SHRIMPTON & LIPINSKI

MAYFIELD

RESIDENTIAL SUBDIVISION STAGE 4

REPORT ON SUBDIVISION EARTHWORKS & RECOMMENDATIONS FOR BUILDING

CARMICHAEL ROAD, WESTMORLAND RISE, WINDOVER RISE BETHLEHEM

Our Ref: 16530
April 2005

S&L CONSULTANTS LTD - SURVEYORS - ENGINEERS - PLANNERS
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1.0 Introduction

The earthworks, roading construction and services installation were completed on 31 March 2005 for Stage 4 of the Mayfield Subdivision in Bethlehem North. 23 residential lots were created in an extension of Carmichael Road (formerly Millers Road) and the small cul de sac of Windover Rise.

The locations and sizes of the 23 lots created are shown on DP 339412 (3 sheets). A copy of DP 339412 is contained in Appendix I.

This report describes the earthworks undertaken in the formation of this stage of subdivision including the relevant standards adopted for the placement of filling to support residential buildings and recommendations for building.

During the report reference is made to drawing 16530-121 which is included in Appendix I to this report. This drawing shows the relevant road and lot locations, areas of cut and filling and subsoil and fill compaction test locations.

2.0 Pre Subdivision Investigations

Prior to obtaining approval a geotechnical assessment of the development area was undertaken by Connell Wagner Ltd on behalf of Mayfield Ltd. The Connell Wagner report is referenced 7073-SH-04 and is dated June 1999. A copy of this report is present on the City Council subdivision file.

Their investigation determined, as quoted from the Connell Wagner report, that:

(a) *The soils over the higher ground generally comprised typical ash deposits for this region with approximately 3 to 4 metres of younger ash overlying older Hamilton ashes, which in turn overlie the Tauranga formation.*

The younger ashes consisted of firm to stiff light brown sandy silts and silty sands. These soils are underlain by the older Hamilton ashes which often comprise a dark brown silty clay layer overlying a series of interbedded brown and orange silty clays, clay silts and sands. The underlying Tauranga formation mostly comprised a series of light grey or white pumiceous sand and silts.

(b) *The low lying generally flat area within the lower end of the south-north gully system comprises topsoil overlaying marine and alluvially deposited normally to slightly over consolidated silts that extend from sea level. These soils contain random layers of sands and sandy silts.*

Connell Wagner reported on the scope of this investigation which comprised in the Stage 4 area

- 6 cone penetrometer tests (CPT) along the Carmichael Road alignment.
- one handaugered borehole within lot 166 adjacent to Windover Rise.

The Connell Wagner data indicated that elevated ground rising to the west and specifically through lots 160 to 163, 168 and 169 comprised the usual ash stratigraphy soils found in elevated areas in Tauranga and surface organic soils overlaying marine and alluvial silts in the lower lying areas along the Carmichael Road alignment and within lots 153 to 159, (part) to 167 (part) and lots 170 to 175 inclusive.

Based on the pre subdivision investigation evidence it was decided that the marine and alluvial silts were to be left in place with only the removal of surface vegetation to be undertaken. Additional structural filling was required in this area to achieve minimum building platform levels. The filling in this area was to be surcharged (preloaded) to simulate the effects and loadings from future housing.

3.0 Scope of Earthworks

The earthworks undertaken in the Stage 4 area comprised:

- The removal of surface growth including hedgerows and rank grass in the lower sections of the gully within lots 153 to 159 inclusive, along Carmichael Road and within lots 163 to 167 and 170 to 175 inclusive and the installation of subsoil drains at locations shown on 16530-121.

- The obtaining of filling material by the reduction of higher ground within lots 160 to 162 and at the western end of Windover Rise. These areas of cut extended into the Stage 3 area of Mayfield to the eastern side of Hawkridge Heights. Cut depths of up to 12 m took place with the majority of the soils encountered being light grey pumiceous sand.

- The placement of filling at locations shown on 16530-121 over lots 153 to 158, 163 to 167 and 170 to 176. The filling depths were generally up to 2 m.

- The placement of a preload 1.0 m deep over the filling on lots 153 to 158, 163 to 167 and 170 to 176 equivalent to a surcharge of 15 kPa and on the Carmichael Road alignment. The preload material was sourced from the topsoil stockpiles and dried soils not considered suitable for placement as a structural filling to support future buildings.

- The monitoring of rates of induced ground settlement from the presence of filling and the surcharge on the preloaded lots and Carmichael Road. Rates of settlement were monitored since the markers were first installed in November 2002. The preload was removed after the rates of settlements reduced to levels where future degrees of differential ground settlement under the imposed loadings from buildings will not exceed the performance requirements stated in Section B1 of the New Zealand Building Code.

- The removal of the preload and the topsoil and grassing of the final lot contours.

The depths of filling shown on drawing 16530-121 were derived from surveyed contours of the finished surface taken on the completion of the earthworks for this stage compared with

the topographical survey undertaken by Connell Wagner Ltd for Mayfield prior to the subdivision construction and from surveyed depths of cutting to remove unsuitable soils by S & L Consultants Ltd.

The earthworks for Stage 4 development were undertaken by A & R Partnership subcontracted to Higgins Contractors Bay of Plenty Ltd during the 2002-2003 earthworks season in compliance with consent 61698 issued by Environment Bay of Plenty. Construction of the roading and services were undertaken after the preloading period.

4.0 Earthworks Standards

The performance specification required of the Contractor was based on the guidelines contained in NZS 4431:1989 "Code of Practice for Earthfill for Residential Development". Compliance with the compaction requirements listed below satisfies the standards listed in Section 7 of NZS 4431.

Air voids percentage (as defined in NZS 4402:1:1980)
Structural Fill - average value less than 10% (any 10 tests)
- maximum single value 12%

Undrained shear strength (measured by insitu vane)
Structural Fill - average value not less than 150 kPa (any 10 tests)
- minimum single value 100 kPa

Bulk density values used in the calculation of air voids percentages were based on the soils present at the test sites. Where compacted ash (brown silty clays, silts and sandy silts) was present a value of 2.64 t/m^3 was used. Where the filling was with grey pumiceous sand a value of 2.47 t/m^3 was used. These values were derived from laboratory tests on representative samples.

57 compaction tests including retests were undertaken in the filling placed in the Stage 4 area at locations shown on 16531-121. A summary of the compaction test results is contained in Appendix III.

Where air voids percentages were higher than the specification required undrained shear strengths were very high and soil moisture contents were probably lower than optimum. In the context of the scale of the earthworks undertaken and the fact that the filled areas were also preloaded, the infrequent higher air voids percentages were considered acceptable when shear strength testing and site observation indicated that a concentrated compactive effort had been applied.

The earthworks were observed by an engineering technician from this office and compaction and strength control testing was undertaken by Opus International Consultants, a local IANZ accredited soil testing laboratory in Tauranga both on site and in the laboratory.

5.0 Post Construction Testing

Post construction handaugered boreholes were put down on each of the lots where structural filling was not placed at locations shown on 16530-121. These boreholes were generally 1 metre deep and were intended to confirm ground bearing conditions for shallow building foundations in the natural ground that had been modified in cut.

As the boreholes were being drilled undrained shear strengths were recorded with a hand held shear vane pushed in advance of the auger.

Summary logs of these boreholes and the shear strengths recorded are contained in Appendix IV.

6.0 Monitoring of Settlements

Rates of ground consolidation under the surcharge of constructing filling and the preload were monitored at locations shown on drawing 16580-81.

14 settlement markers shown as SMK to SMX inclusive were located within lots 153 to 158, 163 to 168 and 172 to 175.

22 settlement markers were located at regular intervals along the centreline of Carmichaels Road from chainage 140 at the intersection with Mayfield Lane to chainage 1320 at the intersection with Westmorland Rise.

Rates of settlement at the markers at each of these locations were recorded from surveys undertaken using stable benchmarks away from the filled areas. Degrees and rates of settlements of the markers are shown on the diagrams in Appendix III.

7.0 Summary and Recommendations

7.1 Subdivision Construction Filling

Structural filling as shown on drawing 16530-121 was placed on **lots 153 to 158, parts of lots 159 and 160, part of lot 163, lots 164 to 166, part of lot 167, part of lot 170 and lots 171 to 175** in accordance with the methods and standards quoted in NZS 4431 under the supervision of S & L Consultants Ltd. Compaction testing on site confirmed that a high and uniform degree of compaction has been achieved suitable for the support of buildings. Post construction boreholes also confirmed this suitability. In the filled areas post construction settlements were induced by the placement of a preload surcharge to simulate the mass of a future house. Rates of settlement reduced and the preload was removed when the likelihood of future ground settlements would be within tolerable limits for a house erected on the lots located in filled areas. Accordingly buildings may be erected with surface foundations in

accordance with NZS 3604 without the need for further ground improvement or to reduce ground contact pressures.

Within areas of structural filling on which buildings may be erected, however, the possibility of variation of soil type and strength may exist away from observation or compaction test locations. The normal inspection of foundation conditions during construction of buildings by competent tradesmen as described in NZS 3604 and by building certifiers should therefore be undertaken. If for any reason areas of low soil strength are found professional geotechnical advice should be sought.

7.2 Areas of Cut

In areas of cut the subsoils present on these lots will be those typical of those found in the Tauranga area.

Post construction handaugered boreholes were put down on lots **153, 159, 160, 162, 163, 168 and 169** at locations shown on 16530-121 and logs of the soils found in these boreholes are contained in Appendix IV.

The varying depths of cut have however exposed a variety of different soil types immediately below the topsoil overlay. This is because the more recent volcanic ashes which extend below the original ground level and which comprise a stiff upper mantle of light brown friable silt overlying bands of yellow or light grey pumiceous sand have been partially or totally removed. Within lot 168 cuts up to 8 m deep have exposed medium dense to dense grey pumiceous sands typical of the fluviatile and estuarine soils within the Matua subgroup of the Tauranga series of subsoils usually present at depths in elevated areas of the western Bay of Plenty.

Within lots 160, 161, 162, 163 and 169 the cut ground comprises stiff brown silts and clayey silts of the older series of local airfall ashes.

Each soil type identified from observations during construction and the post construction boreholes had varying undrained shear strengths or degrees of compaction. The tests undertaken showed that undrained shear strengths in insitu soils are sufficient for the construction of shallow building foundations.

For all lots located in areas of cut the post construction boreholes indicate that ultimate ground bearing pressures for foundation design may be taken as 300 kPa in the limit state. This capacity meets the definition of "good ground" as defined in NZS 3604. In situ tests showed that the soils present in the cut areas are of adequate strength for an ultimate bearing capacity of 300 kPa. However if they are disturbed or are found to be variable during construction, foundations detailed in accordance with NZS 3604 may have to be deepened or widened accordingly.

7.3 Areas of Undisturbed Ground

No areas of original or undisturbed ground exist in the Stage 4 area, with the total area in this stage having been modified by cutting down or filling.

7.4 Land Stability

The areas of the lots contained in Stage 4 at Mayfield comprise near flat or gently sloping ground. In these areas no global stability issues exist that may restrict or prevent buildings being erected and therefore no building restriction lines or areas subject to restrictive covenants are necessary nor are shown on DP 339412.

Levelled areas may be required on some lots for building sites by cutting into the sloping ground rising to the rear boundaries. For cut faces higher than 1.5 metres retaining wall should be erected as the exposed soils may be subject to long term erosion. Such walls are to be specifically designed and a building consent issued. In locating cut batters or undertaking site earthworks care should be given to maintaining support to the properties above.

7.5 Topsoil Thickness

During the subdivision earthworks areas of cut or fill were initially stripped of topsoil and this was then replaced to target depths of up to 300mm. No guarantee is implied or given that the topsoil on any part of any lot is 300mm deep or less and it is recommended that future owners or builders check topsoil depths when preparing site development plans and cost schedules.

8.0 Professional Opinion

A statement in the format of Council's Code of Practice for Development (Form G2) that all lots are suitable for building is contained in Appendix II. This statement is accompanied by form G2A which summarizes the information and recommendations within this report.

9.0 Applicability

Recommendations contained in this document are based on data from boreholes, observations of soil exposures, and test results. Inferences about the nature and continuity of subsoils away from these locations are made but cannot be guaranteed.

In all circumstances, if variations in the subsoils occur which differ from that described or assumed to exist the site should be inspected by an engineer suitably qualified to make an informed judgement and provide advice on appropriate improvement measures.

This report has been prepared specifically for the development at Stage 4 of the Mayfield Subdivision and no responsibility is accepted by S & L Consultants Ltd for the use of any part of this report for other development sites without their written approval.

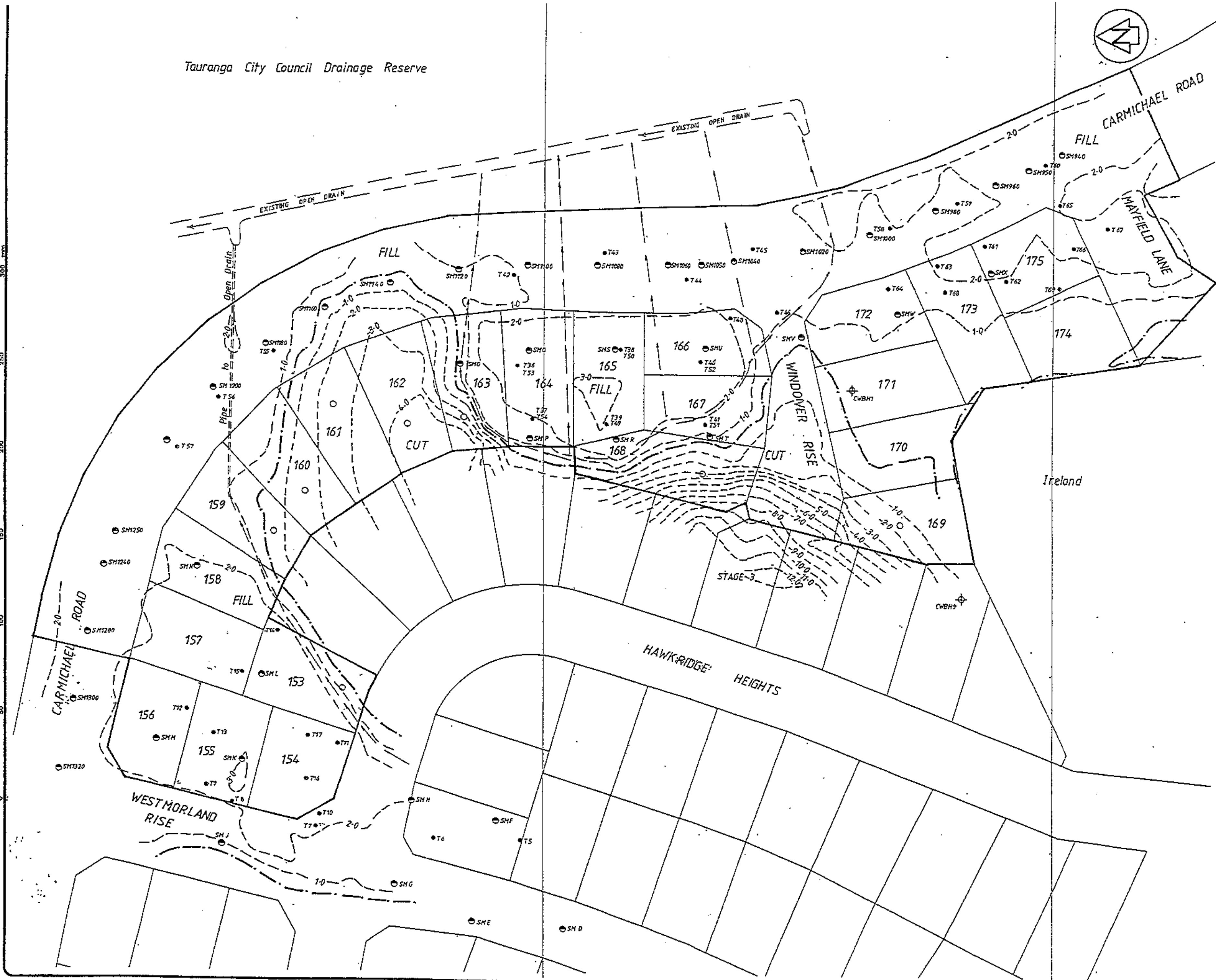
S & L Consultants Ltd
Consulting Engineers, Surveyors, Planners

M W Hughes
Geotechnical Engineer

11 April 2005

APPENDIX I

Drawings – Earthworks Completion Plan 16530-121
Deposited Plan DP 339412



KEY

- 1·0 — Depth of Structural Fill
- -1·0- — Depth of Cut
- Extent of Cut / Fill
- SMW — Settlement Markers
- T66 — Construction Compaction Test Position
- Subsoil Drain
- Preconstruction Borehole by Connell Wagner
- Post construction Borehole

Checked By	Rev No.	DESCRIPTION	DATE
	1	224 Application	04'05

	NAME	DATE	SIGNED
Surveyed			
Designed			
Drawn	SD	04'05	
Checked			
Approved	[signature]	11/4/05	

REFERENCES

SHRIMPTON & LIPINSKI

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TITLE

MAYFIELD SUBDIVISION
STAGE 4

COMPLETED EARTHWORKS REFERENCE PLAN

ORIGINAL SCALES: 1:500 (A1)
DATE: 04'05
DRAWING No: 16530-121
Revision: 1

METRIC DESIGN

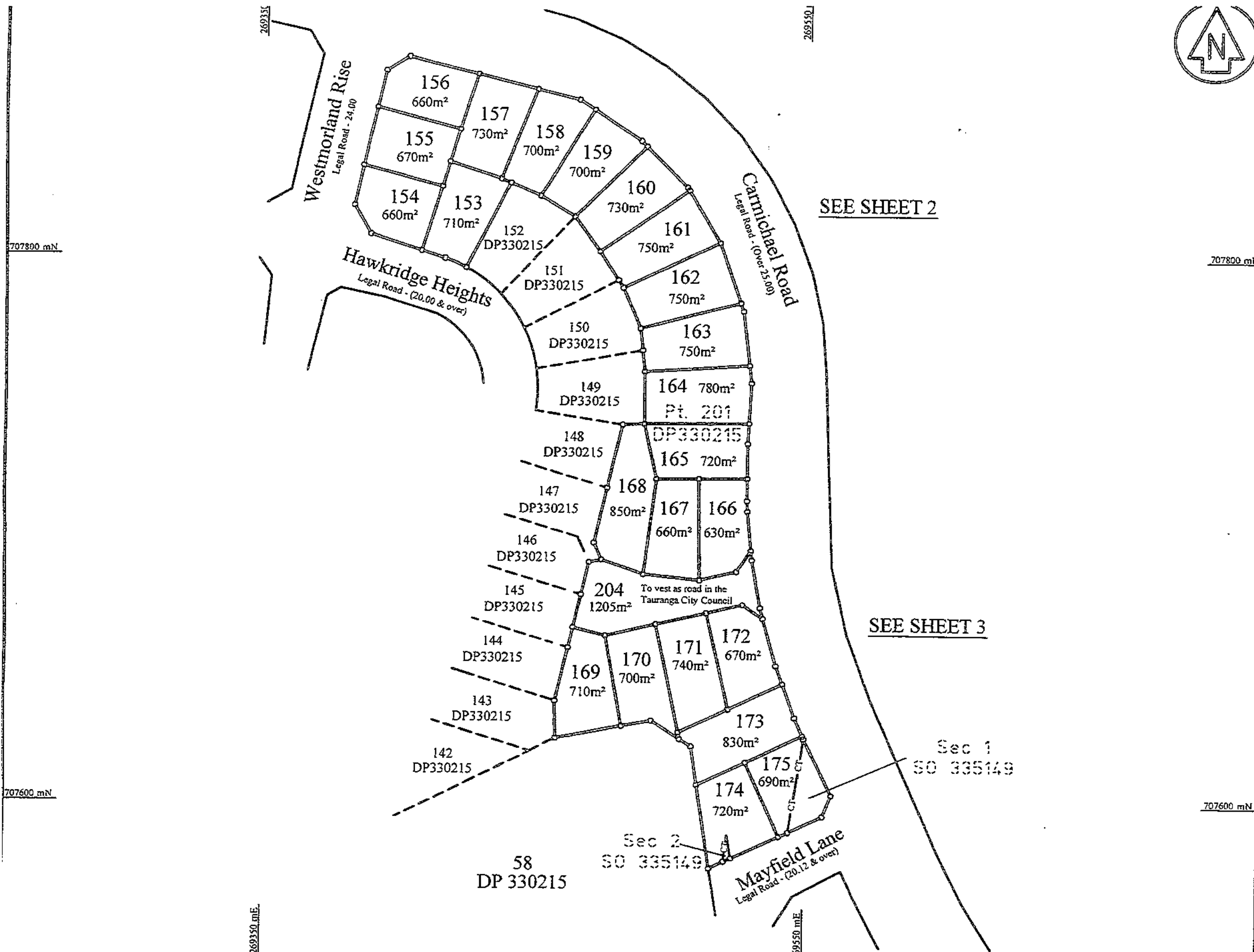
Approvals

Registered Owners.

I hereby certify that this plan was approved by the Tauranga City Council pursuant to Section 223 of the Resource Management Act 1991 on the ____ day of ________ 20__.

__________ Authorised Officer

Sub 5311



C'sT Allocated			
Lot 153	162169	Lot 165	162181
Lot 154	162170	Lot 166	162182
Lot 155	162171	Lot 167	162183
Lot 156	162172	Lot 168	162184
Lot 157	162173	Lot 169	162185
Lot 158	162174	Lot 170	162186
Lot 159	162175	Lot 171	162187
Lot 160	162176	Lot 172	162188
Lot 161	162177	Lot 173	162189
Lot 162	162178	Lot 174	162190
Lot 163	162179	Lot 175	162191
Lot 164	162180	Lot 204	Road

Note: Lots 153 - 175 will be subject to a consent notice

Class of Survey. I

Total Area 1.7715ha

Comprised in CT 124151 Bal.

I, John David Barnes being a person entitled to practise as a licensed cadastral surveyor certify that:

(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor General's Rules for Cadastral Survey 2002/2:

(b) This dataset is accurate and has been created in accordance with that Act and those Rules.

Signed ________ Date ___/___/___

Field Book ____ p. ____ Traverse Book ____ p. ____

Reference Plans ________

Examined ________ Correct ________

Approved as to Survey by Land Information NZ on

...../...../.....

Deposited by Land Information NZ on

...../...../.....

LAND DISTRICT

SOUTH AUCKLAND

Lots 153 - 175 & 204 Being a Subdivision of Pt. Lot 201 DP 330215 & Sec's 1 & 2 SO 335149

TERRITORIAL AUTHORITY TAURANGA CITY

Surveyed by S & L CONSULTANTS LTD F 16530-4

Scale 1:1000 Date

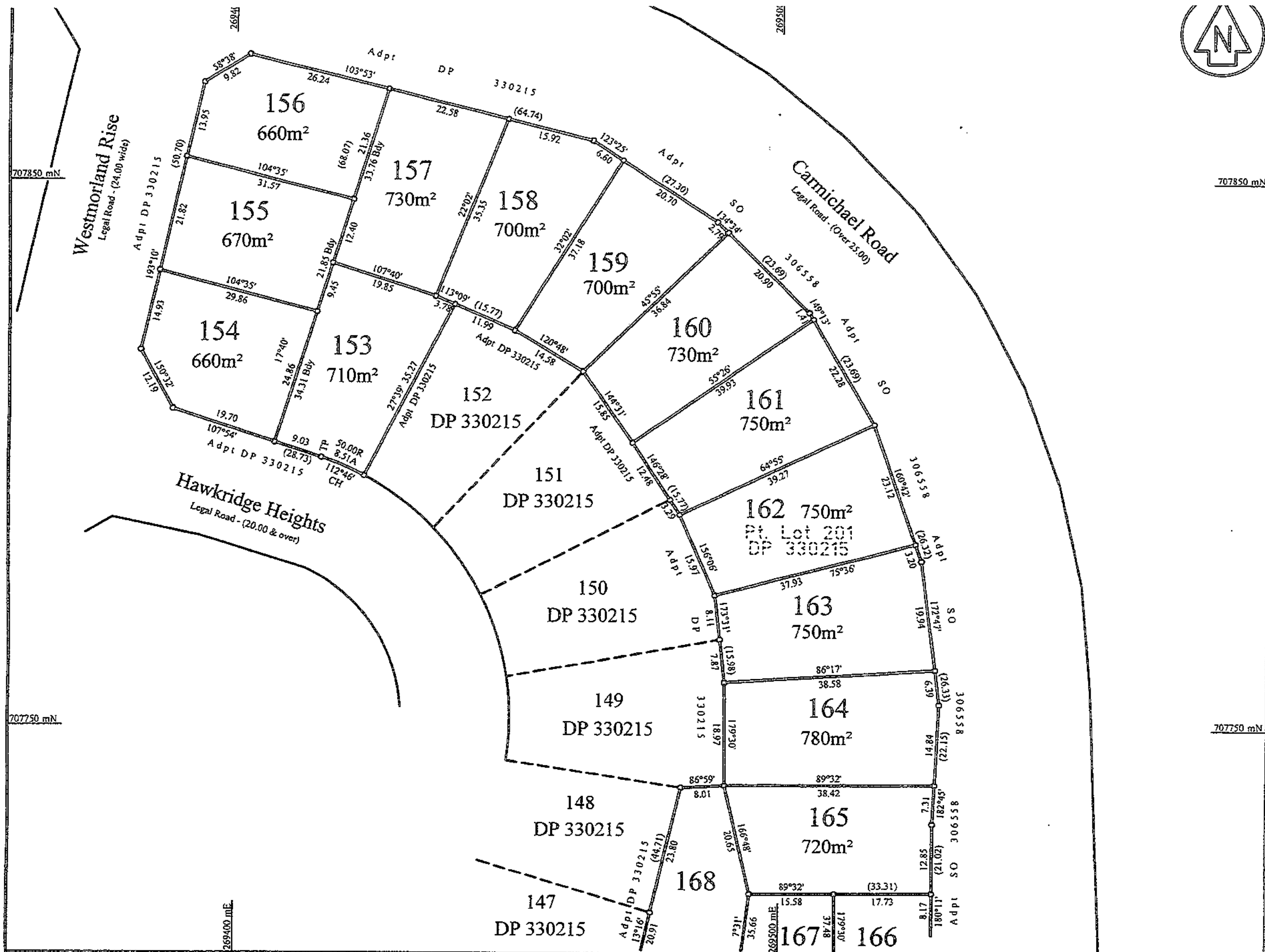
File

Received

Instructions

DP 339412

Sheet 1 of 3 Sheets



Class of Survey: 1

Total Area

Comprised in

I, John David Barnes

being a person entitled to practise as a licensed cadastral surveyor certify that:

(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor General's Rules for Cadastral Survey 2002/2:

(b) This dataset is accurate and has been created in accordance with that Act and those Rules.

Signed .... Date ...../...../.....

Field Book .... p. .... Traverse Book .... p. ....

Reference Plans

Examined .... Correct

Approved as to Survey by Land Information NZ on

...../...../.....

Deposited by Land Information NZ on

...../...../.....

File

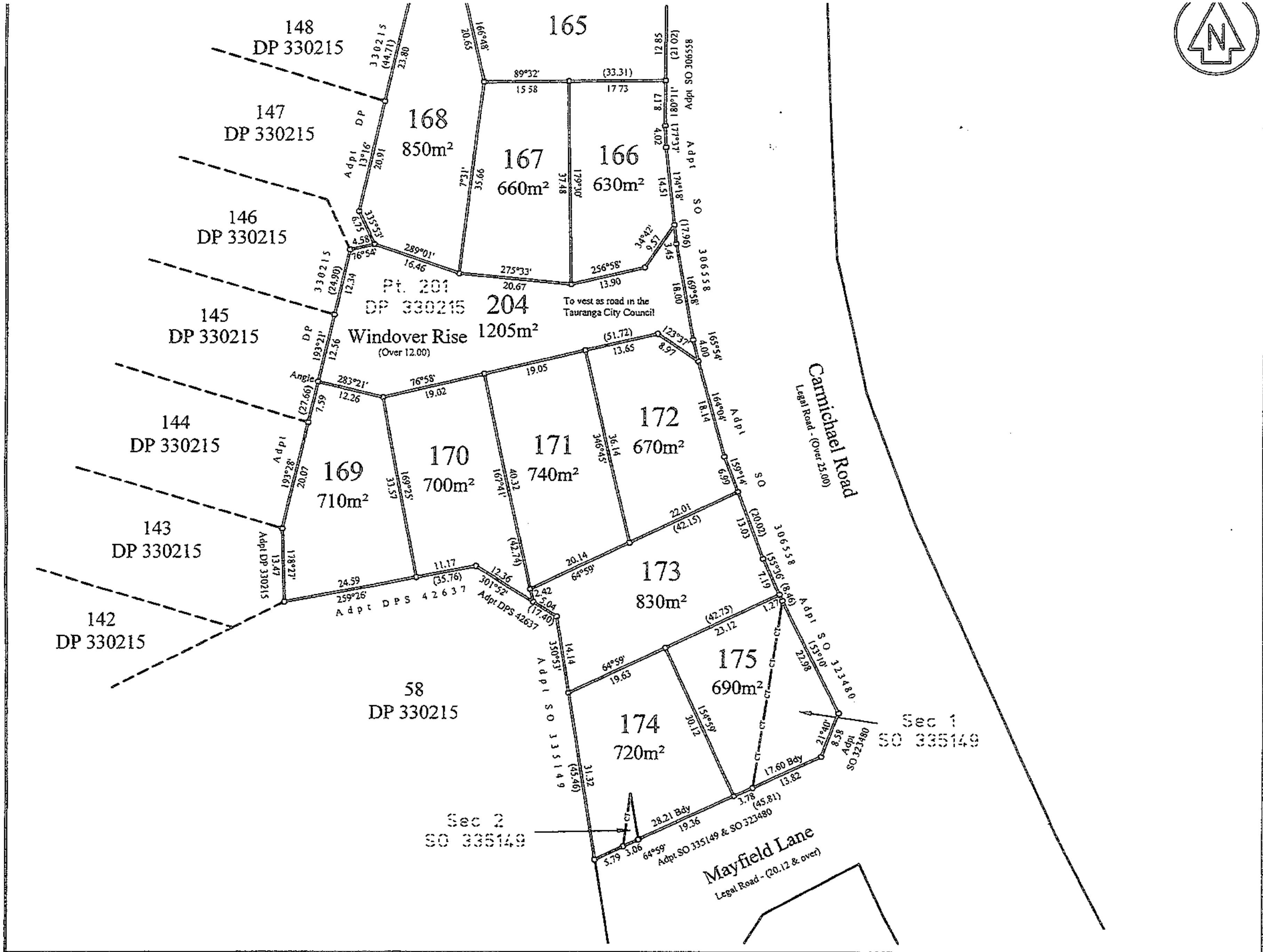
Received

Instructions

DP 339412

Sheet 2 of 3 Sheets

LAND DISTRICT		TERRITORIAL AUTHORITY TAURANGA CITY
SOUTH AUCKLAND	Lots 153 - 175 & 204 Being a Subdivision of Pt. Lot 201 DP 330215 & Sec's 1 & 2 SO 335149	Surveyed by S & L CONSULTANTS LTD F: 16530-4
		Scale 1 : 500 Date



LAND DISTRICT SOUTH AUCKLAND	Lots 153 - 175 & 204 Being a Subdivision of Pt. Lot 201 DP 330215 & Sec's 1 & 2 SO 335149	TERRITORIAL AUTHORITY TAURANGA CITY Surveyed by S & L CONSULTANTS LTD F 16530 - 4 Scale 1 : 500 Date

Class of Survey 1

Total Area

Comprised in

I, John David Barnes

being a person entitled to practise as a licensed cadastral surveyor certify that:

(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor General's Rules for Cadastral Survey 2002/2:

(b) This dataset is accurate and has been created in accordance with that Act and those Rules.

Signed ______________ Date ..../..../....

Field Book ____ p. ____ Traverse Book ____ p. ____

Reference Plans ______________

Examined ______________ Correct ______

Approved as to Survey by Land Information NZ on

...../...../.....

Deposited by Land Information NZ on

...../...../.....

File

Received

Instructions

DP 339412

Sheet 3 of 3 Sheets

APPENDIX II

Statement of Professional Opinion as to the Suitability of Land for Building Development

Lot Summary Report

SECTION 2

To: The Director of Environmental Services

STATEMENT OF PROFESSIONAL OPINION AS TO THE GEOTECHNICAL SUITABILITY OF LAND FOR BUILDING

DEVELOPMENT: Mayfield Subdivision Stage 4

OWNER: Mayfield Ltd

LOCATION: Carmichael Road, Westmorland Rise, Windover Rise Bethlehem

I Michael William Hughes of S & L Consultants Ltd
(Full Name)

PO Box 231, Tauranga
(Name and Address of Firm)

Hereby confirm that;

1) I am a professional person appropriately qualified with experience in geotechnical engineering to ascertain the suitability of the land for building development and was retained as the Soils Engineer to the above development.

2) An appropriate level of site investigation and construction supervision has been carried out under my direction and is described in my development evaluation dated 11 April 2005

3) In my professional opinion, not to be construed as a guarantee, I consider that;

(a) The area shown in my report dated 11 April 2005 of each new allotment is suitable for the erection thereon of the building types appropriate to the zoning of the land, provided that;

Recommendations contained in my report are complied with.

(b) The structural earth fills shown on the attached Plan Nos. 16530-121 have been placed in accordance with the Code of Practice for Development of the Tauranga City Council.

(c) The completed works give due regard to all land slope and foundation stability considerations.

(d) The filled ground is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZS 3604:1999 and related documents providing that:

Recommendations contained in my report, section 7 are complied with.

(e) The original ground not affected by filling but which has been reduced in cut is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZS 3604:1999 and related documents, subject to the recommendations contained in my report including those relating to topsoil depths and soil variations away from test or observation positions.

4. This professional opinion is furnished to the Council and the owner for their purpose alone, on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection for any dwelling.

Signed .... Date 11 April 2005

TAURANGA
DISTRICT COUNCIL

SUITABILITY OF LAND FOR BUILDING DEVELOPMENT

MAY 98

TAURANGA CITY COUNCIL

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MAYFIELD SUBDIVISION STAGE 4
CARMICHAEL ROAD, WESTMORLAND RISE, WINDOVER RISE, BETHLEHEM

The comments and notations included on this summary sheet are outlined in the support documents.
These shall be read in conjunction with this summary.

T.C.C Sub 5311

File Ref: 16530

Lot#	Area(m^2)	Subsurface Data						Foundations		Building line restriction?	Recommendations/restrictions
		Shear Strength kPa	Subdivision Filling		Natural topography unworked	Natural topography earthworked		Conventional shallow Foundations to NZS 3604:1999	Specific Design		
			Y/N	Depth (m)	Y/N	Y/N	Depth(m)	Y/N/NA	Y/N/NA	Y/N	
153	710		Y	0-2.0	N	Y	0-0.5	Y	N	N	
154	660		Y	2.0	N	N		Y	N	N	
155	670		Y	2.0-3.0	N	N		Y	N	N	
156	660		Y	2.0	N	N		Y	N	N	
157	730		Y	2.0	N	N		Y	N	N	
158	700		Y	0-2.0	N	N		Y	N	N	
159	700		Y	0-1.5	N	Y	0-1.5	Y	N	N	
160	730		Y	0-1.5	N	Y	0-2.5	Y	N	N	
161	750		N		N	Y	0-4.0	Y	N	N	
162	750		N		N	Y	3.0-4.0	Y	N	N	
163	750		Y	0-2.0	N	Y	0-4.0	Y	N	N	
164	780		Y	0-2.0	N	N		Y	N	N	
165	720		Y	2.0-3.0	N	N		Y	N	N	
166	630		Y	2.0	N	N		Y	N	N	
167	660		Y	0-2.0	N	Y	0-1.0	Y	N	N	
168	850		Y	0-2.0	N	Y	0-8.0	Y	N	N	
169	710		N		N	Y	0-4.0	Y	N	N	
170	700		Y	0-0.5	N	Y	0-2.0	Y	N	N	
171	740		Y	0-1.0	N	Y	0-0.5	Y	N	N	
172	670		Y	1.0-1.5	N	N		Y	N	N	
173	830		Y	0-2.0	N	N		Y	N	N	
174	720		Y	0-1.0	N	N		Y	N	N	
175	690		Y	1.0-2.0	N	N		Y	N	N	

Comments

Refer to S & L Consultants Ltd report reference 16530 dated 11 April 2005

Lots shown on DP 339412

TAURANGA DISTRICT COUNCIL

LOT SUMMARY REPORT

TAURANGA CITY COUNCIL

MAY 98

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APPENDIX III

Compaction Test Results

Settlement Rates on Preloaded Areas

MAYFIELD SUBDIVISION STAGE 4
SUMMARY OF COMPACTION TEST RESULTS

Sheet 1 of 3

Test No	Location	Air Voids Percentage	Undrained Shear Strength kPa
T4	Lot 179	9.5	>164
T5	Lot 129/130	5.2	>164
T6	Lot 130	11.6	>144
T7	Road	11.4	67
T8	Lot 155	29.6	105
T9	Lot 155	14.6	>164
T10	Road	2.8	>164
T11	Lot 154	6.3	Too hard
T12	Lot 156	24.3	Too hard
T13	Lot 155	7.3	>164
T14	Lot 153	8.2	>162
T15	Lot 157	16.5	Too hard
T16	Lot 154	0.0	>164
T17	Lot 154	2.3	>150

Refer to 16530-121 for test locations

Our Ref: 16530-IV

MAYFIELD SUBDIVISION STAGE 4
SUMMARY OF COMPACTION TEST RESULTS

Test No	Location	Air Voids Percentage	Undrained Shear Strength kPa
T36	Lot 164	4.2	>164
T37	Lot 164	4.9	113
T38	Lot 165	6.1	>160
T39	Lot 165	0.6	Too hard
T40	Lot 166	6.5	84
Retest		4.6	Too hard
T41	Lot 167	3.6	>151
T42	Road	11.8	97
Retest		7.5	Too hard
T43	Road	16.1	>155
Retest		14.6	>179
T44	Road	8.3	>133
T45	Road	21.6	128
Retest		11.7	>171
T46	Road	5.0	158
T48	Lot 166	13.0	>164
Retest		5.6	Too hard
T49	Lot 165	16.2	Too hard
Retest		9.4	>175
T50	Lot 165	12.2	Too hard

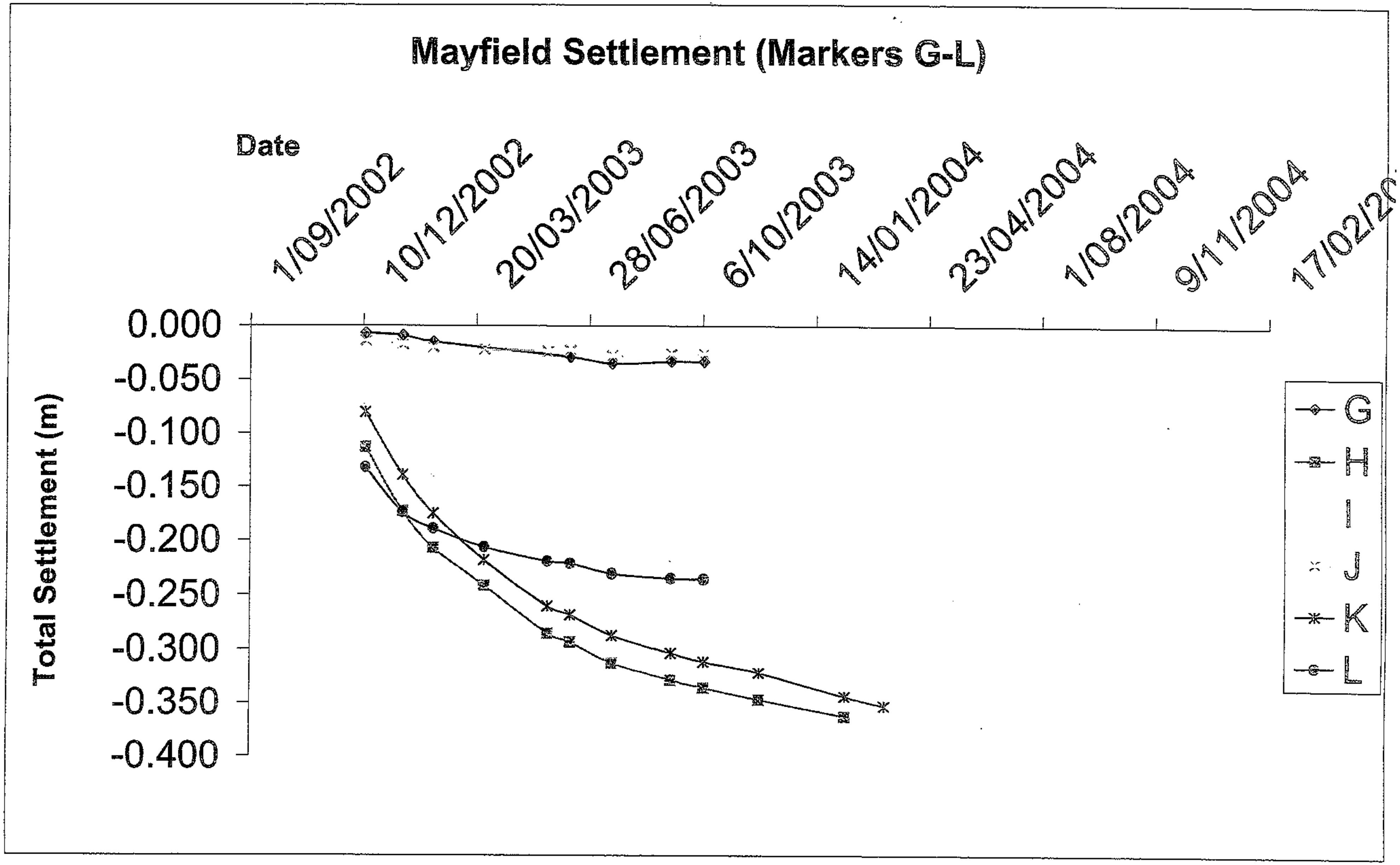
Refer to 16530-121 for test locations

Our Ref: 16530-IV

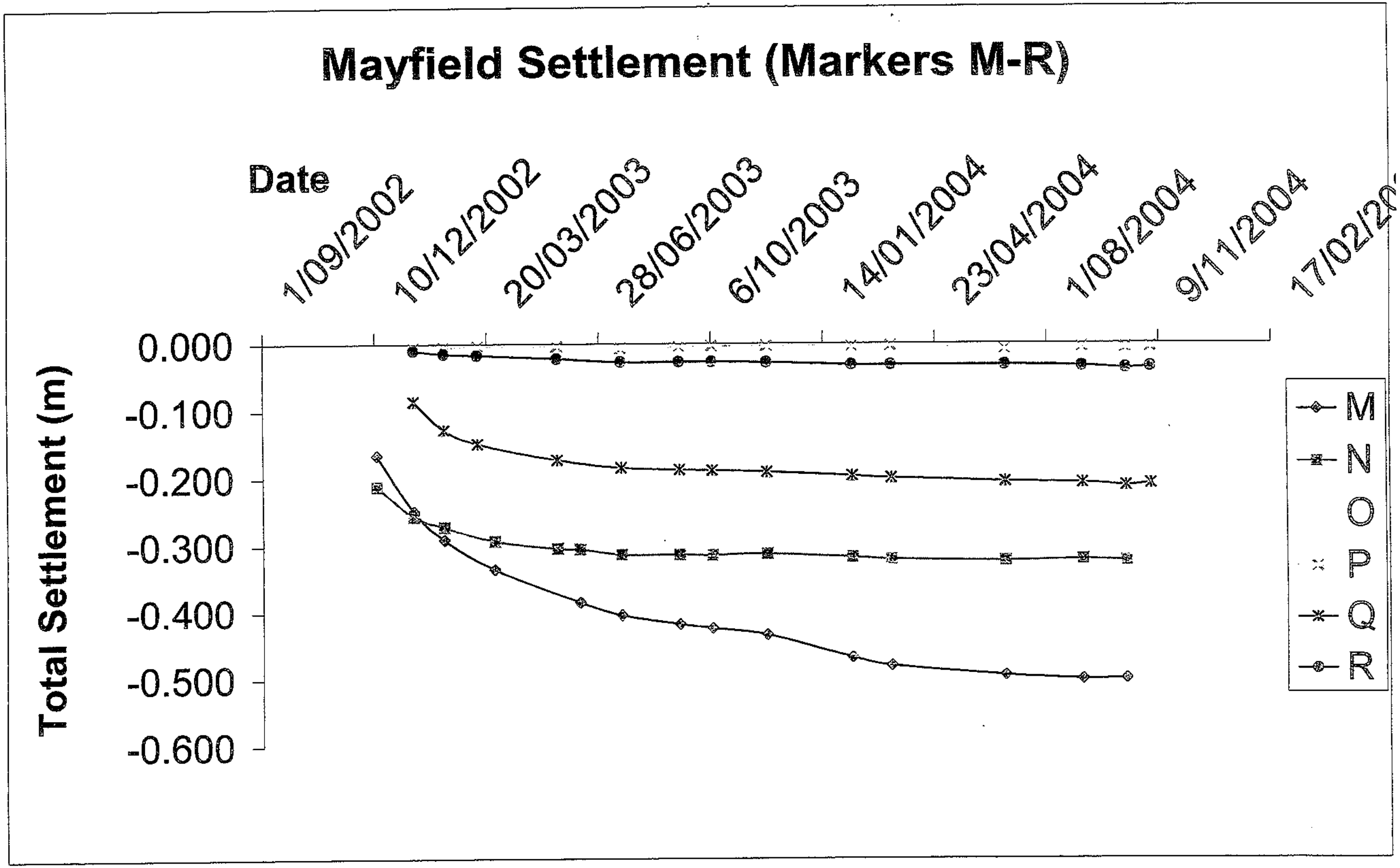
MAYFIELD SUBDIVISION STAGE 4
SUMMARY OF COMPACTION TEST RESULTS

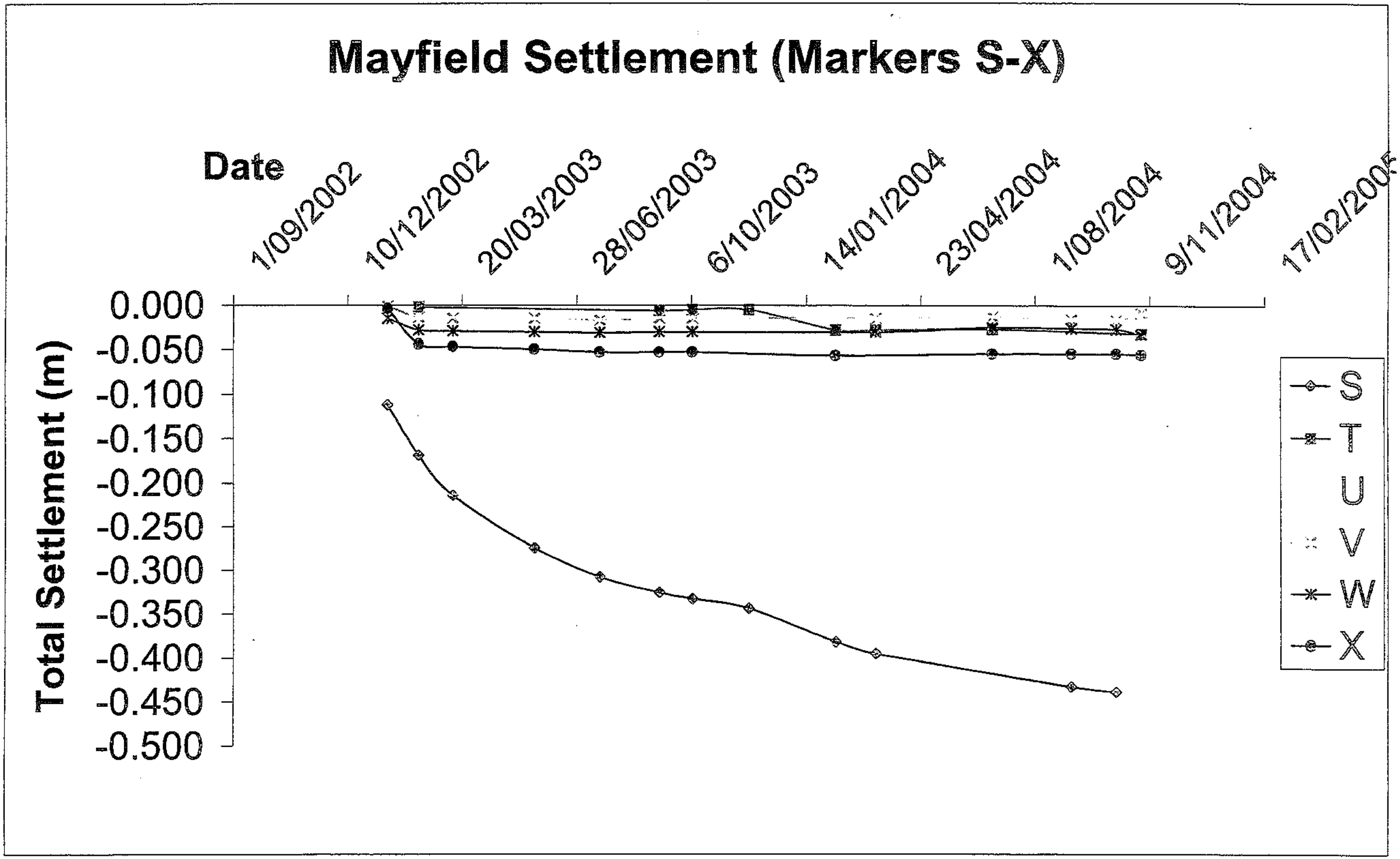
Test No	Location	Air Voids Percentage	Undrained Shear Strength kPa
T51	Lot 167	16.7	>157
Retest		11.2	Too hard
T52	Lot 166	8.0	99
T53	Lot 164	12.5	>184
Retest		15.7	>175
T54	Lot 164	16.1	Too hard
T55	Road	8.0	Too hard
T56	Road	23.9	>152
T57	Road	8.0	Too hard
T58	Road	6.0	131
T59	Road	10.1	>177
T60	Road	28.9	134
T61	Lot 175	6.7	>184
T62	Lot 175	10.0	Too hard
T63	Lot 173	17.6	>183
Retest		3.7	165
T64	Lot 172	8.2	Too hard
T65	Road	17.6	>163
Retest		8.5	Too hard
T66	Lot 175	7.2	>180
T67	Road	9.9	>184
T68	Lot 173	4.4	Too hard
T69	Lot 175	8.3	Too hard

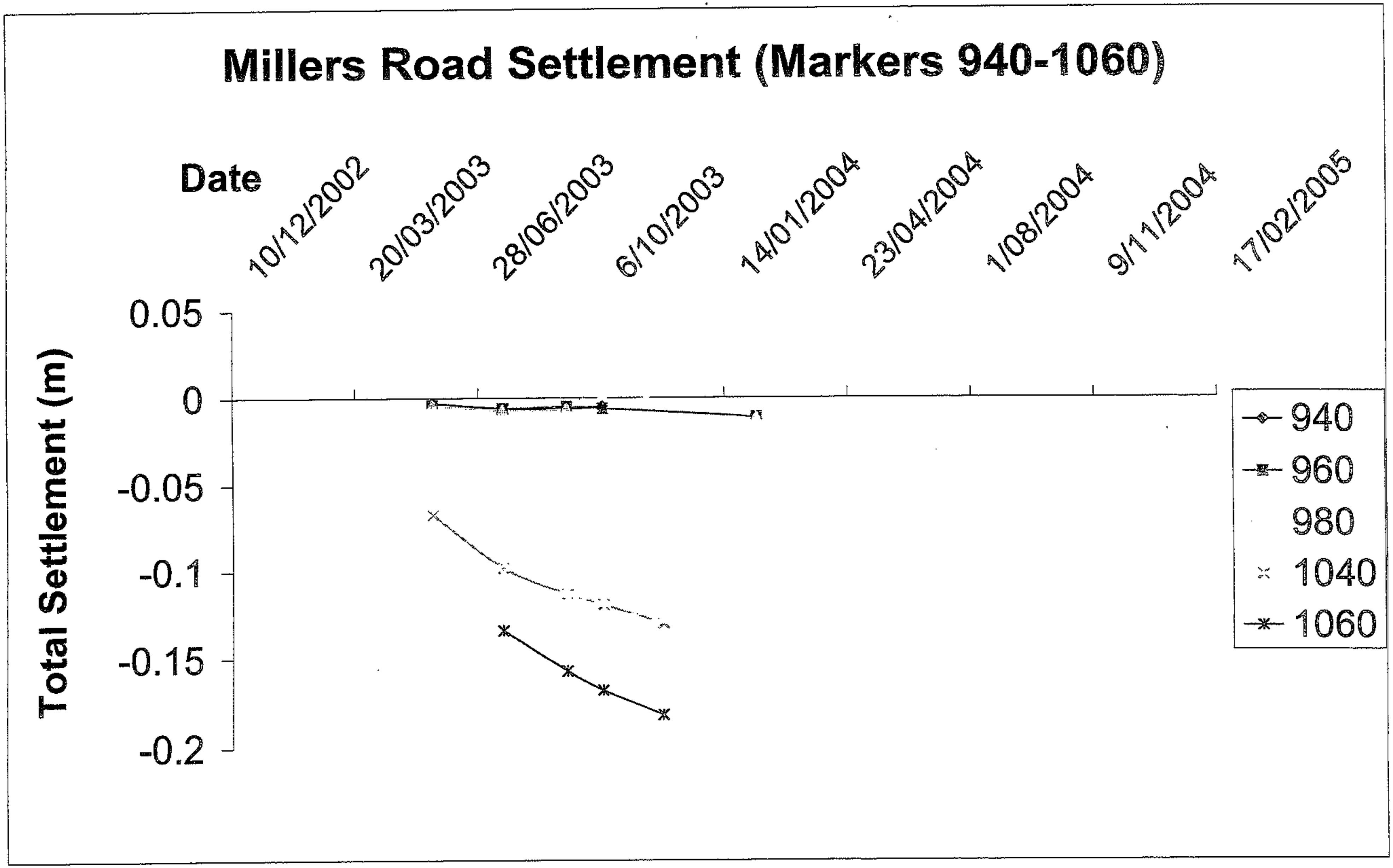
Refer to 16530-121 for test locations



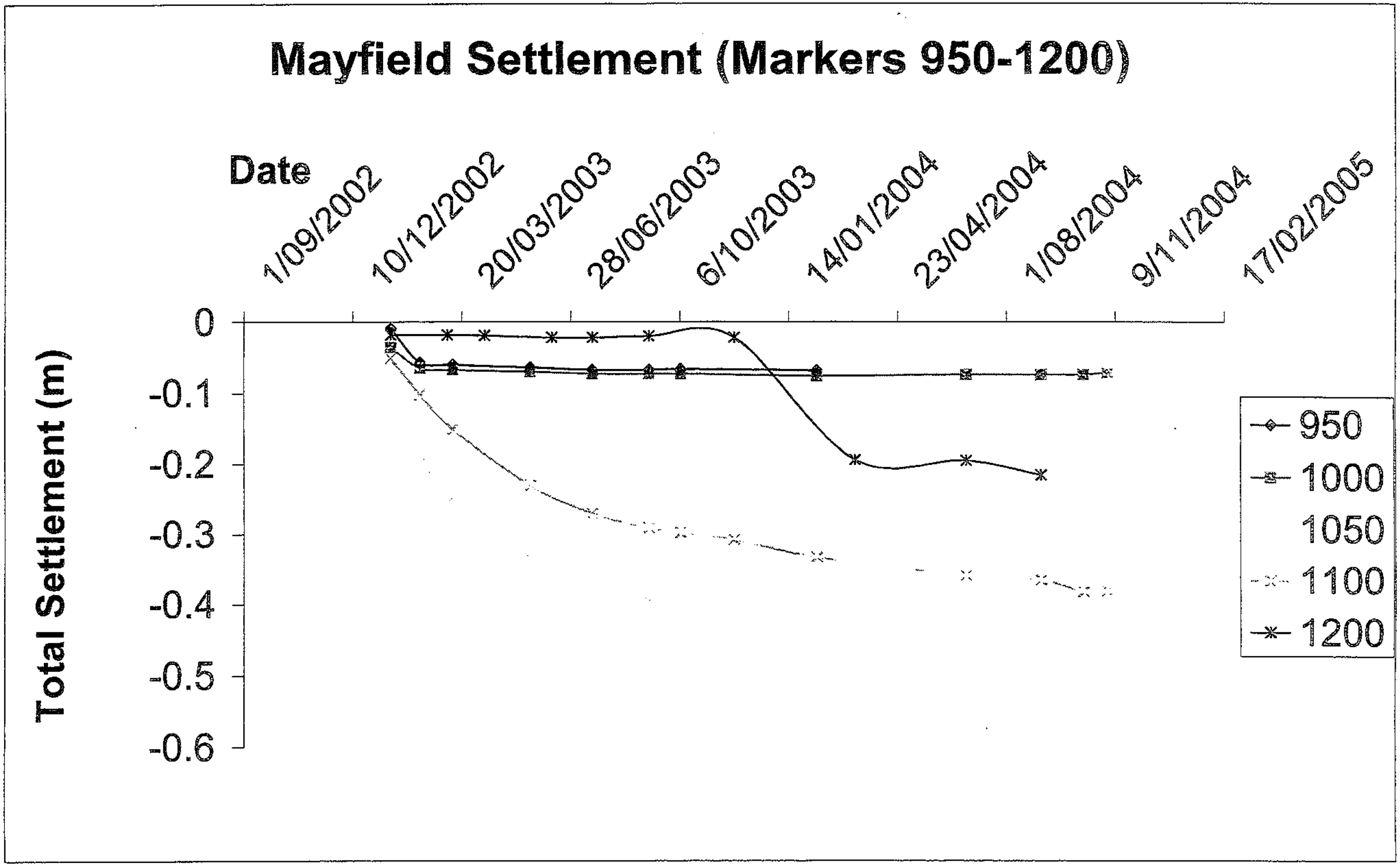
Mayfield Settlement (Markers G-L)
Date
1/09/2002
10/12/2002
20/03/2003
28/06/2003
6/10/2003
14/01/2004
23/04/2004
1/08/2004
9/11/2004
17/02/20
0.000
-0.050
-0.100
-0.150
-0.200
-0.250
-0.300
-0.350
-0.400
Total Settlement (m)
G
H
I
J
K
L

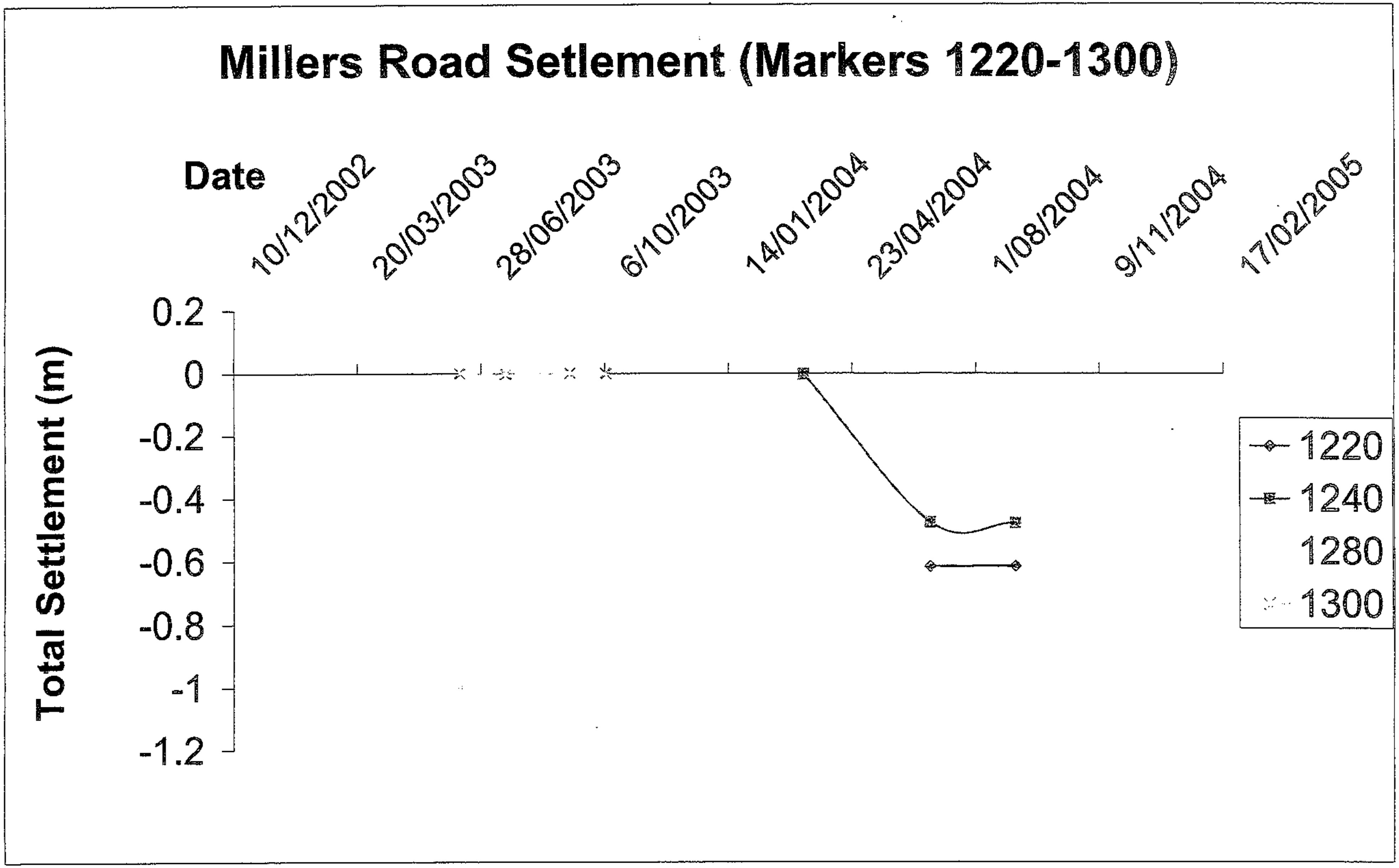

Mayfield Settlement (Markers M-R)
Date
1/09/2002
10/12/2002
20/03/2003
28/06/2003
6/10/2003
14/01/2004
23/04/2004
1/08/2004
9/11/2004
Total Settlement (m)
0.000
-0.100
-0.200
-0.300
-0.400
-0.500
-0.600
M
N
O
P
Q
R

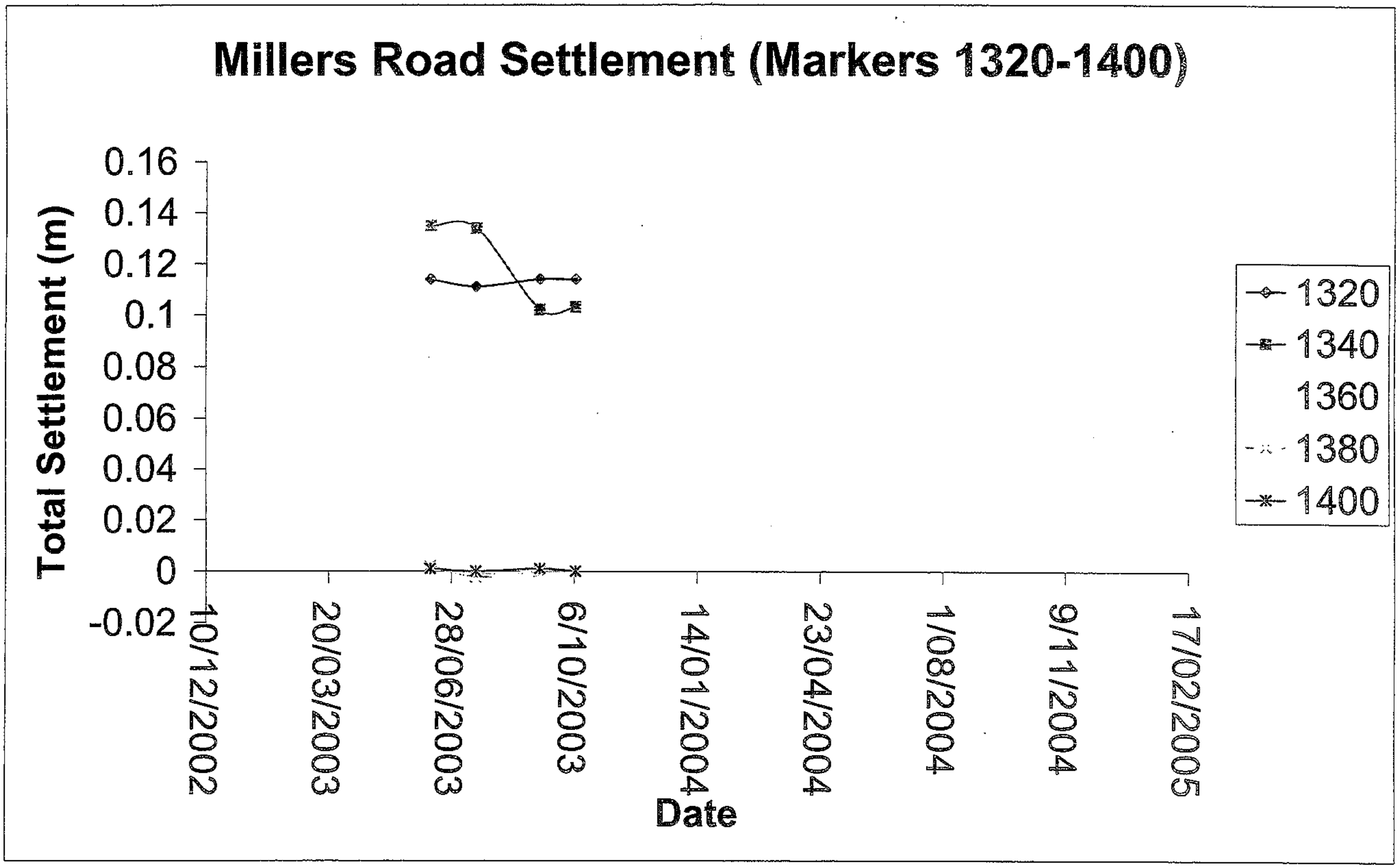

Mayfield Settlement (Markers S-X)
Date
1/09/2002
10/12/2002
20/03/2003
28/06/2003
6/10/2003
14/01/2004
23/04/2004
1/08/2004
9/11/2004
17/02/2005
Total Settlement (m)
0.000
-0.050
-0.100
-0.150
-0.200
-0.250
-0.300
-0.350
-0.400
-0.450
-0.500
S
T
U
V
W
X



Millers Road Settlement (Markers 940-1060)
Date
10/12/2002
20/03/2003
28/06/2003
6/10/2003
14/01/2004
23/04/2004
1/08/2004
9/11/2004
17/02/2005
Total Settlement (m)
0.05
0
-0.05
-0.1
-0.15
-0.2
940
960
980
1040
1060


Mayfield Settlement (Markers 950-1200)
Date
1/09/2002
10/12/2002
20/03/2003
28/06/2003
6/10/2003
14/01/2004
23/04/2004
1/08/2004
9/11/2004
17/02/2005
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
Total Settlement (m)
950
1000
1050
1100
1200


Millers Road Setlement (Markers 1220-1300)
Date
10/12/2002
20/03/2003
28/06/2003
6/10/2003
14/01/2004
23/04/2004
1/08/2004
9/11/2004
17/02/2005
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
Total Settlement (m)
1220
1240
1280
1300


Millers Road Settlement (Markers 1320-1400)
Total Settlement (m)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
-0.02
10/12/2002
20/03/2003
28/06/2003
6/10/2003
14/01/2004
23/04/2004
1/08/2004
9/11/2004
17/02/2005
Date
1320
1340
1360
1380
1400

APPENDIX IV

Post Construction Borehole Logs

Pre Construction Borehole Logs

SHRIMPTON & LIPINSKI

Site: MAYFIELD SUBDIVISION STAGE 4			Borehole on Lots 153 159 Sheet: 1 Of: 1
Job No. 16530	Date Excavated: April 2005	RL Ground: —	Logged By: J Lloyd

Description of Soil	Depth (m)	Undrained Shear Strength (kPa) 50 100 150
LOT NO 153		
TOPSOIL 200 deep		
SAND (f) med dense pumiceous sl-moist white-brown		
SILT sandy (f) sl-clayey stiff friable sl.moist brown	0.5	>0
		>0
SILT hard friable moist grey		
SAND (f) sl-clayey sl.moist brown	1.0	>0
End of bore		
LOT NO 159		
TOPSOIL 100 deep		
SILT clayey stiff moist friable brown sl.plastic	0.5	>0
SILT sl-clayey sandy stiff brown		>0
SILT stiff moist friable moist grey-brown	1.0	>0
End of bore		

EXCAVATION METHOD: Handauger and shear vane or Scala Penetrometer

SHRIMPTON & LIPINSKI	Borehole 160 on Lots 161
Site: MAYFIELD SUBDIVISION STAGE 4	Sheet: 1 Of: 1

Job No. 16530	Date Excavated: April 2005	RL Ground: —	Logged By: J Lloyd

Description of Soil	Soil Symbol	Depth (m)	Undrained Shear Strength (kPa) 50 100 150
LOT NO 160			
TOPSOIL 200 deep			
SILT clayey stiff moist friable brown		0.5	
SILT stiff moist friable brown		1.0	
End of bore			
LOT NO 161			
TOPSOIL 350 deep			
SILT sl. sandy stiff sl. moist brown		0.5	>200
SILT sandy (f) sl. clayey v. stiff sl. moist white			>200
SILT sandy v. stiff sl. moist brown		1.0	>200
SILT stiff light brown			
End of bore			

EXCAVATION METHOD: Handauger and shear vane or Scala Penetrometer

SHRIMPTON & LIPINSKI

Site: MAYFIELD SUBDIVISION STAGE 4	Borehole on Lots 162 163
	Sheet: 1 Of: 1
Job No. 16530 · Date Excavated: April 2005 · RL Ground: —	Logged By: J Lloyd

Description of Soil	Soil Symbol	Depth (m)	Undrained Shear Strength (kPa) 50 100 150
LOT NO 162			
TOPSOIL 300 deep			
SILT sl. Sandy stiff friable sl. moist light brown		0.5	>200
SILT Sandy sl. clayey stiff moist brown			>200
SILT stiff moist light brown		1.0	>200
End of bore			
LOT NO 163			
TOPSOIL 300 deep			
SILT Sandy stiff friable sl. moist light brown - green		0.5	>200
SILT clayey stiff sl. moist brown - green			>200
CLAY v. stiff v. plastic moist white		1.0	
End of bore			

EXCAVATION METHOD: Handauger and shear vane or Scala Penetrometer

SHRIMPTON & LIPINSKI

Site: MAYFIELD SUBDIVISION STAGE 4			Borehole 168 on Lots 169 · Sheet: 1 Of: 1
Job No. 16530	Date Excavated: April 2005	RL Ground: —	Logged By: J Lloyd

Description of Soil	Soil Symbol	Depth (m)	Undrained Shear Strength (kPa) 50 100 150
LOT NO 168			
TOPSOIL 100 deep			
SILT stiff sl. moist friable light green			>>
SILT sl. sandy hard sl. moist brown		0.5	>>
			>>
SILT sl sandy stiff-hard sl. moist light brown		1.0	>>
SAND (f) med dense light green			
End of bore			
LOT NO 169			
TOPSOIL 200 deep			
SILT clayey stiff-hard plastic sl. moist brown			>>
SILT clayey stiff mod plastic sl. moist brown - light brown		0.5	>>
SILT stiff sl. friable moist sl. plastic brown		1.0	>>
End of bore			

EXCAVATION METHOD: Handauger and shear vane or Scala Penetrometer

BOREHOLE LOG

Connell Wagner

Test Location	Borehole Number 1 → ON LOT 171
	Sheet 1 of 1
	Job MAYFIELD Subdivision
	Job Number 7073-01 LC Date: 14 4 99
	Drill Method Hand Auger and Shear vane
See Geotechnical Site Plan	Tested by : Sally Hargraves
	Notes: Long grass
	Water Table: 1.25m bgl (RL 3.25m)
Elevation: 4.5 m	Soil Symbol / Depth / Water Table / Undrained Shear Strength (kPa)

Description of Soil

Dark brown slightly sandy SILT (ML) (topsoil)

(firm)

Dark brown slightly clayey SILT (OL)

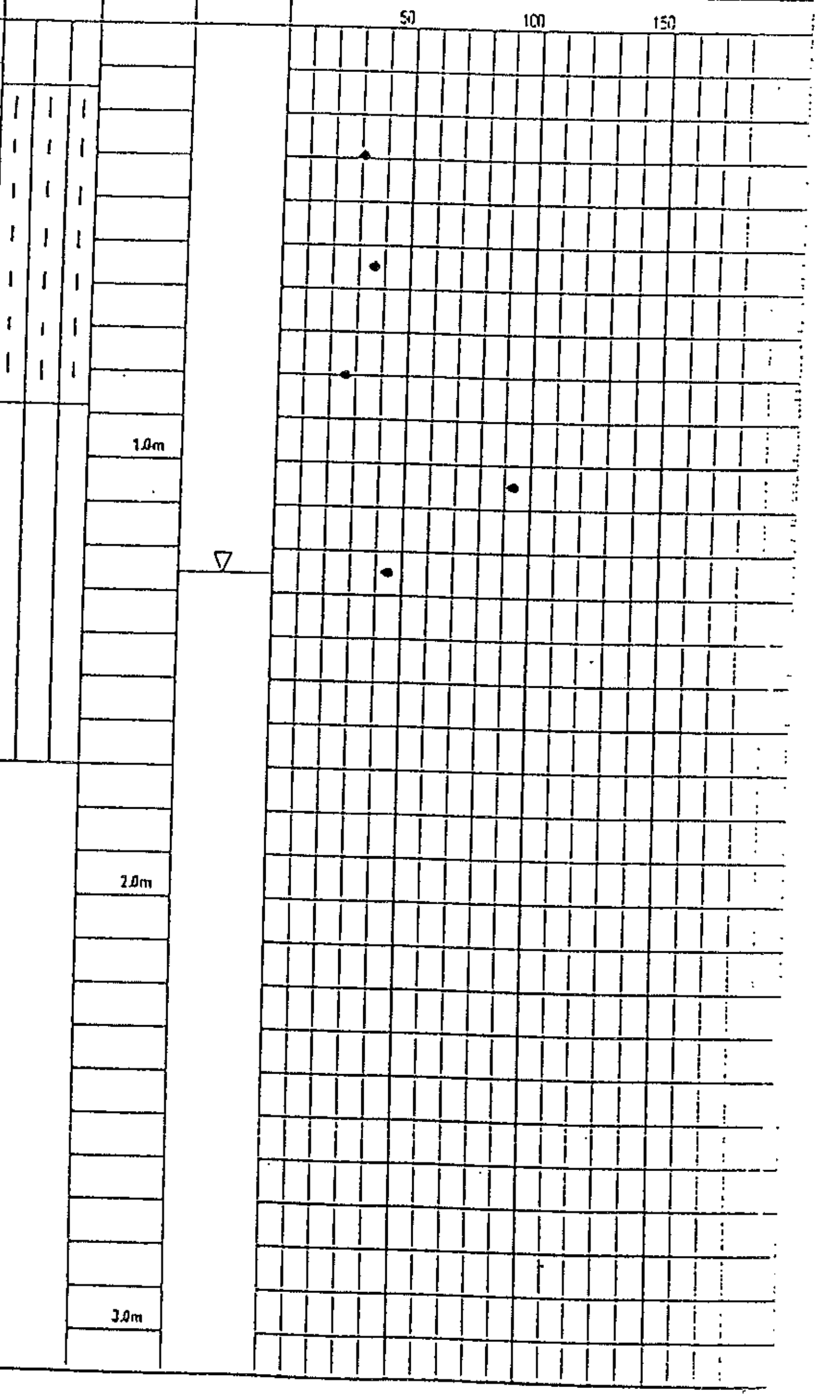
(soft, organic, damp)

Brown slightly sandy SILT (ML)

(firm)

(becomes brown mottled orange, soft to firm)

Borehole ends 1.7m



BOREHOLE LOG

Connell Wagner

ADJACENT TO LOT 169

Test Location	See Geotechnical Site Plan
Elevation:	15.5 m
Borehole Number	9 → LOT 169
Sheet	1 of 1
Job	MAYFIELD Subdivision
Job Number	7073-01 LC
Date:	21/05/99
Drill Method	Hand Auger and Shear vane
Tested by:	Sally Hargraves
Notes:	Edge of ploughed field
Water Table:	None Encountered

Description of Soil	Soil Symbol	Depth	Water Table	Undrained Shear Strength (kPa) 50 100 150
Dark brown slightly sandy SILT (ML) (topsoil)				
(soft to firm)				
Yellowish brown slightly clayey SILT (ML) (Younger ASH)				
(soft to firm, damp)				
Borehole ends 0.9m				
		1.0m		
		2.0m		
		3.0m		