Appendix 24

Certificate of Title

QuickMap Title Details

Information last updated as at 03 Oct 2015

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier	**172605**
Land Registration District	**North Auckland**
Date Issued	31 May 2005

Prior References

NA103D/619

Type	Fee Simple
Area	7863 square metres more or less
Legal Description	Lot 1 Deposited Plan 341981

Proprietors

North City Developments Limited

Subject to Section 59 Land Act 1948 (affects part formerly part Allotments 351 and 363 Parish of Mangawhai)

6441085.32 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 31.5.2005 at 9:00 am

Subject to a right to drain sewerage easement over parts marked A & AA on DP 341981 created by Easement Instrument 6441085.35 - 31.5.2005 at 9:00 am

The easement created by Easement Instrument 6441085.35 is subject to Section 243 (a) Resource Management Act 1991

Subject to a right to drain sewage easement in gross over parts marked A & AA on DP 341981 in favour of Mangawhai Utilities Limited created by Easement Instrument 6441085.41 - 31.5.2005 at 9:00 am

The easement created by Easement Instrument 6441085.41 is subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Easement Instrument 6552222.8 - 29.8.2005 at 12:39 pm

IN THE MATTER of the Resource Management Act 1991 ("the Act")

A N D

IN THE MATTER of a subdivision consent as evidenced by Land Transfer Plan No. 341981

A N D

IN THE MATTER of a Consent Notice issued pursuant to Section 221 of the Act by THE KAIPARA DISTRICT COUNCIL ("the Council")

I, ALAN JOHN McKERCHAR Chief Executive Officer for the Council HEREBY CERTIFY that the following condition to be complied with on a continuing basis was imposed by the Council as a conditions of approval for the subdivision as effected by Land Transfer Plan No. 341981 ("the plan")

1. The use of that part of Lot 1 on the plan as is shown marked with the letter "A" will be restricted to a communal wastewater treatment and disposal system until such time as the lots on the plan are provided with connection to the Council's proposed public sewerage scheme known as the "Ecocare project" ("the Ecocare project").

2. Individual septic tanks/interceptor tanks of 4500 litre capacity with effluent outlet filters are to be installed on each of Lots 2 to 15 (both inclusive) and Lots 17 to 39 (both inclusive) on the plan when residential development is undertaken on each of such lots with the septic tanks/interceptor tanks for each lot to be connected to the communal wastewater treatment and disposal system servicing the lots in the subdivision and maintained thereafter until such time as the lots in the subdivision are provided with a connection to the Ecocare project.

3. Each of the properties being Lots 2 to 15 (both inclusive) and Lots 17 to 39 (both inclusive) on the plan shall have stormwater detention devices constructed on each property with such devices to:

   (i) Be specifically designed by an appropriately qualified competent engineer to the approval of the Council so as to ensure that peak stormwater runoff from each lot will be no greater than that which would have occurred prior to development;

(ii) Have all rainwater tank overflows and other concentrated sources of stormwater directed to these stormwater detention devices; and

(iii) Be maintained on an ongoing basis to ensure their effective continuing operation.

4. Any development undertaken on lots 3, 4, 20, 21, 22, 25, 27, 30, 31 and 32 on the plan shall take into account the requirements of the stormwater management report of Cook Costello Limited dated 28 October 2004, a copy of which is attached hereto, with the areas

(i) Marked "W" and "B" on lot 3 on the plan;
(ii) Marked "J" on lot 4 on the plan;
(iii) Marked "V" on lot 20 on the plan;
(iv) Marked "U" on lot 21 on the plan;
(v) Marked "T" on lot 22 on the plan;
(vi) Marked "S" on lot 25 on the plan;
(vii) Marked "R" on lot 27 on the plan;
(viii) Marked "Q" on lot 30 on the plan;
(ix) Marked "P" on lot 31 on the plan; and
(x) Marked "O" on lot 32 on the plan

not to be built on for any purpose and to be maintained clear of debris, structures, fences and any material that will impede the clear flow of stormwater along the swales within these areas with such areas to remain top soiled and grassed preferably with kikuyu or similar to prevent erosion.

5. Any vehicle crossings constructed on the properties being lots 5, 6, 9, 10, 13, 14, 15, 17, 23, 24, 26, 28, 29, 36, 37, 38 and 39 on the plan shall be constructed in accordance with drawing KDC/A4/S28 of the Council's Draft Engineering Code of Practice for Land Subdivision and Development Year 2000.

6. Any development undertaken on the properties being lots 2 to 15 (both inclusive) and lots 17 to 39 (both inclusive) on the plan shall be undertaken on the recommended building platforms in the geotechnical subdivision report of Cook Costello Limited dated 29 October 2004, a copy of which is attached hereto, and with any development undertaken on such properties to be undertaken in compliance with the recommendations of this report.

7. The registered proprietors for the time being of each of lots 2 to 15 (both inclusive) and lots 17 to 39 (both inclusive) on the plan is to comply with the following requirements and will notify any prospective purchaser of an allotment that:

(a) Each allotment owner will be required to be a shareholder or member of the registered company or other corporate body formed to own, operate, maintain and administer all matters associated with the communal wastewater treatment and disposal system for the subdivision;

(b) The use of the communal effluent disposal scheme within the subdivision including each of the individual septic tanks/interceptor tanks on each of the lots within the subdivision evidenced by the plan is only until such time as connection to the Ecocare project is available. At that time all properties will be required to connect to the Ecocare project, and to comply with all of the Council's current and relevant requirements relating to such connection;

(c) Until the time of connection to the Ecocare project, individual septic tanks/interceptor tanks and plumbing fixtures shall be supplied and installed to each lot in accordance with the standards defined by the registered company or other corporate body responsible for the ongoing management of the communal wastewater treatment and disposal system; and

(d) Until the time of connection to the Ecocare project, the owners of each lot shall enter into an ongoing contract for the maintenance of the individual septic tanks/interceptor tanks serving that lot with an organisation to the approval of the registered company or other corporate body responsible for the ongoing management of the communal wastewater treatment and disposal system.

DATED at Dargaville this 14th day of December 2004

SIGNED by the said ALAN JOHN McKERCHAR, Chief Executive Officer for THE KAIPARA DISTRICT COUNCIL pursuant to the authority of the Council given pursuant to the Local Government Act 2002

A.J. McKerchar

X0411934 GJM

Storm Water
Management Report

RM030088

(Revision 1)

For Metcalf Developments Ltd

cook | costello

Consulting Engineers

28 October, 2004

REF: 7924

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1. INTRODUCTION

Kiapara District Council have requested in the -resource consent conditions RM030088, condition 1. /) a Storm Water Management Report be produced on Lot 7 DP170309 that includes:

1. Consideration of the Mangawhai Heads Community Council Catchment Management Plan (1991).
2. Take into account protected Drainage paths as mentioned in the Mangawhai Heads Community Council Catchment Management Plan (1991).
3. Identify existing drainage paths.
4. Include appropriate pipe sizes for the piping of primary flow paths.
5. Identify the extent of secondary flow paths for the 100-year ARI flood.
6. Identify the need to place restrictive covenants on any areas affected by the secondary flow path.

This report has been prepared based upon numerous site visits, desktop study of the up stream catchment areas, Mangawhai Heads Community Council Catchment Management Plan (1991), test pits and soakage tests provided by Cook Costello Consulting Engineers. Cook Costello Ltd has not independently verified certain information during the desktop study and do not make any endorsements as to its accuracy.

2. SITE DESCRIPTION

2.1. Catchment Descriptions

Lot 7 DP170309 is located near the south-western outlet of the catchment area referred to in the Mangawhai Heads Community Council Catchment Management Plan (1991) as Catchment "9D & 9C". These areas cover the central southern area of the Mangawhai Heads Peninsula and encompass approximately 22.57ha of land. The catchment generally feeds all storm water towards the south west of the peninsula into the Mangawhai estuary.

2.1.1. Catchment Area 9D

The catchment area 9D has been broken down from the area in the Mangawhai Heads Community Council Catchment Management Plan (1991) into three further catchment areas, 9DA1, 9DA2 & 9DA3 for the purpose of a more detailed analysis

compared with the one undertaken in the Mangawhai Heads Community Council Catchment Management Plan (1991). Refer to Appendix 1 for a site plan of the area.

The areas topography consists of relative flat sandy peaty lands through out the south and central parts of the catchment. Recent earthworks in the area have levelled an existing hillside that ran north to south adjacent the intersection of Molesworth Drive and Moir Point Road. This area, Lot 7 DP170309 now has a fall of approximately 1 in 16 towards the south. The northern part of the catchment has a small hill range that runs east to west with a height of 70m. Half of this hillside feeds onto the catchment 9D with the bush cover being relatively the same over the whole catchment such as, Te-tree, Manuka and Gorse.

2.1.2. Catchment Area 9C

The catchment area 9C has been subdivided down from the area in the Mangawhai Heads Community Council Catchment Management Plan (1991) into five further catchment areas, 9C1, 9C2, 9C3, 9C4 and 9C5 for the purpose of a more detailed analysis compared with the one undertaken in the Mangawhai Heads Community Council Catchment Management Plan (1991). Refer to Appendix 1 for a site plan of the area.

The areas topography consists of relative flat catchment area. There is a small hill located in the northeastern part of the catchment area that rise to heights of 40m above mean sea level. This catchment area in the past has been slow in development with relatively large sections for individual housing, but is expected to change over the next 10 years with areas for individual section to be reduced down to 1000m² - 600m². The catchment has a fall from east to west of approximately 0.7%.

2.2. Metcalf Developments Stage 1

Lot 7 DP170309 prior to development was a peat swamp covered in gorse and Te-tree. The section had the above catchments (9C & 9D) draining through it with an average base flow of around 15 l/sec. The stream feeds through the section and onto Moir Point Road Reserve, which ends up in Mangawhai Estuary via a protected drainage path.

Post development, the existing stream has been piped through the sub division via a 900mm diameter pipe with major earthworks undertaken over the site to enure that residential development and storm water runoff was disposed of in a controlled manner. The concepts of low impact design have been adopted for this sub division incorporating into the subdivision storm water system swales to control excessive overland flows and a piped storm water system to deal with minor flows from residential development.

3. GEOLOGY

The Geology of the catchment area from the New Zealand Land Inventory Map NZMS 290 sheet R08/09 (scale 1:100,000) edition 1 1980 are soils of the coastal sand dune complex that are referred to as red hill sandy loam (RLH).

The Lithology of the catchment area from the New Zealand Land Inventory Map NZMS 290 sheet R08/09 (scale 1:100,000) edition 1 1980 are a combination of two types of soils.

The first is found over Lot 7 DP170309 and predominantly to the west which is an alluvium: mud, sand and gravel with minor peat, forming terraces deposits up to 10m above stream or river beds, deposits up to 30m thick; unconsolidated to very soft. Unweathered, or weathered to brown stained material to depths of 2m ($A1_3$)

The second type of soil that covers the catchment areas 9C & 9D and most of the peninsula are sand: feldspathic with some quartz, minor dark minerals and clay, forming fixed dunes; unconsolidated to very soft. Unweathered or weathered to brown stained very soft clayey sand to depths of 5m.

4. SITE INVESTIGATION

4.1. On site Testing

On site soakage tests have been perform over the proposed lot 1 to give preliminary results for the possible design of soakage pits for storm water on each lot, as specified by the resource consent conditions RM 030088 2) h) ii) and iii).

In accordance with NZS 1547:2000 the soil results indicated, a weakly structured sandy loam that has the soakage capacity between 100 – 250mm/hr. Using the assumptions from Appendix 2 each lot has adequate area to service a soakage pit with the required volume being 29m³, which can be constructed as a 3.0m x 3.0m x 3.0m deep soakage pit assuming a void ratio of drainage metal of 35% to total volume.

5. DESIGN AND FLOOD ESTIMATION

5.1. Rainfall Data

A small range of rainfall data is available for the catchments that feed through Lot 7 DP107309. Two standards for rainfall intensity were look at, KDC standards for engineering practice and the nationally recorded Hirds rainfall data. Using the assumption that each catchment has a time of concentration of 30 minutes and

designing for a flood with an ARI of 10 years, the two separate standards gave very different results as shown below.

Source of Data	Depth (mm)	Intensity (mm/hr)
Kaipara District Standards	36	72
Hirds Rainfall Data (V 2.0)	27.5	55

Figure 1: Rainfall Data for Lot 7 DP107309

The Hirds rainfall values were adopted since these have the additional benefit of being recorded rainfall data from throughout New Zealand and are considered more accurate than the KDC standards.

These above values were not the assumptions used for the design of the storm water system for Metcalf Developments Lot 7 DP107309. Instead the time of concentrations have been reduced to 10 minutes adopting an ARI of 10 years instead of the recommended 5 years from KDC standards.

Source of Data	Depth (mm)	Intensity (mm/hr)
Kaipara District Standards	20.8	125
Hirds Rainfall Data (V 2.0)	15.7	94.2

5.2. Demographic and Urbanisation Estimates

The subdivisions' stormwater system has been designed to service the design flow for a fully developed subdivision using the assumptions in Appendix 2. Assuming an impervious area of 40% on average over all the lots but no more then 50%, as specified by the Kaipara District Plan.

5.3. Flow Paths

5.3.1. Primary flow paths

There are two primary flow paths for the Metcalf development that service the subdivision. The first is the 900mm diameter pipe that flows from the northern side of the boundary, under ROW B, down Lot 40 (land to be vested in Council) and into a protected drainage path on the south west side of Lot 7 DP170309.

The second primary flow path is located along the access Lot, Lot 40 and services the swales located either side of the main road. This primary system is designed to carry a 1 in 10 year flow with a t_c of 10 minutes.

Refer to Appendix 1 for a plan of the primary flow paths.

5.3.2. Secondary flow paths

Secondary flow paths are provided for the 1 in 100yr flow as shown on the appended drawing.

6. ON SITE STORM WATER MAINTENANCE, CONSTRUCTION AND CONVEANT AREAS

6.1. Infiltration systems

The geology of the site is peaty sand in with topsoil and peat pockets. The sand is permeable and the peat impermeable with varying particle sizes.

Due to the reliance on infiltration trenches, infiltration and temporary storage systems within the sites and the potential for peat to block the voids between the sand particles and significantly reduce infiltration careful control to ensure that only clean water is discharged to the ground filtration systems is required. It would be preferable to control discharge to infiltration systems to below a suspended solids level of 30gm/l.

6.2. Swales and Secondary flow paths

The secondary flow paths are covered in sand material that is highly erodible from water and wind action. It is essential that these remain topsoiled and grassed preferably with Kikuyu or similar to prevent erosion. Continual observation and maintenance is required to ensure successful operation.

All secondary flow paths are to be 3.0m wide strips of land (restrictive covenants) vested in council for the purpose of transporting any excess storm water from the subdivision of the property Lot 7 DP107309. These covenant areas should not be built on for any purpose and maintained clear of debris, structures, fences and any material that will impede the clear flow of storm water along the swales.

There are two main areas that are to have covenants, over private property, placed on them

1. A 3.0m width restrictive covenant which centreline runs along the boundary between Lot 3 & 4.
2. A 3.0m wide restrictive covenant be placed along the southern boundary through Lots 20, 21, 22, 23, 24, 25, 27, 30, 31 and 32.

There will also need to be two restrictive covenants over ROW B and the swale drains each side of the main road up the subdivision to prevent any future changes to the ROW and roadway that might restrict, prevent or hinder the secondary flow path for

this sub division. The covenant each side of the main road will need to be 3.0m wide. The restrictive covenant over ROW B will cover the entire boundary of ROW B.

See Appendix 1 for the covenant areas.

7. CONCLUSION

An appropriate storm water system which meets the requirements of the Kaipara District Council Subdivision Consent for Metcalf Developments has been constructed for the subdivision which is to be taken over and operated and maintained by Kaipara District Council.

Provided upstream discharges are controlled to similar design standards being a time of concentration of 30 minutes and rainfall intensity of 55mm/hr the primary system and appropriate coefficients of runoff for sandy soils, rainfall is collected in water tanks and the maximum impermeable developable area (roofs, concrete driveways, etc) is controlled the system will have sufficient capacity for the upstream catchments.

A secondary overland flow path has been provided for flows up to the 1 in 100yr flow which exceeds the 1 in 10 year flows.

Regular observation and maintenance of the system shall be carried out by Kaipara District Council to ensure proper operation. This shall include but not be limited to checking and approval of infiltration designs to ensure no blockages by suspended sediments, ensure the flow capacity of swales and overland flow paths are not impeded and any erosion is immediately repaired and regressed.

8. LIMITATIONS AND QUALIFIACTIONS

This report has been prepared for the benefit of Metcalf Developments Ltd as our client with respect to the resource consent condition 1. l) (RM 030088) and for Kaipara District Council approval of the proposal as defined in the brief. It shall not be relied upon for any other purpose. The reliance by other parties on the information or opinions contained in this report shall, without our prior review and agreement in writing, be at such parties' sole risk.

Opinions and judgments expressed herein are based on our understanding and interpretation of current regulatory standards, and should not be construed as legal opinions. Where opinions or judgments are to be relied on they should be independently verified with appropriate legal advice

Recommendations and opinions in this report are based on data from onsite testing desk studies and storm water calculations. The nature and continuity of subsoil

conditions away from Metcalf Developments are inferred and it must be appreciated that actual conditions could vary considerably from the assumed model.

During excavation and construction the site should be examined by an Engineer or Engineering Geologist competent to judge whether the exposed subsoils are compatible with the inferred conditions on which the report has been based. It is possible that the nature of the exposed subsoils may require further investigation and the modification of the design based on this report.

Cook Costello Ltd would be pleased to provide this service to Metcalf Developments Ltd and believe that the project would benefit from such continuity In any event it is essential that the firm is if there is any variation in subsoil conditions from those described in the report as it may affect the design parameters recommended in the report.

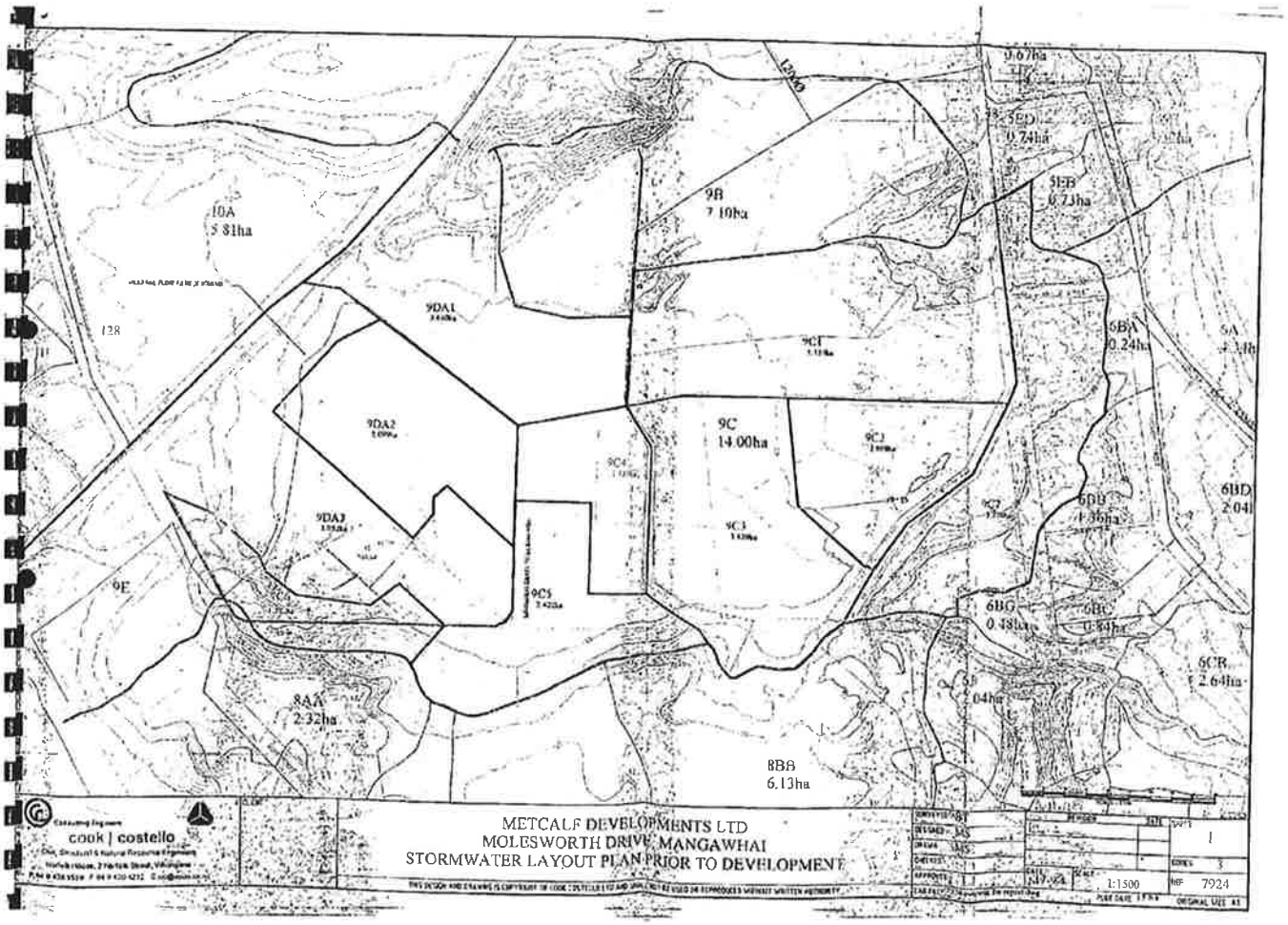
Cook Costello Ltd. have performed the services for this project in accordance with the standard agreement for consulting services and current professional standards for environmental site assessment. No guarantees are either expressed or implied.

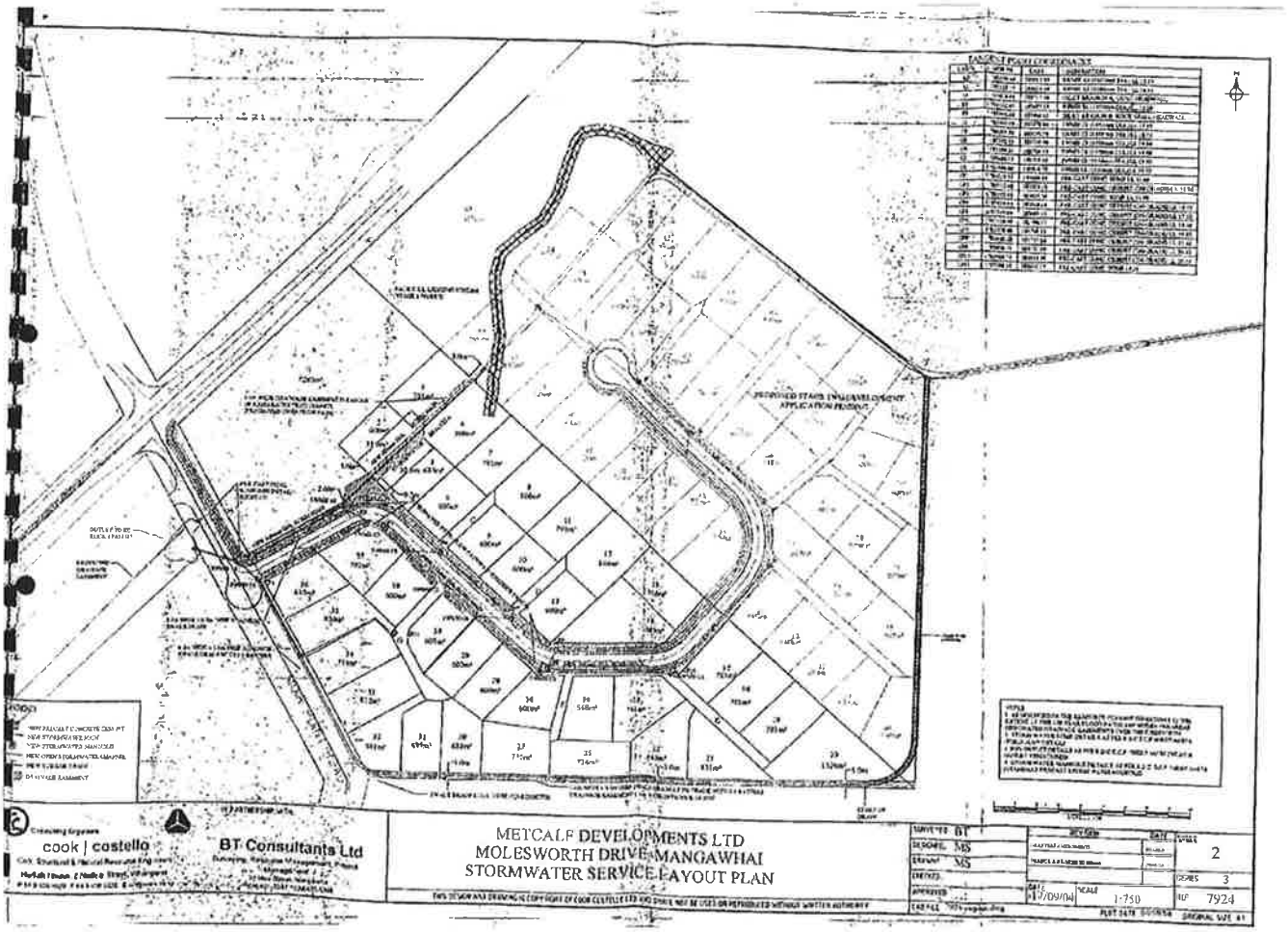
There is no investigation that is thorough enough to preclude the presence of materials at the site that presently, or in the future, may be considered hazardous. Because regulatory evaluation criteria are constantly changing, concentrations of contaminants present and considered to be acceptable now may in the future become subject to different regulatory standards which cause them to become unacceptable and require further remediation for this site to be suitable for the existing or proposed land use activities.

Hamish Peters
Be (Hons)

Philip Cook
Chartered Professional Engineer
BE (Hons), Dip.Ag
M.IPENZ, M.ACENZ, IPER, M.IOD

9. APPENDIX 1: SITE PLAN AND LOCATION


10A
5.81ha
9B
7.10ha
9DA1
9DA2
9DA3
9C
14.00ha
9CT
9CJ
9CS
9E
8AA
2.32ha
8BB
6.13ha
0.07ha
5ED
0.74ha
5EB
0.73ha
6BA
0.24ha
6BB
1.36ha
6BD
2.04
6BG
0.48ha
6BC
0.84ha
6CB
2.64ha
METCALF DEVELOPMENTS LTD
MOLESWORTH DRIVE, MANGAWHAI
STORMWATER LAYOUT PLAN PRIOR TO DEVELOPMENT
cook | costello
1:1500
7924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BT Consultants Ltd
METCALF DEVELOPMENTS LTD
MOLESWORTH DRIVE MANGAWHAI
STORMWATER SERVICE LAYOUT PLAN
2
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7924
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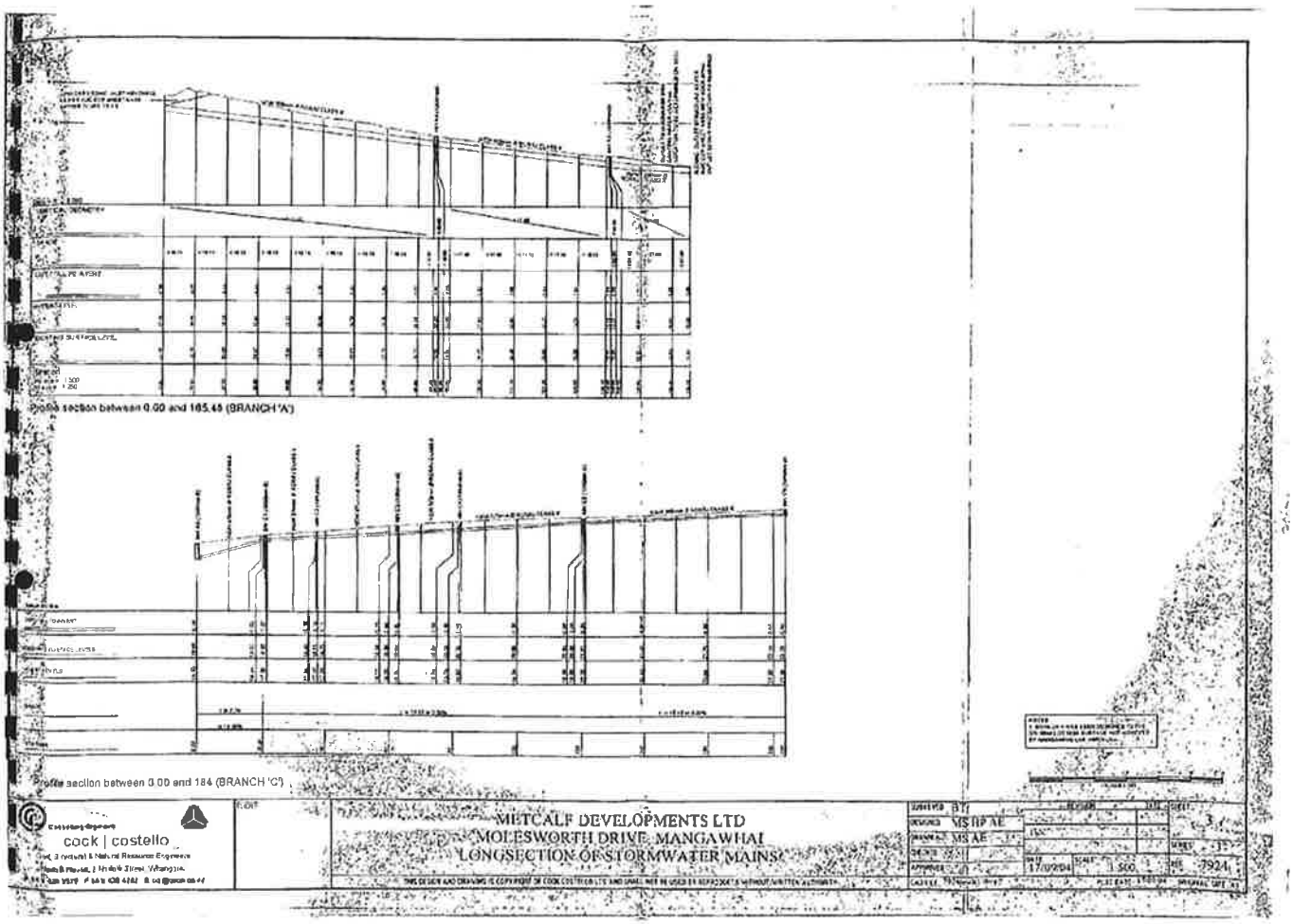

Profile section between 0.00 and 165.45 (BRANCH 'A')
Profile section between 0.00 and 184 (BRANCH 'C')
cock | costello
METCALF DEVELOPMENTS LTD
MOLESWORTH DRIVE, MANGAWHAI
LONGSECTION OF STORMWATER MAINS
MS RP AE
MS AE
17/02/04
1:500
7924

10. APPENDIX 2: STORM WATER CALCULATIONS

HIRDSV2 - High Intensity Rainfall Design System

Mangawhai: Northing 6564750, Easting 2651370

ARI	Duration 10m	20m	30m	60m	2h	6h	12h	24h	48h	72h
2	11.1	15.8	19.4	27.7	36.1	54.9	71.6	93.3	110.7	122.4
10	15.7	22.3	27.5	39.3	51.2	77.9	101.4	132.1	154.6	169.5
20	18.2	25.9	32.0	45.7	59.5	90.4	117.7	153.3	178.3	194.8
30	19.8	28.3	35.0	50.0	65.1	98.9	128.8	167.7	194.4	211.9
40	21.2	30.3	37.3	53.4	69.5	105.6	137.5	179.0	207.0	225.3
50	22.3	31.9	39.3	56.3	73.3	111.3	144.8	188.5	217.5	236.5
60	23.3	33.3	41.0	58.8	76.5	116.2	151.2	196.8	226.7	246.2
70	24.1	34.5	42.6	61.0	79.4	120.5	156.9	204.2	234.8	254.8
80	24.9	35.6	44.0	63.0	82.0	124.5	162.0	210.9	242.2	262.7
100	26.3	37.6	46.5	66.6	86.6	131.5	171.2	222.8	255.3	276.5
125	27.8	39.8	49.1	70.4	91.6	139.1	181.0	235.5	269.3	291.3
150	29.1	41.7	51.5	73.8	96.0	145.7	189.6	246.7	281.6	304.2

Mangawhai: Standard errors (mm)

ARI	10m	20m	30m	60m	2h	6h	12h	24h	48h	72h
2	0.9	1.3	1.5	2.1	2.8	4.0	4.7	6.2	7.6	8.0
10	1.4	2.0	2.3	3.4	4.5	6.2	7.4	10.1	12.0	12.7
20	1.6	2.4	2.7	3.9	5.3	7.2	8.8	11.8	13.9	14.7
30	1.8	2.6	2.9	4.3	5.8	7.8	9.6	12.9	15.1	16.0
40	1.9	2.8	3.1	4.6	6.2	8.3	10.3	13.7	15.9	16.9
50	2.0	2.9	3.2	4.8	6.5	8.7	10.9	14.4	16.6	17.6
[illegible]	2.1	3.0	3.3	5.0	6.8	9.1	11.4	15.0	17.2	18.3
[illegible]	2.1	3.1	3.4	5.2	7.1	9.4	11.8	15.5	17.7	18.8
80	2.2	3.2	3.5	5.3	7.3	9.7	12.2	15.9	18.1	19.3
100	2.3	3.3	3.6	5.6	7.7	10.2	12.9	16.7	18.9	20.2
125	2.4	3.5	3.8	5.9	8.2	10.7	13.6	17.6	19.7	21.1
150	2.5	3.6	3.9	6.1	8.6	11.1	14.3	18.4	20.4	21.9

$I_{\leq 30\,min} = 23.5\,mm$

$I = 46.9\,mm/hr$

$I_{100\ 30\,min} = 46.9 \times 2 = 93\,mm/hr$

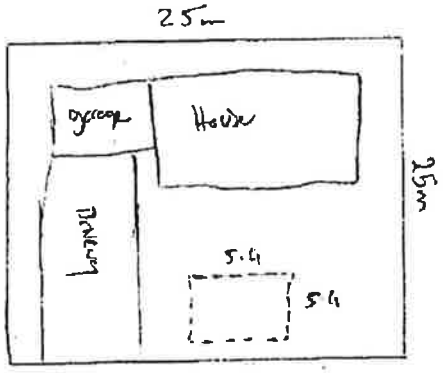
$I_{100\ 10\,min} = 26.3 \times 6 = 157.8\,mm/hr$

cook | costello
Consulting Engineers
Telephone 09-438 9529
Facsimile 09-430 4282
2 Norfolk Street Whangarei
Email: ccl@coco.co.nz

PROJECT	JOB NUMBER	ENGINEER
Stormwater runoff from a lot	7424	HP
	DATE 1/9/14	PAGE 1

Assumptions.

- Lot Size 650m² (ave)
- House 150 m²
- garage 64m²
- Driveway 15m × 3.0m = 45m²
- C values
  - 0.9 for sealed & roof tops
  - 0.25 for grass lawns.
- t_c = 10 mins
- ARI = 10 yrs
- i = 94.2 mm/hr
- $Q = \frac{CiA}{3.6 \times 10^6}$ (l/sec).



C	i	A(m²)	Q
0.9	94.2	House 150	3.53
0.9		Garage 64	1.57
0.9		Driveway 45	1.06
0.25		Lawn 366	8.62
			Σ = 14.78 l/sec. Flow O.K.

Vol of water displaced is:

Vol = 15.7mm rainfall × 650m² = 10.2m³

Assume void ratio of 35% of Soakage pits volume.

$\frac{10.2\ m^3}{V_T} \times 100 = 35$

V_T = 29 m³ (5.4 × 5.4 × 1.0m deep). O.K.

or (3.0 × 3.0 × 3.0m deep)

NORTHLAND SOIL MECHANICS AND TESTING LABORATORY

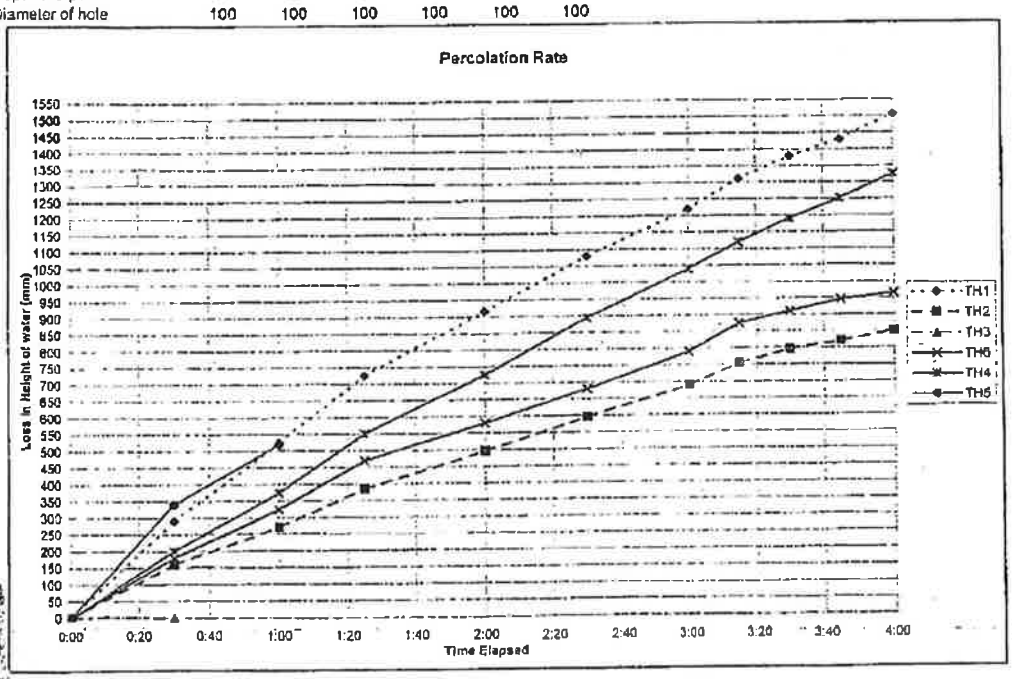
Tarewa House, 19 Lower Tarewa Road, Tel. (09) 4389529, WHANGAREI

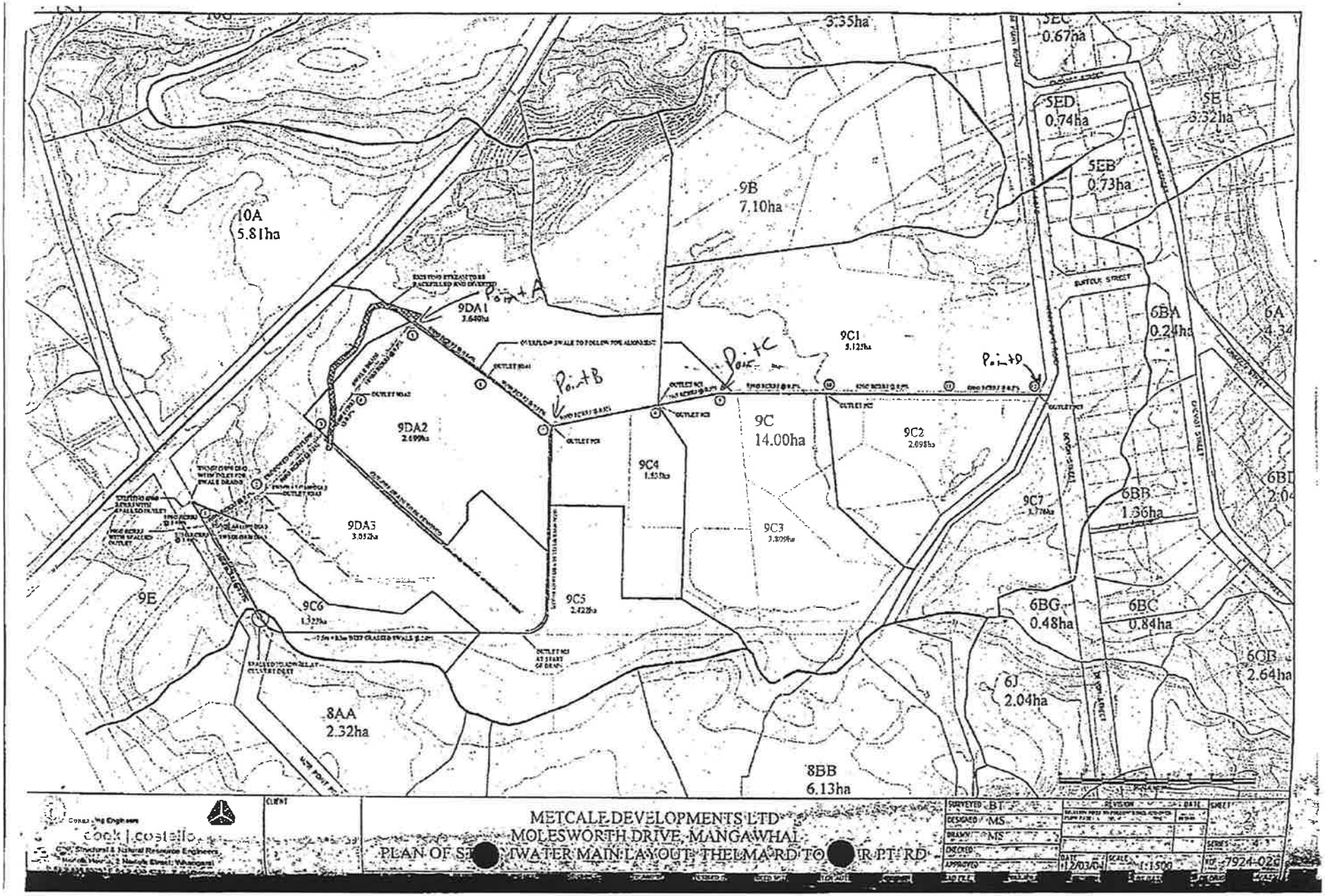
PERCOLATION TEST -GRAPH SHEET

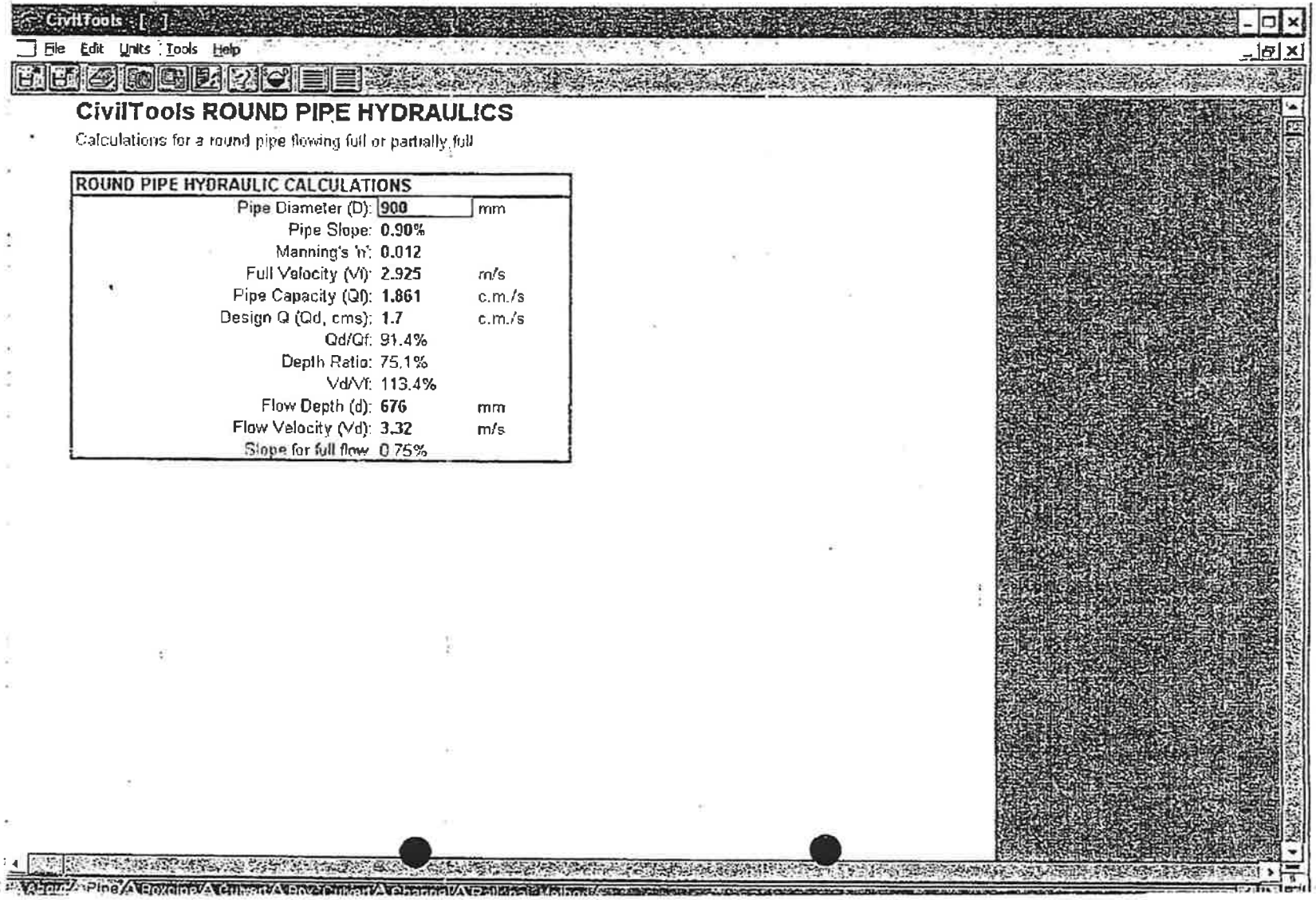
Test 24 / NZS 4610 : 1982 Appendix A

Client:	METCALF DEVELOPMENT	**Ref.:**	7924
Job:	Effluent disposal	**Report No.:**	
Location:	ESTUARY DRIVE, MANGAWAI	**Page:**	1
Tested by:	AK	**Presoaking conditions:**	30 MINUTES
Date:	22/07/2004	**Weather conditions prior:**	SHOWERS

		Loss in height of water						Percolation Rate (mm/hr)					
Time	Time elapsed	TH1	TH2	TH3	TH4	TH5	TH6	TH1	TH2	TH3	TH4	TH5	TH6
11:00	0	0	0	0	0	0	0						
11:30	0:30	290	160	CAVED	200	340	180	580	320	0	400	680	360
12:00	1:00	525	270		375	520	325	470	220	0	350	360	290
12:25	1:25	725	385		550	CAVED	470	480	276	0	420	0	348
13:00	2:00	915	495		725		580	326	189	0	300	0	189
13:30	2:30	1080	595		895		680	330	200	0	340	0	200
14:00	3:00	1220	690		1040		790	280	190	0	290	0	220
14:15	3:15	1310	755		1120		875	360	260	0	320	0	340
14:30	3:30	1380	795		1190		910	280	160	0	280	0	140
14:45	3:45	1430	820		1250		945	200	100	0	240	0	140
15:00	4:00	1505	850		1325		965	300	120	0	300	0	80
Depth of hole		600	600	600	600	600	600						
Depth of topsoil		-	-	-	-	-	-						
Diameter of hole		100	100	100	100	100	100						




10A
5.81ha
9B
7.10ha
3.35ha
5EC
0.67ha
5ED
0.74ha
5E
3.32ha
5EB
0.73ha
9DA1
3.640ha
9C1
5.125ha
6BA
0.24ha
6A
4.34
9DA2
2.699ha
9C
14.00ha
9C2
2.098ha
9C4
1.858ha
9C7
1.776ha
6BB
1.36ha
9DA3
3.052ha
9C3
3.809ha
9E
9C6
1.322ha
9C5
2.428ha
6BG
0.48ha
6BC
0.84ha
6CB
2.64ha
6J
2.04ha
8AA
2.32ha
8BB
6.13ha
BUSTOCK STREET
METCALF DEVELOPMENTS LTD
MOLESWORTH DRIVE, MANGAWHAI
PLAN OF S[redacted]WATER MAIN LAYOUT THELMA RD TO [redacted]R PT RD
cook | costello
SURVEYED BT
DESIGNED MS
DRAWN MS
CHECKED
APPROVED
DATE 12/03/04
SCALE 1:1500
SHEET 2
7924-02C


CivilTools
File Edit Units Tools Help
CivilTools ROUND PIPE HYDRAULICS
Calculations for a round pipe flowing full or partially full
ROUND PIPE HYDRAULIC CALCULATIONS
Pipe Diameter (D): 900 mm
Pipe Slope: 0.90%
Manning's 'n': 0.012
Full Velocity (Vf): 2.925 m/s
Pipe Capacity (Qf): 1.861 c.m./s
Design Q (Qd, cms): 1.7 c.m./s
Qd/Qf: 91.4%
Depth Ratio: 75.1%
Vd/Vf: 113.4%
Flow Depth (d): 676 mm
Flow Velocity (Vd): 3.32 m/s
Slope for full flow 0.75%

cook | costello
Consulting Engineers
Telephone 09-438 9529
Facsimile 09-430 4282
2 Norfolk Street Whangarei
Email: ccl@coco.co.nz

PROJECT	JOB NUMBER	ENGINEER
Swale check	7926	HP
	DATE 17/9/14	PAGE 1

check Swale size along the southern side of the subdivision. for catchment Area 96C.

$$Q = 2.78\,CiA$$

$A = 1.0$ ha.
$T_c = 10$ mins (depth = 26.3mm)
$i = 26.3 \times 6 = 157.8$ mm/hr.

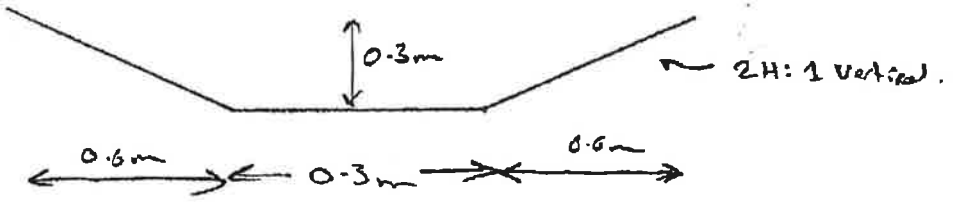
Assume 40% impervious. $C = 0.9$
" 60% pervious $C = 0.25$

$$C = \frac{CA_1 + CA_2}{A_T} = \frac{0.9 \times (0.4 \times 1.0) + 0.25(0.6 \times 1.0)}{1.0}$$

$$C = 0.51$$

$$Q = 2.78 \times 0.51 \times 157.8 \times 1.0$$
$$= 223\ l/sec.$$

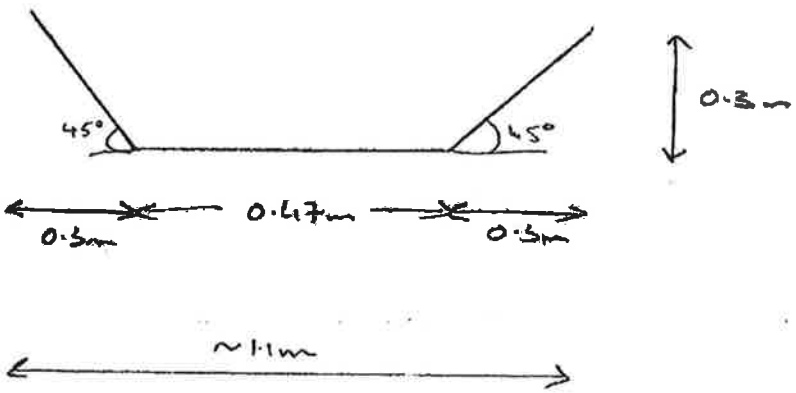
From civil tools Swale needs to be.



OR

cook | costello
Consulting Engineers
Telephone 09-438 9529
Facsimile 09-430 4282
2 Norfolk Street Whangarei
Email: ccl@coco.co.nz

PROJECT	JOB NUMBER	ENGINEER
Swale cleat.	7926.	HP
	DATE 17/9/14	PAGE 2



CivilTools TRAPEZOIDAL CHANNEL HYDRAULICS

Use section a, b, or c, depending on what you want to calculate

CALCULATIONS FOR A TRAPEZOIDAL CHANNEL

a) Solve for Q and V given channel dimensions and depth

Base Width (B): 0.3	m
Side Slopes (SS): 2	H:1V
Mannings 'n': 0.026	
Bed Slope (S): 2.000%	
Flow Depth (d): 0.22	m
Flow Area (A): 0.16	sq. m
Wetted perimeter (P): 1.28	m
Flow Velocity (V): 1.37	m/s
Flow Rate (Q): 0.22	cu.m/s
Flow is: Supercritical	
Critical Depth (Yc): 0.24	m
Sediment transport size (D75): 27.9	mm, approx

b) Solve for depth given Q and channel dimensions

Base Width (B): 0.3	m
Side Slopes (SS): 2	H:1V
Mannings 'n': 0.026	
Bed Slope (S): 2.000%	
Flow Rate (Q): 0.223	cu.m/s
Flow Depth (d): 0.22	m
Flow Area (A): 0.16	sq. m
Wetted perimeter (P): 1.28	m
Flow Velocity (V): 1.37	m/s
Flow is: Supercritical	
Critical Depth (Yc): 0.24	m
Sediment transport size (D75): 27.9	mm, approx

c) Solve for base width (B) given depth, Q, and channel dimensions

Side Slopes (SS): 2	H:1V
Mannings 'n': 0.026	
Bed Slope (S): 2.000%	
Flow Rate (Q): 0.223	cu.m/s
Flow Depth (d): 0.22	m
Base Width (B): 0.30	m
Flow Area (A): 0.16	sq. m
Wetted perimeter (P): 1.28	m
Flow Velocity (V): 1.37	m/s
Flow is: Supercritical	
Critical Depth (Yc): 0.24	m
Sediment transport size (D75): 27.9	mm, approx

CivilTools TRAPEZOIDAL CHANNEL HYDRAULICS

Use section a, b, or c, depending on what you want to calculate

CALCULATIONS FOR A TRAPEZOIDAL CHANNEL

a) Solve for Q and V given channel dimensions and depth

Base Width (B): 0.47	m
Side Slopes (SS): 1	H:1V
Mannings 'n': 0.026	
Bed Slope (S): 2.000%	
Flow Depth (d): 0.22	m
Flow Area (A): 0.15	**sq. m**
Wetted perimeter (P): 1.09	m
Flow Velocity (V): 1.46	**m/s**
Flow Rate (Q): 0.22	**cu.m/s**
Flow is: Supercritical	
Critical Depth (Yc): 0.24	m
Sediment transport size (D75): 30.6	mm, approx

b) Solve for depth given Q and channel dimensions

Base Width (B): 0.47	m
Side Slopes (SS): 1	H:1V
Mannings 'n': 0.026	
Bed Slope (S): 2.000%	
Flow Rate (Q): 0.223	cu.m/s
Flow Depth (d): 0.22	**m**
Flow Area (A): 0.15	sq. m
Wetted perimeter (P): 1.09	m
Flow Velocity (V): 1.46	**m/s**
Flow is: Supercritical	
Critical Depth (Yc): 0.24	m
Sediment transport size (D75): 30.7	mm, approx

c) Solve for base width (B) given depth, Q, and channel dimensions

Side Slopes (SS): 1	H:1V
Mannings 'n': 0.026	
Bed Slope (S): 2.000%	
Flow Rate (Q): 0.223	cu.m/s
Flow Depth (d): 0.22	m
Base Width (B): 0.47	**m**
Flow Area (A): 0.15	sq. m
Wetted perimeter (P): 1.10	m
Flow Velocity (V): 1.46	**m/s**
Flow is: Supercritical	
Critical Depth (Yc): 0.24	m
Sediment transport size (D75): 30.6	mm, ap

Consulting Engineers

ACENZ

Geotechnical Subdivision Report

RM 030088

Revision 1

For Metcalf Developments Ltd

cook | costello

29 October, 2004

Project Number : 7924.

Geotechnical
Subdivision Report

RM030088

Revision 1

For Metcalf Developments Ltd

cook | costello

Consulting Engineers

29 October, 2004

REF: 7924

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1. INTRODUCTION

Kaipara District Council have requested in the resource consent conditions RM030088, condition 2. ee) a geotechnical suitability report be produced on Lot 7 DP170309 that includes:

1. The geotechnical suitability of the proposed Lot 2-39.
2. Identify stable building platforms.
3. Make any specific design recommendations for construction.

This report has been prepared based upon numerous site visits, desktop study of the surrounding geologies, numerous test pits, Scala Penetrometers and Nuclear Densometer tests provided by Cook Costello Consulting Engineers and the Northland Soil Mechanics and Testing Laboratory Ltd.

2. SITE DESCRIPTION

Lot 7 DP170309 is located near the southwestern outlet of the central Mangawhai peninsula catchment area (22.57ha). prior to development this area consists of a peaty swamp over laying acceding sand dune hills of the Mangawhai peninsula. The flattened area had collected alluvial deposits of silt and peat, which over time formed a swamp of dense Manuka and Tee Tree.

The section topography prior to earthworks consisted of a sand dune hill that ran north to south from the northwestern corn into the centre of the property. The central and western area of the section were predominantly covered in the Manuka swamp as described above.

3. GEOLOGY

The Geology of the property from the New Zealand Land Inventory Map NZMS 290 sheet R08/09 (scale 1:100,000) edition 1 1980 are soils of the coastal sand dune complex that are referred to as red hill sandy loam (RLH).

The Lithology of the area from the New Zealand Land Inventory Map NZMS 290 sheet R08/09 (scale 1:100,000) edition 1 1980 are a combination of two types of soils.

The first is found over Lot 7 DP170309 and predominantly to the west which is an alluvium: mud, sand and gravel with minor peat, forming terraces deposits up to 10m

above stream or river beds, deposits up to 30m thick; unconsolidated to very soft. Unweathered, or weathered to brown stained material to depths of 2m ($A1_3$)

The second type of soil that covers the catchment areas 9C & 9D and most of the peninsula are sand: feldspathic with some quartz, minor dark minerals and clay, forming fixed dunes; unconsolidated to very soft. Unweathered or weathered to brown stained very soft clayey sand to depths of 5m.

4. SITE INVESTIGATION

4.1. Pre-Earthworks

Initial geotechnical investigations were undertaken in early March 2003 to quantify the amount of silty PEAT that had to be excavated before residential development was possible. Two initial boreholes performed over site showed the silty PEAT to be at depths of 0.9m and 1.1m below the surface. This gave estimates in the range of 12,000-15,000m³ of soil to be excavated. It was agreed by the principal and engineer that the hill that ran through the centre of the section, would be excavated, re-laid and compacted over the site to specified design levels.

Refer to Appendix 1 for the cut to fill areas.

4.2. Post Earthworks

The contractor for the job was specified to compact the excavated sand in accordance with NZS 4431:1989 and NZS 4404:2004:

"In accordance with clause 7.4.3.2(a) *"The minimum and maximum densities for the soil are established by tests specified in 11.10 (Relative Density Test), and the dry density of the compacted fill is expressed as a relative density in terms of these minimum and maximum densities. This relative density should be not less than 80%."*

Equipment used on the job was a motor scraper for cutting and moving the bulk of the sand around site. Additional equipment brought onto site was a tractor toed roller to achieve compaction over all filled areas.

Nuclear Densometer tests were performed on site during construction to test and record all compaction results. These results were based on a previous minimum and maximum dry density test. Refer to Appendix 3 for results.

The compaction results from the Nuclear Densometer tests range between 92.3-106.2%. All compacted fill areas achieved compaction relative easily. Refer to Appendix 2 for results.

Dynamic Cone (Scala) Penetrometer tests were performed on site after each Nuclear Densometer test to verify the uniformity and penetration resistance of the insitu sand. The allowable bearing capacity of the insitu sand varied over the site with some areas falling below 100Kpa allowable bearing capacity, which is recommended for residential construction. For that reason it is recommended that each site be assessed prior to any residential foundation design which will take place. With compaction of the construction area it is expected that each site will achieve an allowable bearing capacity of 100Kpa.

5. BUILDING SUITABILITY

5.1. Lot 1

A geotechnical description and assessment of this Lot is outside the scope of the resource consents but is considered necessary to explain the soil conditions under the excavated hillside and how these may affect effluent disposal and also other soil conditions found over the subdivision. Lot 1 has had compaction tests performed over the site on the western side of the section due to the fill placed there. Most of these sites did not need compaction tests due to the sand dune hill that was located over the sections. The soil is considered to be uniformly graded dune sand that has been top loaded and therefore is considered to be sufficiently compacted for the proposed purpose of effluent treatment and disposal.

Numerous test pits have been performed over Lot 1 for the purpose of establishing the water table for effluent disposal. The test pits revealed there to be thin layers of sandstone over the site but are not considered to be one consistent sandstone layer. This impervious layer of sandstone more probably pockets of sandstone which form pans and were only found over the site where the hill had been.

The future development of Lot 1 is proposed to be commercial/light industrial. No foundation assessments for these developments will be based on information from this report, but will need geotechnical testing relevant to the size and scope of the development.

5.2. Lot 7-15, 17-36

These sites have been laid or partially laid with excavated sand, compacted and tested in accordance with NZS 4431:(1989) and contract specifications of one Nuclear Densometer test per 100m² for the first 10 tests and then one nuclear Densometer test per 500m³ if the first ten comply. All compaction requirements were achieved over the sites for residential development. Refer to Appendix 2.

Building sites within these sections will be within a 3.0m offset from the property boundaries as specified in the Kaipara District Council Plan.

Prior to any residential development soil tests will need to be undertaken to ensure residential foundations are designed appropriately for the onsite soil conditions at the time of development. These tests are to ensure the ground to suitable for NZS 3604 standard foundations.

5.3. Lot 2-6, 37-39

These sites were not tested for compaction due to no fill being needed to be placed over the site to achieve design levels.

Building sites within these sections will be within a 3.0m offset from the property boundaries as specified in the Kaipara District Council Plan.

Prior to any residential development soil tests will need to be undertaken to ensure residential foundations are designed appropriately for the onsite soil conditions at the time of development.

6. STORM WATER

It is recommended that residential developers will be required to undertake a flood level check to ensure that no house is placed below a 100mm freeboard of the flood levels expected to be flowing adjacent Lots 2-5.

This assessment should includes the properties Lot 20-22, 25, 27, 30-32 due to the swale flowing along the southern edge of the proposed sections.

7. CONCLUSION

A geotechnical assessment of the subdivision that meets the requirements of:

- NZS 4431:(1989), earthworks compactions standard.
- NZS 4404: (2004); Land development subdivision engineering standard
- NZS 4402, Methods of testing soils for civil engineer purposes.
- Kaipara District Council Subdivision Consent for Metcalf Developments

has been produced for the subdivision of Lot 7 DP107309.

It is now confirmed that Lot 7 DP107309 has been appropriately developed for residential development in accordance with good geotechnical engineering practices.

All proposed sections on Lot 7 DP107309 will have building sites within a 3.0m offset form their respective boundaries. These building sites will require further soil tests of the specific locations of the residential developments foundation to verify or confirm that residential foundations are designed appropriately.

8. LIMITATIONS AND QUALIFIACTIONS

This report has been prepared for the benefit of Metcalf Developments Ltd as our client with respect to the resource consent condition 1. ee) (RM 030088) and for Kaipara District Council approval of the proposal as defined in the brief. It shall not be relied upon for any other purpose. The reliance by other parties on the information or opinions contained in this report shall, without our prior review and agreement in writing, be at such parties' sole risk.

Opinions and judgments expressed herein are based on our understanding and interpretation of current regulatory standards, and should not be construed as legal opinions. Where opinions or judgments are to be relied on they should be independently verified with appropriate legal advice

Recommendations and opinions in this report are based on data from desk studies, Nuclear Densometer readings, scala penetrometers and numerous test pits. The nature and continuity of subsoil conditions away from Metcalf Developments are inferred and it must be appreciated that actual conditions could vary considerably from the assumed model. Cook Costello Ltd has not independently verified certain information during the desktop study and do not make any endorsements as to its accuracy.

During excavation and construction the site should be examined by an Engineer or Engineering Geologist competent to judge whether the exposed subsoils are compatible with the inferred conditions on which the report has been based. It is possible that the nature of the exposed subsoils may require further investigation and the modification of the design based on this report.

Cook Costello Ltd would be pleased to provide this service to Metcalf Developments Ltd and believe that the project would benefit from such continuity. In any event it is essential that the firm is if there is any variation in subsoil conditions from those described in the report as it may affect the design parameters recommended in the report.

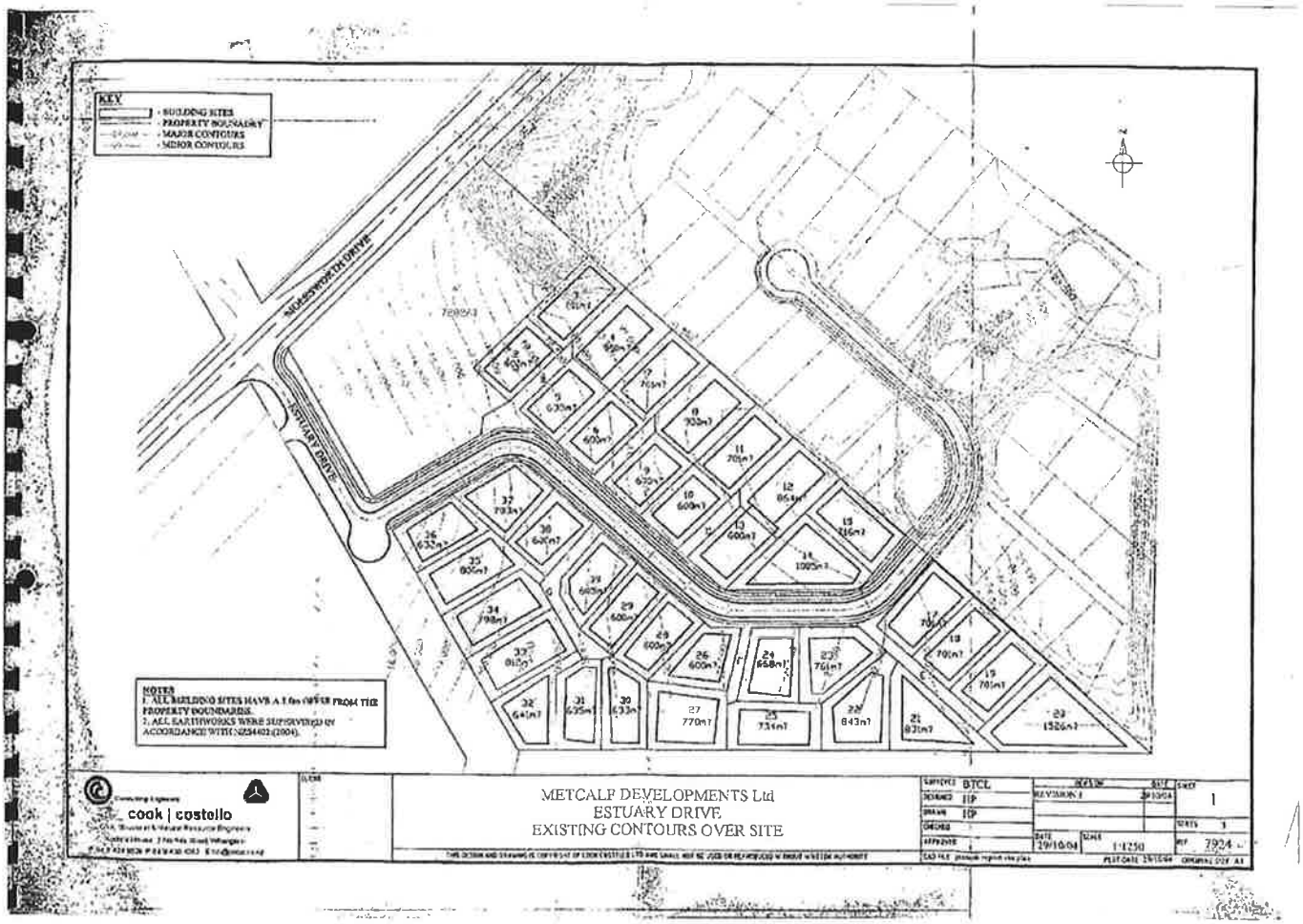
Cook Costello Ltd. have performed the services for this project in accordance with the standard agreement for consulting services and current professional standards for environmental site assessment. No guarantees are either expressed or implied.

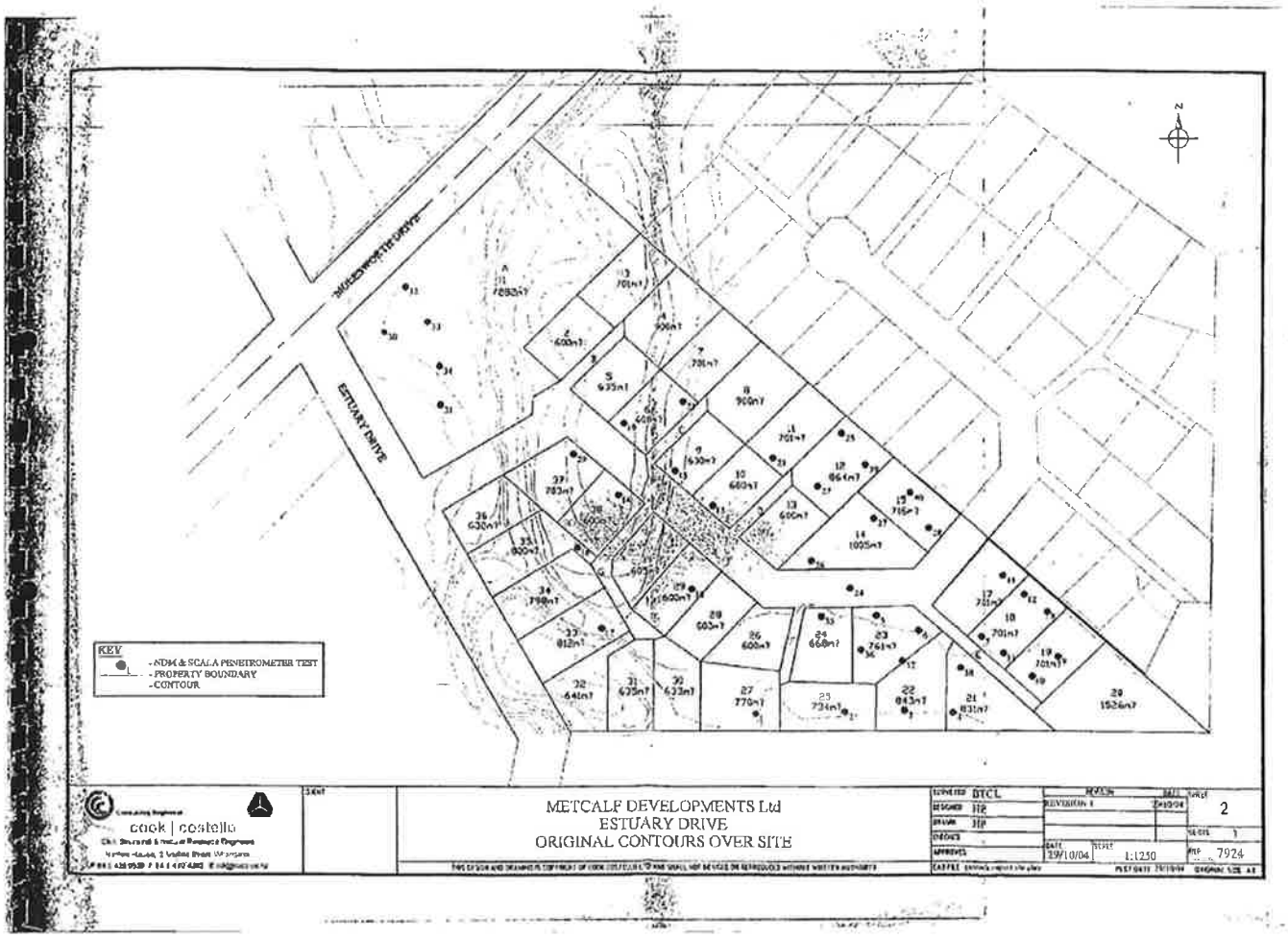
There is no investigation that is thorough enough to preclude the presence of materials at the site that presently, or in the future, may be considered hazardous. Because regulatory evaluation criteria are constantly changing, concentrations of contaminants present and considered to be acceptable now may in the future become subject to different regulatory standards which cause them to become unacceptable and require further remediation for this site to be suitable for the existing or proposed land use activities.

Hamish Peters
Be (Hons)

Philip Cook
Chartered Professional Engineer
BE (Hons), Dip.Ag
M.IPENZ, M.ACENZ, IPER, M.IOD

9. APPENDIX 1: SITE PLANS


KEY
BUILDING SITES
PROPERTY BOUNDARY
MAJOR CONTOURS
MINOR CONTOURS
HOLDSWORTH DRIVE
ESTUARY DRIVE
NOTES
1. ALL BUILDING SITES HAVE A 1.0m OFFSET FROM THE PROPERTY BOUNDARIES.
2. ALL EARTHWORKS WERE SUPERVISED IN ACCORDANCE WITH NZS4402 (1986).
cook | costello
METCALF DEVELOPMENTS Ltd
ESTUARY DRIVE
EXISTING CONTOURS OVER SITE
DRAWN TP
DATE 29/10/04
SCALE 1:1250
REF 7924


N
EDGEWOOD DRIVE
ESTUARY DRIVE
KEY
- NDM & SCALA PENETROMETER TEST
- PROPERTY BOUNDARY
- CONTOUR
cook | costello
METCALF DEVELOPMENTS Ltd
ESTUARY DRIVE
ORIGINAL CONTOURS OVER SITE
DRAWN DTCL
DESIGNED HR
CHECKED HR
APPROVED
DATE 29/10/04
SCALE 1:1250
REF 7924
REVISION 1
2


NOLESWORTH DRIVE
ESTUARY DRIVE
KEY
- CUT AREA
- FILL AREA
cook | costello
METCALF DEVELOPMENTS Ltd
ESTUARY DRIVE
CUT TO FILL
3
29/10/04
7924

10. APPENDIX 2: ONSITE GEOTECHNICAL INVESTIGATIONS

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD
2 Norfolk Street
Whangarei
PH 09 4389529

TEST REPORT

Lab Job No:	8020-415
Your ref.:	7924
Date of Issue:	4-3-04
Date of Re-Issue:	-
Page:	1 of 42

Test Report.

No.04-22

PROJECT :	Metcalfe developments, Stage 1, compaction control.
CLIENT :	Cook Costello Ltd 2 Norfolk Street Whangarei
ATTENTION :	Mr Philip Cook
INSTRUCTIONS:	Determination of the field dry density and water content using a nuclear densometer. Determination of the penetration resistance of a soil using a dynamic cone (scala) penetrometer. Determination of the minimum & maximum dry density of a cohesionless soil (subcontracted to geotechnics)
TEST METHOD :	NZS 4407:1991 Test 4.2.1, 4.2.2. NZS 4402:1991 Test 6.5.2 NZS 4402 1988 Test 4.2.1,4.2.2,4.2.2. (subcontracted to geotechnics)
TEST RESULTS :	As Per Laboratory Sheets attached

S. White

For N.S.M.T.L.

D.Krissansen

Approved Signatory

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

Norfolk House
2 Norfolk Street
Whangarei
PH 09 4389529

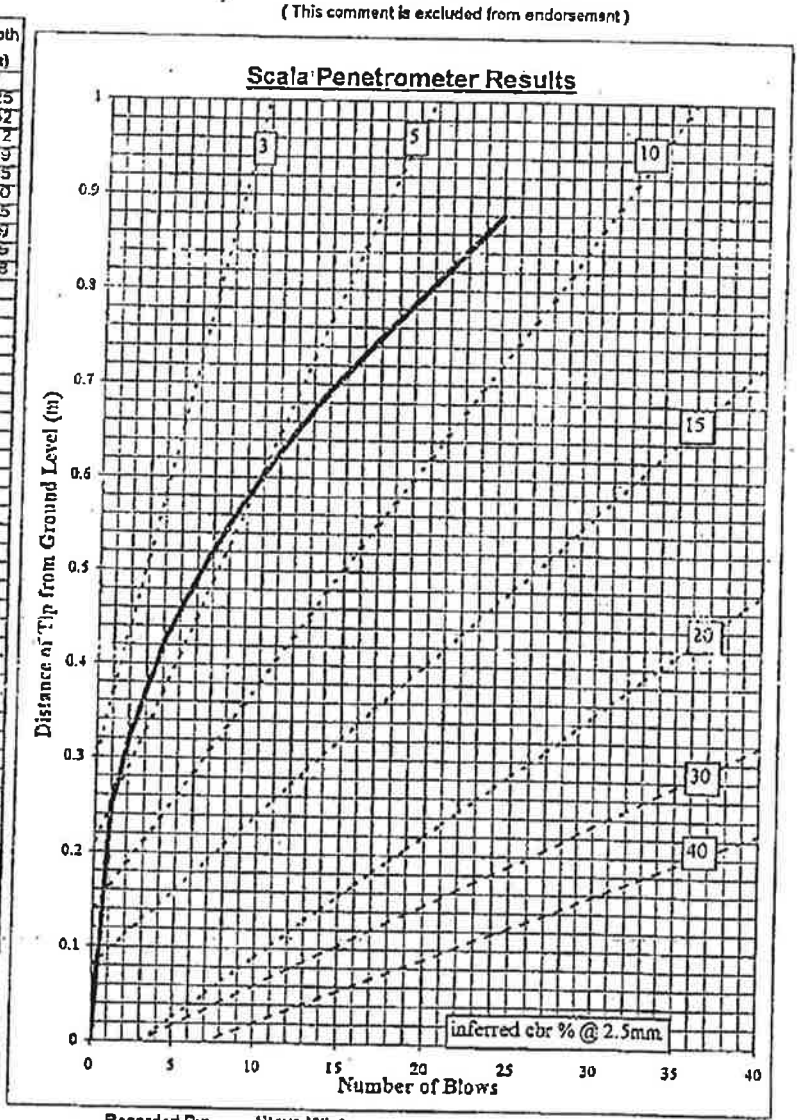
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	Scala No:	SP 1
Client:	Cook Costello Ltd	Ref.:	8020-415
Job:	Metcalfe developments	Report No.:	04-22
Location:	Mangawhai	Page:	2 of 42
Ground level:	~400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	95.1	0	0	0
1	70.2	1	249	0.25
1	63.1	2	71	0.32
2	52.5	4	51.5	0.42
2	43.9	6	34.5	0.49
2	40	8	29.5	0.55
2	34.7	10	26.5	0.60
2	30.1	12	23	0.65
2	25.8	14	21.5	0.69
3	18.4	17	18.2	0.75
3	7.1	24	18.6	0.93



Recorded By: Steve White
Date: 18/11/2003
Checked By:
Date: 5/3/04

NSMTL Test 23
5/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

Norfolk House
2 Norfolk Street
Whangarei
PH 09 4389529

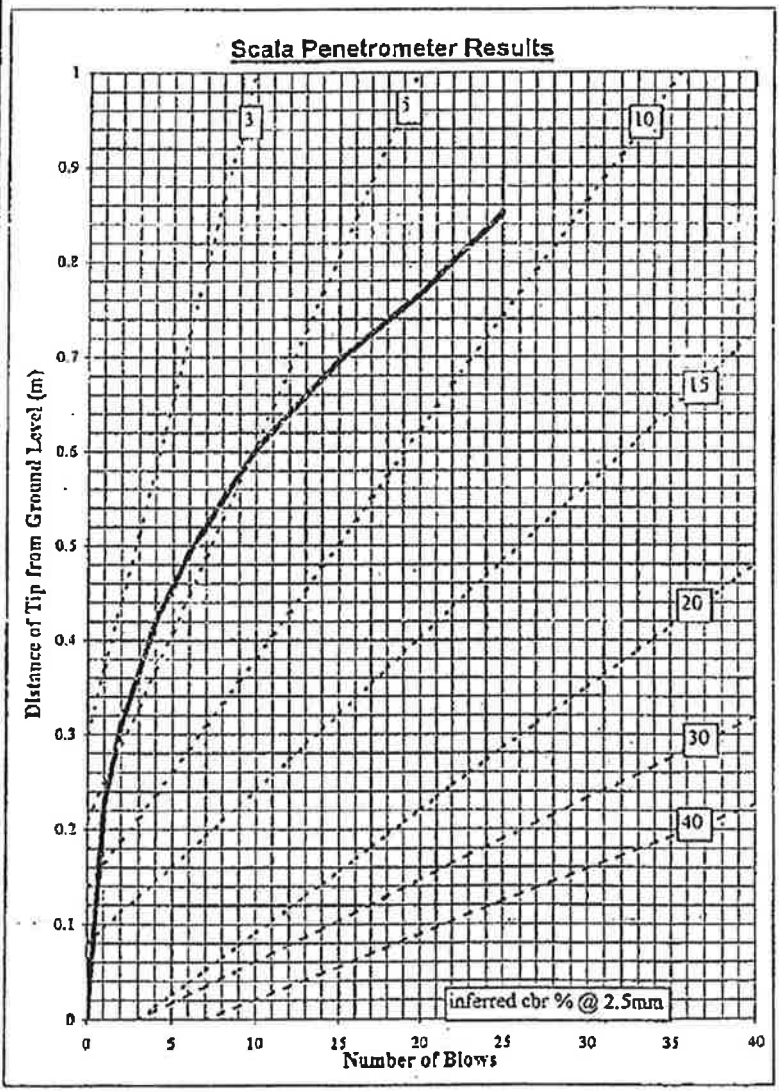
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP2
Client:	Cook Costello Ltd	**Ref.:**	8020-415
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	3 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	93	0	0	0
1	70.2	1	228	0.23
1	61.8	2	84	0.31
2	50.9	4	54.5	0.42
2	43.6	6	36.5	0.49
2	38.1	8	27.5	0.55
2	32.6	10	27.5	0.60
3	23.3	15	18.6	0.70
5	16.4	20	13.8	0.77
5	7.0	25	17.2	0.85



Recorded By: Steve White
Date: 18/11/2003
Checked By:
Date: 8/3/04

NSMTL Test 23
5/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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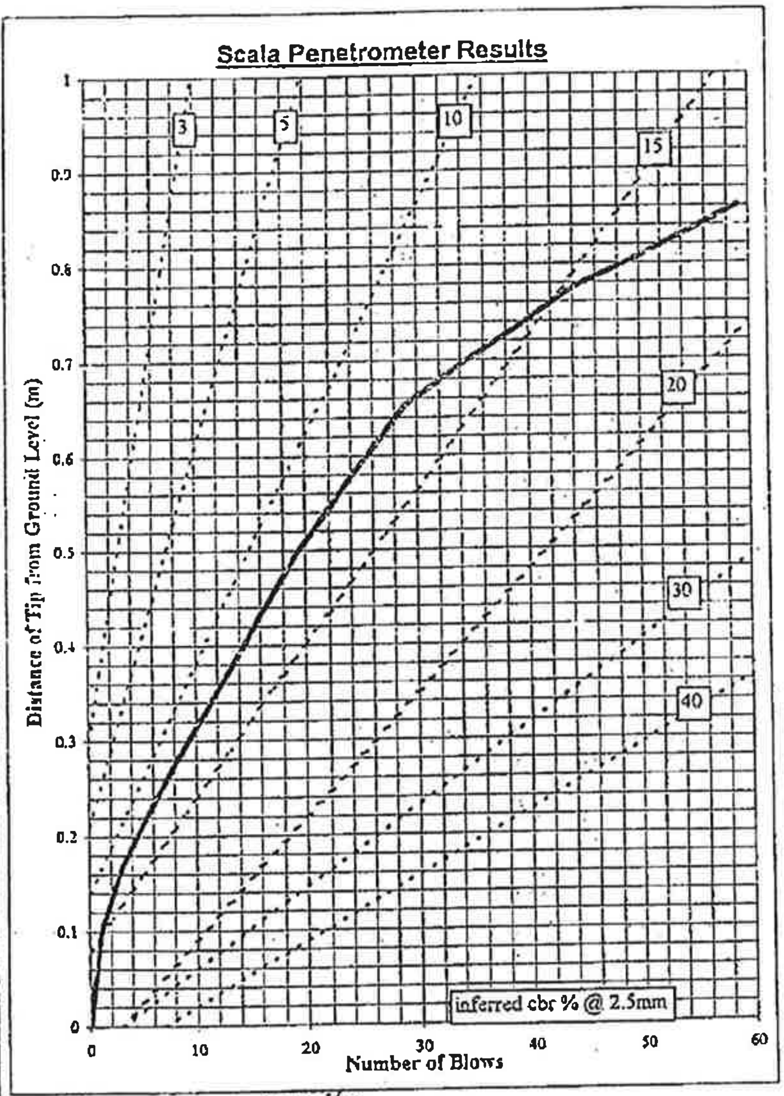
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Job No:	8020-415	Scala No:	SP3
nt:	Cook Costello Ltd	Ref.:	8020-415
:	Metcalfe developments	Report No.:	04-22
ation:	Mangawhai	Page:	4 of 42
und level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

Tip to ref (cm)	Total Blows	mm/blow	depth (m)
93.5	0	0	0
84.6	1	93	0.10
77.9	3	34.5	0.17
73.3	5	23	0.21
69.1	7	21	0.26
65.1	9	20	0.30
55.4	14	19.4	0.39
45.3	19	20.2	0.49
36.[illegible]	24	17	0.58
[illegible]	29	15	[illegible]
25.[illegible]	34	6.4	0.70
21.2	39	7.8	0.73
17.1	44	8.2	0.78
14.4	49	5.4	0.80
11.6	54	5.5	0.83
8.5	59	6.2	0.86



Recorded By: Steve White
Date: 18/11/2003
Checked By:
Date: 4/3/04

TL-Test 23
2004
415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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DYNAMIC CONE (SCALA) PENETROMETER

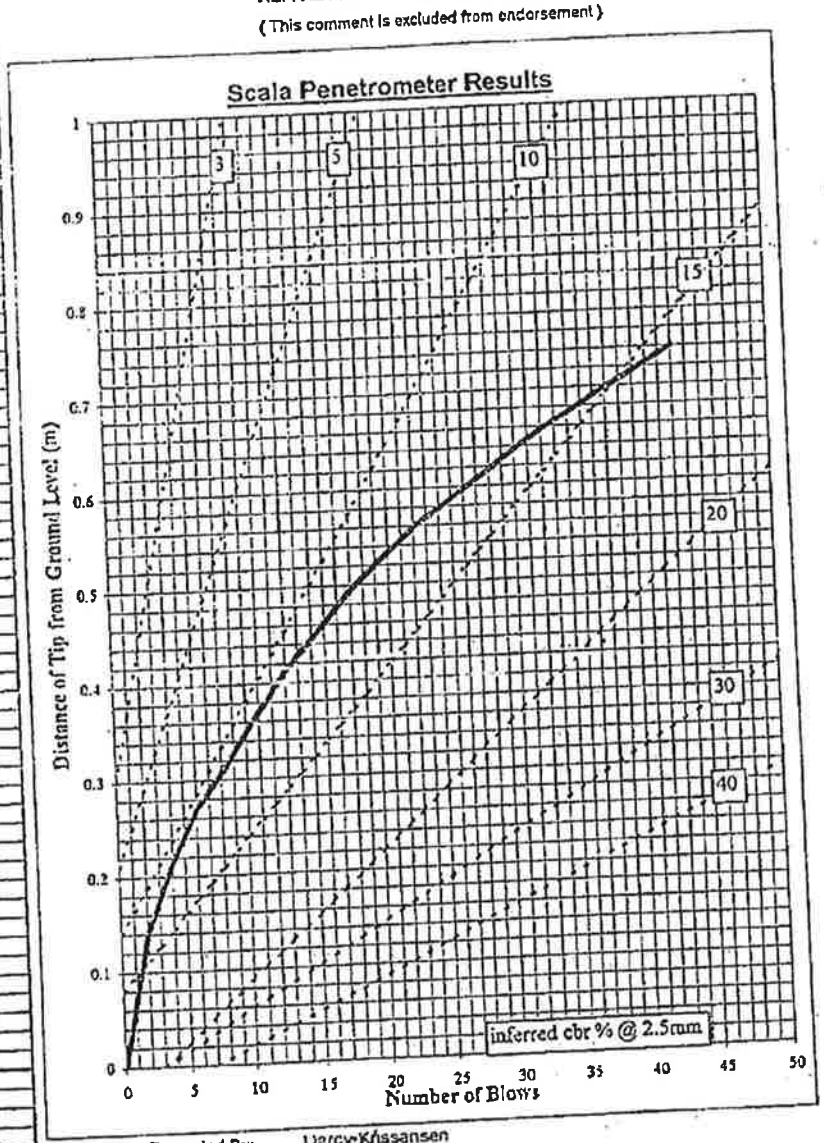
NZS 4402 : 1988 Test 6.5.2

Job No:	8020-415
nt:	Cook Costello Ltd
:	Metcalfe developments
cation:	Mangawhai
ound level:	~ 400mm below GL

Scala No:	SP4
Ref.:	7924
Report No.:	.04-22
Page:	5 of 42

Slope of the line is the suggested correlation of
e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

ws	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
	92.1	0	0	0
	78	2	70.5	0.14
	70.7	4	36.5	0.21
	65.1	6	28	0.27
	61.4	8	18.5	0.31
	50.9	13	21	0.41
	42.6	18	15.6	0.50
	[illegible]	23	12.6	0.58
	[illegible]	28	9.6	0.67
	[illegible]	33	10	0.67
	22.3	38	8.2	0.75
	13.1	43	8.4	0.74



Recorded By: Darcy Krissansen
Date: 19/11/2003
Checked By:
Date: 8/3/04

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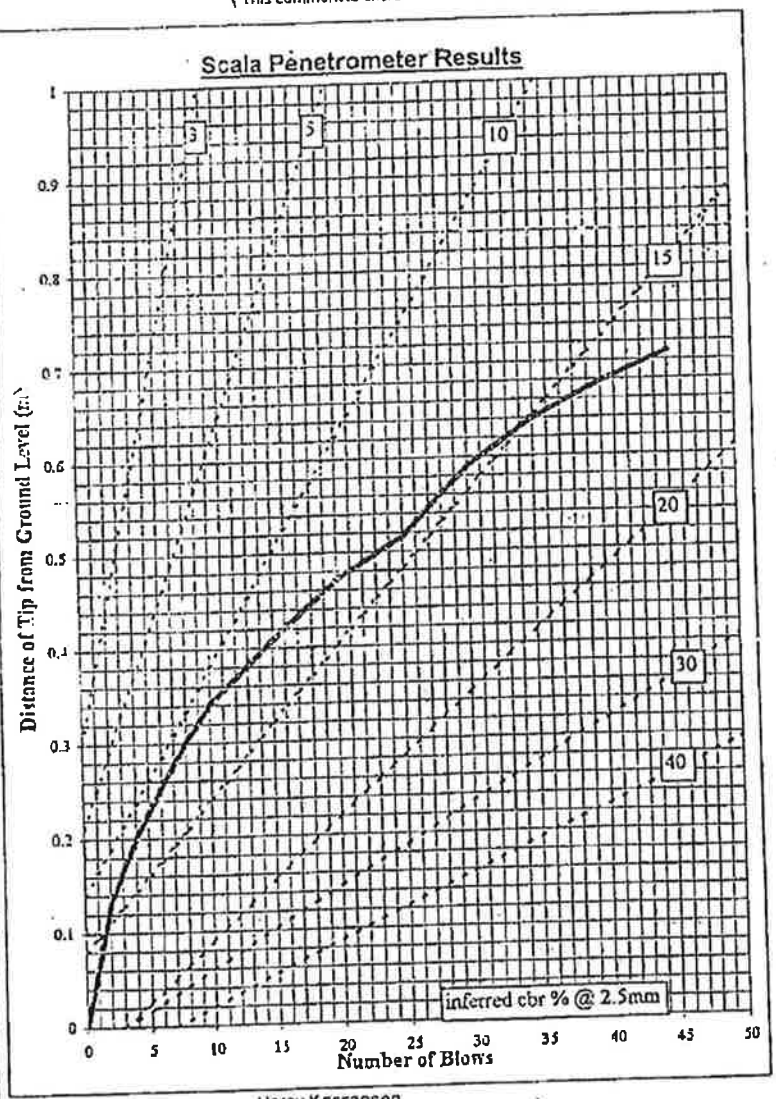
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP5
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	6 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	90.3	0	0	0
2	77.2	2	65.5	0.13
2	70.2	4	35	0.20
2	64.9	6	26.5	0.25
2	60.1	8	24	0.30
2	56.1	10	20	0.34
5	49.5	15	13.2	0.41
[redacted]	43.2	20	12.6	0.47
[redacted]	32.7	25	9	0.53
5	31.3	30	14.6	0.58
5	26.5	35	15	0.64
5	22.5	40	7.6	0.68
5	19.4	45	6.2	0.71



Recorded By: Darcy Knssansen
Date: 19/11/2003
Checked By:
Date: 8/3/04

NSMTL Test 23
5/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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DYNAMIC CONE (SCALA) PENETROMETER

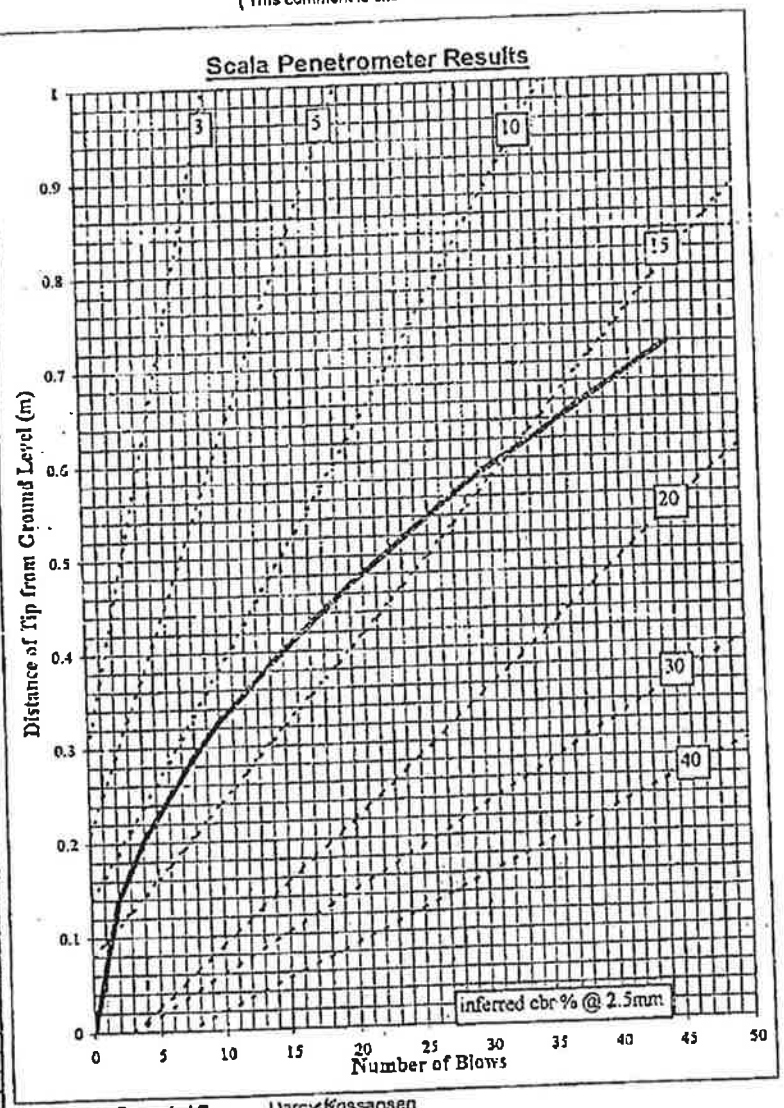
NZS 4402 : 1988 Test 6.5.2

lb Job No:	8020-415
lient:	Cook Costello Ltd
ob:	Metcalfe developments
ocation:	Mangawhai
round level:	~ 400mm below GL

Scala No:	SP6
Ref.:	7924
Report No.:	04-22
Page:	7 of 42

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. lows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	93.8	0	0	0
2	80	2	69	0.14
2	73.5	4	32.5	0.20
2	69	6	22.5	0.25
2	64.7	8	21.5	0.29
2	61.1	10	18	0.33
5	53.7	15	14.6	0.40
5	46.9	20	13.6	0.47
5	41	25	11.8	0.53
5	35.4	30	11.2	0.58
5	31.1	35	8.6	0.63
5	25.4	40	9.4	0.67
5	21.9	45	9	0.72



Recorded By: Darcy Krissansen
Date: 19/11/2003
Checked By:
Date:

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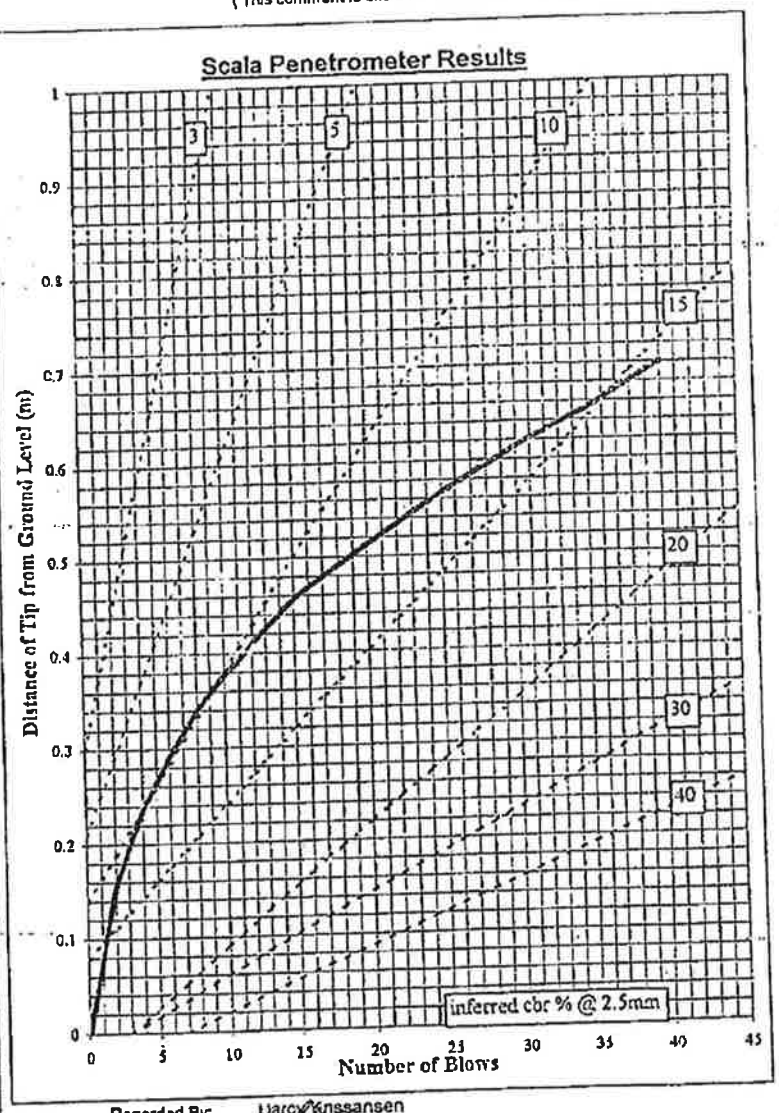
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2.

Lab Job No:	8020-415	**Scala No:**	SP7
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	8 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	68.9	0	0	0
2	73.2	2	78.5	0.16
2	65.2	4	40	0.24
2	59.6	6	28	0.29
2	54.8	8	24	0.34
2	51.1	10	18.5	0.38
5	43.2	15	15.8	0.46
5	37.6	20	11.2	0.51
5	33.2	25	10.8	0.55
5	27.5	30	9.4	0.61
5	23.6	35	7.8	0.65
5	18.9	40	9.4	0.70



Recorded By: Darcy Krissansen
Date: 19/11/2003
Checked By:
Date: 8/3/04

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5/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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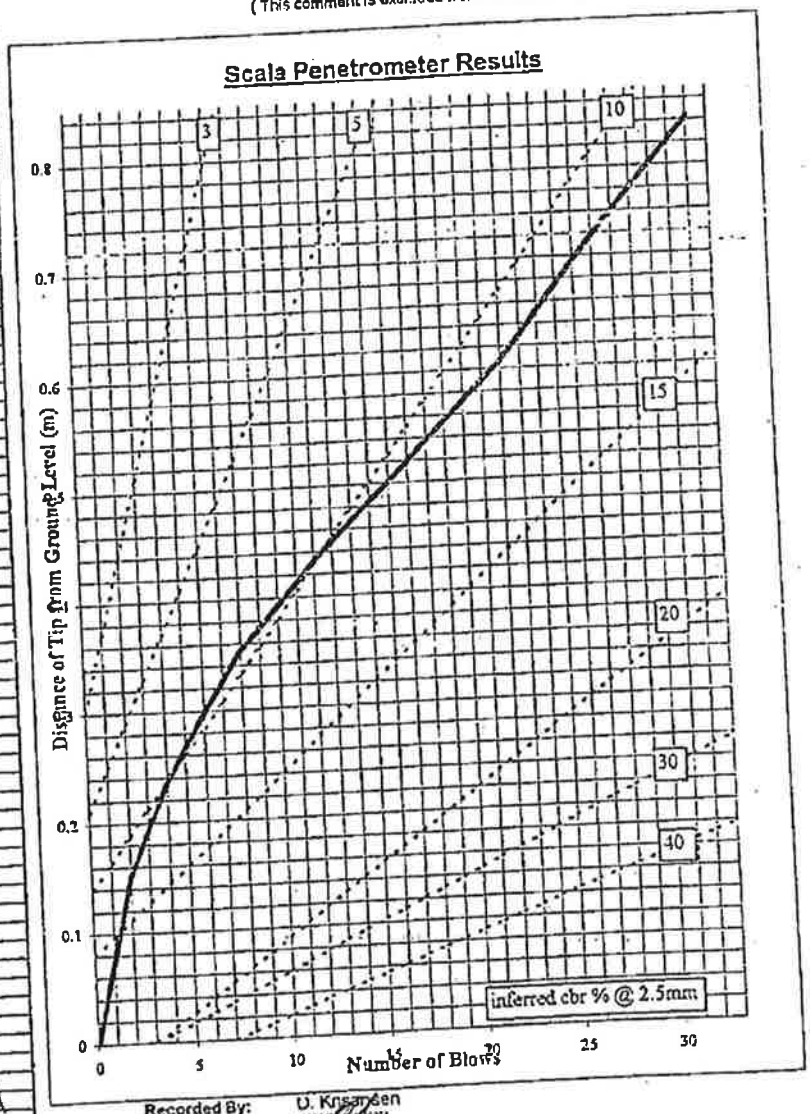
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	Scala No:	SP8
Client:	Cook Costello Ltd	Ref.:	7924
Job:	Metcalfe developments	Report No.:	04-22
Location:	Mangawhai	Page:	9 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	92.5	0	0	0
2	77.3	2	76	0.15
2	65.6	4	42.5	0.24
2	62.6	6	31	0.30
2	57.1	8	27.5	0.35
2	53.2	10	19.5	0.39
2	49.3	12	19.5	0.43
5	40.5	17	17.6	0.52
5	31.7	22	17.6	0.61
5	26.7	27	22	0.72
5	16.2	32	21	0.62



Recorded By: D. Krissansen
Date: 2003
Checked By:
Date: 8/5/04

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NSMTL Test 23
5/03/2004
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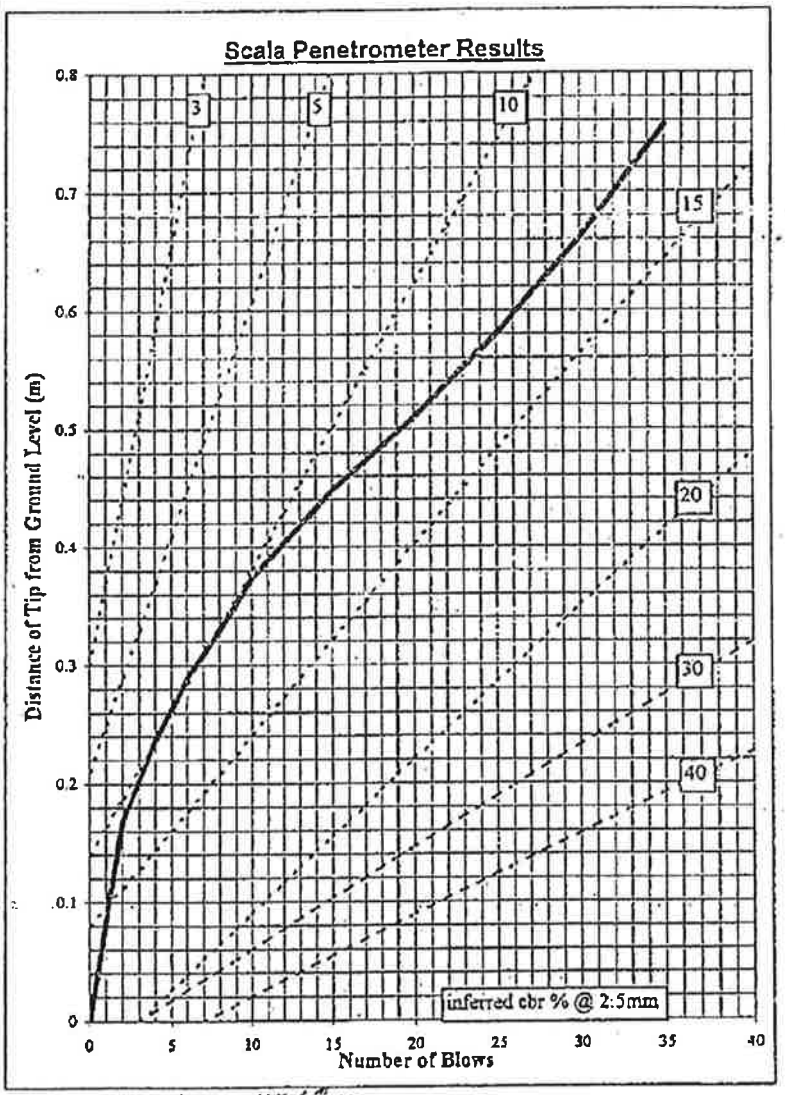
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	Scala No:	SP3
Client:	Cook Costello Ltd	Ref.:	7924
Job:	Metcalfe developments	Report No.:	04-22
Location:	Mangawhai	Page:	10 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF; NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	90.2	0	0	0
2	73.3	2	84.5	0.17
2	66.4	4	34.5	0.24
2	61.3	6	25.5	0.29
2	57.2	8	20.5	0.33
2	52.8	10	22	0.37
5	45.4	15	14.8	0.45
5	39.2	20	12.4	0.51
5	32.2	25	14	0.58
5	24.1	30	16.2	0.66
5	14.6	35	19	0.76



Recorded By: D Krissansen
Date: 20/11/2003
Checked By:
Date: 5/12/04

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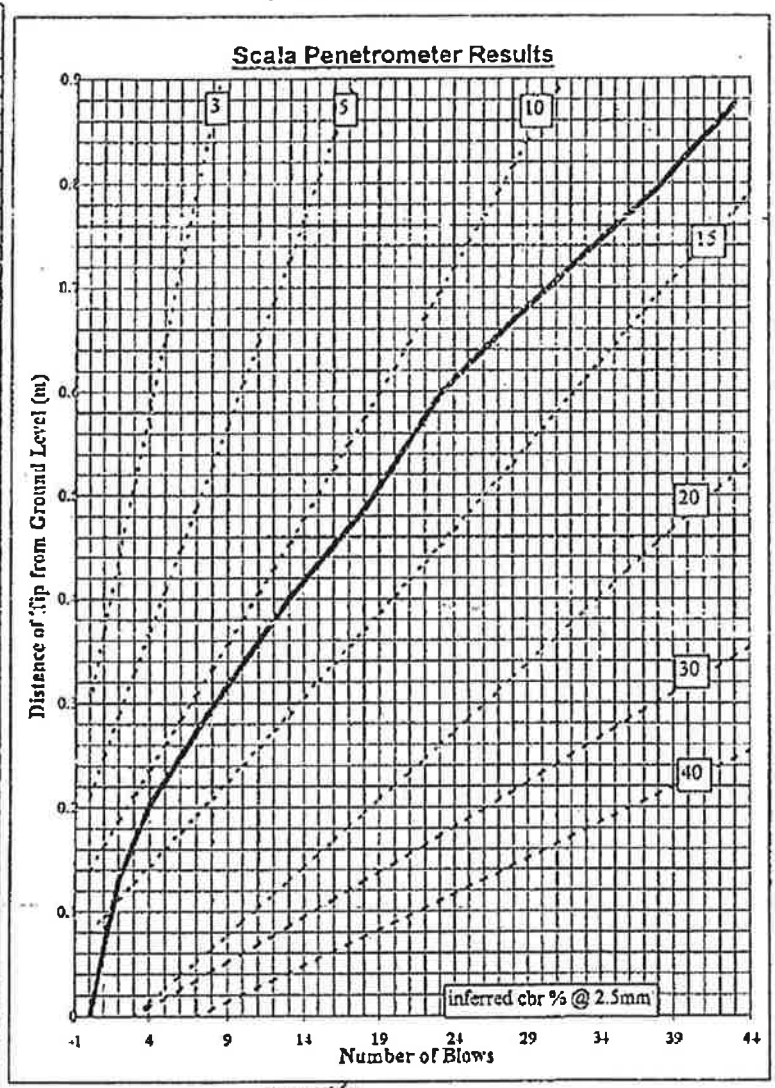
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP10
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	11 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,5) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	54.8	0	0	0
2	61.5	2	65.5	0.13
2	74.3	4	38	0.19
2	89.7	6	33	0.25
2	65	8	23.5	0.30
5	54.5	13	21	0.40
5	49	18	17	0.49
5	34.9	23	22.2	0.60
5	27.6	28	19.2	0.57
5	21.3	33	15	0.73
5	15.1	38	12.4	0.80
5	7	43	16.2	0.86



Recorded By: Steve White
Date: 21/[illegible]/2003
Checked By:
Date: 8/3/04

NSMTL Test 23
5/03/2004
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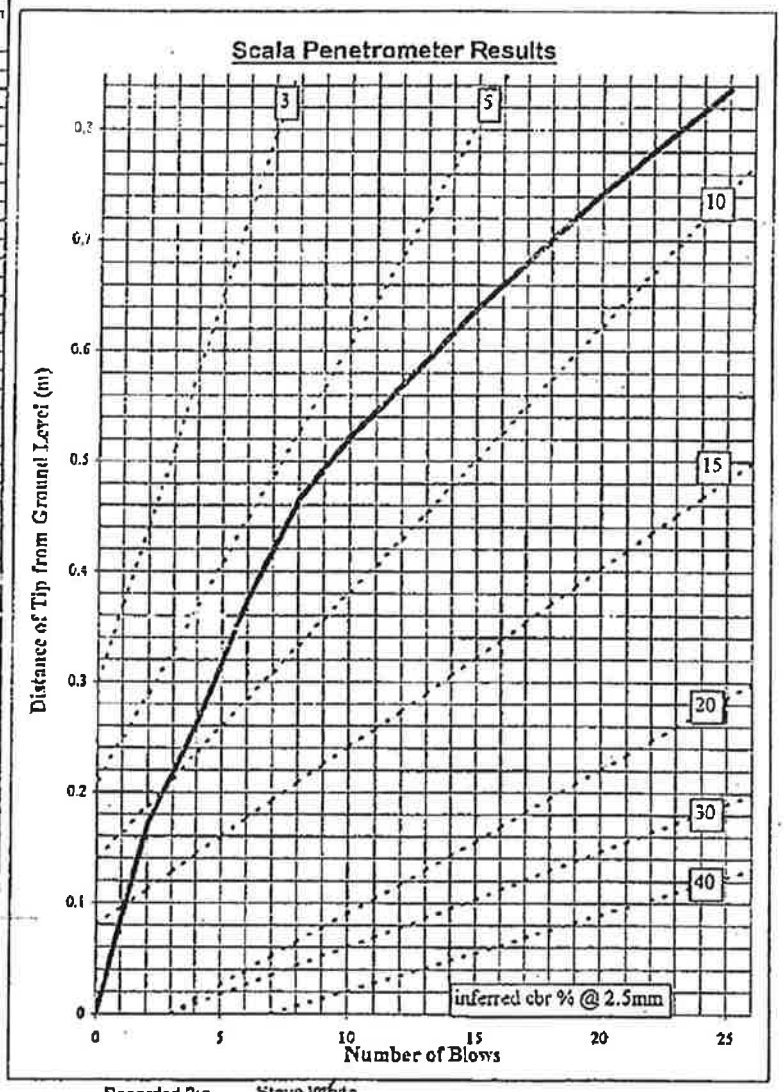
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402: 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP11
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	12 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	90.1	0	0	0
2	77.9	2	86	0.17
2	68.8	4	45.5	0.26
2	57.7	6	55.5	0.37
2	43.6	8	45.5	0.47
2	42.9	10	28.5	0.52
5	31.2	15	23.4	0.64
5	20.8	20	20.8	0.74
5	11.5	25	18.6	0.84



Recorded By: Steve White
Date: 21/[illegible]/2003
Checked By:
Date: 8/3/04

NSMTL Test 23
5/03/2004
8020-415,7924,metcalfe, mangawhal, 19-11-03 SS31-Issue No: 1

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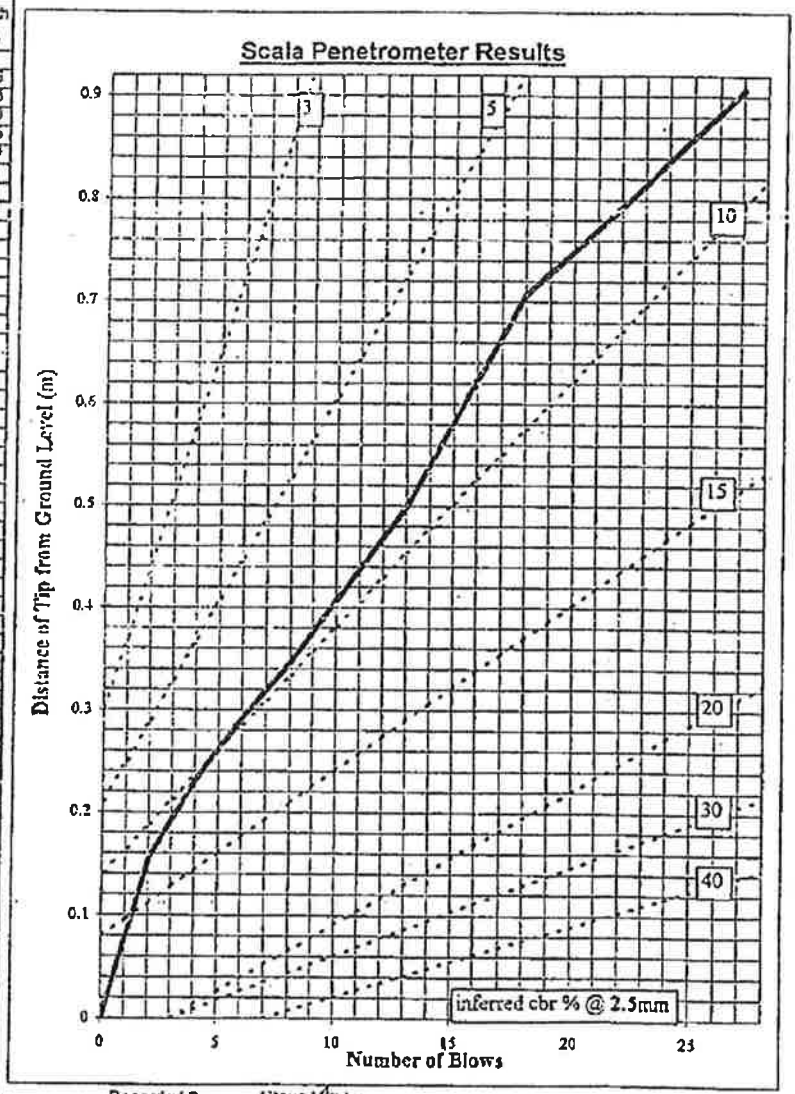
DYNAMIC CONE (SCALA)-PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP12
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	13 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	94.4	0	0	0
2	78.9	2	77.5	0.16
2	71.3	4	38	0.23
2	65.2	6	30.5	0.29
2	59.8	8	27	0.35
5	44.5	13	30.6	0.50
5	23.7	18	41.6	0.71
5	13	23	21.4	0.81
4	3.6	27	23	0.91



Recorded By: Steve White
Date: 21/[illegible]/2003
Checked By:
Date: 8/1/04

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5/03/2004
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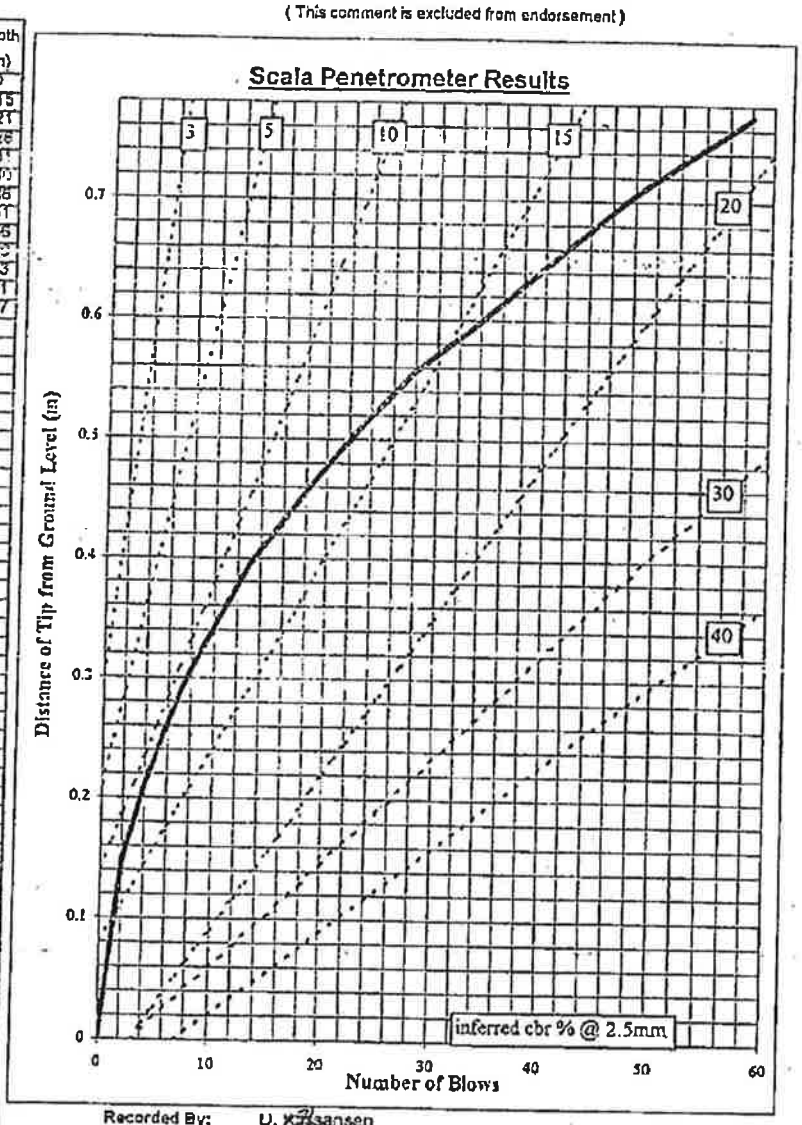
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	Scala No:	SP13
Client:	Cook Costello Ltd	Ref.:	7924
Job:	Metcalfe developments	Report No.:	04-22
Location:	Mangawhai	Page:	14 of 42
Ground level:	- 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	95.4	0	0	0
2	80.5	2	74.5	0.15
2	74.1	4	32	0.21
2	69	6	25.5	0.26
2	64.6	8	22	0.31
5	55.9	13	17.4	0.40
5	49.7	18	12.4	0.46
5	44.4	23	10.6	0.51
5	39.6	28	9.6	0.55
5	35.2	33	8.8	0.59
5	32.3	38	7.6	0.63
10	24.6	48	7.6	0.71
10	18.4	58	6.4	0.77



Recorded By: D. Krissansen
Date: 2[illegible]/2003
Checked By:
Date:

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5/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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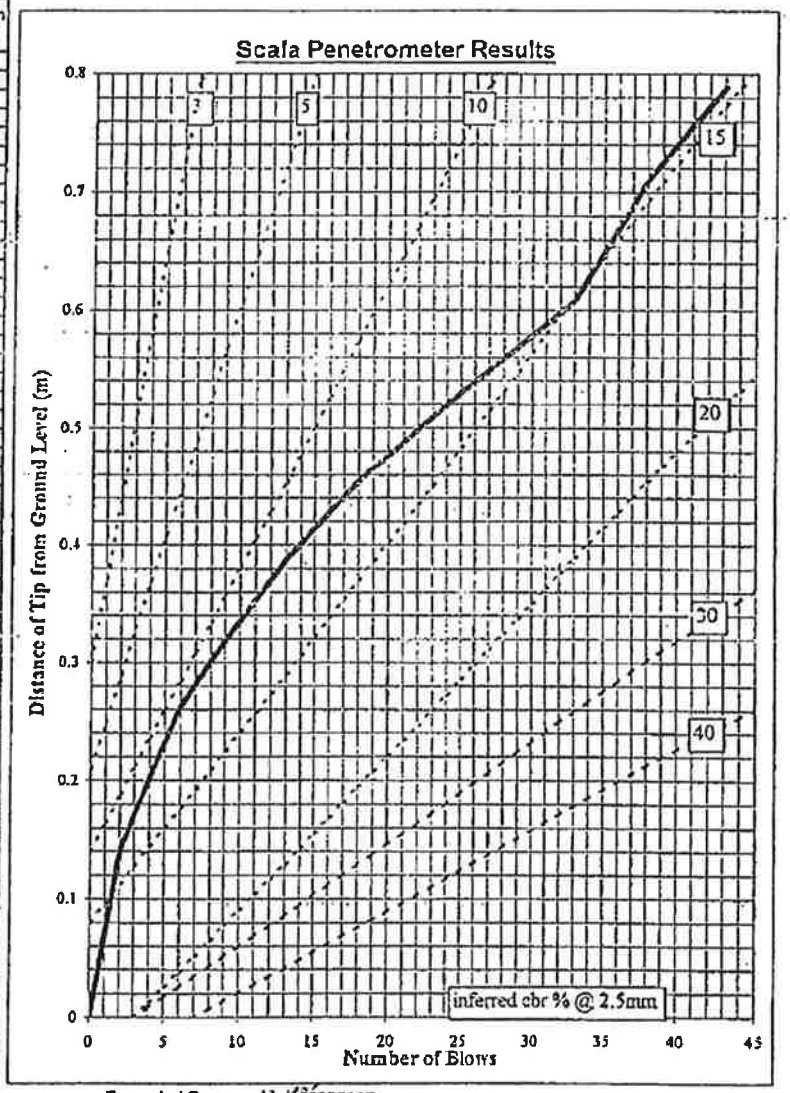
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	Scala No:	SP14
Client:	Cook Costello Ltd	Ref.:	7924
Job:	Metcalfe developments	Report No.:	04-22
Location:	Mangawhai	Page:	15 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	92.4	0	0	0
2	78.3	2	70.5	0.14
2	72.1	4	31	0.20
2	66.1	6	30	0.26
2	62.2	8	19.5	0.30
5	53.6	13	17.2	0.39
5	46.9	18	13.4	0.46
5	41.4	23	11	0.51
5	36.5	28	9.8	0.56
5	31.6	33	9.8	0.61
5	27.4	38	20.4	0.71
5	13.6	43	15.6	0.79



Recorded By: D. Krissansen
Date: 2[illegible]/12/03
Checked By:
Date:

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5/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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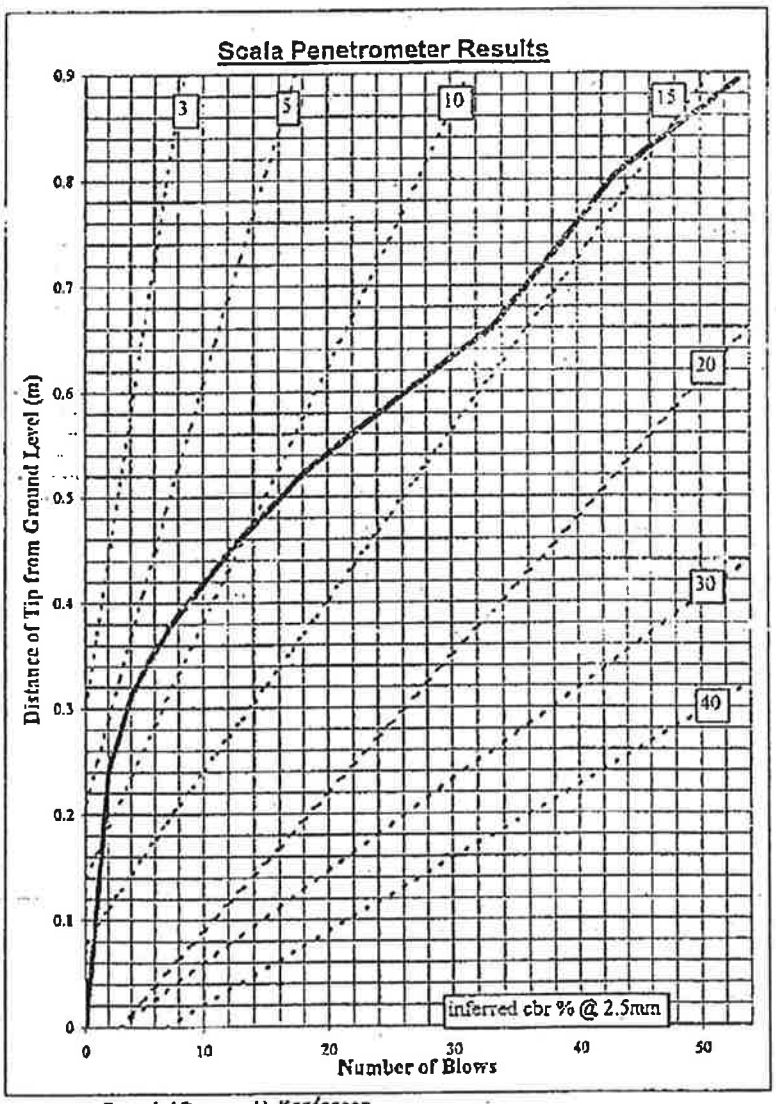
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP15
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	16 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	98.6	0	0	0
2	74.4	2	121	0.24
2	67.3	4	35.5	0.31
2	63.1	6	21	0.36
2	59.7	8	17	0.39
5	52.5	13	14.4	0.46
5	46.4	18	12.2	0.52
5	41.6	23	9.6	0.57
5	37.2	28	8.8	0.61
5	32.8	33	8.8	0.66
10	18.3	43	14.5	0.80
10	9.3	53	9	0.89



Recorded By: D. Krissansen
Date: 26/11/2003
Checked By:
Date: 5/12/04

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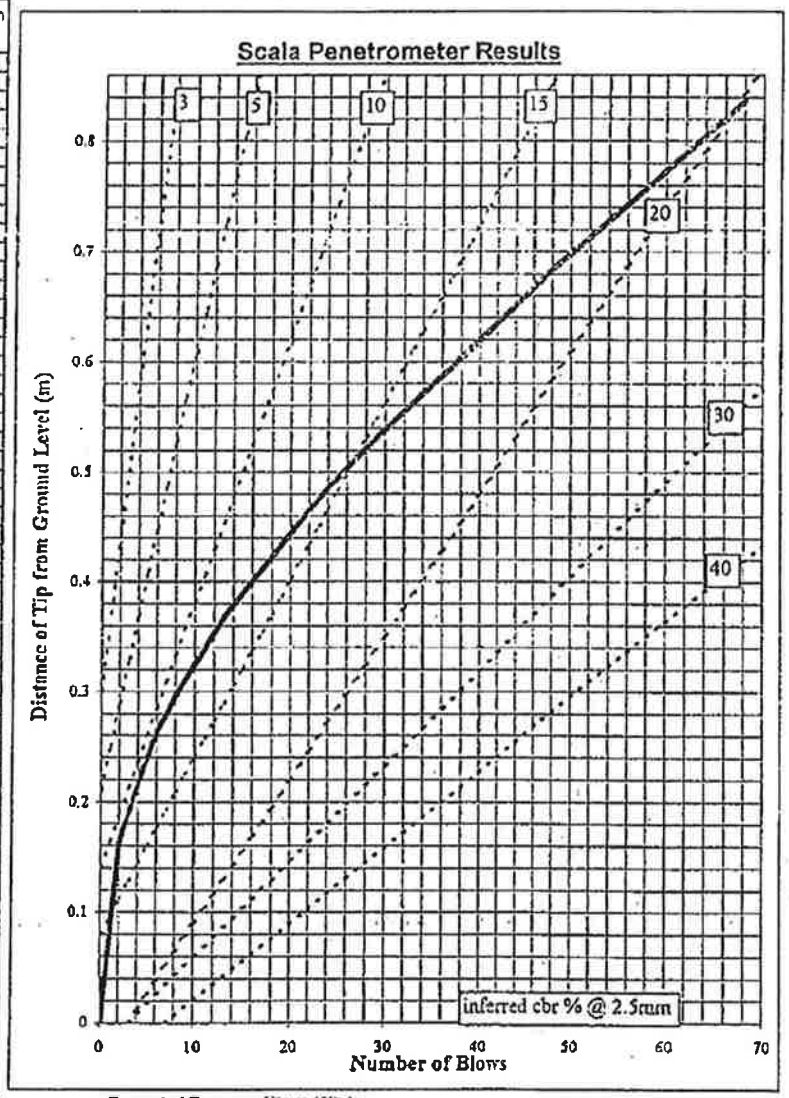
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP16
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:-**	04-22
Location:	Mangawhai ::	**Page:**	17 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	91.6	0	0	0
2	75.1	2	82.5	0.17
2	69.6	4	26.5	0.22
2	65.2	6	23	0.26
2	62	8	16	0.30
5	54.6	13	14.4	0.37
5	49.3	18	11	0.42
5	44	23	10.6	0.48
5	39.3	28	9.4	0.52
10	31.2	38	8.1	0.60
10	23.2	48	8	0.68
10	15.6	58	7.4	0.76
10	7.9	68	7.9	0.84



Recorded By: Steve White
Date: 28/[illegible]/2003
Checked By:
Date: 8/3/04

NSMTL Test 23
5/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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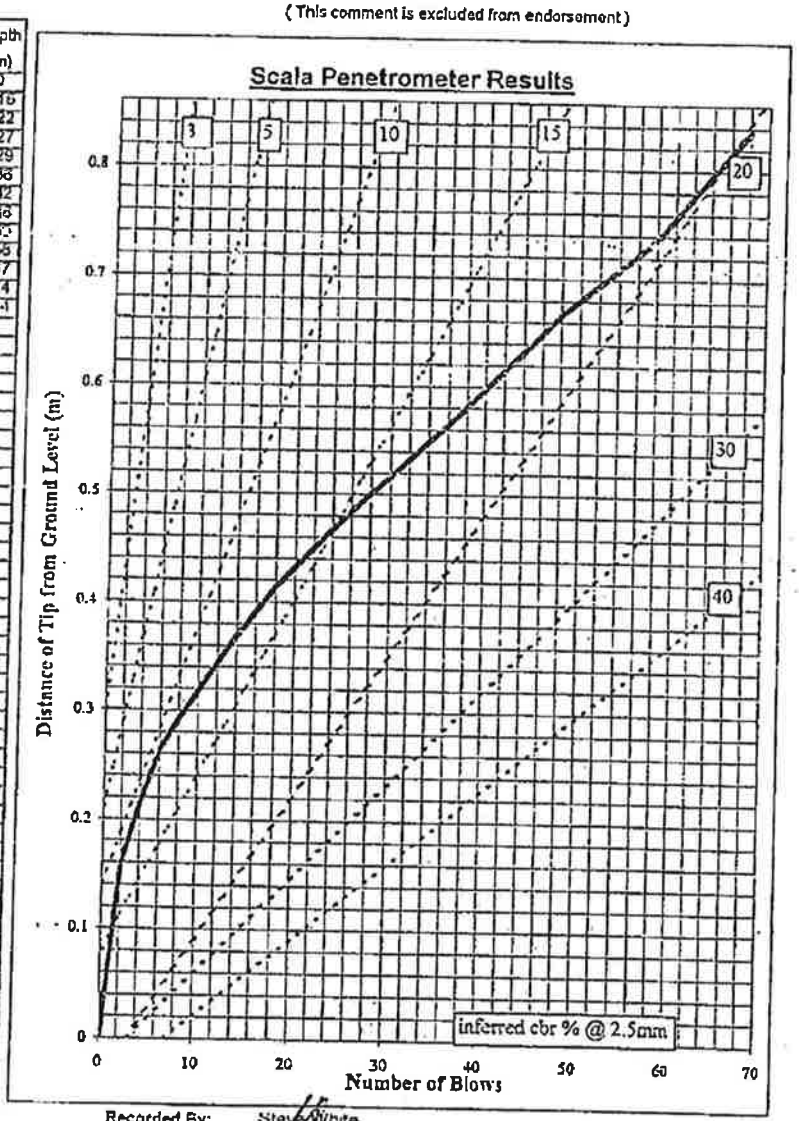
DYNAMIC CONE (SCALA)-PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP17
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	18 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of
s (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	89.5	0	0	0
2	73.7	2	79	0.16
2	67.9	4	29	0.22
2	63	6	24.5	0.27
2	60.2	8	14	0.29
5	53.7	13	13	0.36
5	48	18	11.4	0.42
5	43.6	23	8.8	0.46
5	39.4	28	8.4	0.50
10	31.4	38	8	0.58
10	22.8	48	8.6	0.67
10	15.7	58	7.1	0.74
10	5.9	68	9.8	0.84



Recorded By: Steve White
Date: 29/11/2003
Checked By:
Date: 15/1/04

NSMTL Test 23
15/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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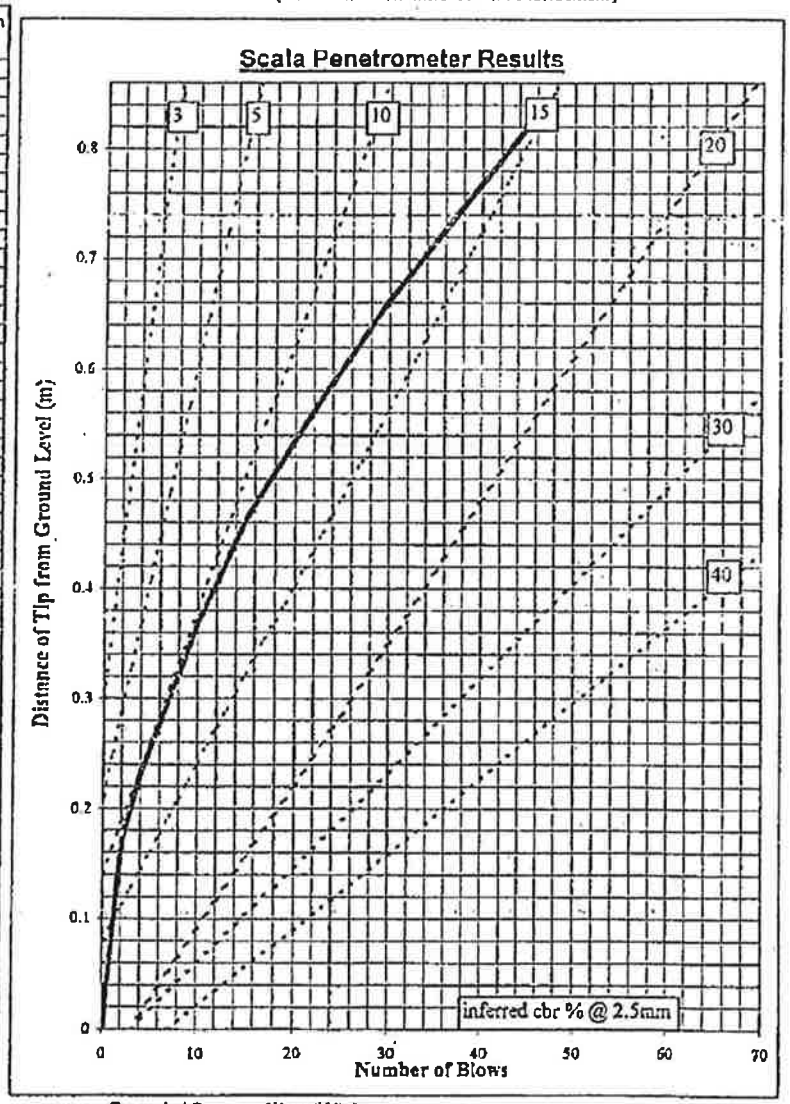
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP18
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	19 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	94.7	0	0	0
2	77.7	2	85	0.17
2	71.5	4	31	0.23
2	65.5	6	23	0.28
2	62.3	8	22	0.32
2	57.8	10	23.5	0.37
5	48.5	15	18.6	0.46
5	41.1	20	14.8	0.54
5	34.8	25	12.6	0.60
5	28.4	30	12.4	0.66
5	23.1	35	10.6	0.72
10	12.6	45	10.5	0.82



Recorded By: Steve White
Date: 8/12/2003
Checked By:
Date: 8/12/04

NSMTL Test 23
5/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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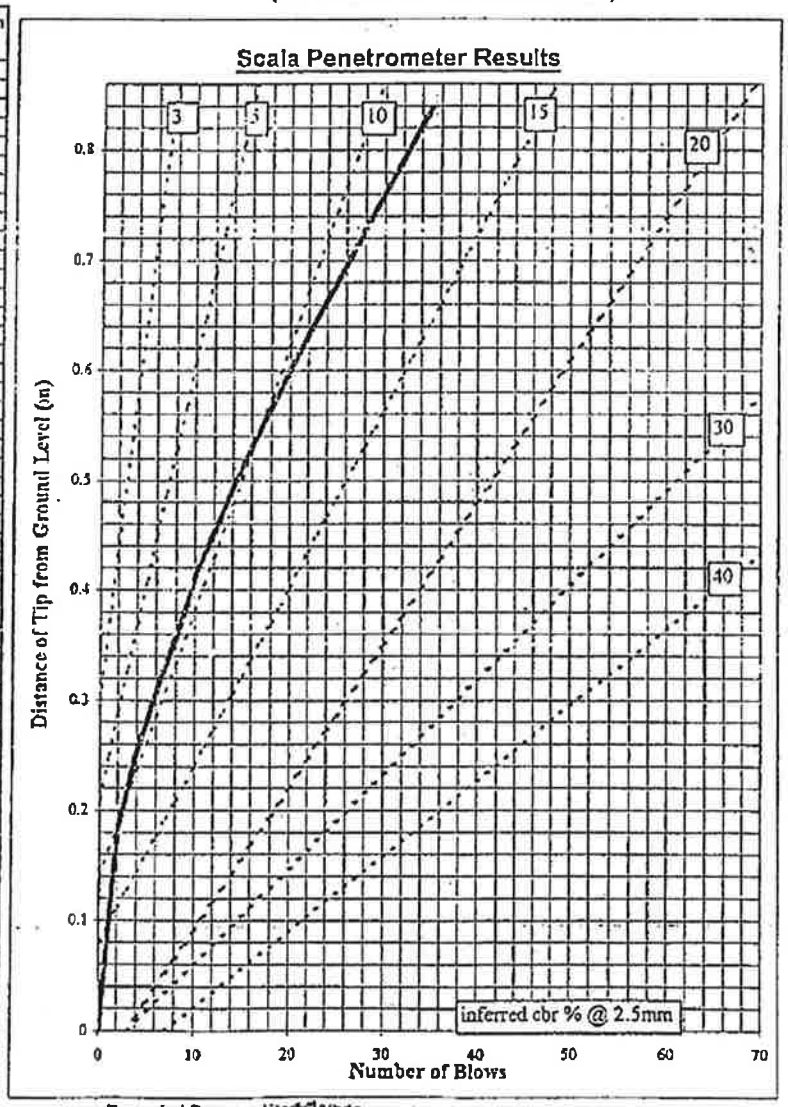
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	6020-415	Scala No:	SP19
Client:	Cook Costello Ltd	Ref.:	7924
Job:	Metcalfe developments	Report No.:	04-22
Location:	Mangawhai	Page:	20 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	94.2	0	0	0
2	79.8	2	82	0.18
2	66.7	4	33.5	0.26
2	63.4	6	25.3	0.31
2	58.4	8	25	0.36
2	52.9	10	27.5	0.41
5	42.9	15	20	0.51
5	34	20	17.8	0.60
5	25.2	25	15.6	0.69
5	18.1	30	15.2	0.76
5	10.3	35	15.6	0.84



Recorded By: Steve White
Date: 8/[illegible]/03
Checked By:
Date: 4/3/04

NSMTL Test 23
5/03/2004
6020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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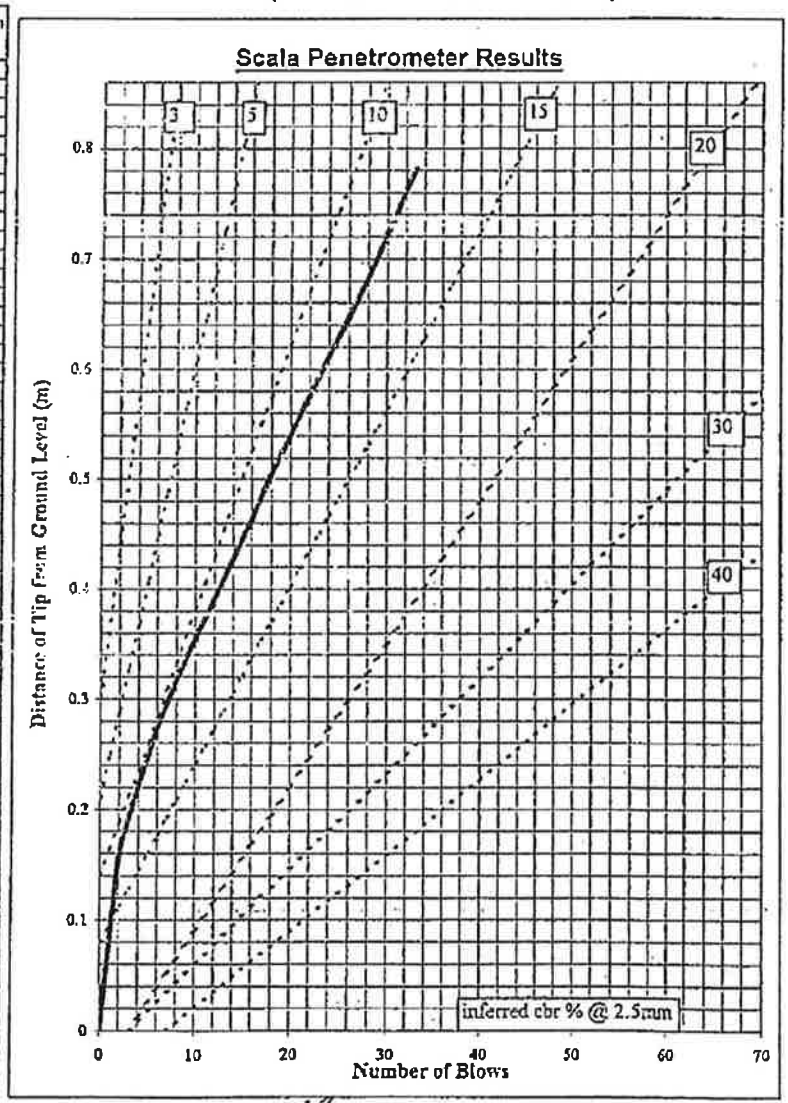
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP20
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	21 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of
a (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	93.8	0	0	0
2	77.4	2	82	0.16
2	71.4	4	30	0.22
2	66.3	6	25.5	0.28
2	62	8	21.5	0.32
2	58.2	10	19	0.36
2	54.8	12	18	0.39
2	51	14	18	0.43
2	47.2	16	21	0.47
2	43.2	18	21	0.51
5	34.4	23	17.6	0.59
5	25.4	28	18	0.68
5	15.6	33	19.6	0.78



Recorded By: D. Krissansen
Date: 12/11/2003
Checked By:
Date: 6/1/04

NSMTL Test 23
5/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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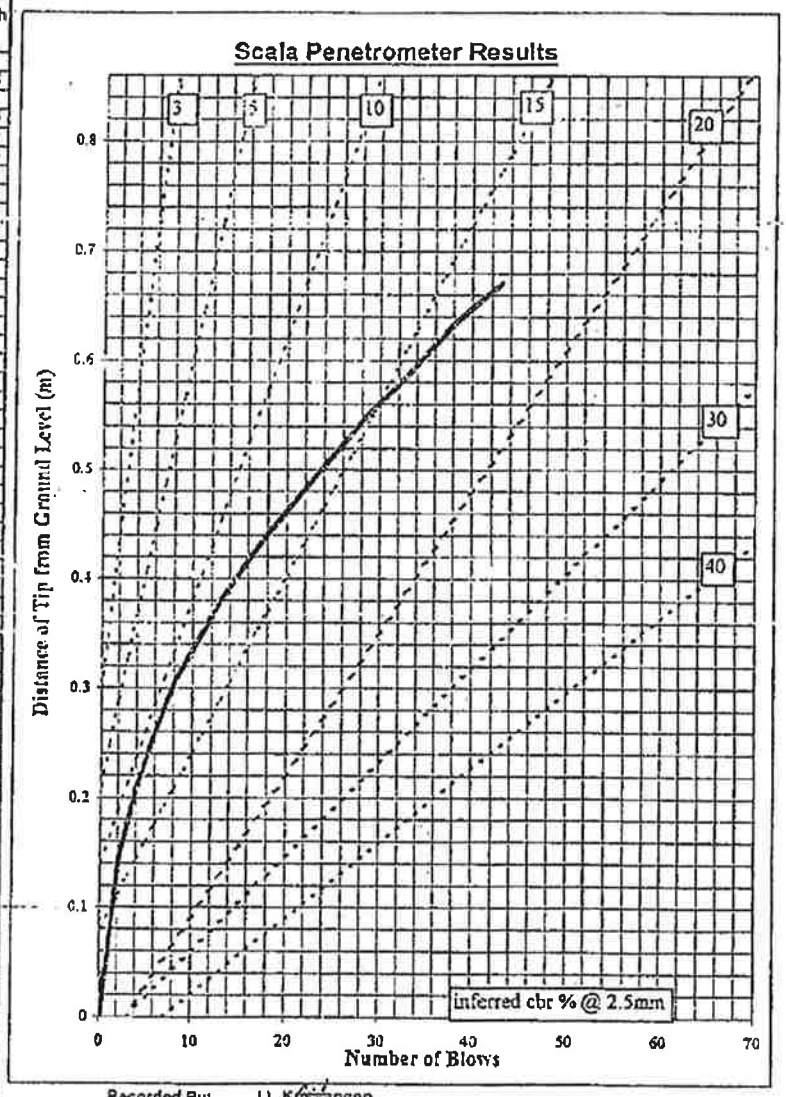
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP21
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	22 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	92.4	0	0	0
2	78.2	2	71	0.14
2	71.3	4	34.5	0.21
2	66.4	6	24.5	0.26
2	61.9	8	22.5	0.31
5	54.3	13	15.2	0.36
5	48.2	18	12.2	0.44
5	43	23	10.4	0.49
5	37.9	28	10.2	0.55
5	33.7	33	8.4	0.59
5	29.1	38	9.2	0.63
5	25.3	43	7.6	0.67



Recorded By: D. Krissansen
Date: 12/11/XXXX
Checked By:
Date: 9/12/04

NSMTL Test 23
8/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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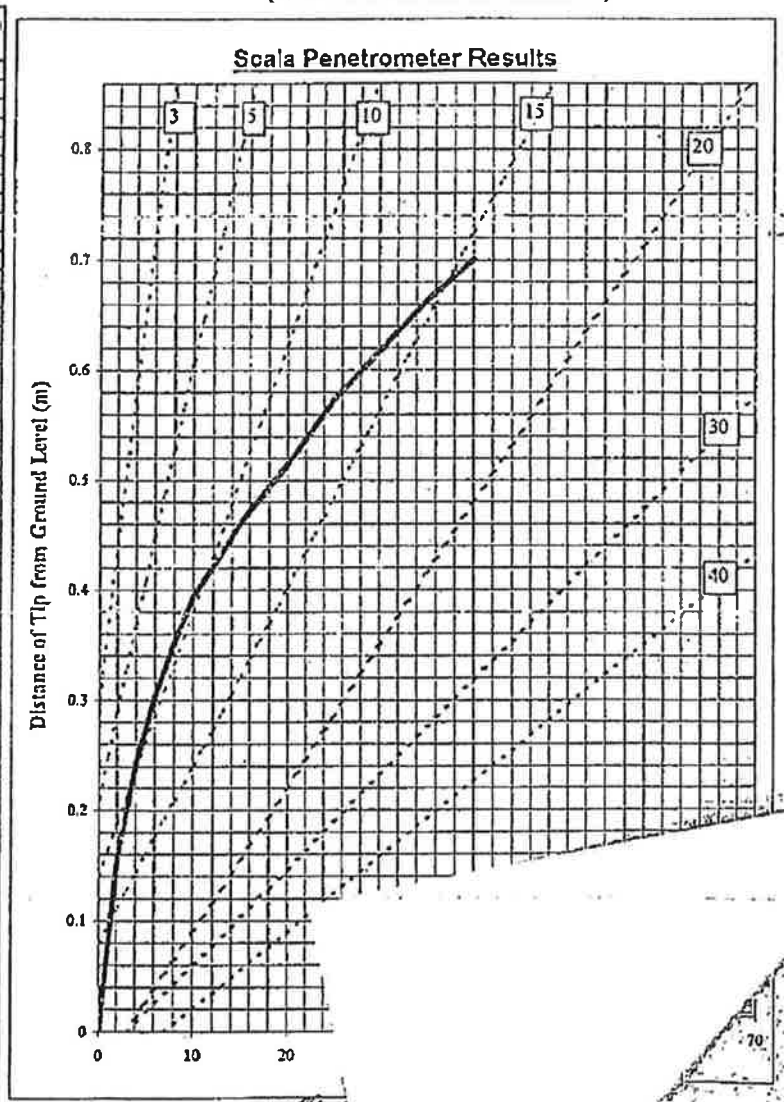
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	Scala No:	SP22
Client:	Cook Costello Ltd	Ref.:	7924
Job:	Metcalfe developments	Report No.:	04-22
Location:	Mangawhai	Page:	23 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	89.9	0	0	0
2	74.2	2	78.5	0.16
2	65.5	4	43.5	0.24
2	59.6	6	29.5	0.30
2	54.6	8	25	0.35
2	50.4	10	21	0.40
5	43.7	15	13.4	0.48
5	38.4	20	10.6	0.52
5	32.9	25	11.0	0.57
5	28.2	30	9.4	0.62
5	23.6	35	9.2	0.66
5	19.8	40	7.6	0.70



Recorded By: D. Krissansen
Date: 19/11/2003
Checked By:
Date: 4/3/04

NSMTL Test 23
8/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03

SS31-Issue No. 1

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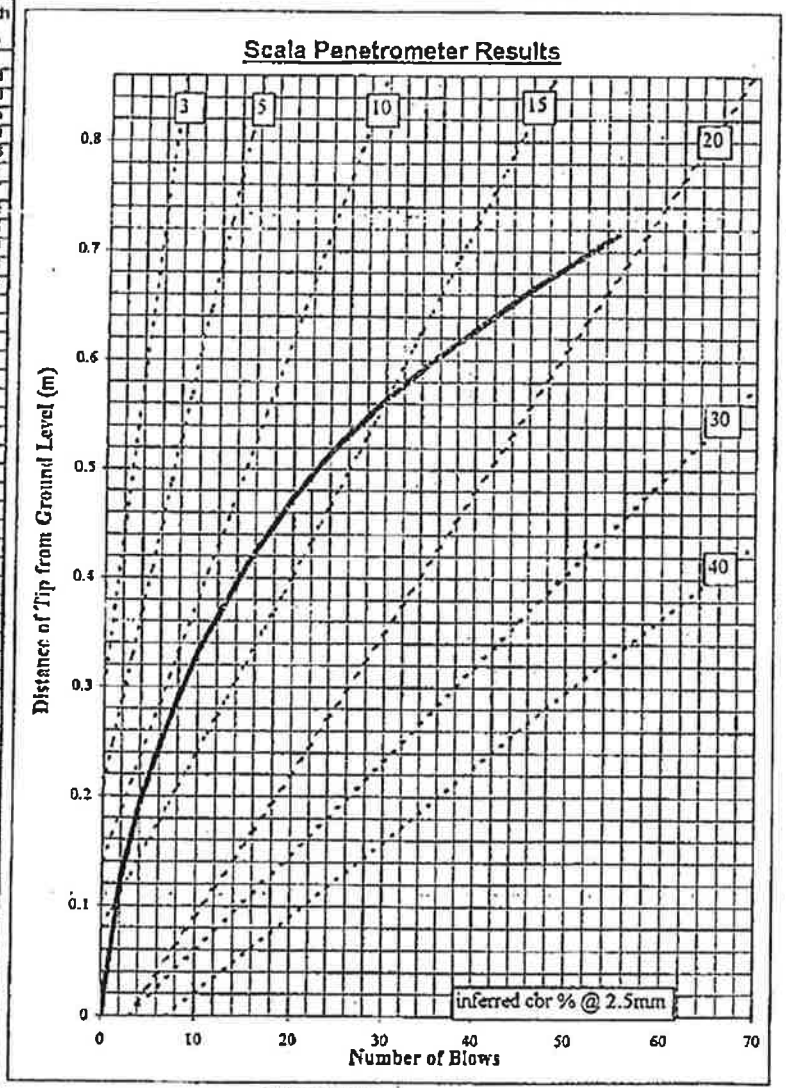
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	Scala No:	SP23
Client:	Cook Costello Ltd	Ref.:	7924
Job:	Metcalfe developments	Report No.:	04-22
Location:	Mangawhai	Page:	24 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,8) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	80.9	0	0	0
2	78.4	2	62.5	0.13
2	71.4	4	35	0.20
2	66.2	6	26	0.25
2	61.8	8	22	0.29
2	57.6	10	21	0.33
5	49.7	15	15.8	0.41
5	43.5	20	12.4	0.47
5	38.7	25	10.2	0.52
5	34.5	30	7.8	0.56
5	31.1	35	6.8	0.60
10	25	45	6.1	0.65
10	19.4	55	5.6	0.72



Recorded By: D. Krissansen
Date: 19/11/2003
Checked By:
Date: 27/1/04

NSMTL Test 23
8/03/2004
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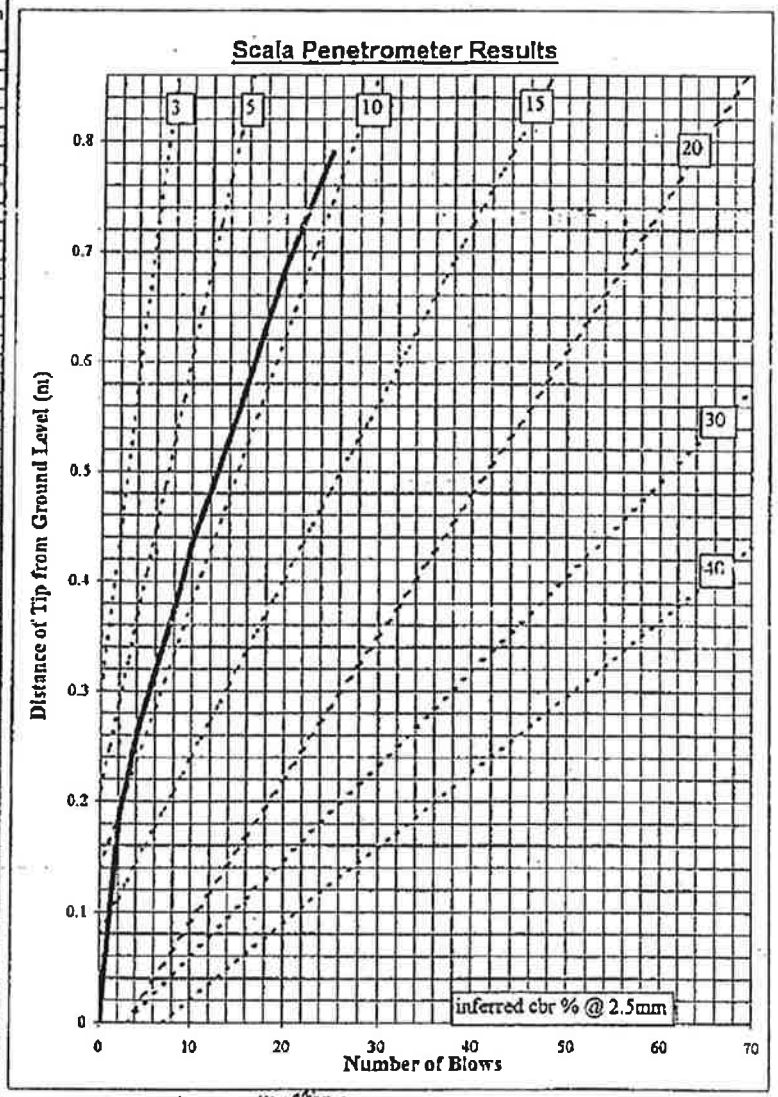
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP24
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	25 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	84.7	0	0	0
2	66.1	2	93	0.19
2	58.5	4	38	0.26
2	52.8	6	28.5	0.32
2	47.2	8	28	0.38
2	41.2	10	30	0.44
5	29.1	15	24.2	0.56
5	16	20	26.2	0.69
5	5.9	25	20.4	0.79



Recorded By: Steve White
Date: 13/11/2004
Checked By:
Date: 8/3/04

NSMTL Test 23
8/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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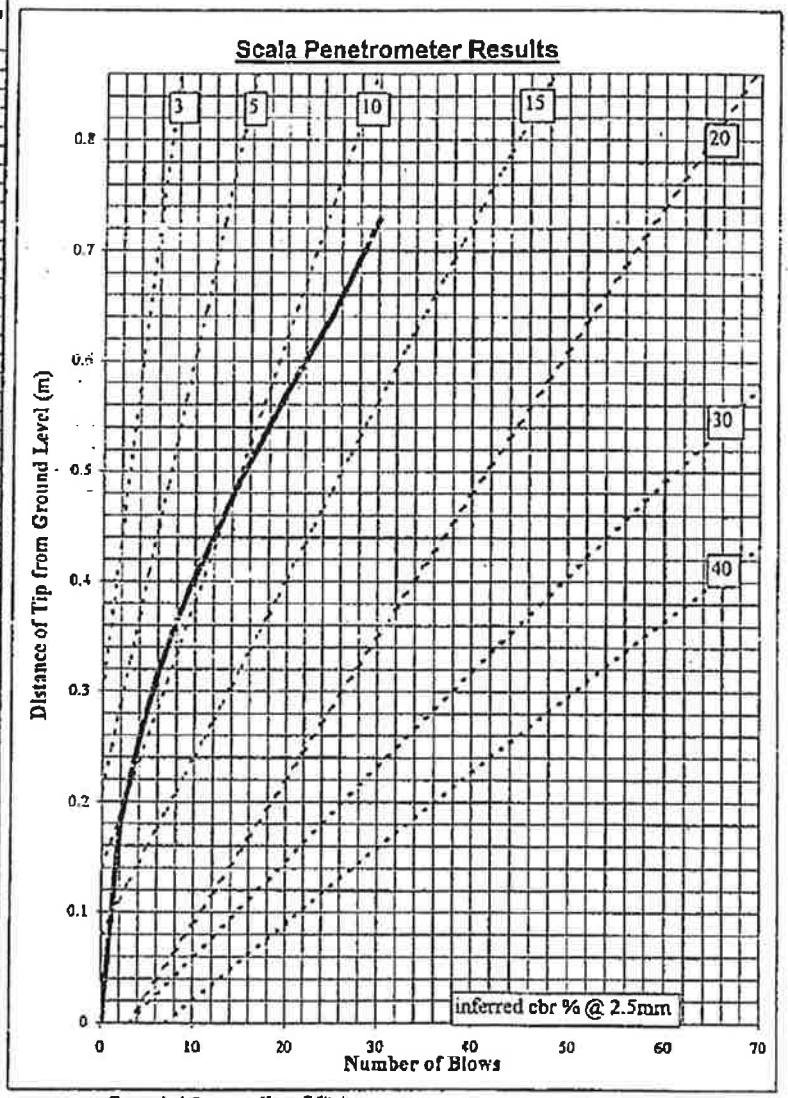
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP25
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	26 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	86.3	0	0	0
2	67.9	2	92	0.18
2	60.6	4	36.5	0.25
2	54.5	6	30	0.32
2	49.8	8	24	0.37
2	45.8	10	20	0.41
5	38.8	15	16	0.50
5	29	20	15.6	0.57
5	22.1	25	13.8	0.64
5	15.5	30	17.2	0.73



Recorded By: Steve White
Date: 13/11/2004
Checked By:
Date: 4/5/04

NSMTL Test 23
8/03/2004
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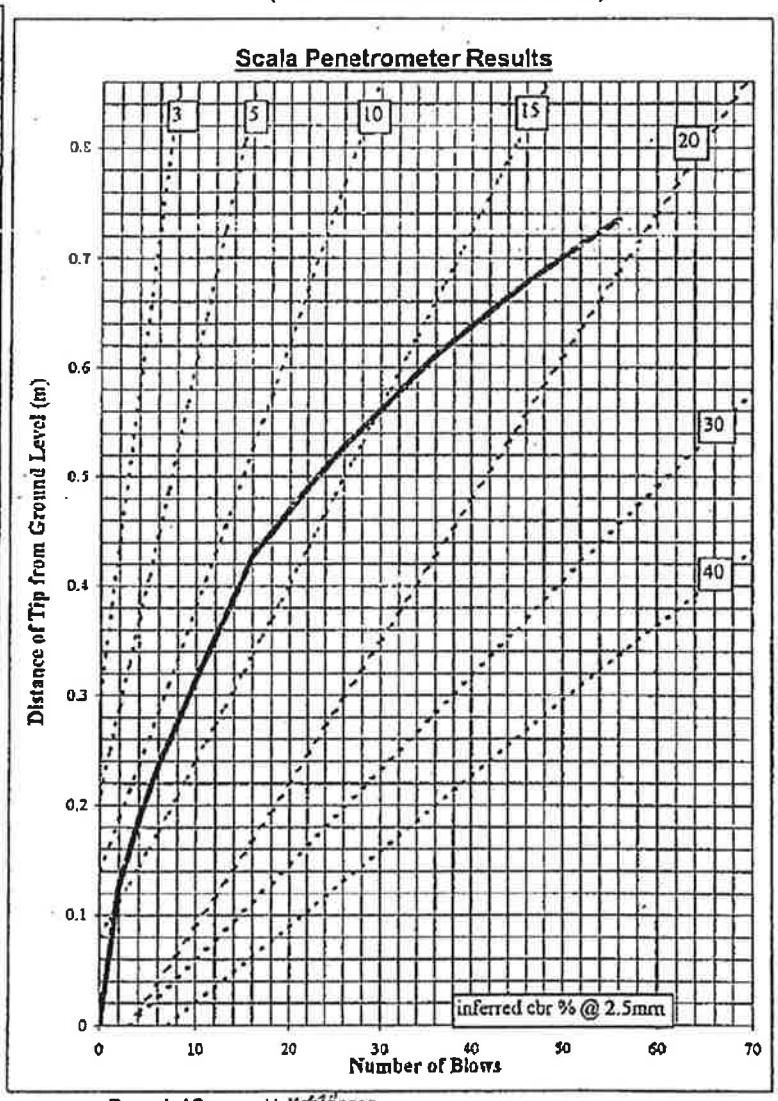
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP26
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	27 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	85.4	0	0	0
2	72.7	2	63.5	0.13
2	66.6	4	30.5	0.19
2	61.7	6	24.5	0.24
5	51.9	11	19.6	0.34
5	42.6	16	18.6	0.43
5	37.4	21	10.4	0.48
5	32.6	26	9.6	0.53
10	24.3	36	8.2	0.61
10	17.6	46	6.7	0.68
10	11.9	56	5.7	0.74



Recorded By: D. Krissansen
Date: 18/11/2004
Checked By:
Date: 1/12/04

NSMTL Test 23
8/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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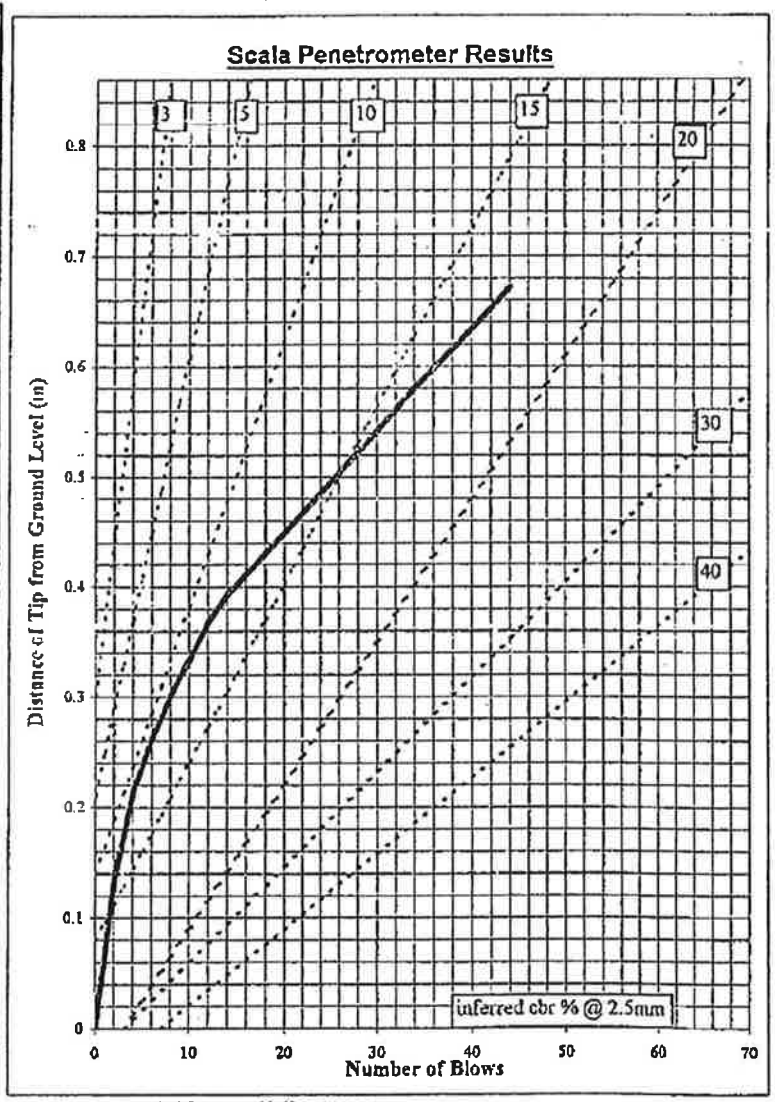
DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 : 1988 Test 6.5.2

Lab Job No:	8020-415	**Scala No:**	SP26
Client:	Cook Costello Ltd	**Ref.:**	7924
Job:	Metcalfe developments	**Report No.:**	04-22
Location:	Mangawhai	**Page:**	28 of 42
Ground level:	~ 400mm below GL		

Slope of the line is the suggested correlation of e (mm/blow) and CBR after STOCKWELL
REF: NZ ENGINEERING (32,6) 15 June 1977
(This comment is excluded from endorsement)

No. Blows	Tip to ref (cm)	Total Blows	mm/blow	depth (m)
0	85.5	0	0	0
2	72.2	2	66.5	0.13
2	64.1	4	40.5	0.21
2	59.3	6	24	0.26
2	55.4	8	19.5	0.30
2	52.1	10	16.5	0.33
2	48.7	12	17	0.37
2	46.2	14	12.5	0.39
5	41.5	19	9.4	0.44
5	37	24	9	0.49
5	32.3	29	9.4	0.53
5	27.5	34	9.6	0.58
5	23	39	9	0.63
5	18.3	44	9.4	0.67



Recorded By: D. Krissansen
Date: 12/[illegible]/2004
Checked By:
Date: 5/3/04

NSMTL Test 23
8/03/2004
8020-415,7924,metcalfe, mangawhai, 19-11-03 SS31-Issue No: 1

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PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

8020-415
Cook Costello Ltd
Metcalfe Developments
Mangawhai
7924
04-22

Tested By: S White
Date: 18/11/03
Checked By:
Date:
Page: 29 of 42

ty: 2.7 t/m³ (assumed) Maximum dry density: 1660 kg/m³

Site No	Test No	Bulk Density kg/m³	Dry Density kg/m³	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
-	1	1820	1530	6.0	34.1	92.3	250	-
-	2	1900	1760	8.0	20.5	106.1	250	-
-	3	1770	1680	5.0	29.1	101.4	250	-
-	4	1760	1660	4.5	30.1	101.5	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

Lab Job No:	8020-415	Tested By:	D Krissansen
Client:	Cook Costello Ltd	Date:	19/11/03
Job:	Metcalfe Developments	Checked By:	
Location:	Mangawhai	Date:	
REF:	7924	Page:	30 of 42
Report No:	04-22		

Solid Density: 2.7 t/m^3 (assumed) Maximum dry density: 1660 kg/m^3

Date	Site No	Test No	Bulk Density kg/m^3	Dry Density kg/m^3	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
19/11/03	-	5	1760	1680	5.0	29.3	101.2	150	-
19/11/03	-	6	1760	1660	6.0	28.4	99.7	150	-
19/11/03	-	7	1750	1650	6.0	29.2	99.4	150	-

D. Krissansen
Approved Signatory

AND SOIL MECHANICS
STING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

lo: 8020-415
Cook Costello Ltd
Metcalfe Developments
Mangawhai
7924
2: 04-22

Tested By: D.Krissansen
Date: 20/11/03
Checked By:
Date:
Page: 31 of 42

sity: 2.7 t/m³ (assumed) Maximum dry density: 1660 kg/m³

Site No	Test No	Bulk Density kg/m³	Dry Density kg/m³	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
-	8	1800	1700	5.5	27.6	102.6	200	-
-	9	1780	1690	5.5	28.6	101.7	200	-
-	10	1720	1630	6.0	30.4	98.0	200	-
-	11	1760	1620	9.0	25.7	97.6	200	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

Lab Job No:	8020-415	**Tested By:**	D Krissansen
Client:	Cook Costello Ltd	**Date:**	21/11/03
Job:	Metcalfe Developments	**Checked By:**	
Location:	Mangawhai	**Date:**	
REF:	7924	**Page:**	32 of 42
Report No:	04-22		

Solid Density: 2.7 t/m^3 (assumed) **Maximum dry density:** 1660 kg/m^3

Date	Site No	Test No	Bulk Density kg/m^3	Dry Density kg/m^3	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
21/11/03	-	12	1810	1710	6.0	26.2	103.0	250	-
21/11/03	-	13	1770	1680	5.5	28.4	101.2	250	-
21/11/03	-	14	1780	1700	4.5	29.2	102.5	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

Lab Job No:	8020-415	Tested By:	S White
Client:	Cook Costello Ltd	Date:	26/11/03
Job:	Metcalfe Developments	Checked By:	
Location:	Mangawhai	Date:	
REF:	7924	Page:	33 of 42
Report No:	04-22		

Solid Density: 2.7 t/m³ (assumed) Maximum dry density: 1660 kg/m³

Date	Site No	Test No	Bulk Density kg/m³	Dry Density kg/m³	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
26/11/03	-	15	1860	1740	7.0	23.1	104.5	250	-
26/11/03	-	16	1810	1680	7.5	24.9	101.2	250	-
26/11/03	-	17	1860	1730	7.0	23.3	104.5	250	-
26/11/03	-	18	1830	1690	8.5	23.1	101.9	250	-
26/11/03	-	19	1780	1670	6.5	26.9	100.8	250	-
26/11/03	-	20	1790	1670	6.5	26.9	100.8	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1; 4.2.2

Lab Job No:	8020-415	Tested By:	S White
Client:	Cook Costello Ltd	Date:	28/11/03
Job:	Metcalfe Developments	Checked By:	
Location:	Mangawhai	Date:	
REF:	7924	Page:	34 of 42
Report No:	04-22		

Solid Density: 2.7 t/m^3 (assumed) Maximum dry density: 1660 kg/m^3

Date	Site No	Test No	Bulk Density kg/m^3	Dry Density kg/m^3	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
28/11/03	-	21	1810	1710	6.0	26.6	102.7	250	-
28/11/03	-	22	1790	1660	8.0	25.6	99.8	250	-
28/11/03	-	23	1800	1710	5.5	27.7	102.9	250	-
28/11/03	-	24	1900	1760	7.5	21.4	106.2	250	-
28/11/03	-	25	1790	1650	8.5	24.8	99.2	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

Lab Job No:	8020-415	Tested By:	S White
Client:	Cook Costello Ltd	Date:	8/12/2003
Job:	Metcalfe Developments	Checked By:	
Location:	Mangawhai	Date:	
REF:	7924	Page:	35 of 42
Report No:	04-22		

Solid Density: 2.7 t/m^3 (assumed) Maximum dry density: 1660 kg/m^3

Date	Site No	Test No	Bulk Density kg/m^3	Dry Density kg/m^3	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
8/12/2003	-	26	1790	1690	6.0	27.5	101.6	250	-
8/12/2003	-	27	1840	1720	7.0	24.5	103.5	250	-
8/12/2003	-	28	1770	1660	6.5	27.9	100.0	250	-
8/12/2003	-	29	1770	1660	6.5	27.4	100.3	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

Lab Job No:	8020-415	**Tested By:**	D. Krissansen
Client:	Cook Costello Ltd	**Date:**	12/12/2003
Job:	Metcalfe Developments	**Checked By:**	
Location:	Mangawhai	**Date:**	8/3/04
REF:	7924	**Page:**	36 of 42
Report No:	04-22		

Solid Density: 2.7 t/m^3 (assumed) **Maximum dry density:** 1660 kg/m^3

Date	Site No	Test No	Bulk Density kg/m^3	Dry Density kg/m^3	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
12/12/2003	-	30	1830	1730	6.0	25.8	104.1	250	-
12/12/2003	-	31	1830	1740	5.5	26.3	104.7	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

Lab Job No:	8020-415	Tested By:	D. Krissansen
Client:	Cook Costello Ltd	Date:	18/12/2003
Job:	Metcalfe Developments	Checked By:	
Location:	Mangawhai	Date:	
REF:	7924	Page:	37 of 42
Report No:	04-22		

Solid Density: 2.7 t/m^3 (assumed) Maximum dry density: 1660 kg/m^3

Date	Site No	Test No	Bulk Density kg/m^3	Dry Density kg/m^3	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
18/12/2003	-	32	2000	1760	13.5	10.6	106.0	250	-
18/12/2003	-	33	1900	1760	8.0	20.8	105.8	250	-
18/12/2003	-	34	1780	1670	6.0	27.6	100.8	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

Lab Job No:	8020-415	Tested By:	S White
Client:	Cook Costello Ltd	Date:	13/01/2004
Job:	Metcalfe Developments	Checked By:	
Location:	Mangawhai	Date:	3/3/04
REF:	7924	Page:	38 of 42
Report No:	04-22		

Solid Density: 2.7 t/m³ (assumed) Maximum dry density: 1660 kg/m³

Date	Site No	Test No	Bulk Density kg/m³	Dry Density kg/m³	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
13/01/2004	-	35	1800	1630	10.5	23.0	98.1	250	-
13/01/2004	-	36	1760	1640	7.5	27.4	98.5	250	-
13/01/2004	-	37	1790	1620	10.5	22.7	97.7	250	-
13/01/2004	-	38	1790	1670	7.5	25.4	100.3	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

Lab Job No:	8020-415	Tested By:	D. Krissansen
Client:	Cook Costello Ltd	Date:	16/01/2004
Job:	Metcalfe Developments	Checked By:	
Location:	Mangawhai	Date:	5/3/04
REF:	7924	Page:	39 of 42
Report No:	04-22		

Solid Density: 2.7 t/m^3 (assumed) Maximum dry density: 1660 kg/m^3

Date	Site No	Test No	Bulk Density kg/m^3	Dry Density kg/m^3	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
16/01/2004	-	39	1780	1710	4.5	28.9	102.7	250	-
16/01/2004	-	40	1850	1680	9.5	21.3	101.5	250	-
16/01/2004	-	41	1900	1730	9.5	19.3	104.1	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

2 Norfolk Street
Whangarei
PH 09 4389529

NUCLEAR DENSOMETER READINGS

NZS 4407:1991 Test 4.2.1, 4.2.2

Lab Job No:	8020-415	Tested By:	D. Krissansen
Client:	Cook Costello Ltd	Date:	12/02/2004
Job:	Metcalfe Developments	Checked By:	
Location:	Mangawhai	Date:	
REF:	7924	Page:	40 of 42
Report No:	04-22		

Solid Density: 2.7 t/m^3 (assumed) Maximum dry density: 1660 kg/m^3

Date	Site No	Test No	Bulk Density kg/m^3	Dry Density kg/m^3	Moisture Content %	% Air Voids	% Compaction	Depth Below Ground mm	Vane Shear Strength (corrected) kPa
12/02/2004	-	42	1960	1720	14.0	12.2	103.3	250	-
12/02/2004	-	43	1930	1680	15.5	12.1	101.0	250	-

D. Krissansen
Approved Signatory

NORTHLAND SOIL MECHANICS
AND TESTING LABORATORY LTD

Norfolk House
2 Norfolk Street
Whangarei
PH 09 4389529

APPENDIX 1-Test Results from Geotechnics

Lab Job No.:	8020-415	**Ref:**	7924
Client:	Cook Costello Ltd	**Checked By:**	
Job:	Metcalfe developments	**Date:**	6/3/04
Location:	Mangawhai	**Page:**	42 of 42
Report No:	04-22		

Sample No: 03-207 Minimum Dry Density
Maximum Dry Density

D. Krissansen
Approved Signatory

Geotechnics

Our Ref: 613917.60
Client Ref: 8020-415
25 November 2003

Northland Soil Mechanics & Testing Laboratory
2 Norfolk Street
Whangarei

Attention: Darcy Krissansen

Dear Darcy

LABORATORY TEST REPORT
Maximum and Minimum Dry Density Test

Sampling Procedure

Samples have been tested on an as received basis from the client.

Sample/Test Location Plan

None.

RECEIVED 22/11/2003

Samples

Bulk sample was delivered to our laboratory.

Date of Sample Receipt

18 November 2003

Clients' Instructions

Determine the maximum and minimum dry density of the sample.

11. APPPENDIX 3: LABORATORY GEOTECHNICAL INVESTIGATIONS

Test Method

NZS4402:1988 Supplement 1
Test 4.2.1 Minimum dry density
Test 4.2.2 Maximum dry density.

Test Results

Table 1 – Summary of Results

Sample Identification	**03-207**
Location	**Mangawhai**
Maximum size of particle used in the test (mm)	0.600
Percentage of oversize material discarded (%)	0
Minimum dry density (t/m^3)	1.36
Maximum dry density (t/m^3)	1.66
Nominal mould volume (ml)	3000
Optimum double amplitude of vibration	Assumed
Densified volume measured by	Screeding
Soil condition for maximum determination	Water content after test 15.7%
Natural moisture content	5.3

Test Remarks

Maximum Dry Density:
Sample was saturated with water spray until it has an apparent cohesion, as opposed to soak under water.

Material Description

03-207 : SAND(fine to medium), loose, light to medium brown, some roots are present.

Approved by Registrar-General of Land under No. 2002/6055

Easement instrument to grant easement or *profit à prendre*, or create land covenant

Sections 90A and 90F, Land Transfer Act 1952

Registrar-General of Land Approval 02/6055EE Auckland

EI 6552222.8 Easement I
Cpy - 01/01, Pgs - 003, 29/08/05, 13:28
DocID: 312069906

Land registration district

NORTH AUCKLAND

Grantor

Surname(s) must be underlined or in CAPITALS.

SANDWAY DEVELOPMENTS LIMITED

Grantee

Surname(s) must be underlined or in CAPITALS.

SANDWAY DEVELOPMENTS LIMITED and METCALF DEVELOPMENTS LIMITED

Grant* of easement or *profit à prendre* or creation or covenant

The **Grantor**, being the registered proprietor of the servient tenement(s) set out in Schedule A, **grants to the Grantee** (and, if so stated, in gross) the easement(s) or *profit(s) à prendre* set out in Schedule A, **or creates** the covenant(s) **set out** in Schedule A, with the rights and powers or provisions set out in the Annexure Schedule(s).

Dated this 2nd day of **August** **2005**

Attestation

R R MALONEY Director - SANDWAY DEVELOPMENTS LTD **Signature [common seal] of Grantor**	**Signed in my presence by the Grantor** *Signature of witness* *Witness to complete in BLOCK letters (unless legibly printed)* **Witness name** Anna Garland **Occupation** Solicitor **Address** Auckland
R R MALONEY Director - SANDWAY DEVELOPMENTS LTD R R MALONEY Director - METCALF DEVELOPMENTS LTD **Signature [common seal] of Grantee**	**Signed in my presence by the Grantee** *Signature of witness* *Witness to complete in BLOCK letters (unless legibly printed)* **Witness name** Anna Garland **Occupation** Solicitor **Address** Auckland

Certified correct for the purposes of the Land Transfer Act 1952.

[Solicitor for] the Grantee

*If the consent of any person is required for the grant, the specified consent form must be used.

Approved by Registrar-General of Land under No. 2002/6055

Annexure Schedule 1

Approval 02/6055EF Registrar-General of Land A.C.L.S.

Easement instrument Dated 24th August 2005 Page 1 of 2 pages

Schedule A *(Continue in additional Annexure Schedule if required.)*

Purpose (nature and extent) of easement, *profit*, or covenant	Shown (plan reference)	Servient tenement (Identifier/CT)	Dominant tenement (Identifier/CT *or* in gross)
Land covenant		**213643 to 213681 (inclusive)**	**213681 and 172605**

~~**Easements or *profits à prendre* rights and powers (including terms, covenants, and conditions)**~~

Delete phrases in [ ] and insert memorandum number as required.
Continue in additional Annexure Schedule if required.

Unless ~~otherwise~~ provided below, the rights and powers implied in specific classes of easement are those prescribed by the ~~Land Transfer~~ Regulations 2002 and/or the Ninth Schedule of the Property Law Act 1952.

The implied rights and powers are ~~**[varied] [negatived] [added to]**~~ or ~~**[substituted]**~~ by:

~~[Memorandum number , registered under section 155A of the Land Transfer Act 1952]~~

~~[the provisions set out in Annexure Schedule 2].~~

Covenant provisions
Delete phrases in [ ] and insert memorandum number as required.
Continue in additional Annexure Schedule if required.

The provisions applying to the specified covenants are those set out in:

~~[Memorandum number , registered under section 155A of the Land Transfer Act 1952]~~

[Annexure Schedule 2].

All signing parties and either their witnesses or solicitors must sign or initial in this box

Approved by Registrar-General of Land under No. 2002/5032

Annexure Schedule 2

Insert type of instrument
"Mortgage", "Transfer", "Lease" etc

Easement Instrument	Dated 24 August 2005	Page 2 of 2 Pages

(Continue in additional Annexure Schedule, if required.)

A. Sandway Developments Limited has undertaken a subdivision of certain land resulting in residential lots being created and more particularly described in those certificates of titles 213643-213681 inclusive referred to in schedule A as the servient lots.

B. Sandway Developments Limited is presently the owner of the land contained in certificate of title 213681 referred to in Schedule A as one of the dominant lots.

C. Metcalf Developments Limited is presently the owner of the land contained in certificate of title 172605 referred to in Schedule A as one of the dominant lots.

D. It is the Grantor's intention that the lands referred to as the servient lots be the subject of the land covenant as set out herein for the benefit of the dominant lots and further that the owner for the time being of each of the servient lots shall be bound by the covenants, stipulations and restrictions set out below to the intent that the respective owners and occupiers for the time being of the dominant lots may be able to enforce the observance of such covenants, stipulations and restrictions against the owners for the time being of the servient lots whether in equity or otherwise.

E. The Grantor wishes to utilise the provisions of sections 49 and 66(a) Property Law Act 1952.

As incidental to and so as to bind the servient lots for the benefit of each of the dominant lots the Grantor hereby covenants and agrees in the manner set out below so that the covenants will run with the servient lots for the benefit of the dominant lots as follows:

1. The Grantor as registered proprietor of the servient lots will not object to nor oppose the Grantees (for the purposes of this clause the Grantees shall include any future registered proprietors of the dominant lots) undertaking a commercial activity within or upon the dominant lots (or the balance of the land contained in the dominant lots, if that land is further subdivided) and the Grantor if required by the Grantees will provide any consent as required by the Kaipara District Council (or its successors) to enable the commercial activity to be undertaken by the Grantees.

The Grantor shall as regards to the covenants be liable only in respect of the breaches thereof, which shall occur while the Grantor is the registered proprietor of any of the servient lots or any part of it in respect of which any such breach shall occur.

If this Annexure Schedule is used as an expansion of an instrument, all signing parties and either their witnesses or solicitors must sign or initial in this box.

Approved by Registrar-General of Land under No. 2002/6055

Easement instrument to grant easement or *profit à prendre*, or create land

Sections 90A and 90F, Land Transfer Act 19

EI 6441085.35 Easement
Cpy - 01/01, Pgs - 005, 31/05/05, 10:03
DocID: 311364223

Approval 02/6055EF

Land registration district

NORTH AUCKLAND

Grantor *Surname(s) must be underlined or in CAPITALS.*

METCALF DEVELOPMENTS LIMITED

Grantee *Surname(s) must be underlined or in CAPITALS.*

METCALF DEVELOPMENTS LIMITED

Grant* of easement or *profit à prendre* or creation or covenant

The Grantor, being the registered proprietor of the servient tenement(s) set out in Schedule A, **grants to the Grantee** (and, if so stated, in gross) the easement(s) or *profit(s) à prendre* set out in Schedule A, **or creates** the covenant(s) **set out** in Schedule A, with the rights and powers or provisions set out in the Annexure Schedule(s).

Dated this 20 day of December 2004.

Attestation

DIRECTOR **Signature [common seal] of Grantor**	**Signed in my presence by the Grantor** *Signature of witness* *Witness to complete in BLOCK letters (unless legibly printed)* **Witness name** A.J. SWEETMAN **Occupation** SOLICITOR TAKAPUNA **Address**
DIRECTOR **Signature [common seal] of Grantee**	**Signed in my presence by the Grantee** *Signature of witness* *Witness to complete in BLOCK letters (unless legibly printed)* **Witness name** A.J. SWEETMAN **Occupation** SOLICITOR TAKAPUNA **Address**

Certified correct for the purposes of the Land Transfer Act 1952.

[Solicitor for] the Grantee

*If the consent of any person is required for the grant, the specified consent form must be used.

Approved by Registrar-General of Land under No. 2002/6055

Annexure Schedule 1

Registrar-General of Land Approval 02/6055EF ADLS

Easement Instrument Dated 22 December 2004 Page 1 of 2 pages

Schedule A *(Continue in additional Annexure Schedule if required.)*

Purpose (nature and extent) of easement, *profit*, or covenant	Shown (plan reference)	Servient tenement (Identifier/CT)	Dominant tenement (Identifier/CT *or* in gross)
Right to drain Sewerage	**A on DP 341981** AA on DP 341981	**172605**	**Certificates of Title 172606 to 172642 (inclusive)**

Easements or *profits à prendre* rights and powers (including terms, covenants, and conditions)

Delete phrases in [ ] and insert memorandum number as required.
Continue in additional Annexure Schedule if required.

Unless otherwise provided below, the rights and powers implied in specific classes of easement are those prescribed by the Land Transfer Regulations 2002 and/or the Ninth Schedule of the Property Law Act 1952.

The implied rights and powers are **[varied]** ~~**[negatived]**~~ **[added to]** ~~**or [substituted]**~~ by:

~~[Memorandum number , registered under section 155A of the Land Transfer Act 1952]~~.

[the provisions set out in Annexure Schedule 2].

Covenant provisions
Delete phrases in [ ] and insert memorandum number as required.
Continue in additional Annexure Schedule if required.

~~The provisions applying to the specified covenants are those set out in:~~

~~[Memorandum number , registered under section 155A of the Land Transfer Act 1952]~~

~~[Annexure Schedule 2].~~

All signing parties and either their witnesses or solicitors must sign or initial in this box

Approved by Registrar-General of Land under No. 2002/5032

Annexure Schedule 2

Insert type of instrument
"Mortgage", "Transfer", "Lease" etc

Easement	Dated 22 December 2004	Page 2 of 3 Pages

(Continue in additional Annexure Schedule, if required.)

SCHEDULE 2

Unless otherwise provided below the rights and powers implied in specific classes of easement are those prescribed by the Land Transfer Regulations 2002 and/or the Ninth Schedule of the Property Law Act 1972;

The implied rights and powers are varied and added to by the following provisions:

1. Any maintenance repair or replacement of any easement facility that is necessary because of any act or omission by any user of the easement facility being either or all the owners of the dominant and servient tenements (which includes any of their agents, employees, contractors, sub-contractors or invitees) must be carried out promptly by that user at the sole costs of that user or in such proportion as relates to the act or omission. For the purposes of this clause "easement facility" means those services and land containing those services as specified on Area "A" on DP 341981 and more particularly described in Schedule A hereto. * and Area "AA"

2. At the option of the Grantor the Grantee shall forthwith provide the Grantor with a registerable surrender instrument

2. ~~The Grantee shall provide the Grantor with an extinguishment~~ of this sewerage easement upon ~~the happening of the following events:~~ the connection by all the Registered proprietors of Lots 1 to 15 DP 341981 and Lots 16 to 39 DP 341981

~~(a) Upon the connection by the Grantee~~ to the reticulated public sewerage scheme for Mangawhai (as defined and referred to in Resource Consent No. RM030088 dated 11 May 2004 by the Kaipara District Council) ~~and~~

~~(b) The Kaipara District Council has given its consent to the extinguishment of this sewerage easement.~~

3. The costs of preparation ~~of this sewerage extinguishment of easement~~ shall be ~~at the cost of~~ borne by the Grantor however any costs associated with the signing of the extinguishment of the sewerage easement and delivering it to the Grantor shall be ~~at the cost of~~ borne by the grantee.

4. The Grantee hereby shall be liable to the Grantor in respect for any failure to deliver up the signed extinguishment of sewage easement.

5. ~~Notwithstanding the fact that the extinguishment of sewerage easement referred to in Paragraph 1 above may not have been registered, this sewerage easement shall be of no effect and the Grantee shall have no right in relation to the sewerage easement upon the happening of those events as specified in Paragraph 2(a) & 2(b) above with the exception of the Grantor's rights to require an extinguishment of this sewerage easement and the Grantee's obligations to deliver up the extinguishment of sewerage easement.~~

Forthwith upon execution of the surrender instrument by the Grantee the within sewage easement shall be deemed to be extinguished and of no further force and effect save for the right of the Grantor to call for a registerable surrender of the sewage easement as set out in Clause 2 hereof and the fulfilment by the Grantee of it's obligations as set out in Clauses 2 and 3 hereof.

If this Annexure Schedule is used as an expansion of an instrument, all signing parties and either their witnesses or solicitors must sign or initial in this box.

ANNEXURE SCHEDULE - CONSENT FORM

Land Transfer Act 1952 section 238(2)

*

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(*insert type of instrument)

Person giving consent	Capacity and Interest of Person giving consent Surname must be underlined (eg. Caveator under Caveat no.)
BANK OF NEW ZEALAND	MORTGAGEE Under Mortgage No. 5997797.1

Consent

Delete words in [ ] if inconsistent with the consent
State full details of the matter for which consent is required

[Without prejudice to the rights and powers existing under the interest of the person giving consent]

The Person giving consent hereby consents to registration of: the within

~~An easement in gross~~ creating a right to drain sewage ~~(in relation to area "A" on DP 341901)~~ and undertakes that if it exercises any of its powers and remedies under that it will do so subject to the provisions of this easement instrument but otherwise without prejudice to the rights and remedies of the mortgagee under its mortgage.

* the mortgage

Dated this 10th day of January 2005

Attestation

	Signed in my presence by the Person giving consent
SIGNED for and on behalf of BANK OF NEW ZEALAND by its Attorneys Rachel Elizabeth Wood Noel Ronald Lefford Signature/s of Person/s giving consent	Signature of Witness Witness to complete in BLOCK letters (unless legibly printed): Witness name: Margaret Jane Aston Occupation: Bank Officer Address: Auckland

*An Annexure Schedule in this form my be attached to the relevant instrument, where consent is required to enable registration under the Land Transfer Act 1952, or other enactments, under which no form is prescribed.

D0412039.TS.DOC:gd

Bank of New Zealand

CERTIFICATE OF NON-REVOCATION OF POWER OF ATTORNEY

We, Rachel Elizabeth Wood and Noel Ronald Letford both of Auckland, Bank Officers, severally certify that:

1. By deed dated 26 October 2001 (the "Deed"), we were, by virtue of being respectively a Second Authorised Officer, and a Second Authorised Officer, appointed jointly as attorneys of Bank of New Zealand (the "Bank") on the terms and subject to the conditions set out in the Deed.

2. Copies of the Deed are deposited in the following registration dis tricts of Land Information New Zealand as follows:

Canterbury	as No.	5110221
North Auckland	as No.	D657518.1
Otago	as No.	5110774
South Auckland	as No.	5110008
Taranaki	as No.	483763.1
Wellington	as No.	5110812

3. We have executed the instrument(s) to which this certificate relates under the powers conferred by the Deed.

4. At the date of this certificate we have not received any notice or information of the revocation of that appointment by the dissolution of the Bank or otherwise.

SIGNED at Auckland this 10th day of January 2005

Rachel Elizabeth Wood

SIGNED at Auckland this 10th day of January 2005

Noel Ronald Letford