Soils are dense / tightly packed and unsaturated.	Very Low	None required. However, the soil profile should be confirmed to deeper depth at detailed design stage.
Ground shaking from Fault Rupture of Wairau Fault or Splinter Fault	Unlikely	**Variable. Insignificant to Catastrophic.** Depends upon size of earthquake event.	Very Low - High	Undertake specific foundation and structural design for proposed building.
Flooding of Waihopai River in an extreme event	Rare	**Insignificant.** Terrace level on eastern side of Waihopai River is lower than the site terrace.	Very Low	None required.
Variable depth of unsuitable foundation soils	Almost Certain	**Minor.** Creates a cost implication for development.	High	Ensure loess mantle is undercut and subgrade proof rolled before constructing foundations.
Waste Pits Offal pits or waste pits may be present within footprint containing animal carcasses or farm waste.	Unlikely - Possible	**Minor.** Unsuitable materials resulting in locally unsuitable subgrade	Low	Remove unsuitable materials during earthworks and replace with suitable fills.

Subsoil Class

Site subsoil class is used to determine earthquake loads for design. It defines the performance of local ground in an earthquake based on the material strength and depth. Subsoil Classes are defined within NZS1170.5:2004 which is the standard for Structural Design Actions – Earthquake Actions, New Zealand. Sites are classified by subsoil classes A to E, depending upon the depth to rock and consistency / density of the overlying soils.

The site subsoil classification for this site is based on observations at the proposed site.

There is currently no information on the depths to rock. We have assumed a depth of gravels being more than 100m. The density of the gravels is assumed to be similar to those seen in the pits and the terrace riser exposure.

The site has therefore been classified as Site Subsoil Class D according to Table 3.2 in NZS 1170.5:2004.

Suitability for development

The site is considered to be suitable for the proposed winery building from a geotechnical perspective. There are no fatal flaws that would prevent development of this site.

The geotechnical issues that exist on the site can be addressed with standard engineering design and construction practice.

The most pertinent consideration for development is the variable depth of the silt mantle. The amount of silt soils that have to be removed from the site in order to form a suitable building platform in the gravels will have a reasonable cost implication for development.

Our investigations infer that silt is present on the slightly elevated ground, and is minimal or not present in the lower lying areas. Loess was only encountered in 2 of the 6 test pits that were excavated. The elevated ground around TP3 where the loess was thickest makes up in the order of 10% of the building platform area.

During development, a level building platform is likely to be required. We would recommend that the silts are stripped from the elevated areas, and the lower lying areas infilled (if required). It may be prudent to relocate the silts to areas of the winery where soils are poor or thin. If the lower lying areas are to be raised, then either surplus gravels from the earthworks, or gravels imported from a borrow area on another part of the site could be used.

The other main consideration for the proposed building is the effect of earthquake shaking. The foundations and structure of the building will need to be specifically designed to accommodate the effects of ground shaking.

Further investigations

Due to the size of the proposed structure, we would recommend that further investigation is undertaken on this site at detailed design phase primarily to confirm the deeper ground conditions, the variability in depth of surface silty soils, material strength parameters and groundwater level.

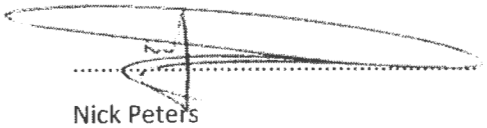
These investigations are likely to comprise at least 2 machine boreholes to approximately 15m depth, and an additional days test pitting to supplement the works already completed. Test pitting would be spatially distributed across the building platform in a grid like layout.

Applicability

This report has been prepared for the benefit of Winegrowers of Ara with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

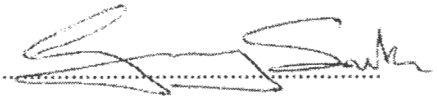
Report prepared by:



Nick Peters

Senior Engineering Geologist

Authorised for Tonkin & Taylor Ltd by:



Gary Smith

Principal Engineering Geologist

Attached: Figure 3 – Test Pit Investigation Plan
Test Pit Logs TP1 to TP6 inclusive

19-Dec-12
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Appendix A: **Figure 3 – Test Pit Investigation Plan**

(Note Figures 1 and 2 are embedded in the report text)

Notes:

Test Pit locations are approximate only
Aerial Image taken from Google Earth
Scale as shown

TP4 – Test Pit Location

Proposed Roads

Tonkin & Taylor
Environmental & Engineering Consultants
www.tonkin.co.nz

		CAD	Date
DRAWN			
DRAFTING CHECKED	✓		
APPROVED			
FILE: CADFILE			
APPROX. SCALE (AT A3 SIZE)	AS SHOWN		
PROJECT No.	82880.100		

Wine Growers of Ara
Proposed Winery
Waihopai River

Figure 3 Test Pit Investigation Plan

REV: 0

Appendix B Test Pit Logs

- TP1 to TP6 inclusive

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EXCAVATION LOG

EXCAVATION No: TP1
Hole Location: Building footprint

SHEET 1 OF 1

PROJECT: ARA Wines			LOCATION: Marlborough		JOB No: 82860.100
CO-ORDINATES:	-413535 mN 1734329 mE		EXPOSURE TYPE:	Test Pit	EXCAV. STARTED: 8/11/12
			EQUIPMENT:	Volvo EC14OB 14T Exc.	EXCAV FINISHED: 8/11/12
R.L.	120.00 m		OPERATOR:	Crafer Crouch	LOGGED BY: NCP
DATUM	WGS84	—120.5	DIMENSIONS:	3.0m x 1.0m	CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION							GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			None	120.0			OL	SILT with organics/rootlets; dark brown. Dry.	D	St		TOPSOIL	
						× × ×	ML	SILT, light brown. Dry.		VSt - H		LOESS	
							GM	Silty fine to medium GRAVEL; brown. Moist.	M	MD - D		ALLUVIUM	
				119.5	0.5		GM	Silty sandy fine to coarse GRAVEL; brown. Moist, tightly packed. Gravel is sub-rounded fresh and slightly weathered greywacke.					
	Not Required	None Encountered		119.0	1.0		GM	Sandy fine to coarse GRAVEL with trace cobbles; brown grey. Moist to wet, tightly packed. Gravel is sub-rounded, fresh and slightly weathered greywacke.	M-W				Q2a
				118.5	1.5								
				118.0	2.0			End of Test Pit (Target Depth)					
					2.5								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP2
Hole Location: Building footprint

SHEET 1 OF 1

PROJECT: ARA Wines	LOCATION: Marlborough		JOB No: 82860.100
CO-ORDINATES: -413335 mN 1734328 mE	EXPOSURE TYPE: Test Pit		EXCAV. STARTED: 8/11/12
	EQUIPMENT: Volvo EC140B 14T Exc.		EXCAV FINISHED: 8/11/12
R.L. 120.00 m	OPERATOR: Crafer Crouch		LOGGED BY: NCP
DATUM WGS84	DIMENSIONS: 3.0m x 1.0m		CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION							GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 12 NB 50 NB	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			None	120.0		OL	Gravelly SILT with trace organics/rootlets; dark brown. Dry.	D	St		TOPSOIL	
				119.5 0.5		GM	Silty fine to coarse GRAVEL; light brown. Dry. Gravel is sub-rounded. Between 0.37-0.6m becomes more silty		MD		ALLUVIUM	
						GM	Silty GRAVEL with sand: grey brown. Tightly packed (medium dense to dense), moist. Gravel is sub-rounded greywacke.	M	MD - D			
				119.0 1.0		GM	Sandy, fine to coarse GRAVEL with trace cobbles; brown grey. Moist to wet, tightly packed. Gravel is sub-rounded, fresh and slightly weathered greywacke.	M-W				Q2a
	Not Required	Not Encountered		118.5 1.5								
				118.0 2.0								
				2.5			End of Test Pit (Target Depth)					

RECEIVED
- 4 AUG 2014
MARLBOROUGH DISTRICT COUNCIL

RECEIVED
4 SEP 2015
MARLBOROUGH DISTRICT COUNCIL

T+T DATATEMPLATE.GDT DTG

Log Scale 1:15

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EXCAVATION LOG

EXCAVATION No: TP3
Hole Location: Building footprint

SHEET 1 OF 1

PROJECT: ARA Wines		LOCATION: Marlborough	JOB No: 82860.100
CO-ORDINATES:	-413335 mN 1734325 mE	EXPOSURE TYPE: Test Pit	EXCAV. STARTED: 8/11/12
		EQUIPMENT: Volvo EC140B 14T Exc	EXCAV FINISHED: 8/11/12
R.L.	120.00 m	OPERATOR: Crafer Crouch	LOGGED BY: NCP
DATUM	WGS84 —120.5	DIMENSIONS: 3.0m x 1.0m	CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 0 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			None	120.0		OL	Gravelly SILT with trace organics/rootlets; dark brown, dry.	D	St		TOPSOIL	
						ML	SILT; light brown. Dry.		VSt-H		LOESS	
				119.5 0.5		ML	Slightly sandy SILT: brown, with grey and orange mottling. Moist.	M				
	Not Required	Not Encountered		119.0 1.0		GM	Sandy fine to coarse GRAVEL with trace cobbles; brown grey. Moist to wet, tightly packed. Gravel is sub-rounded greywacke. Pockets of SILT (Reworked LOESS). Wet gravels below 1.5m.	M-W	MD-D		ALLUVIUM	Q2a
				118.5 1.5								
				118 0 2.0			End of Test Pit (Target Depth)					
				2.5								

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EXCAVATION LOG

EXCAVATION No: TP4
Hole Location: Building footprint

SHEET 1 OF 1

PROJECT: ARA Wines			LOCATION: Marlborough		JOB No: 82860.100
CO-ORDINATES:	-413335 mN 1734324 mE		EXPOSURE TYPE:	Test Pit	EXCAV. STARTED: 8/11/12
			EQUIPMENT:	Volvo EC14OB 14T Exc.	EXCAV FINISHED: 8/11/12
R.L.	121.00 m		OPERATOR:	Crafer Crouch	LOGGED BY: NCP
DATUM	WGS84	121.5	DIMENSIONS:	3.0m x 1.0m	CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION							GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			None	121.0			OL	Gravelly SILT with trace organics/rootlets; dark brown. Dry.	D	St		TOPSOIL	
							GM	Silty GRAVEL; light brown. Dry. Gravel is fine - coarse, tightly packed, fresh-slightly weathered greywacke.		MD - D		ALLUVIUM	
	•			120.5	0.5		GM	Silty, sandy, fine to coarse GRAVEL with minor cobbles; brown-grey. Wet. Tightly packed, well graded. Gravel is sub-rounded, fresh - slightly weathered greywacke.	W				Q2a
				120.0	1.0								
				119.5	1.5		GM	Silty sandy fine to coarse GRAVEL; greyish brown. Wet, tightly packed. Gravel is sub-rounded, fresh - slightly weathered greywacke.					
	•			119.0	2.0								
	Not Required	Not Encountered			2.5			End of Test Pit (Target Depth)					

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EXCAVATION LOG

EXCAVATION No: TP5
Hole Location: Building footprint

SHEET 1 OF 1

PROJECT: ARA Wines			LOCATION: Marlborough		JOB No: 82860.100
CO-ORDINATES:	-413334 mN 1734322 mE		EXPOSURE TYPE:	Test Pit	EXCAV. STARTED: 8/11/12
			EQUIPMENT:	Volvo EC14OB 14T Exc.	EXCAV FINISHED: 8/11/12
R.L.	121.00 m		OPERATOR:	Crafer Crouch	LOGGED BY: NCP
DATUM	WGS84	~121.5	DIMENSIONS:	3.0m x 1.0m	CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			None	121.0		OL	Gravelly SILT with trace organics/rootlets; dark brown. Dry.	D	St		TOPSOIL	
						GM	Silty fine to coarse GRAVEL; brown. Dry. Tightly packed. Silt (LOESS) matrix around gravel clasts		MD		ALLUVIUM	
				120.5 0.5		GM	Sandy fine to coarse GRAVEL with trace cobbles; brown grey. Dense, moist to wet, tightly packed. Gravel is sub-rounded, fresh - slightly weathered greywacke. Sandy GRAVEL with silt between 0.5-1.2m.	M-W	MD - D			Q2a
				120.0 1.0								
				119.5 1.5								
				119.0 2.0								
	•			2.5			End of Test Pit (Target Depth)					

• Not Required
Not Encountered

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TnT DATATEMPLATE.GDT DTG

Log Scale 1:15

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP6
Hole Location: Building footprint

SHEET 1 OF 1

PROJECT: ARA Wines | LOCATION: Marlborough | JOB No: 82860.100

CO-ORDINATES: -413334 mN, 1734318 mE
R.L. 123.00 m
DATUM WGS84 —123.5

EXPOSURE TYPE: Test Pit
EQUIPMENT: Volvo EC140B 14T Exc.
OPERATOR: Crafer Crouch
DIMENSIONS: 3.0m x 1.0m

EXCAV. STARTED: 8/11/12
EXCAV FINISHED: 8/11/12
LOGGED BY: NCP
CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION							GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			None	123.0		OL	Silty GRAVEL with trace organics/rootlets; dark brownish grey. Dry.	D	St		TOPSOIL	
						GM	Silty GRAVEL; light brown. Dry.		MD		ALLUVIUM	
				122.5 0.5		GM	Silty, sandy fine to coarse GRAVEL with trace cobbles; brownish grey. Dense, moist to wet, tightly packed. Gravel is sub-rounded, fresh - slightly weathered greywacke.	M-W	MD - D			Q2a
				122.0 1.0								
				121.5 1.5								
						GM	Silty sandy fine to coarse GRAVEL with trace cobbles; brown. Dense, moist to wet, tightly packed. Gravel is sub-rounded, fresh - slightly weathered greywacke.				
				121.0 2.0								
	Not Required	Not Encountered		2.5			End of Test Pit (Target Depth)					

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EXCAVATION TEST PIT LOGS.GPJ 18-Dec-2012