

985135 - 21 Douglas / 209 Amesbrook.

TONKIN & TAYLOR LTD. ENVIRONMENTAL & ENGINEERING CONSULTANTS

109 FEATHERSTON STREET WELLINGTON NEW ZEALAND

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PH 64-4-472 6997 FAX 64-4-472 6977

Our Ref: 81041
21 April 1998

Mr S Luscombe
27A Marie Street
Nelson

COPY

Attention: Mr Luscombe

Dear Sir

Lot 1 of Proposed Subdivision of Part Lot 5 DP 5476, Tahuna, Nelson
Geotechnical Investigations

1. Introduction

This report presents the results the results of a geotechnical assessment of Lot 1 of a proposed subdivision of part Lot 5 DP 5476, (21 Douglas Street), Tahuna, Nelson. The report has been prepared at the request of Mr S. Luscombe, (who will be obtaining title for Lot 1).

The scope of work and terms and conditions of engagement are as set out in Tonkin & Taylor's letter Ref 81041, dated 8 April 1998.

Tonkin and Taylor have been provided with the following drawings and reports:

- "Proposed Subdivision of Pt. Lot DP 5476" Subdivision Plan prepared by Gourdie and Ward Ltd, Registered Surveyors, dated March 1998.
- Untitled contour plan of Lot 1 at 1:250 scale.

The scope of work comprised:

- inspection of the site to assess the geological and geomorphic setting,
- excavation of three test pits to identify the soils and rock profile,
- Putting down four Scala penetrometer tests to assess the soil characteristics
- Condition survey of existing crib wall downslope of the site.
- Documentation of the results of the investigations, and recommendations regarding site development.

This report has been requested for the purpose of obtaining consent to subdivide. It is



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proposed that a level building site be formed by excavating a cut platform across the site. The exact level of the platform has not yet been finalised.

2.0 Investigation Results

The site is on a westerly trending ridge on the eastern side of Annesbrook Drive. The ridge is a remnant terrace surface elevated 10 to 15m above the surrounding land. Within the Lot the slopes are generally moderately steep to steep (25 to 35°), and downslope of the Lot a cut slope has been excavated and a 3m high crib wall constructed along the side of Annesbrook Drive. On the upper part of the lot the slopes flatten to merge with the gently sloping ridge crest east of the site.

The site is well vegetated and there are no natural soil or rock exposures. Recent shallow instability is inferred by a small scarplet on the northwestern flank on a locally steep section of slope inclined at 38°. We understand that the proposed house will be located immediately east of the small slip. The owner reports that for several years he has tipped loose debris and garden waste has been tipped at the head of the steeper section of slope.

2.1 Subsurface Conditions

The sub-surface conditions have been inferred from three test pits (TP1 - TP3) and four Scala penetrometer tests (P1 - P4). The log of the test pits and Scala results are attached. The location of the auger hole and Scala tests is shown in Figure 1.

The underlying rock at this location has been mapped as Magazine Point Formation (Geological Map of New Zealand, Sheet O27 AC, Dun Mountain, NZGS 1981).

TP1 reveals that along the crest of the ridge the soils consists of approximately 1 metre of a sandy colluvium overlying a residually weathered soil profile, grading with depth from a siltstone derived residual soil through completely weathered to highly weathered siltstone. At about two metres depth there is a transition from soil properties to rock properties which corresponds with the transition from highly weathered to moderately weathered siltstone.

Test Pit 2 was excavated near the toe of the natural slope and revealed a thin veneer of recently deposited colluvium overlying a buried topsoil horizon. The transition from soil to rock like characteristics occurs at about 2m depth.

Test Pit 3, was excavated into the cut batter adjacent to the crib wall. The uppermost soil layers are absent and the transition from soil to rock occurs at about 1.2m depth.

The soils were mainly dry, and no seepage was encountered.

Scala probes confirmed the presence of loose soils extending to depths of 0.8 to 1.8

metres.

3.0 Stability

There is evidence of recent shallow instability on the steep northwest flank of the ridge. On the basis of the depth of burial of topsoil in Test Pit 2 and the height of inferred scarps identified near Scala penetrometer probe P1 the maximum depth of past slippage has been less than 1 metre.

There is no evidence of slope instability along the length of the cut slope above the crib wall.

4.0 Crib Wall Condition Survey

The crib wall is about 30 metres long and ranges from 1 to 3 metres high. It is 6.5 metres from the West boundary of Lot 1.

The existing condition of the crib wall was assessed by visual examination of the crib blocks and crib infill material and by measuring the angle of the face of the wall at three levels in a series of profiles along the length of the wall.

Vegetation blankets most of the wall, which made the visual examination difficult. However, where measurements were taken, the wall face of the wall is inclined consistently at 79 to 80° and there is no evidence of longitudinal bulging. At a number of places surface spalling of the concrete crib units has occurred and rusted reinforcing steel is exposed. We understand that the wall is about 20 years old so this type of deterioration is not unexpected. This is not considered to be a serious problem at this time and does not effect the overall integrity of the wall or stability of the slope. In time, sections of the wall may need to be partly or wholly replaced.

4.0 Recommendations

Recommendations in this report are based on data from three test pits and four Scala penetrometer probes. The nature and continuity of subsoil away from the test locations is inferred and it must be appreciated that actual conditions could vary from the assumed model.

The proposed development comprises construction of a house on a cut platform at about RL 28 covering the central part of the site. Access will be via a driveway formed on the northern side of the site.

In our opinion the site is suitable for residential development and an area for a building site has been identified (dwg ref 81041.001). Our investigations have not included the

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northwest corner or the southern end of the site and these areas have therefore been excluded from the area considered suitable for development. The following recommendations should be applied to the development within the building envelope shown.

1. Foundations

Foundations should be taken through loose fill materials, the colluvium and the residually weathered siltstone to derive support from the dense, highly or less weathered siltstone at depth. Investigations indicate that founding depth is variable across the site, but will be range from 0.9 to 1.8m below the existing ground surface within the building envelope.

2. Cut Slopes.

Unsupported cut slopes can be excavated above the RL 27m contour within the following limits:

	Recommended max. Unsupported slope angle
Cuts less than 1m in height	45° (1H: 1V)
Cuts 1 to 2m in height	26° (2 H: 1 V)
Cuts 2m to 4m in height	Top 2m section cut at 26°, Bottom 2m section at 36° (1.5H:1V)
Cuts greater than 4m in height	Requires specific design

Once an earthworks plan has been developed we should review it. No earthworks should be carried out until the review is completed.

A stormwater cutoff drain shall be installed along the top of any cut slope greater than 2m in height.

3. Filling

Fill should not be placed on ground sloping at greater than 26° unless designed by a registered engineer experienced in soil mechanics and slope stability. No fill should be placed up slope of the crib wall within a line drawn at 45° from the foot of the crib wall. Elsewhere, any filling in excess of 1m in height should be designed by a registered engineer experienced in soil mechanics and soil stability.

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4. Small Slip.

The loose soils within the existing small slip shown on Figure 1 should be removed above the RL 25m contour to a depth of 0.8m and this section of slope should be re-graded to a maximum slope angle of 26°.

5. Stormwater

All stormwater from roof and paved areas shall be collected and piped to the Council's reticulation system.

6. Vegetation

Vegetation generally enhances the stability of slopes. Site clearance should therefore be kept to a minimum and cleared areas should be planted as soon as possible.

7. Foundation Investigation.

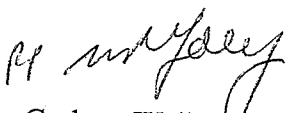
This report does not remove the need for inspection and design of foundations that would normally ensue in natural ground as required in NZS3604:1990 "Code of Practice for Light Timber Buildings Not Requiring Specific Design"

5.0 Applicability

This report has been prepared solely for the benefit of you as our client with respect to the particular brief given to us and data or opinions contained in it may not be used in other contexts or for any other purpose without our preview and agreement.

During excavation and construction, the site should be examined by an engineer or engineering geologist competent to judge whether the subsoils are compatible with the inferred conditions on which this report is based. We would be pleased to provide this service to you and believe the project will benefit from such continuity. However, it is important that we be contacted if there is any variation in subsoil conditions from those described in the report.

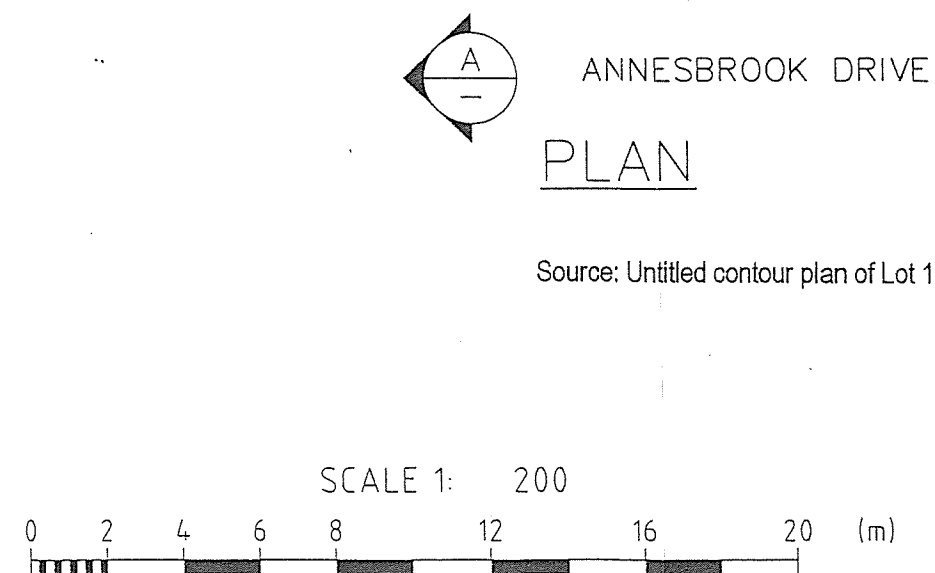
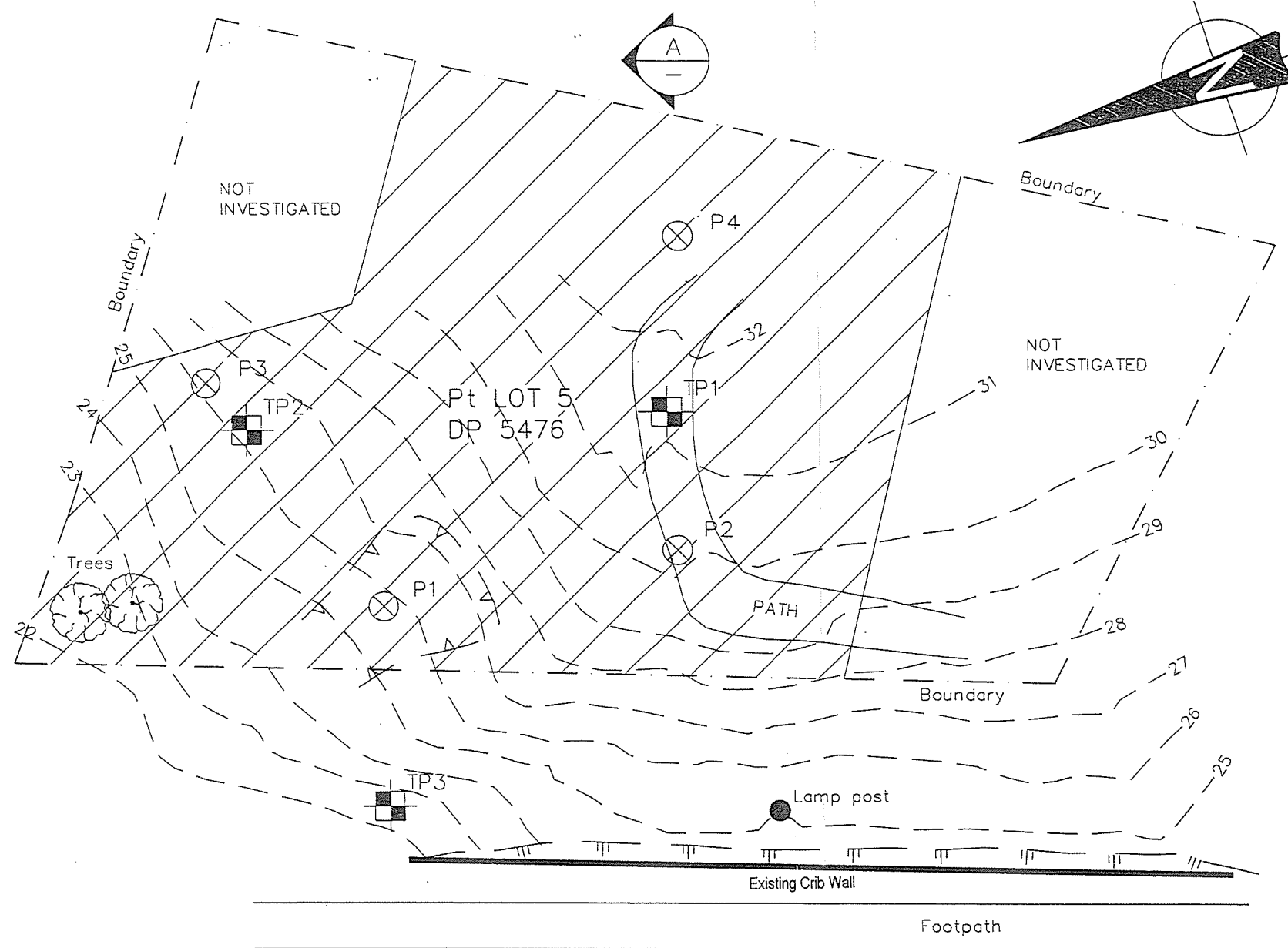
Yours faithfully,
TONKIN & TAYLOR LTD


Graham Wallace
Project Coordinator

21 April 1998

Prepared by Mark Foley
Reviewed by Gary Smith

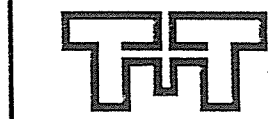
Attachments: Figure 1 "Investigation Location Plan"
 Test Pit Logs TP1 - TP3
 Scala Penetrometer test results P1 - P3
 Engineering log terminology



Source: Untitled contour plan of Lot 1 at 1:200 scale

Cad File : 81041001

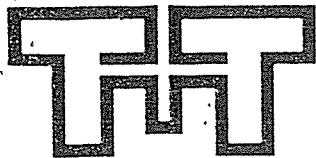
Mr S LUSCOMBE
PROP. SUBDIVISION Pt LOT 1 DP5476
21 DOUGLAS ST, TAHUNA, NELSON
Investigation Location Plan



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ENVIRONMENTAL &
ENGINEERING CONSULTANTS

DRAWN	DS	21/4/98
DWG. CHECKED	<i>[Signature]</i>	
APPROVED		
JOB No.	SCALES (A3)	
81041	1:200	
FIG. No.	REV.	
FIG 1	0	

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES



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EXCAVATION LOG

EXCAVATION NO: 1

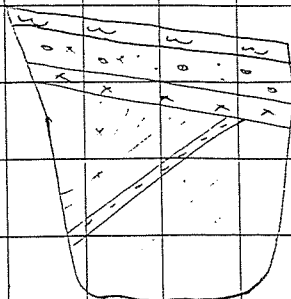
SHEET 1 OF 1

PROJECT: DUNEDIN 21 LOCATION: JOB NO: 81041
CO-ORDINATES: REFER FIGURE 1 EXPOSURE TYPE: PIT HOLE STARTED: 21/4/98
EQUIPMENT: KOBELCO 6 TONNE HOLE FINISHED: 21/4/98
RL: OPERATOR: LOGGED BY: MZF
DATUM: EXCAVATION DIMENSIONS: 3.5m x 8m. CHECKED BY:

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION							GEOLOGICAL				
PENETRATION			SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1	2	3													
						0.0	0.0	u	CL	Gravelly SAND, well graded, black with some clay.	D	L			TOP SOIL
						0.5	0.5	u	SM	Silty SAND well graded, light brownish yellow, with some gravel and rare clay.	D	D			COLLUVIUM
						1.0	1.0	x x	ML	Sandy SILT, light brown non plastic, with rare clay.	D	L			RESIDUAL SOIL
						1.5	1.5	x x	ML	SILTSTONE, brown, E.W. faintly bedded, extremely weak. [Sandy SILT, non plastic, with rare clay]	D	D			MAGAZINE POINT FORMATION
						2.0	2.0	x x		H.W. joints (fissures) v. closely spaced, gapped with 5-2mm clay seams dip > 50°	D	UD			
						2.5	2.5	x x		SANDSTONE, brown M.W. weak Dip 50°					
						3.0	3.0	x x		M.W. weak, joints closely spaced, weak to moderately strong.					

SKETCH

Pit terminates at 3.2m





EXCAVATION LOG

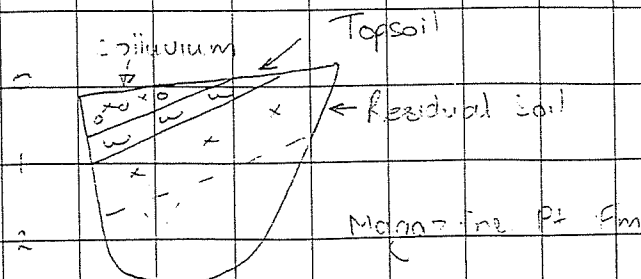
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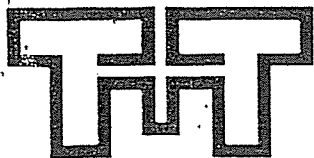
SHEET 1 OF 1

PROJECT: Douglas 21	LOCATION:	JOB NO: 81041
CO-ORDINATES: REFER FIGURE 1	EXPOSURE TYPE: -	HOLE STARTED: 9.4.98
RL:	EQUIPMENT: KOBELCO 6T.	HOLE FINISHED: 9.6.98
DATUM:	OPERATOR:	LOGGED BY: MRC
	EXCAVATION DIMENSIONS: 3.5m x 1.8m	CHECKED BY:

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION							GEOLOGICAL					
PENETRATION		SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED 25 SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT		
1	2	3														
NIL NIL								CL	Gravelly CLAY, yellowish brown, slightly plastic,	M	F			Colluvium		
				0.5				OL	silty CLAY, slightly plastic dark grey, with some fine to coarse gravel, organic	D	F			Topsoil		
				1.0				ML	Sandy SILT, non plastic yellowish brown, with rare clay.	D	MD			Residual Soil		
				1.5					Gradational		D					
				2.0				ML	SILTSTONE, brown, E.W. faintly bedded, joints closely spaced, ex weak sandy silt, non plastic	D	VD				Magazine Point Formation	
				2.5					HW - MW, joints dip > 45° weak to mod. strong	D						
									Hole terminated at 2.5m, Hard digging							

SKETCH





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EXCAVATION LOG

EXCAVATION NO: 3

SHEET 1 OF 1

PROJECT: DOUGLAS 21 LOCATION: JOB NO: S1041
CO-ORDINATES: REFER FIGURE 1 EXPOSURE TYPE: PIT HOLE STARTED: 9.4.98
EQUIPMENT: KOBELCO 6T HOLE FINISHED: 9.4.98
RL: OPERATOR: LOGGED BY: MRF
DATUM: EXCAVATION DIMENSIONS: 3m x 8m CHECKED BY:

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION						GEOLOGICAL				
PENETRATION 1 2 3			SUPPORT	WATER	SAMPLES, TESTS	RL (m) DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
								WCL	Sandy Silt, grey organic	D	L		TOPSOIL	
						0.5		ML	SILTSTONE, brown, E.W. massive, extremely weak [Sandy SILT, non plastic, with rare clay]	D	D		MAGAZINE POINT FORMATION	
						1.0								
						1.5			HW, weak, joints closely spaced					
						2.0								
						2.5			gradational MW moderately strong to SW, strong joints closely spaced, non persistent, dip > 45°	D				
						3.0								

SKETCH

Pit terminated at 3.0m
Hard Digging

Cut batter

← Magazine Pt Fm



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Test No. P1

Sheet 1
of 1

Date: 9/4/98

Job No: 81041

Operated MRF

Logged by MRF

Checked t GS

Site: 21 Douglas Street

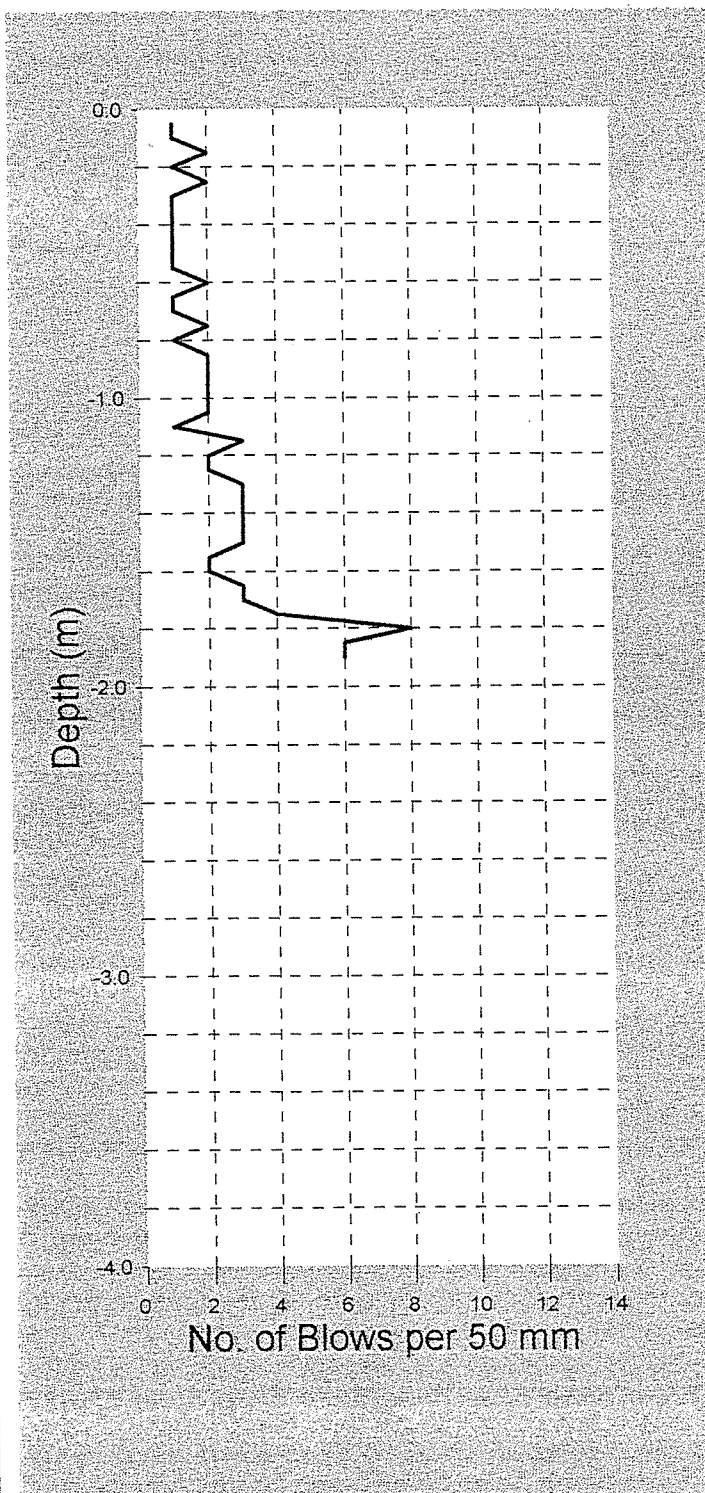
Location Proposed House Site - Refer Figure 1

Ground Surface RL:

Depth from Ground RL to Excavated Surface:

mm DRIVEN	No. of BLOWS
50	1
100	1
150	2
200	1
250	2
300	1
350	1
400	1
450	1
500	1
550	1
600	2
650	1
700	1
750	2
800	1
850	2
900	2
950	2
1000	2
1050	2
1100	1
1150	3
1200	2
1250	2
1300	3
1350	3
1400	3
1450	3
1500	3
1550	2
1600	2
1650	3
1700	3
1750	4
1800	8
1850	6
1900	6
1950	
2000	

mm DRIVEN	No. of BLOWS
2050	
2100	
2150	
2200	
2250	
2300	
2350	
2400	
2450	
2500	
2550	
2600	
2650	
2700	
2750	
2800	
2850	
2900	
2950	
3000	
3050	
3100	
3150	
3200	
3250	
3300	
3350	
3400	
3450	
3500	
3550	
3600	
3650	
3700	
3750	
3800	
3850	
3900	
3950	
4000	



Test Method Used : NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer



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WELLINGTON

Test No. P2
Sheet 1
of 1

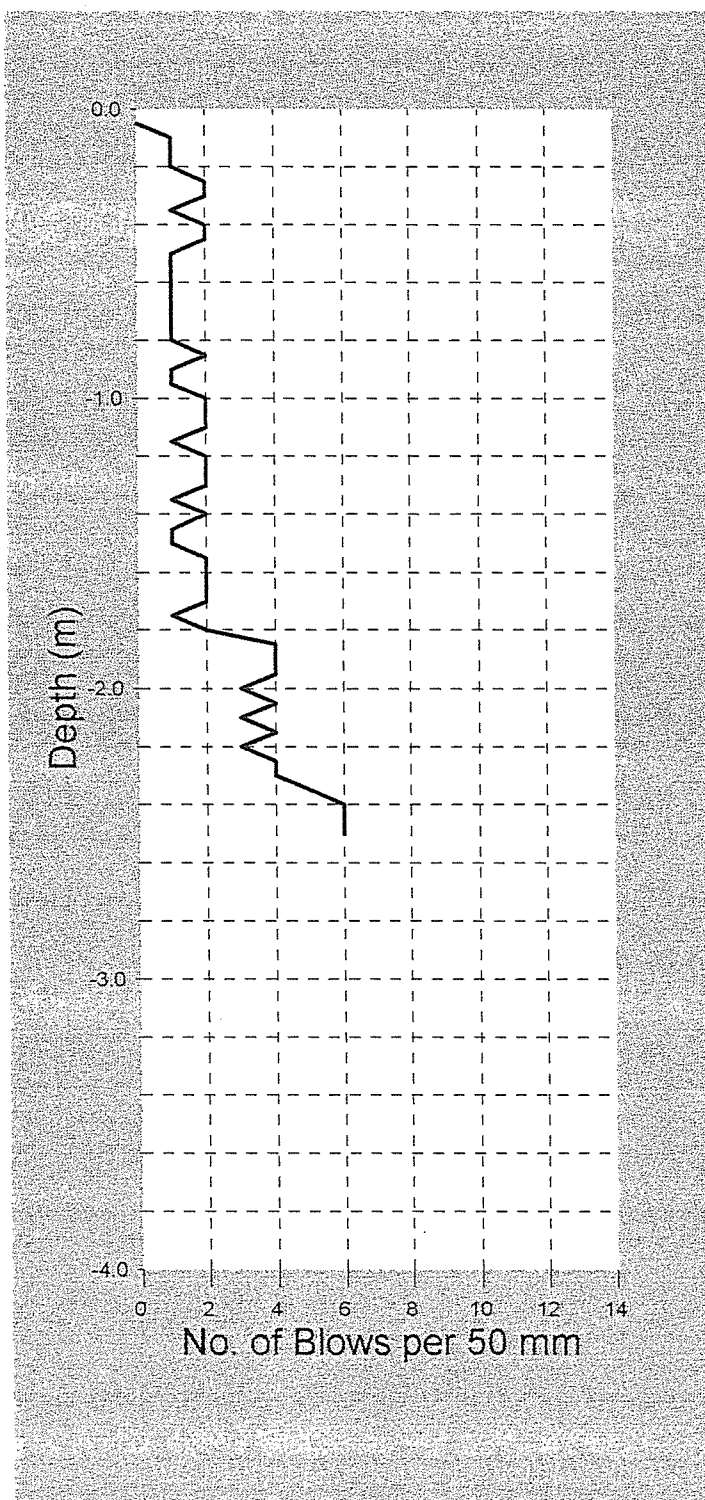
Site: 21 Douglas Street
Location Proposed House Site - Refer Figure 1
Ground Surface RL:

Date: 9/4/98
Job No: 81041
Operated MRF
Logged by MRF
Checked t GS

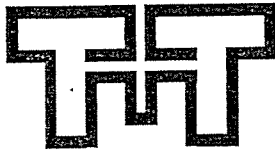
Depth from Ground RL to Excavated Surface:

mm	No. of
DRIVEN	BLOWS
50	0
100	1
150	1
200	1
250	2
300	2
350	1
400	2
450	2
500	1
550	1
600	1
650	1
700	1
750	1
800	1
850	2
900	1
950	1
1000	2
1050	2
1100	2
1150	1
1200	2
1250	2
1300	2
1350	1
1400	2
1450	1
1500	1
1550	2
1600	2
1650	2
1700	2
1750	1
1800	2
1850	4
1900	4
1950	4
2000	3

mm	No. of
DRIVEN	BLOWS
2050	4
2100	3
2150	4
2200	3
2250	4
2300	4
2350	5
2400	6
2450	6
2500	6
2550	
2600	
2650	
2700	
2750	
2800	
2850	
2900	
2950	
3000	
3050	
3100	
3150	
3200	
3250	
3300	
3350	
3400	
3450	
3500	
3550	
3600	
3650	
3700	
3750	
3800	
3850	
3900	
3950	
4000	



Test Method Used : NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer



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Test No. P3

Sheet 1

of 1

Date: 9/4/98

Job No: 81041

Operated MRF

Logged by MRF

Checked IGS

Site: 21 Douglas Street

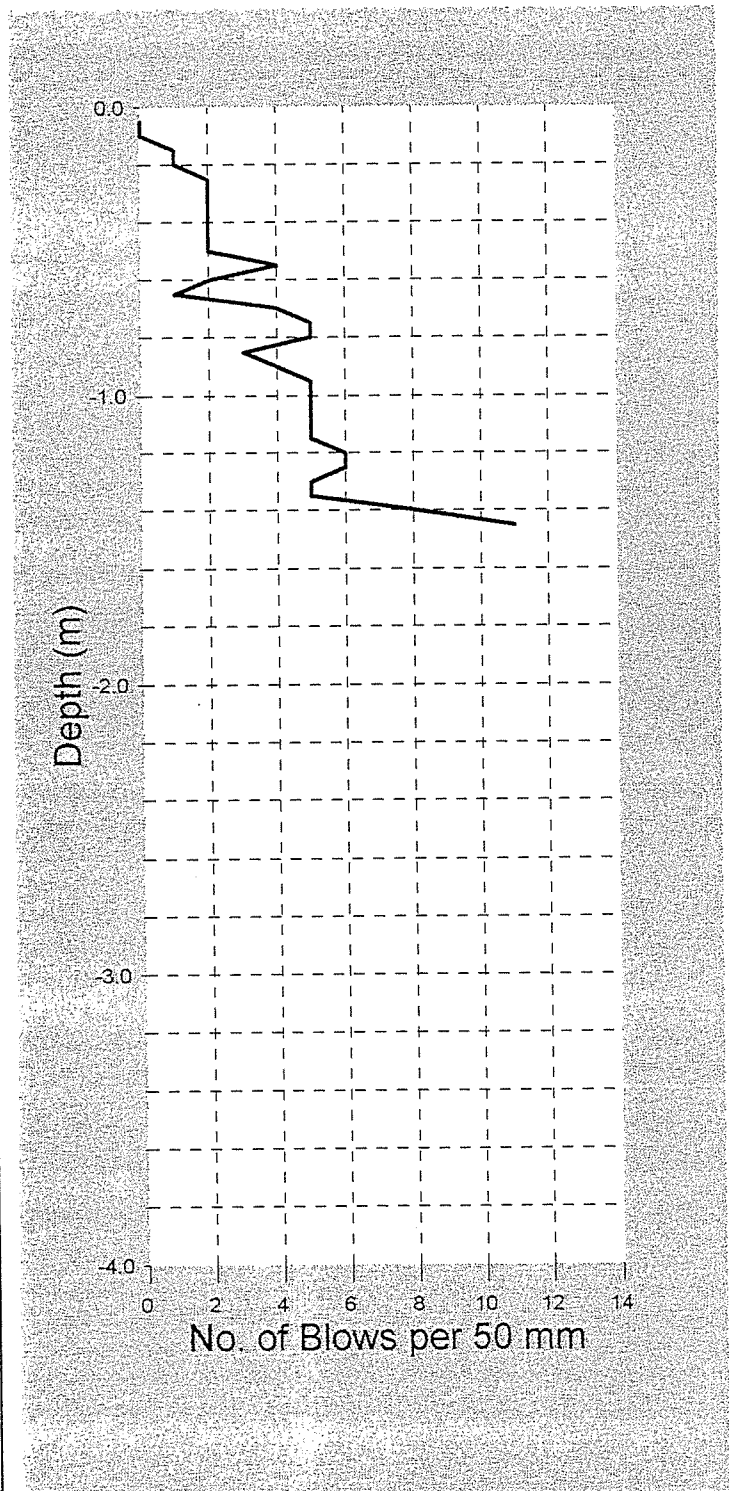
Location Proposed House Site - Refer Figure 1

Ground Surface RL:

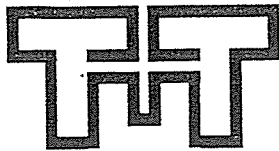
Depth from Ground RL to Excavated Surface:

mm DRIVEN	No. of BLOWS
50	0
100	0
150	1
200	1
250	2
300	2
350	2
400	2
450	2
500	2
550	4
600	2
650	1
700	4
750	5
800	5
850	3
900	4
950	5
1000	5
1050	5
1100	5
1150	5
1200	6
1250	6
1300	5
1350	5
1400	8
1450	11
1500	
1550	
1600	
1650	
1700	
1750	
1800	
1850	
1900	
1950	
2000	

mm DRIVEN	No. of BLOWS
2050	
2100	
2150	
2200	
2250	
2300	
2350	
2400	
2450	
2500	
2550	
2600	
2650	
2700	
2750	
2800	
2850	
2900	
2950	
3000	
3050	
3100	
3150	
3200	
3250	
3300	
3350	
3400	
3450	
3500	
3550	
3600	
3650	
3700	
3750	
3800	
3850	
3900	
3950	
4000	



Test Method Used : NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer



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PO BOX 12 152
WELLINGTON

Test No. P4

Sheet 1
of 1

Date: 13/4/98

Job No: 81041

Operated MRF

Logged by MRF

Checked IGS

Site: 21 Douglas Street

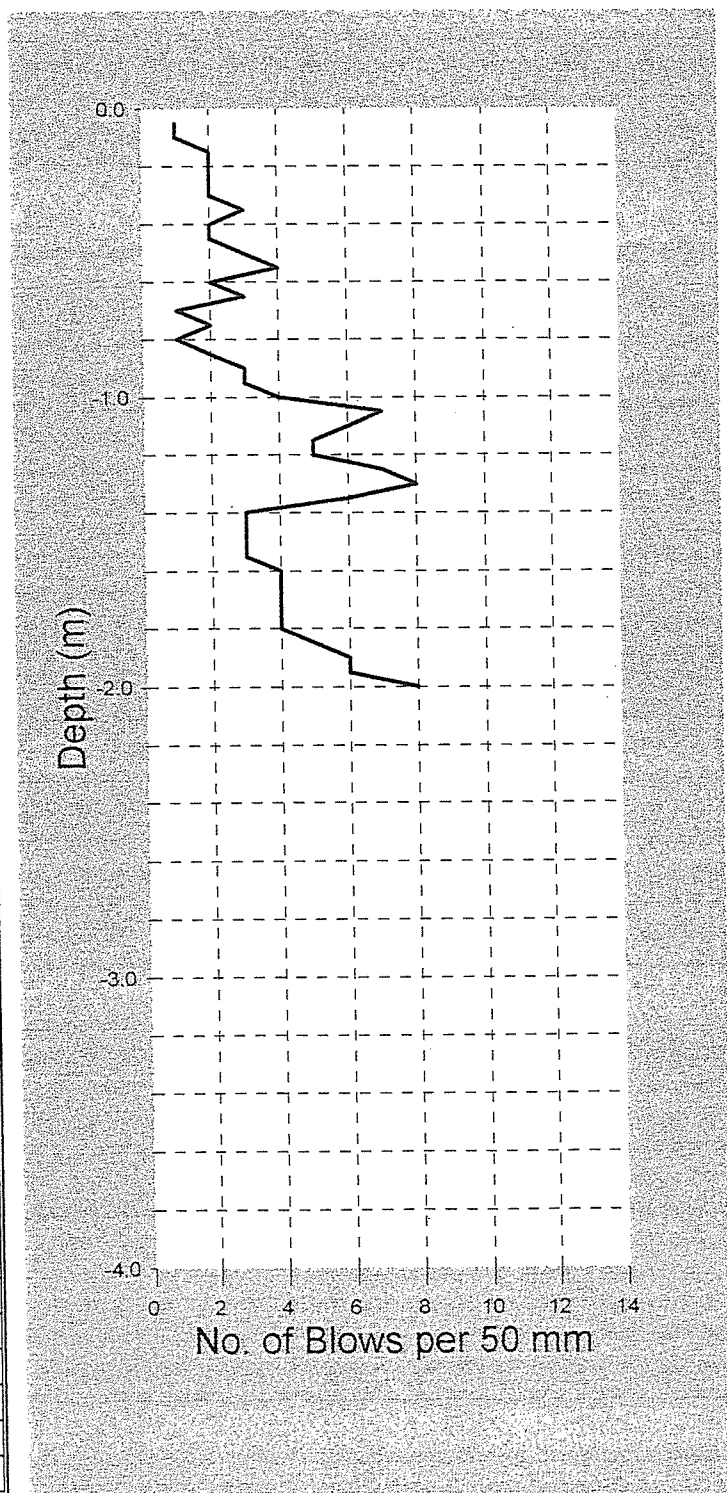
Location Proposed House Site - Refer Figure 1

Ground Surface RL:

Depth from Ground RL to Excavated Surface:

mm DRIVEN	No. of BLOWS
50	1
100	1
150	2
200	2
250	2
300	2
350	3
400	2
450	2
500	3
550	4
600	2
650	3
700	1
750	2
800	1
850	2
900	3
950	3
1000	4
1050	7
1100	6
1150	5
1200	5
1250	7
1300	8
1350	6
1400	3
1450	3
1500	3
1550	3
1600	4
1650	4
1700	4
1750	4
1800	4
1850	5
1900	6
1950	6
2000	8

mm DRIVEN	No. of BLOWS
2050	
2100	
2150	
2200	
2250	
2300	
2350	
2400	
2450	
2500	
2550	
2600	
2650	
2700	
2750	
2800	
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3500	
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3600	
3650	
3700	
3750	
3800	
3850	
3900	
3950	
4000	



Test Method Used : NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer



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ENVIRONMENTAL &
ENGINEERING CONSULTANTS

ENGINEERING LOG TERMINOLOGY

SHEET 1 of 2

DRILLING OR EXCAVATION

WATER	CORE RECOVERY	METHOD/CASING
 Water level on date shown  Water Inflow  Water Outflow	Core recovered expressed as percentage of the length of the core run	Shows drilling method and depth of casing Common types: OB - open barrel W - wash H03 - HQ triple tube coring PQ3 - PQ triple tube coring

SAMPLE TYPE	GRAPHIC LOG	TESTS
(The length of the sample is indicated by the length of symbol)  OPEN BARREL  DOUBLE OR TRIPLE TUBE  STANDARD PENETRATION TEST  LARGE DIA. THIN WALLED TUBE  SMALL DIA. THIN WALLED TUBE  BULK SAMPLE	The graphic log shows soil and rock substances, significant defects, and core loss. Soil and rock substances represented clear contrasting symbols consistent for each project. TYPICAL SYMBOLS:  ORGANIC MATERIAL  CLAY  SILT  SAND  GRAVEL	N=22 SPT uncorrected blow count for 300mm • 75kPa Undrained shear strength as measured by field vane  Pressuremeter Test * Laboratory test(s) carried out: Common types: LV - Laboratory vane AL - Atterburg limits UU - Undrained triaxial PSD - Particle size C' σ' - Effective stress CONS - Consolidation DS - Direct Shear COMP - Compaction UN - Unconfined Compression IS - Point Load
	 MUDSTONE  SILTSTONE  SANDSTONE  VOLCANIC ROCK  NO CORE	

SOIL DESCRIPTIONS

CLASSIFICATION SYMBOL

Based on USBR Unified Soil Classification System Visual Method for field identification. Classification symbols based on Laboratory Method may differ.

Soil and rock descriptions generally follow the "Guidelines for the field descriptions of Soils and Rocks in Engineering Use" by the NZ Geomechanics Society (1985). Particular in-house abbreviations are given below.

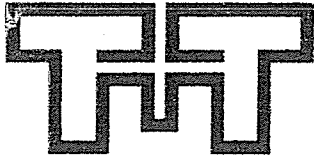
MOISTURE CONTENT	UNDRAINED SHEAR STRENGTH	RELATIVE DENSITY
D - Dry, looks and feels dry M - Moist, no free water on hand when remoulding W - Wet, free water on hand when remoulding Moisture content may be compared to the plastic limit (PL) eg M > PL = moist, moisture content greater than the plastic limit	VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	Cu (kPa) <10 10 to 25 25 to 50 50 to 100 100 to 200 >200 SPT - Uncorrected VL Very Loose 0 to 4 L Loose 4 to 10 MD Medium Dense 10 to 30 D Dense 30 to 50 VD Very Dense >50

ROCK DESCRIPTIONS

WEATHERING	FIELD STRENGTH	UCS (MPa)	Point Load Index (MPa)
UW Unweathered	R0 Extremely Weak	0.25-1	N/A
SW Slightly Weathered	R1 Very Weak	1 to 5	N/A
MW Moderately Weathered	R2 Weak	5 to 25	N/A
HW Highly Weathered	R3 Moderately Strong	25 to 50	1-2
CW Completely/Extr. Weathered	R4 Strong	50 to 100	2-4
RW Residual Soil	R5 Very Strong	100 to 250	4-10
	R6 Extremely Strong	>250	

P.T.O.

985135 - 21 Douglas / 209 Annesbrook



TONKIN & TAYLOR LTD. ENVIRONMENTAL & ENGINEERING CONSULTANTS

109 FEATHERSTON STREET WELLINGTON NEW ZEALAND

PO BOX 12 152 WELLINGTON NEW ZEALAND

PH 64-4-472 6997 FAX 64-4-472 6977

The Chief Executive Officer
Nelson City Council
PO Box 645
NELSON

Attention: Mr J Rudhall

Dear Sir

DPO	
D-ley	
22 APR 1998	
NELSON CITY COUNCIL	File: Site file

Our Ref.: 81041
21 April 1998

CERTIFICATE - PROPOSED BUILDING SITE
LOT 1 OF PROPOSED SUBDIVISION OF PART LOT 5 DP 5476,
TAHUNA, NELSON

This certificate defines an area suitable for the erection of a dwelling and the geotechnical conditions which should be applied to any development on the site.

We have carried out an investigation in accordance with sound engineering principles and practice on the above property. The soils investigation on which this certificate is based on are documented in our letter report "Lot 1 of Proposed Subdivision of Part Lot 5 DP 5476, Tahuna, Nelson, Geotechnical Investigations" Ref: 81041, dated 21 April 1998. This certificate should be read in conjunction with the report.

It is our professional opinion not to be construed as a guarantee that there is a building site on proposed Lot 1, as indicated on Figure 1 of our report, which is suitable for the erection of a residential dwelling subject to the conditions set out below.

1. Foundations

Foundations should be taken through loose fill materials, the colluvium and the residually weathered siltstone to derive support from the dense, highly or less weathered siltstone at depth. Investigations indicate that founding depth is variable across the site, but will be range from 0.9 to 1.8m below the existing ground surface within the building envelope.

2. Cut Slopes.

Unsupported cut slopes can be excavated above the RL 27m contour within the following limits:



	Recommended max. Unsupported slope angle
Cuts less than 1m in height	45° (1H: 1V)
Cuts 1 to 2m in height	26° (2 H: 1 V)
Cuts 2m to 4m in height	Top 2m section cut at 26°, Bottom 2m section at 36° (1.5H:1V)
Cuts greater than 4m in height	Requires specific design

Once an earthworks plan has been developed we should review it. No earthworks should be carried out until the review is completed.

A stormwater cutoff drain shall be installed along the top of any cut slope greater than 2m in height.

3. Filling

Fill should not be placed on ground sloping at greater than 26° unless designed by a registered engineer experienced in soil mechanics and slope stability. No fill should be placed up slope of the crib wall within a line drawn at 45° from the foot of the crib wall. Elsewhere, any filling in excess of 1m in height should be designed by a registered engineer experienced in soil mechanics and soil stability.

4. Small Slip.

The loose soils within the existing small slip shown on Figure 1 should be removed above the RL 25m contour to a depth of 0.8m and this section of slope should be re-graded to a maximum slope angle of 26°.

5. Stormwater

All stormwater from roof and paved areas shall be collected and piped to the Council's reticulation system.

6. Vegetation

Vegetation generally enhances the stability of slopes. Site clearance should therefore be kept to a minimum and cleared areas should be planted as soon as possible.

7. Foundation Investigation.

This certificate does not remove the need for inspection and design of foundations that would normally ensue in natural ground as required in NZS3604:1990 "Code of Practice for Light Timber Buildings Not Requiring Specific Design"

TONKIN & TAYLOR LTD
Nelson City Council, Nelson

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Our Ref: 81041
21 April 1998

This certificate is furnished to the Nelson City Council alone. It is acknowledged that the Nelson City Council is entitled to provide information contained in this certificate pursuant to Section 31 of the Building Act 1992 and Section 44A of the Local Government Official Information and Meeting Act 1987.

Yours faithfully
TONKIN & TAYLOR LTD

A handwritten signature in dark ink, appearing to read 'Graham Wallace', is written over the printed name.

Graham Wallace
Registered Engineer

Prepared by Mark Foley
Reviewed by Gary Smith

**TONKIN & TAYLOR LTD. ENVIRONMENTAL & ENGINEERING CONSULTANTS**

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☐ CHRISTCHURCH PO BOX 13 055 155 KILMORE STREET PH 64-3-365 3703 FAX 64-3-365 3742
☐ WELLINGTON PO BOX 12 152 109 FEATHERSTON STREET PH 64-4-472 6997 FAX 64-4-472 6977
☐ WHANGAREI PO BOX 1261 17 RUST AVE PH 64-9-438 9055 FAX 64-9-438 7825

DOCUMENT TRANSFER RECORDTO: Nelson City CouncilADDRESS: 3ATTENTION: John RudhallJOB NO: 81041

YOUR REF:

CONTRACT:

DATE: 22/4/98

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☐ LETTERS☐ PHOTOS☒ REPORTS☐ PRINTS/TRANSPARENCIES☐ DISKETTES☐ SPECIFICATIONS☐ SCHEDULES☐ CALCULATIONS

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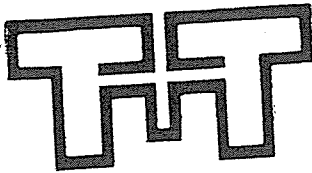
☐ OUR MESSENGER☐ YOUR MESSENGER☐ MAIL☐ AIR FREIGHT☐ RAIL☐ BUS☐ COURIER☐ OTHER

DWG or REF NO: REV: COPIES: DESCRIPTION:

81041		1	Certificate Proposed building Site Lot 1 of Proposed subdivision of Part Lot 5 DP 5676 Tahurangi Nelson 22 April 1998
81041		1	Copy Report Re Lot 1 of Proposed Subdiv of Part Lot 5 DP 5676 Tahurangi Nelson

REMARKS:

SIGNED FOR TONKIN & TAYLOR LTD.



TONKIN & TAYLOR LTD. ENVIRONMENTAL & ENGINEERING CONSULTANTS
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PO BOX 13055 CHRISTCHURCH NEW ZEALAND
PH 64-3-365 3709 FAX 64-3-365 3742
57466337

985135 - 109 Annesbrook Dr.

Our Ref.: 81041
20 July 1998

The Chief Executive Officer
Nelson City Council
PO Box 645
NELSON

Attention: Mr Don Bellagh

Dear Sir

**109 Annesbrook Drive, Tahuna, Nelson
Geotechnical Supervision of Earthworks**

I confirm that Mr S Luscombe has requested Tonkin and Taylor Ltd to carry out Geotechnical Supervision of the proposed earthworks and retaining wall construction at 109 Annesbrook Drive.

Our proposed schedule of site visits is as follows:

1) Supervision Phase 1

- 1) Following topsoil stripping to inspect driveway foundations.
- 2) With construction bench at RL 29.5
- 3) On completion of excavation to RL 28.3 and after five pilot pole holes have been drilled to full depth and a trench has been excavated to RL 25.5 within area of garage box cut.

We will inspect the soil conditions beneath the house foundations but understand that the inspection and certification of the foundation structural elements is to be carried out by others)

2) Supervision Phase 2

- 1) On completion of box cut excavation prior to tilt slab erection.
- 2) Inspection of structural details in walls and strip footing.

3) Supervision Phase 3

- 1) With excavation level at RL 26
- 2) On completion of driveway excavation and after drilling of five pilot pole holes.
- 3) On completion of fill placement for driveway ramp and construction of retaining walls.

4) Producer Statement



TONKIN & TAYLOR LTD
Nelson City Council, Nelson

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Our Ref: 81041
21 July 1998

On satisfactory completion of the earthworks we will prepare a producer statement - construction (review).

Yours faithfully
TONKIN & TAYLOR LTD


Graham Wallace
Registered Engineer