

REPORT

HUTT CITY COUNCIL

Preliminary Geotechnical
Suitability Assessment

60 Eastern Hutt Road



Tonkin & Taylor

ENVIRONMENTAL AND ENGINEERING CONSULTANTS



REPORT

HUTT CITY COUNCIL

**Preliminary Geotechnical Suitability
Assessment**

60 Eastern Hutt Road

**Report prepared for:
HUTT CITY COUNCIL**

**Report prepared by:
TONKIN & TAYLOR LTD**

**Distribution:
HUTT CITY COUNCIL
TONKIN & TAYLOR LTD (FILE)**

2 copies

1 copy

December 2010

T&T Ref: 85233

Table of contents

1	Introduction	2
1.1	General	2
1.2	Scope of Work	2
1.2.1	Desk top study	2
1.2.2	Site Investigation	2
1.2.3	Reporting and analysis	2
2	Geotechnical Assessment	2
2.1	Site Description	2
2.2	Site Geology and Soil Profile	3
2.3	Geotechnical Constraints to Development	4
2.3.1	Instability of Eastern Hill Slopes	4
2.3.2	Settlement/Bearing Capacity	4
2.3.3	Site Excavation/Filling	5
2.4	Site Geotechnical Summary Information	6
3	Conclusion	6
4	Applicability	7

Appendix A: Test Pit Logs

Appendix B: Scala penetrometer probes

Executive Summary

Hutt City Council has engaged Tonkin & Taylor Ltd to provide recommendations on the suitability of a portion of the land at 60 Eastern Hutt Road (the Site refer Figure 1) for future development as a “General Business Activity Area”.

With further site specific investigation, design and construction control and subject to the remedial work outlined in the table below we consider that the Site could be suitably developed to meet the requirements of the Building Code and the Resource Management Act.

Area reference (refer Figure 5)	Geotechnical Hazard/ Constraint Identified	Appropriate Remedial Solutions
A	Inundation of land at the base of the eastern hill slopes, refer Section 2.3.1.1	Either: a) 10m “No build” zone along the base of the hill slopes and provisional allowance for a catch fence. or b) Suitable design of buildings to withstand a 450yr return period seismic event.
B	Debris flows discharging from gullies, refer section 2.3.1.2	Creation of 6 to 8m wide “no build” zones and construction of an overland flow path at a level 500mm below building platforms
C	Settlement of fill/soft sediments, refer section 2.3.2	Removal of shallow surface layers of compressible material And (if deep layers of fill or compressible organic deposits are identified) either: a) Construction of piles extending to rock . or b) Design of buildings to tolerate expected magnitude of settlement
General Site	Earthworks to create flat building platforms	<ul style="list-style-type: none"> • Retaining of all excavations steeper than 30 degrees in soils and 45 degrees in highly weathered rock. • Excavation of unsuitable surface soils and construction of specifically engineered fill platforms with geogrid reinforcing

1 Introduction

1.1 General

Hutt City Council (HCC) is currently seeking to obtain a District Plan change for a portion of the land at 60 Eastern Hutt Road (the Site, refer Figure 1). This plan change would classify the Site as a “General Business Activity Area”. We understand that HCC may then consider creating two new Lots in the future. One Lot being the Site identified on Figure 1 and the second Lot being the balance of the land at 60 Eastern Hutt Rd (Pt Lot 3 DP 83794) which would be retained by HCC as Recreation Reserve.

We understand that approval has been granted by the Department of Conservation for revocation of the existing Reserve Status over the extent of the Site shown on Figure 1 attached.

HCC has engaged Tonkin & Taylor Ltd (T&T) to undertake a geotechnical investigation and provide recommendations for the suitability of the Site for future development as a “General Business Activity Area”.

The purpose of this geotechnical report is to provide HCC with an understanding of the geotechnical constraints and their implications on future development of the Site.

The conditions of our engagement are detailed in our proposal dated May 2010.

1.2 Scope of Work

The scope of work for T&T’s geotechnical assessment includes:

1.2.1 Desk top study

- Review of Cuttriss Consultants Ltd report on the Site, dated 10 December 2007
- Review of historical information (aerial photographs, HCC archive records, SLUR register)
- Review of Geological plans and previous T&T investigations in the area

1.2.2 Site Investigation

- Excavation of investigation (test) pits, refer Fig 1 for test pit locations
- Geological mapping and geomorphic assessment including visual inspection of the existing stream channels and the surrounding slopes.
- Scala penetrometer probes to determine depth to rock and density of surface soils, refer Figure 1 for locations.

1.2.3 Reporting and analysis

- Preparation of a plan showing investigation locations
- Analysis and interpretation
- Preparation of this summary report

2 Geotechnical Assessment

2.1 Site Description

The Site is situated within the Hutt Valley on a west facing, gentle to moderately steep (5 to 20 degree) slope at the toe of the eastern hills. The Site lies at the convergence of two steeply incised gullies. Both gullies hold active watercourses that discharge into existing culverts at the western

edge of the Site, refer Figure 1. The slope gradient steepens significantly at the eastern edge of the Site and beyond (25 to 30 degrees).

Historic aerial photographs indicate some ground modification (slope re-profiling and realignment of stream channels) prior to 1951, refer Figure 2. It is likely that some excavation and filling will have been undertaken over the western portion of the Site during construction of the Eastern Hutt Road and the culverts under the road.

The Site is currently vegetated in grass, gorse, scrub and regenerating native bush. An old farm fence was located running alongside the southern stream gully. Historical aerial photographs indicate the Site was cleared of vegetation between 1950 and 1965, refer Figures 3 and 4.

The Site is not registered on the Greater Wellington Regional Council (GWRC) Selected Land Use Register (SLUR). The SLUR is based on records held by the GWRC regarding contaminated materials and uncontrolled filling.

The extent of the proposed Site is shown on Figure 1 attached.

2.2 Site Geology and Soil Profile

The Site geotechnical investigation comprised excavation of 6 investigation pits to approximately 3m depth, geological mapping, 5 Scala penetrometer tests and a geomorphic assessment of the Site. The extent of the investigation was limited by the steep terrain and the dense vegetation. Geological mapping of soil/rock exposures was limited to the one cut slope on the adjacent property, 80-82 Eastern Hutt Road.

Investigation logs for test pits TP1 to TP6 are presented in Appendix A and their locations are shown on Figure 1.

The geology of the Site and surrounding hill slopes comprises a weathered profile of Greywacke Sandstone and Siltstone overlain by recent sediments and some topsoil. The Greywacke rock is typically completely weathered (CW) to a residual soil near the surface, decreasing in weathering with depth. The weathering profile was observed to be relatively deep at some locations on the Site. At test pit 3 (TP3) CW, very stiff soil was observed over the full depth of the test pit (3.2m). Completely weathered rock was observed along the rear cutting exposure behind the unit at 80-82 Eastern Hutt Road.

Highly weathered, weak to moderately strong rock was observed in testpit TP4 at 1.9m depth. Highly weathered rock was also likely to be encountered in the Scala penetrometer probes at SC2 and SC4 at 1.5m to 2.5m depth respectively.

Colluvial soils of variable consistency and thickness were encountered across the surface of the Site. The colluvial soils are thickest at the existing stream channels at the mouth of the gullies, and at the western margin of the Site. At the gully mouths, sediment has accumulated as a result of colluvial (fan type) deposition. This material is typically rich in silts and organics, and variable in strength from firm to very stiff consistency. A thick colluvium/alluvium unit in testpit TP4 is likely to have derived from slope instability in the gully above.

A thin layer of fill material was encountered in test pit TP4 at the western edge of the Site adjacent to Eastern Hutt road. This material was an organic rich, silty soil with traces of refuse material (glass). This filling is likely to be limited in extent on the western part of the Site, refer Figure 5.

Groundwater was identified in most of the pits. The steep (30 degree) hill slopes to the south of the Site are likely to comprise an approximately 1m to 2m thick layer of colluvium and residual soil overlying a highly to completely weathered greywacke rock (based on Scala penetrometer SC4).

2.3 Geotechnical Constraints to Development

Geotechnical constraints to potential development of the Site for a “General Business Activity Area” are identified below. Where applicable, the extent and location of the geotechnical constraints are identified in plan on Figure 5.

2.3.1 Instability of Eastern Hill Slopes

During an extreme event (significant rainfall event or large seismic event) there is a possibility that a shallow landslide may be triggered in the 1 to 2m thick colluvium (slope wash) and weak residual soil material overlying the steep weathered rock slopes to the east of the Site.

This is likely to result in two distinct geotechnical hazards:

- Direct inundation of land at the base of the hill slopes, and
- Concentrated debris flows from the steep gullies (comprising re-mobilised landslip debris)

2.3.1.1 Mitigation of direct landslide inundation

To mitigate this hazard a “no build” zone at the base of the hill slope is likely to be required. Depending on the locations and types of buildings proposed, the “no build” zone could be reduced by constructing a catch fence at the base of the slope or designing and constructing buildings to withstand impact from a significant (450 yr return period) seismic induced landslide.

2.3.1.2 Mitigation of debris flows

The extent of the Site at risk from these events will depend on the final levels and topography of any development. Potential debris flow events can be effectively managed (controlled) by creating overland flow paths through the Site to carry the debris when culverts and stormwater pipes become blocked. Building platforms will need to be approximately 500mm above the invert of designated overland flow paths. An economic way of achieving this would be to orientate the access roads perpendicular to the slope contours (where possible) and at a level below the building platforms such that they create debris chutes through the Site.

It would be necessary to create and maintain 6 to 8m wide “no build” zones through the Site for the overland flow paths. The approximate location of these no build zones is indicated on Figure 5. The final alignment of the overland flow paths could be modified to fit around the proposed development.

The two hazards described above are associated with an extreme (very infrequent) event, so the risk to any development is considered to be low. To put these hazards in context it should be appreciated that similar landslide or flood risk is common to many Sites in the Hutt Valley.

Once the proposed building locations are confirmed a site specific assessment of the likelihood and magnitude of landslides and the potential run out zone should be assessed.

2.3.2 Settlement/Bearing Capacity

Over the Site, buildings and sealed surfaces would likely be founded in stiff residual soil, completely weathered rock or in dense (silty, gravel) colluvial deposits. All of these units are likely to be suitable for shallow foundations subject to some trimming and minor under cutting of weak surface layers. Initial assessment indicates that Ultimate Geotechnical Bearing Capacities of 300kPa could be expected.

Some shallow fill material has been identified in the west of the Site and some organic silt deposits have been identified within the stream channels/gullies. Construction of foundations in these materials may result in excessive settlement as the layers consolidate/compress under applied loads from buildings and roads. All of the shallow organic and fill material should be removed prior to construction of buildings, roads or fill embankments.

If deeper layers of fill, organics or compressible alluvial deposits are encountered, buildings would need to be piled to stiff underlying soils or rock. For construction of any large fills, a settlement assessment will be required to confirm the magnitude of expected settlements and the time for these settlements to occur. Settlement monitoring of deep fill platforms may be required to confirm when it is suitable to start construction of rigid foundations or sealed surfaces.

A site specific geotechnical investigation will be required to confirm the suitability of the subgrade at all proposed building locations.

2.3.3 Site Excavation/Filling

Earthworks will be required to create level building platforms across the Site. It will be necessary to excavate and fill on the upslope and downslope side of building platforms respectively. All excavation steeper than 30 degrees for stiff insitu soil and 45 degrees for highly weathered rock will need to be supported by specifically engineered retaining walls. Fill platforms will need to be founded on firm residual soils or dense, silty gravel colluvial deposits. The fill material will need to be placed, compacted and monitored in accordance with NZS 4431. All fill slopes steeper than 2H:1V will need to be specifically designed and supported with geogrid layers.

Figure 5 shows areas of the Site loosely classified on the basis of the different geotechnical constraints identified.

2.4 Site Geotechnical Summary Information

Table 1: Summary information for the Site at 60 Eastern Hutt Road

Area reference (refer Figure 5)	Geotechnical Hazard/ Constraint Identified	Appropriate Remedial Solutions
A	Inundation of land at the base of the eastern hill slopes, refer Section 2.3.1.1	Either: c) 10m "No build" zone along the base of the hill slopes and provisional allowance for a catch fence. or d) Suitable design of buildings to withstand a 450yr return period seismic event.
B	Debris flows discharging from gullies, refer section 2.3.1.2	Creation of 6 to 8m wide "no build" zones and construction of an overland flow path at a level 500mm below building platforms
C	Settlement of fill/soft sediments, refer section 2.3.2	Removal of shallow surface layers of compressible material And (if deep layers of fill or compressible organic deposits are identified) either: c) Construction of piles extending to rock . or d) Design of buildings to tolerate expected magnitude of settlement
General Site	Earthworks to create flat building platforms	<ul style="list-style-type: none"> • Retaining of all excavations steeper than 30 degrees in soils and 45 degrees in highly weathered rock. • Excavation of unsuitable surface soils and construction of specifically engineered fill platforms with geogrid reinforcing

3 Conclusion

With further (site specific) investigation, design and construction control as recommended in this report and subject to the remedial work outlined in Sections 2.3 & 2.4, we consider that the Site could be suitably developed for use in the General Business Activity Area to meet the requirements of the Building Code and the Resource Management Act.

4 Applicability

The soil profile and depth to rock over this Site is inferred from the 6 excavated investigation pits, 5 Scala penetrometer probes and a walkover of the Site and surrounding hill slopes. It must be appreciated that the subsurface conditions could vary away from the test locations. Site specific geotechnical investigations will be required once the location and extent of any proposed development have been confirmed.

This report has been prepared for the benefit of Hutt City Council 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:

Authorised for Tonkin & Taylor by:



.....

Andrew Kennedy

Geotechnical Engineer



.....

Bruce Symmans

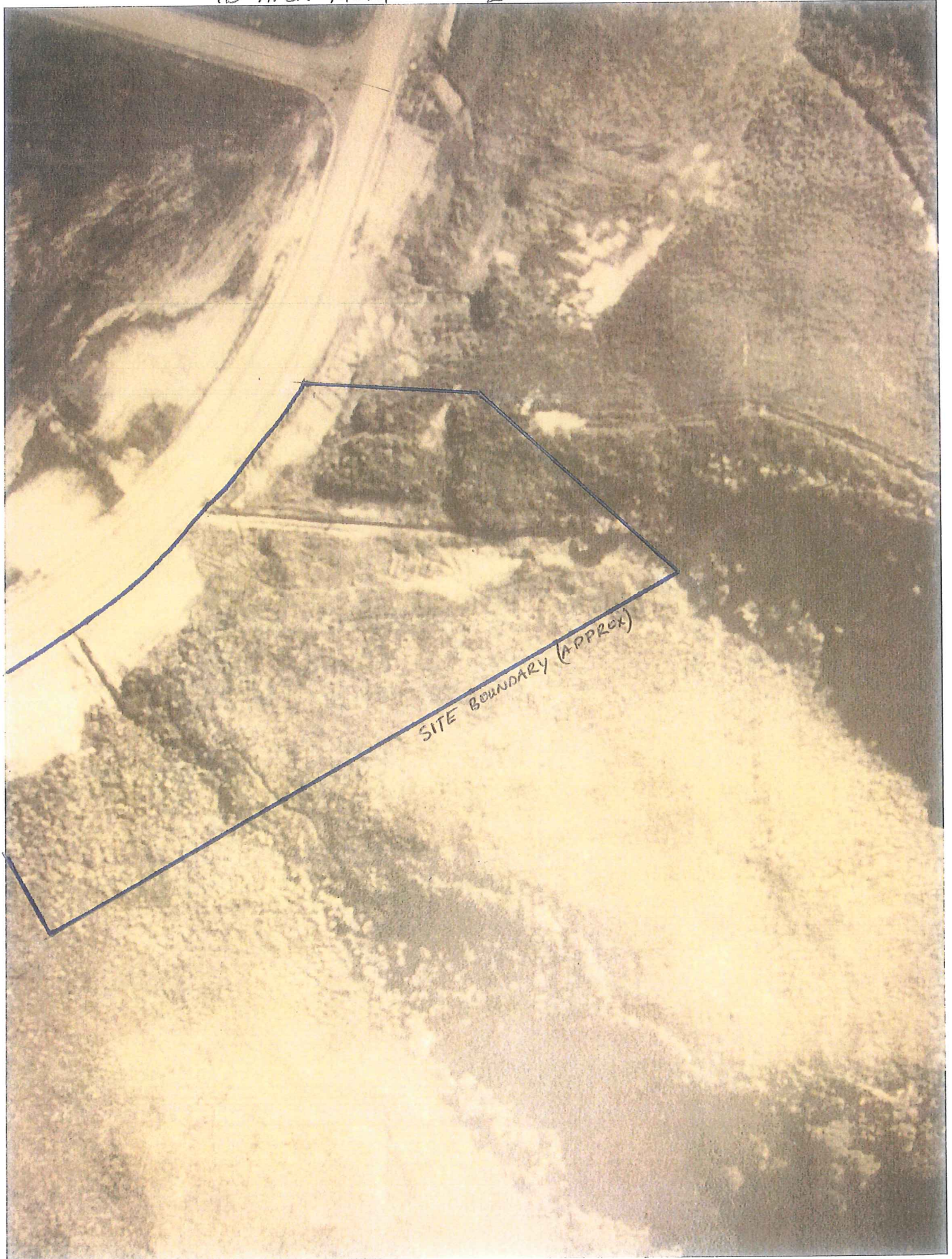
Senior Geotechnical Engineer

aik P:\85233\WorkingMaterial\2010 06 21 FINAL Geotech report_revised.doc



Figure 1 -
The Site

FIGURE 2: 1951 SN 570 HISTORICAL AERIAL PHOTOGRAPH
ID Arch 74074 LOWER HUTT CITY COUNCIL



NOT TO SCALE

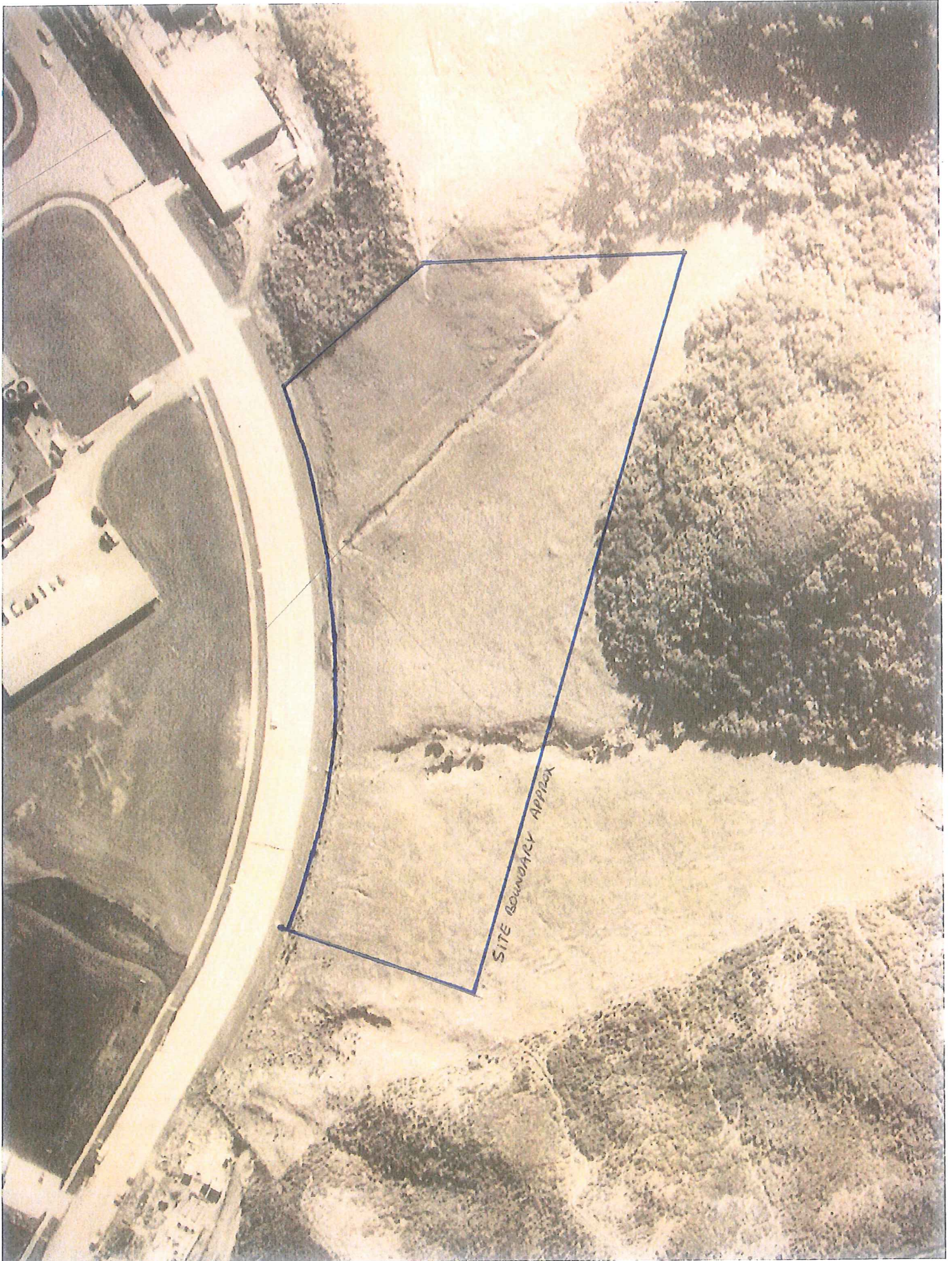


DATE: 7-5-51
SERIAL NO: 60157

FIGURE 3

1965 SN 2001
ID ARCH 74080

HISTORICAL AERIAL PHOTOGRAPH
LOWER HUTT CITY COUNCIL



NOT TO SCALE

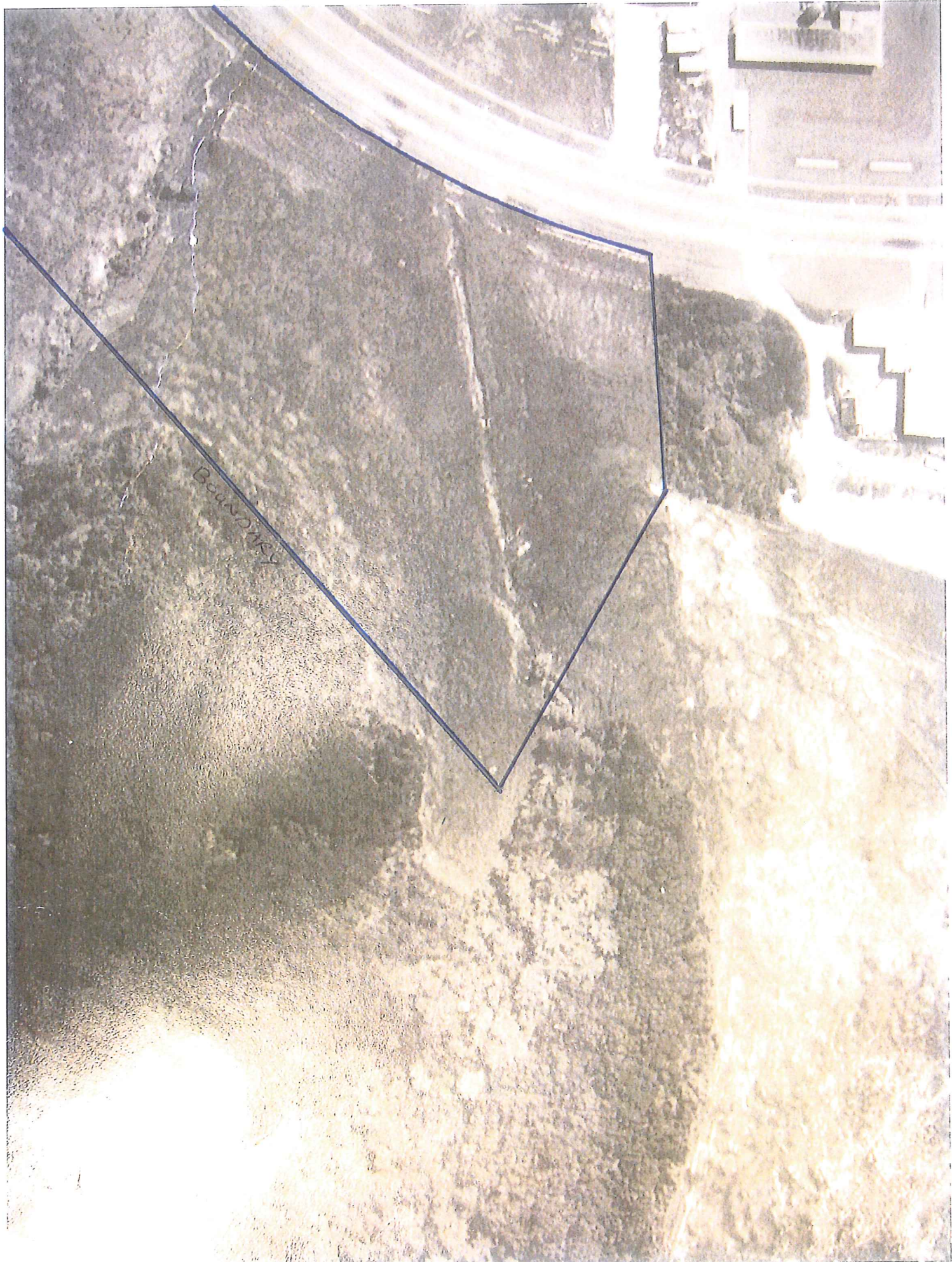


DATE 1965

FIGURE 4

1972 SN 4847
ID ARCH 74090

HISTORICAL AERIAL PHOTOGRAPH
LOWER HUTT CITY COUNCIL



BOUNDARY

NOT TO SCALE

TAN

DATE: 18-11-72

AIR PHOTO ARCH 74090

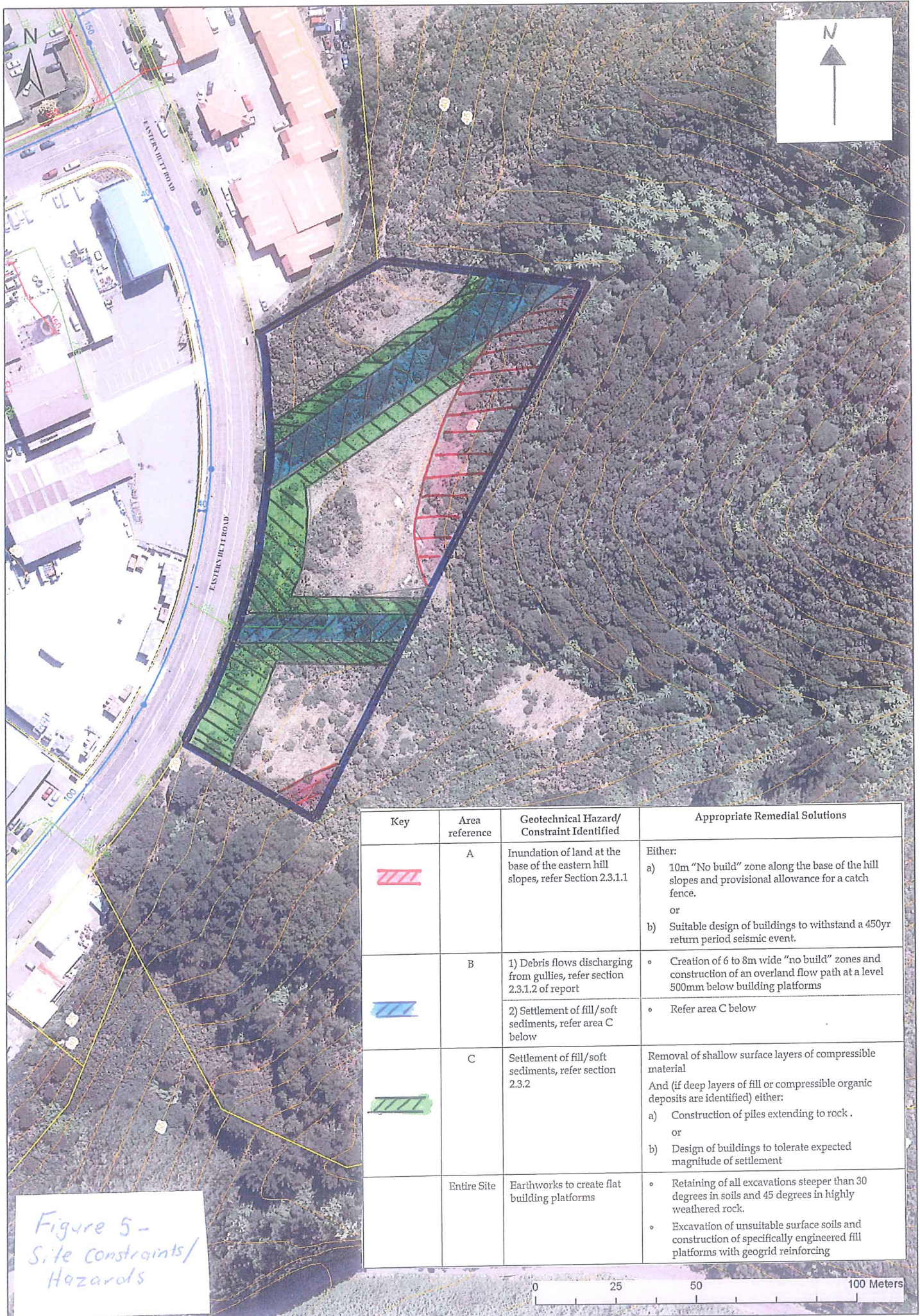



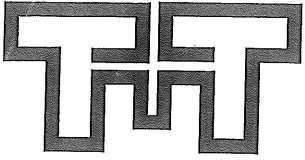


Figure 5 -
Site Constraints/
Hazards

Key	Area reference	Geotechnical Hazard/ Constraint Identified	Appropriate Remedial Solutions
	A	Inundation of land at the base of the eastern hill slopes, refer Section 2.3.1.1	Either: a) 10m "No build" zone along the base of the hill slopes and provisional allowance for a catch fence. or b) Suitable design of buildings to withstand a 450yr return period seismic event.
	B	1) Debris flows discharging from gullies, refer section 2.3.1.2 of report 2) Settlement of fill/soft sediments, refer area C below	<ul style="list-style-type: none"> o Creation of 6 to 8m wide "no build" zones and construction of an overland flow path at a level 500mm below building platforms o Refer area C below
	C	Settlement of fill/soft sediments, refer section 2.3.2	Removal of shallow surface layers of compressible material And (if deep layers of fill or compressible organic deposits are identified) either: a) Construction of piles extending to rock . or b) Design of buildings to tolerate expected magnitude of settlement
	Entire Site	Earthworks to create flat building platforms	<ul style="list-style-type: none"> o Retaining of all excavations steeper than 30 degrees in soils and 45 degrees in highly weathered rock. o Excavation of unsuitable surface soils and construction of specifically engineered fill platforms with geogrid reinforcing

0 25 50 100 Meters

Appendix A: Test Pit Logs



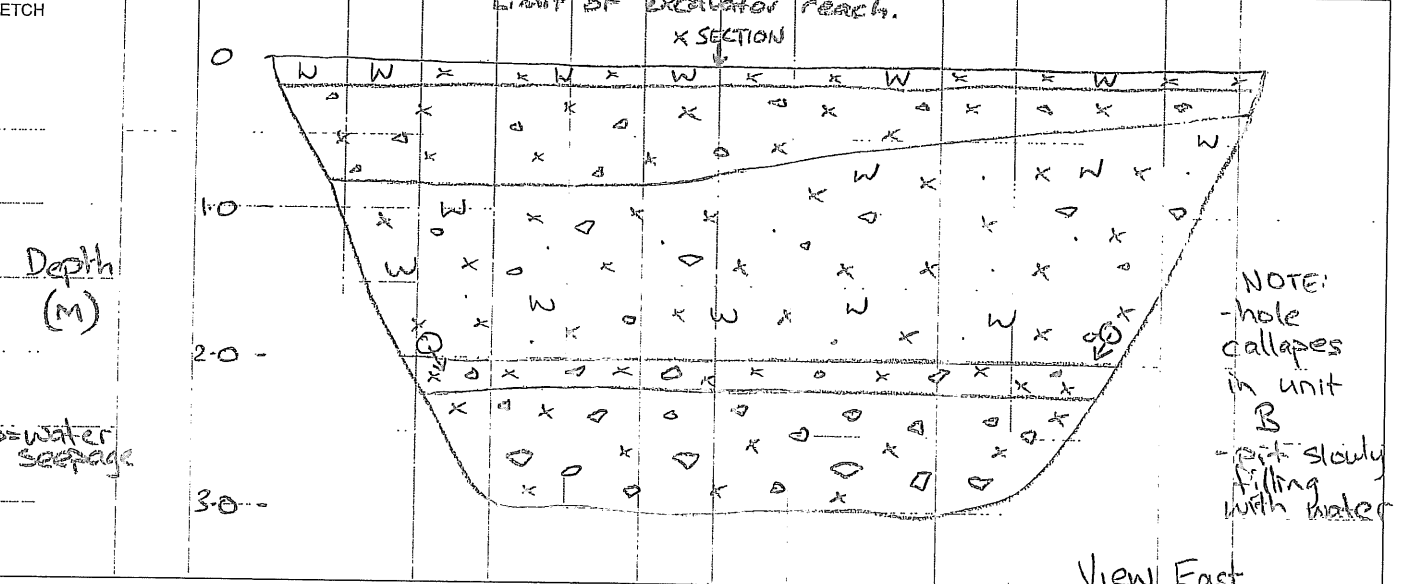
TONKIN & TAYLOR LTD.

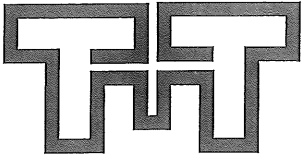
EXCAVATION LOG

EXCAVATION NO:
TP 1
SHEET 1 OF 1

PROJECT: EASTERN HULT 60 LOCATION: EASTERN HULT ROAD, 60 JOB NO: 80233
 CO-ORDINATES: REFER SITE PLAN EXPOSURE TYPE: TEST PIT HOLE STARTED: 4/06/10 am
 (FIGURE 1) EQUIPMENT: 7t excavator HOLE FINISHED: 04/06/10 am
 RL: n/a OPERATOR: JASON COLE LOGGED BY: CUSP
 DATUM: n/a EXCAVATION DIMENSIONS: n CHECKED BY: ALK 23/6/10

EXCAVATION AND TESTS:			ENGINEERING DESCRIPTION:					GEOLOGICAL:				
PENETRATION	SUPPORT	WATER	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, DEFECTS, STRUCTURE	UNIT
1 2 3							TOPSOIL <100mm layer	M	fb		Topsoil	A
				0.5		ML	SILT with some Gravel Gravels are fine to coarse grained. Angular. Brown. Trace organics.	M	St		Colluvium/ Alluvium/ sediment	B
				1.0		ML	SILT with some Gravel, minor Sand and minor organics. low to medium plasticity. Grey. Gravels are fine to coarse grained, angular. Organics comprise: sticks, branches, bark.	M	F			
				1.5			... increasing organic content.					
				2.0		ML	Gravelly SILT Moderate plasticity. Brownish Grey. Gravels are fine to coarse, angular.	M	F			
				2.5		GW	Silty GRAVEL with some Sand Gravels are fine to coarse sized, sub angular. Grey.	M				
				3.0			Testpit terminated at 3.0m. Limit of excavator reach.					





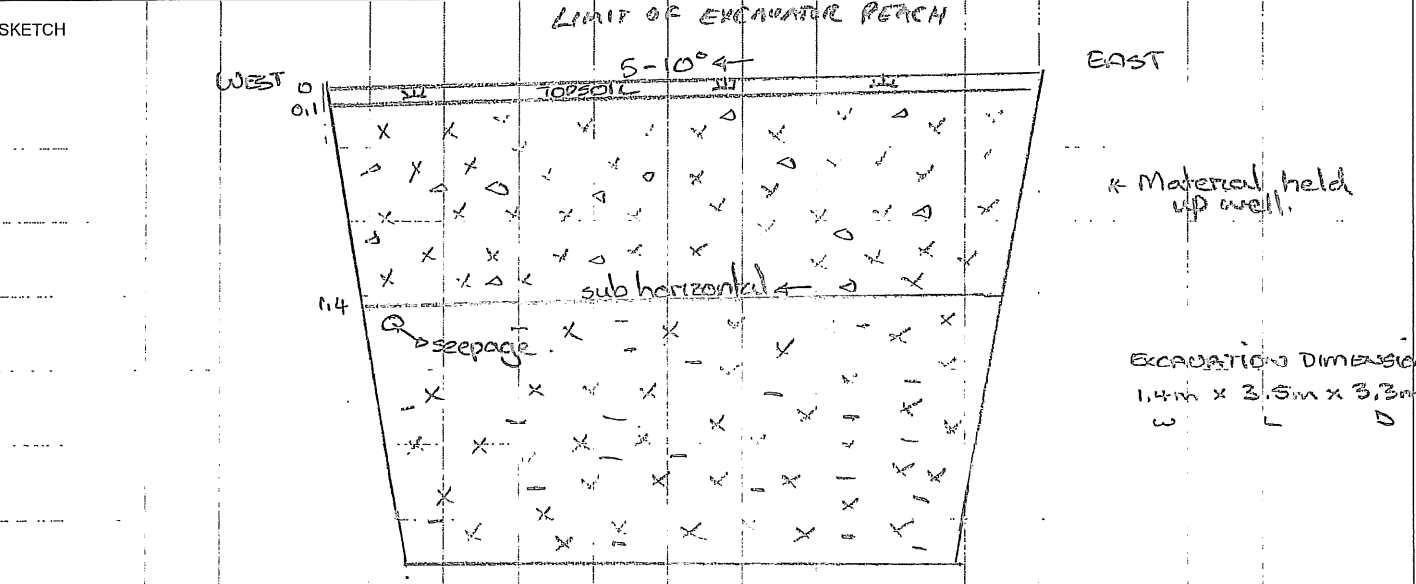
TONKIN & TAYLOR LTD.

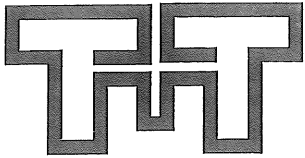
EXCAVATION LOG

EXCAVATION NO:
TP3
SHEET 1 OF 1

PROJECT: EASTERN HULLT GO LOCATION: 60 EASTERN HULLT ROAD JOB NO: 85233
 CO-ORDINATES: REFER SITE PLAN (FIGURE 1) EXPOSURE TYPE: TEST PIT HOLE STARTED: 04/06/10 am
 EQUIPMENT: OPERATOR: JASON (DIXON + DUNLOP) LOGGED BY: ARH HOLE FINISHED: 04/06/10 am
 RL: N/A EXCAVATION DIMENSIONS: CHECKED BY: ARH 23/6/10

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, DEFECTS, STRUCTURE	UNIT
123					Wx	TOPSOIL:	M	76		TOPSOIL	A
			159kPa(P) 55kPa(R) 159kPa(P) 52kPa(R) 152kPa(P) 79kPa(R) 152kPa(P) 61kPa(R)	0.5	X X X X X X	ML SILT with minor fine gravels mottled orangey brown and brown. Firm; moist, silt slightly plastic, gravels subangular	M	VSE		Residual Soil / CW Greynache Rock	C
			130/38 197kPa(P) 88kPa(R)	1.5	X X X X X X X X X	MH clayey SILT with minor gravels, material mottled orange + bluey grey, moderately plastic fine gravels typically up to medium.	M	VSE			
				2.0	X X X X X X X X X						
				2.5	X X X X X X X X X						
				3.0	X X X X X X X X X	TEST PIT TERMINATED AT 3.0M LIMIT OF EXCAVATION REACH					



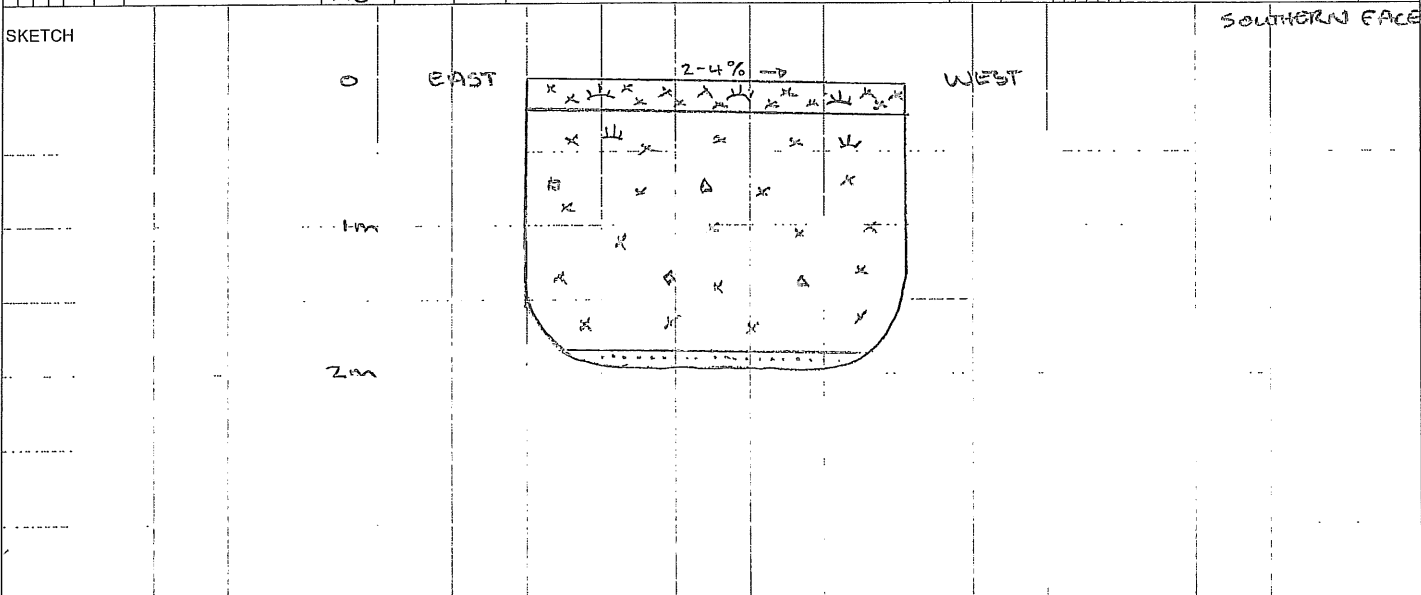


EXCAVATION LOG

EXCAVATION NO:
TPS
SHEET 1 OF 1

PROJECT: EASTERN HULT CO	LOCATION: 60 EASTERN HULT	JOB NO: 85233
CO-ORDINATES: REFER SITE PLAN (FIGURE 1)	EXPOSURE TYPE: TEST PIT	HOLE STARTED: 04/06/10 pm
RL: N/A	EQUIPMENT:	HOLE FINISHED: 04/06/10 pm
DATUM: N/A	OPERATOR: JASON - DIXON + DUNLOP	LOGGED BY: ARH
	EXCAVATION DIMENSIONS:	CHECKED BY: AM 23/6/10

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, DEFECTS, STRUCTURE	UNIT
1 2 3							Topsoil SILT with high organic content, dark brown	D	fb		Topsoil	A
			158 kPa (P) 64 kPa (R) 152 kPa (P) 70 kPa (R)	0.5	X X X	ML	SILT with minor gravel and trace organics (fibrous) stiff, low plasticity mottled orange/grey				CW Greywacke Rock/ Residual Soil	C1
			158 kPa (P) 67 kPa (R) 149 kPa (P) 30 kPa (R)	1.0	X X X			M	VSE			
			139 kPa (P) 45 kPa (R)	1.5	X X X							
				2.0	X X		SAUNDSTONE blue grey, highly weathered, stony	m	Str		HW Greywacke Rock	C2
				2.5								
				3.0								



Appendix B: Scala penetrometer probes



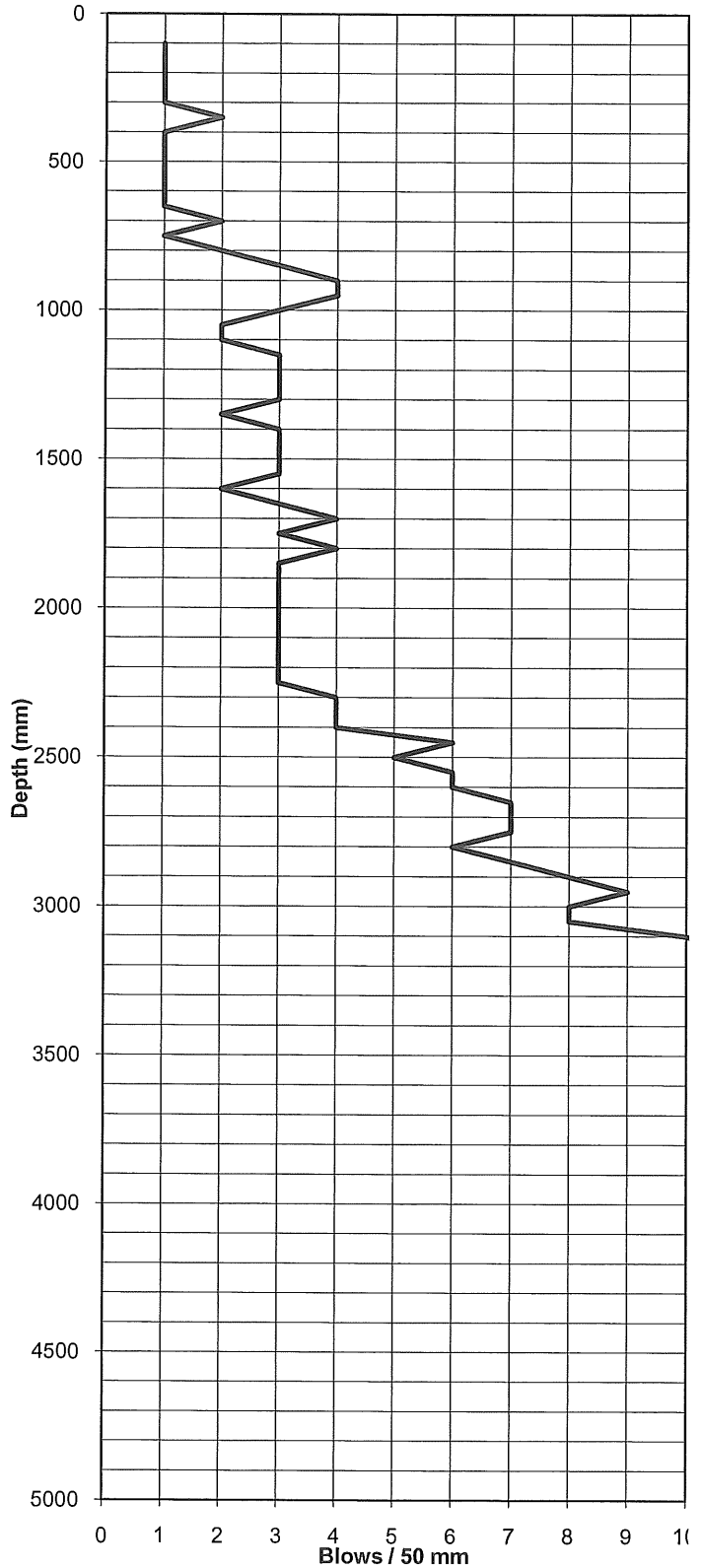
TONKIN & TAYLOR
SCALA PENETROMETER LOG

Job No: 85233
Project: EASTERNHUTT 60
Location: 60 Eastern Hutt Road, Wingate

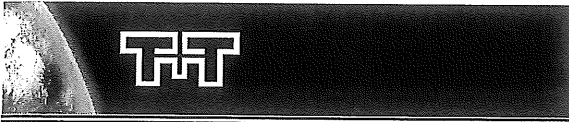
Date: 04/06/2010
Operated by: ABB
Logged by: TJMD
Checked by: *AK*

Test No.	SC-1
Sheet of	1 / 1

mm Driven	No. of Blows	mm Driven	No. of Blows
50		2550	6
100	1	2600	6
150	1	2650	7
200	1	2700	7
250	1	2750	7
300	1	2800	6
350	2	2850	7
400	1	2900	8
450	1	2950	9
500	1	3000	8
550	1	3050	8
600	1	3100	10
650	1	3150	11
700	2	3200	11
750	1	3250	
800	2	3300	Refusal
850	3	3350	
900	4	3400	
950	4	3450	
1000	3	3500	
1050	2	3550	
1100	2	3600	
1150	3	3650	
1200	3	3700	
1250	3	3750	
1300	3	3800	
1350	2	3850	
1400	3	3900	
1450	3	3950	
1500	3	4000	
1550	3	4050	
1600	2	4100	
1650	3	4150	
1700	4	4200	
1750	3	4250	
1800	4	4300	
1850	3	4350	
1900	3	4400	
1950	3	4450	
2000	3	4500	
2050	3	4550	
2100	3	4600	
2150	3	4650	
2200	3	4700	
2250	3	4750	
2300	4	4800	
2350	4	4850	
2400	4	4900	
2450	6	4950	
2500	5	5000	



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



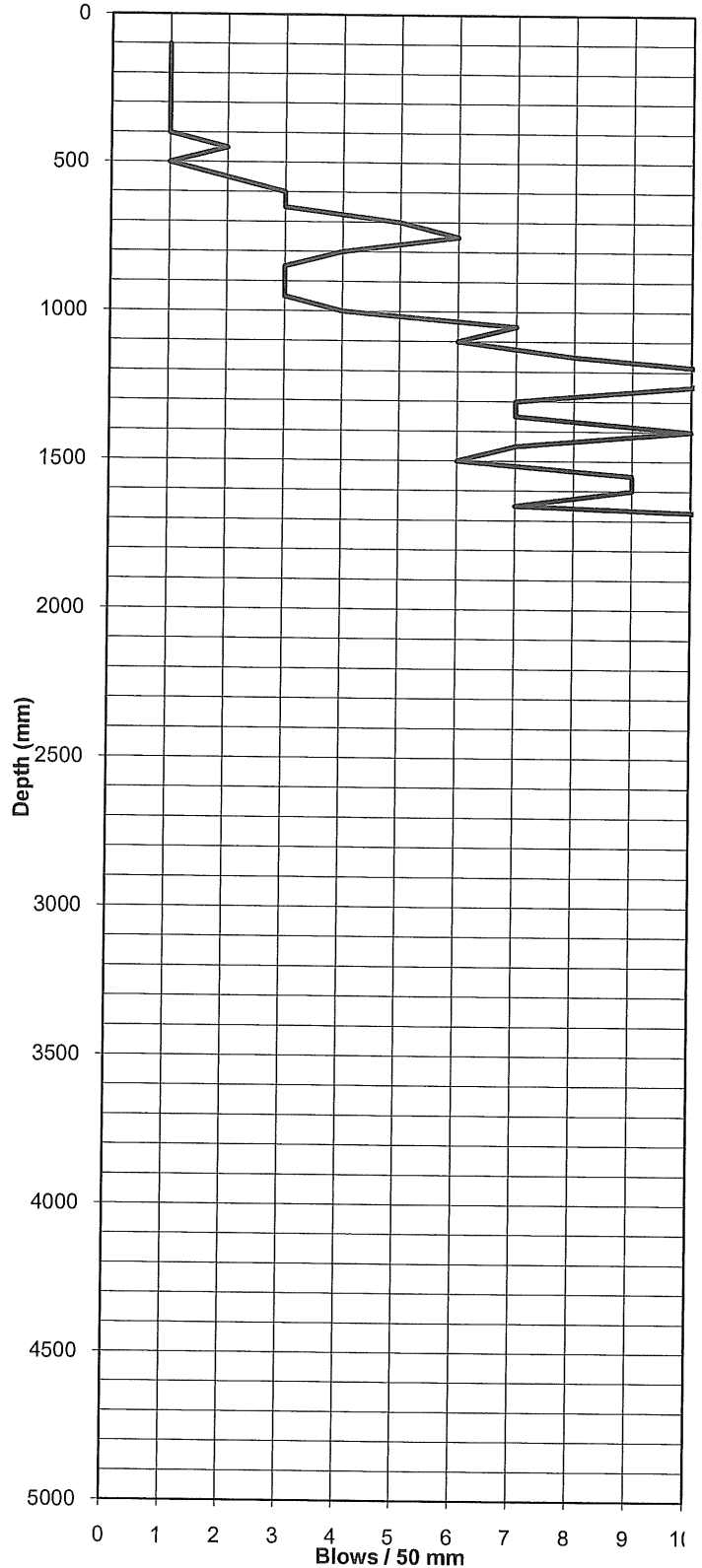
TONKIN & TAYLOR
SCALA PENETROMETER LOG

Job No: 85233
 Project: EASTERNHUTT 60
 Location: 60 Eastern Hutt Road, Wingate

Date: 04/06/2010
 Operated by: ABB
 Logged by: TJMD
 Checked by: *DM*

Test No.	SC-3
Sheet of	1 / 1

mm Driven	No. of Blows	mm Driven	No. of Blows
50		2550	
100	1	2600	
150	1	2650	
200	1	2700	
250	1	2750	
300	1	2800	
350	1	2850	
400	1	2900	
450	2	2950	
500	1	3000	
550	2	3050	
600	3	3100	
650	3	3150	
700	5	3200	
750	6	3250	
800	4	3300	
850	3	3350	
900	3	3400	
950	3	3450	
1000	4	3500	
1050	7	3550	
1100	6	3600	
1150	8	3650	
1200	11	3700	
1250	10	3750	
1300	7	3800	
1350	7	3850	
1400	10	3900	
1450	7	3950	
1500	6	4000	
1550	9	4050	
1600	9	4100	
1650	7	4150	
1700	14	4200	
1750		4250	
1800	Bouncing	4300	
1850		4350	
1900		4400	
1950		4450	
2000		4500	
2050		4550	
2100		4600	
2150		4650	
2200		4700	
2250		4750	
2300		4800	
2350		4850	
2400		4900	
2450		4950	
2500		5000	



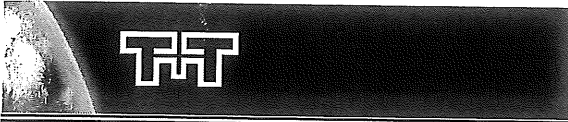
Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

EASTERNHUTT 60

T&T job No.:

85233

9/06/2010



TONKIN & TAYLOR

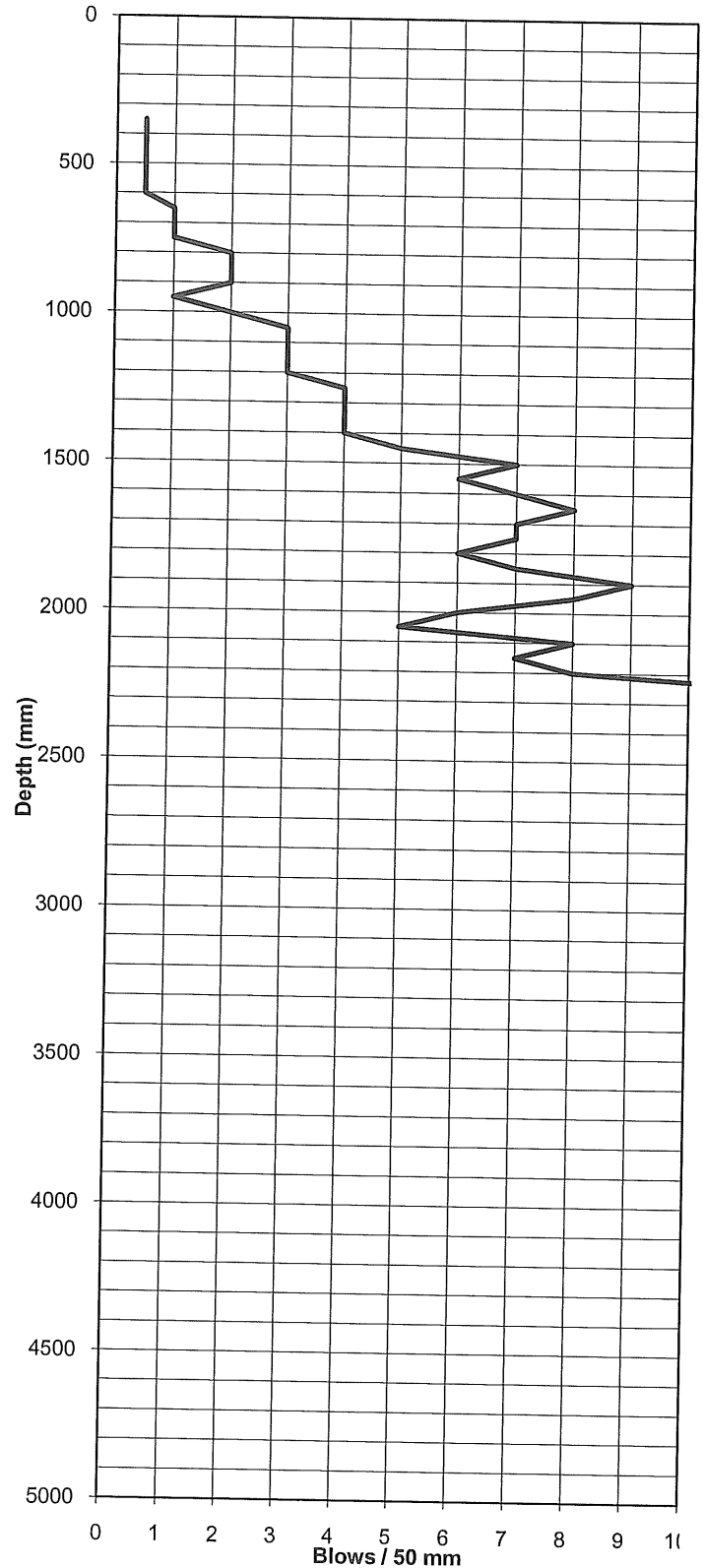
SCALA PENETROMETER LOG

Job No: 85233
 Project: EASTERNHUTT 60
 Location: 60 Eastern Hutt Road, Wingate

Date: 04/06/2010
 Operated by: ABB
 Logged by: TJMD
 Checked by: *AJK*

Test No.	SC-5
Sheet of	1 / 1

mm Driven	No. of Blows	mm Driven	No. of Blows
50		2550	
100		2600	
150		2650	
200		2700	
250		2750	
300	↓	2800	
350	0.5	2850	
400	0.5	2900	
450	0.5	2950	
500	0.5	3000	
550	0.5	3050	
600	0.5	3100	
650	1	3150	
700	1	3200	
750	1	3250	
800	2	3300	
850	2	3350	
900	2	3400	
950	1	3450	
1000	2	3500	
1050	3	3550	
1100	3	3600	
1150	3	3650	
1200	3	3700	
1250	4	3750	
1300	4	3800	
1350	4	3850	
1400	4	3900	
1450	5	3950	
1500	7	4000	
1550	6	4050	
1600	7	4100	
1650	8	4150	
1700	7	4200	
1750	7	4250	
1800	6	4300	
1850	7	4350	
1900	9	4400	
1950	8	4450	
2000	6	4500	
2050	5	4550	
2100	8	4600	
2150	7	4650	
2200	8	4700	
2250	12	4750	
2300	12	4800	
2350	Refusal	4850	
2400		4900	
2450		4950	
2500		5000	



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

EASTERNHUTT 60

T&T job No.:

85233

9/06/2010



www.tonkin.co.nz

