GEOTECHNICAL COMPLETION REPORT FOR CABRA DEVELOPMENTS LIMITED 55 LOT RESIDENTIAL SUBDIVISION STAGES 5, 6 & 13 AT MATUA ROAD AND TAPU ROAD, HUAPAI

Prepared for Cabra Developments

23 February 2015 Ref:L17300p

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CONSULTING ENGINEERS

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APPENDICES

1.0 INTRODUCTION

This Geotechnical Completion Report is for a 55 Lot Residential Subdivision at 88 Tapu Road, Huapai. The Geotechnical Completion Report has been prepared for Cabra Developments Limited, as documentation required to be submitted to the Auckland Council following the subdivisional development. The Auckland Council resource consent number for the subdivision is R59597.

2.0 SUBDIVISIONAL DEVELOPMENT

The residential subdivision comprised a total of 55 lots. Lots 170 to 208 and 211 to 222 (inclusive) are Huapai medium intensity lots, varying in size from 600m^2 to 1033m^2. Lots 168, 169, 209 and 210 are Huapai Park residential lots, varying in size from 503m^2 to 725m^2.

The developed lots are accessed by Matua Road on the northern boundary and Tapu Road on the eastern boundary and two new internal public roads. Road 1 (Hooton Drive) is a 6.5m wide asphaltic concrete formation extending approximately 260m from Matua Road to the southern boundary of the subdivision. Road 1 services lots 168 to 178 (inclusive) and 203 to 210 (inclusive).

Road 2 (Remana Crescent) is a 6.0m wide asphaltic concrete formation extending approximately 300m in a loop from and to Road 1. Road 2 services lots 192 to 202 (inclusive) and 211 to 222 (inclusive).

Lots 179 to 184 (inclusive) gain access from Matua Road on the northern boundary. Lots 185 to 191 (inclusive) gain access from Tapu Road on the eastern boundary.

The earthworks operation involved approximately 40,000m^3 of cut to fill.

As indicated on the cut to fill as-built contour plan, within the appendices, a total of 55 lots have been formed utilising cut to fill earthworks. The maximum depth of fill was around 4.0m and the maximum depth of cut was around 3.0m.

3.0 RELATED REPORTS

A geotechnical investigation report was prepared for Matua Residential Estate 223-Lot Residential Subdivision at Matua Road & Tapu Road, Huapai site by this office, ref: LM15200 dated 19th October 2012. The recommendations contained in the IHCL report have been reviewed during preparation of this document.

4.0 EARTHWORKS OPERATIONS

4.1 Plant

The earthworks operations for this site were carried out from the mid-March 2014 to the end of January 2015 with a shut down over the winter season. The plant utilised on site by the contractors, Opie Contractors (2014) Limited as the main contractor and Bob Hick Earthmovers Limited as the sub-contractor is generally outlined below:

- 2 x CAT 23-ton Hydraulic Excavators
- 1 x CAT 22-ton long reach Hydraulic Excavator
- 1 x CAT 815 4WD Pad Foot Compactor
- 1 x CAT 615c Elevating Scraper
- 2 x Komatsu HA250 6-wheel Moxy Tip Trucks
- 2 x CAT D7 HLGP Bulldozer with scoop
- 1 x Komatsu 110R Rubber Track Tip Truck
- 1 x Hyundai 35-ton Hydraulic Excavator
- 1 x Komatsu CS360 Lime Hoe
- 1 x Rubber Track Lime Spreader Truck
- 1 x Hitachi EX200 Hydraulic Excavator
- 2 x John Deere 7700 Tractors with levelling bar and discs
- 1 x Terex Water Cart

4.2 Construction Program

Earthwork activities commenced in mid-March 2014, with the construction of sediment retention pond A, the formation of clean water diversion drains, topsoil stripping and the mucking out of the main gully. The main gully was backfilled by early April 2014 and topsoil and unsuitable stockpiles placed on the western side of the site.

The bulk earthworks operations over the entire development were carried out from March 2014 to the end of May 2014 when the site was closed for the winter season. Before winter shut down finished lots 204 to 208 and 216 to 222 were topsoiled, mulched and grassed. The remaining exposed areas were stabilised with straw mulch. The sediment retention pond remained operational. The bulk earthworks re-commenced in October 2014 until mid-February 2015.

The construction of timber pole retaining walls and Keystone retaining walls commenced in November 2014 and continued until late January 2015.

The road formation construction commenced in mid-September 2014 with the stabilising of the Road 1 and 2 subgrades. The subgrade stabilising of the Matua Road upgrade was undertaken in early October 2014. The footpaths and cycleway were constructed during November 2014 to January 2015. The sealing of the road formations was completed in December 2014.

The sediment retention control pond was decommissioned in November with large areas of the site being topsoiled and grassed. The earthworks on the southern and western lots are controlled by decanting earth bunds. The final topsoiling and grassing the site was completed in mid-February 2015.

The subdivision earthworks were completed by 10th February 2015.

5.0 COMPACTION QUALITY CONTROL

5.1 Control Criteria

The Standards adopted for the earthworks were NZS4431:1989 Code of Practice for Earthfill for Residential Development. With testing in accordance with NZS4402:1986 Methods of Testing Soils for Civil Engineering Purposes. The following compaction standards were adopted for the fill:

Air Voids:

Average less than 8%
Maximum single value of 10%

Undrained Shear Strength:

Average value at least 140kPa
Minimum single value 100kPa

Auckland Council (formerly Rodney District Council) Standards for Engineering Design & Construction; standards for road formation and pavement construction require Benkelman Beam testing prior to final surfacing. The Council requirements that we have adopted for control criteria are outlined in the table below:

Table 5.1 Benkelman Beam Limits

Benkleman Beam Limits	
Traffic Load (vpd)	**95th Percentile Deflection**
<300 vpd (residential only)	1.50mm
<3000 vpd	1.25mm
>3000 vpd	1.00mm

The 1.5mm criteria apply to the road formation within this subdivision.

The 1.0mm criteria apply to Matua Road.

5.2 Field Control

Prior to the placement of fill materials, the site was inspected to ensure all topsoil and unsuitable material had been removed to our satisfaction and benches had been cut at a gentle reverse gradient back into slopes prior to placing fill.

Regular insitu strength tests were carried out on the filling utlising Shear Vane apparatus, at or in excess of the frequency recommended in NZS 4431:1989.

Five in-situ density, strength and water content tests were undertaken within the areas of bulk filling. The recorded air voids percentages were within the criteria specified in section 5.1 above.

Benkelman Beam tests were undertaken on the compacted basecourse of the new road formations prior to sealing. A summary of the test results follow:

Road-1 (Hooton Drive):

- Deflections ranged from 0.42mm to 1.37mm, with an average deflection of 0.90mm.
- 95th Percentile was 0.86mm.

Road-2 (Remana Crescent):

- Deflections ranged from 0.44mm to 1.42mm, with an average deflection of 0.89mm.
- 95th Percentile was 0.85mm.

Matua Road:

- Deflections ranged from 0.30mm to 1.15mm, with an average deflection of 0.68mm.
- 95th Percentile was 0.64mm.

Refer to the Road Test laboratory test result sheets in the appendices for complete findings.

Control testing carried out on the compacted fill during the earthworks demonstrated that the required shear strengths and air void criteria was consistently being achieved. In some areas there were test failures during earthworks compaction. These test failures were relayed to the site foreman and/or his staff and to the best of our knowledge the affected areas of fill were reworked.

5.3 Post Construction Borehole Testing

Following completion of the earthworks a total of 11 hand auger boreholes (BH1 to BH11) were drilled in selected locations over the subdivision as an additional check on quality control. From these boreholes, samples were taken for expansive soils testing.

6.0 PROJECT EVALUATION

On the basis of our observations, inspections and field testing, we have formed the following conclusions:

6.1 Bearing Capacity for Building Foundations

Generally all filled and natural ground within the zone of influence of conventional residential shallow foundations has a geotechnical ultimate bearing capacity of 300kPa. At these bearing pressures differential settlements due to building loads should be within acceptable limits.

However due to the presence of soft natural subsoils within the likely influence of shallow foundations on Lots 204, 205, 207 and 208 an ultimate bearing capacity of 210kPa should be adopted. Using stiffened rib-raft type foundation systems would be the preferred option on these lots.

Where an ultimate bearing capacity greater than 300kPa is required to support any dwelling constructed outside the scope of NZS 3604:2011 Timber Framed Buildings, we recommend that further specific site investigation and design of the foundations are carried out prior to building consent application.

We note that NZS 3604:2011 only allows for a maximum fill depth of 600mm over the building platform of a residential dwelling due to the risk of the weight of fill inducing consolidation of the subsoils. Any additional filling exceeding 600mm thickness will require further geotechnical investigation and should be endorsed by an engineered design solution.

6.2 Expansive Soils

Seven sets of Expansive soil tests were completed on samples selected from different locations throughout the subdivision and within the likely zone of influence of shallow building foundations.

Laboratory testing was undertaken by Opus International Consultants Limited in accordance with Tests 2.1, 2.2, 2.3, 2.4 and 2.6 of NZS 4402:1986 Method of Testing Soils for Civil Engineering Purposes. Full test results are contained in appendix B.

Based on these results for lots 168 to 177 (inclusive), 184 to 191 (inclusive) and 201 to 222 (inclusive) the AS 2870 Site Classification is M (moderately expansive)

For lots 178 to 183 (inclusive) and 192 to 200 (inclusive) the AS 2870 Site Classification is H1 (highly expansive).

In terms of AS 2870:2011 Residential Slabs and Footings Site Class M soils have characteristic surface movement limits of 20mm to 40mm and Site Class H1 soils of 40mm to 60mm. Specific foundation design parameters are detailed in the Suitability Statement.

Due to the potential shrink/swell nature of the expansive soils when slab-on-grade construction is carried out during periods of extended dry weather (ie: a hot dry summer season) excavated floor slab areas should be thoroughly wetted and soaked for a minimum of 48 hours prior to final preparation of the impermeable damp proof course and concrete pouring. This can be achieved with extended fine spraying of the prepared sub-grade with a garden hose sprinkler and/or the like. Alternatively extended heavy wetting of the compacted hardfill under the slab.

Rapid construction following excavation and benching is also considered a suitable option provided the insitu material is sufficiently moist. Careful detailing of control joints in brittle cladding elements is also recommended.

Expansive soils are typically clay soils that undergo volumetric change due to seasonal fluctuations in moisture content. Other factors that can affect moisture content are outlined below:

- Garden watering, site drainage and tank overflows.
- The location of large trees near buildings, especially high transpiration species (i.e. willows, eucalyptus and/or the like).
- The moisture content of the platform at construction stage. Many platforms have dried out after initial excavation. Designers should consider moisture content of the building platform and consider thoroughly wetting the platform before pouring the floor slab in dry conditions.

6.3 Topsoil

Topsoil depths were checked by drilling of a borehole in the approximate centre of the residential lots. Our findings are indicative only and may vary in other locations. The topsoil depths range from 50mm to 500mm. Lots 178 and 187 have topsoil depths exceeding 300mm.

6.4 *Retaining Walls*

Some boundaries on lots 177, 178, 179, 189, 190, 193 and 194 have been supported by cantilever timber pole retaining walls or Keystone retaining walls. These walls reach a maximum height of 1.4 metres. The location of these walls is shown on as-built retaining wall plan 17300AB/EW-104. No building construction, including the construction of additional retaining walls, or earthworks should take place above and/or below walls within 1.5 x the retained height of the wall measured from either the top or base of the wall, unless endorsed by a Chartered Professional Engineer experienced in geomechanics to ensure no additional loads are applied to the wall and/or toe support is not removed/increasing the gradient of the front slope.

6.5 *Stormwater Disposal*

All stormwater runoff from the roofs; decks; hardstand areas, surface and subsoil drainage should be collected into a sealed stormwater system and discharged into the public piped stormwater system.

Concentrated stormwater flows should not be allowed to discharge close to any future building(s) or onto sloping ground within the vicinity of the building site. This would be detrimental to foundation conditions.

6.6 *Finished Floor Levels*

Due to the overland flow path along the western boundary of Lot 192 and over Road 2 (Remana Crescent) all future habitable dwellings on Lots 192, 193, 214 and 215 should have a minimum floor level of RL 29.8m as the 0.01 AEP maximum overland flood flow level is RL 29.5m at the upstream end of the overland flow path.

6.7 *Service Trenches*

Wherever possible trench backfill has generally been compacted to minimise potential for future settlements. As is normal practice on all subdivisions building development involving foundations within the 45 degree zone of influence from pipe inverts will require specific Engineering input and design.

6.8 *Underfill Drainage*

Underfill drainage has been installed at the base of the deep gully fills to collect ground water seepages as a precautionary measure and do not require any specific maintenance. Please refer to as-built underfill drainage plan 17300AB/EW-103 in the appendix for underfill drain locations. These drains are located at depth which is unlikely to influence shallow residential foundations constructed in accordance with NZS 3604:2011.

IAN HUTCHINSON CONSULTANTS LIMITED

Prepared by

M. Jones
GEOTECHNICAL MANAGER
NZCE (Civil)

Reviewed by

I.T. Hutchinson
MANAGING DIRECTOR
BE (Civil) ME MIPENZ CPEng

7.0 STATEMENT OF PROFESSIONAL OPINION AS TO SUITABILITY OF LAND FOR BUILDING DEVELOPMENT

Scheme Plan No: R59597 **Owner: Cabra Developments Limited**

Address: Matua Road & Tapu Road **Locality: Huapai**

I, Ian Thomas **Hutchinson** of IAN HUTCHINSON CONSULTANTS LIMITED 154 Centreway Road, P O Box 150, OREWA

Hereby confirm that:

1. I am a Chartered Professional Engineer experienced in the field of geotechnical engineering and was retained by the Owner/Developer as the Geotechnical Engineer on Stages 5, 6 and 13 of the Matua Estate Subdivision at 88 Tapu Road, Huapai.

2. The extent of my inspections during construction and the results of all tests carried out are described my report ref: L17300p dated 23 February 2015.

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

   (a) The earthfills shown on the attached as-built cut/fill depth contour plan No: 17300AB/EW-103 has been completed in compliance with NZS 4431:1989 and the Legacy Rodney District Council Standards for Engineering Design and Construction.

   (b) The completed works give due regard to land slope and foundation stability considerations. However as shown on the appended as-built batter restriction zone plan 17300AB/CN-603 areas within lots 168 to 181 (inclusive) and 184 to 198 (inclusive) have gradients or are adjacent to slopes with gradients steeper than 1 in 4.

   No building construction and no earthworks should be undertaken in these zones unless endorsed by specific design of all foundations and retaining walls completed by a Chartered Professional Engineer.

   All building construction on or above the slopes within these zones will require specifically designed piled foundations. The piles should be embedded a minimum of 2.0m below cleared ground level and resist soil creep over the upper 1.0m of embedment. Pile design parameters are given below. No additional filling should be placed on or above these slopes.

- $\phi' = 30^{o}$
- $S_u' = 100kPa$
- Geotechnical ultimate end bearing capacity below 2.0m embedment = 450kPa
- An ultimate sidewall adhesion of 36kPa ignoring adhesion over the upper 1000mm of embedment
- Lateral earth pressure of $K_o=0.5$ acting over three auger pile diameters for the initial 1000mm of embedment with a density of $18kN/m^3$.

All building construction on or at the toe of slopes within these zones should be specifically designed and should consider the impact of any cuts on batter stability. We envisage all cuts should be supported by a specifically designed retaining wall.

(c) A geotechnical ultimate bearing capacity of 300kPa may be used for foundation design on Lots 168 to 203 (inclusive) and 206, 209 to 222 (inclusive). However due to the presence of soft natural subsoils within the likely influence of shallow foundations on Lots 204, 205, 207 and 208 (inclusive) an ultimate bearing capacity of 210kPa should be adopted. Using stiffened rib-raft type foundation systems is a preferred option on these lots.

(d) Retaining walls are located on or adjacent to Lots 177, 178, 179, 189, 190, 193 and 194. Refer to the as-built consent notice area plans 17300AB/CN-601 appended.

No building construction, including the construction of additional retaining walls, or earthworks should take place above and/or below walls within 1.5 x the retained height of the wall measured from either the top or base of the wall, unless endorsed by a Chartered Professional Engineer experienced in geomechanics to ensure no additional loads are applied to the wall and/or toe support is not removed/increasing the gradient of the front slope.

(e) As is normal practice within subdivisional building development involving foundations within the 45 degree zone of influence from pipe inverts will require Engineering input.

(f) The assessed AS 2870 expansive Site Class for Lots 168 to 177 (inclusive), 184 to 191 (inclusive) and 201 to 222 (inclusive) is M (moderately expansive).

(i) All shallow foundations should extend a minimum of 600mm below cleared ground level, following topsoil stripping and benching.

(ii) Alternatively foundation design may be undertaken in accordance with AS 2870:2011 sections 3 and 4 for Site Class M.

(iii) Where brittle exterior cladding such as brick veneer, stucco plaster, solid plaster, block work, styrofoam type cladding or sprayed plaster over harditex systems, etc is proposed, consideration should be given to detail control joints. Control joint spacing should not exceed 3.0 metres either horizontally or vertically and be positioned around doorways, windows and building envelope returns where cracking is most likely to occur.

(g) The assessed AS 2870 expansive Site Class for lots 178 to 183 (inclusive) and 192 to 200 (inclusive) is H1 (highly expansive).

(i) All shallow foundations should extend a minimum of 900mm below cleared ground level, following topsoil stripping and benching.

(ii) We recommend four bar reinforcing cages should be used as a minimum.

(iii) Alternatively foundation design may be undertaken in accordance with AS 2870:2011 sections 3 and 4 for Site Class H1.

(iv) Where brittle exterior cladding such as brick veneer, stucco plaster, solid plaster, block work, styrofoam type cladding or sprayed plaster over harditex systems, etc is proposed, consideration should be given to detail control joints. Control joint spacing should not exceed 3.0 metres either horizontally or vertically and be positioned around doorways, windows and building envelope returns where cracking is most likely to occur.

(h) Subject to the geotechnical limitations, expansive soil assessments, restrictions and recommendations contained in clauses 3.(a), 3.(b), 3.(c), 3.(d), 3.(e), 3.(f) and 3.(g) above: The filled and natural ground within the residential lot boundaries is generally suitable for residential buildings constructed in accordance with NZS 3604:2011 Timber Framed Buildings and related documents.

4. Road subgrades have been modified to accommodate the pavement design requirements. Accessway subgrades have been formed with due regard for stability and settlement, although CBR values do vary between natural and filled ground as is to be expected.

The professional opinion contained in this report is furnished to the Auckland Council and Cabra Developments Limited for their purposes alone on the express condition that it will not be relied upon by any other person. Prospective purchasers should still satisfy themselves as to any specific conditions pertaining to their particular land interest.

Signed: _____ **Date:** 23 February 2015

I.T. Hutchinson
MANAGING DIRECTOR
BE (Civil) ME MIPENZ
CPEng Civil Structural IntPE (NZ)

CPEng Reg No: 63973
Member: ACENZ and IPENZ

Table 7.1 SUITABILTY STATEMENT SUMMARY

Lot No.	Requirements	Ultimate Bearing Capacity (kPa)	AS2870 -2011 Class	Topsoil Depth (mm)
168	Batter restriction zone. Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
169	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	100
170	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
171	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	100
172	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	100
173	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
174	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
175	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
176	Batter restriction zone. Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
177	Batter restriction zone. Retaining wall setback zone restrictions. Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
178	Batter restriction zone. Retaining wall setback zone restrictions. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	400
179	Batter restriction zone. Retaining wall setback zone restrictions. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	200
180	Batter restriction zone. Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	350

Lot No.	Requirements	Ultimate Bearing Capacity (kPa)	AS2870 -2011 Class	Topsoil Depth (mm)
181	Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	200
182	AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	150
183	Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	150
184	Batter restriction zone. Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
185	Batter restriction zone. Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	150
186	Batter restriction zone. Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
187	Batter restriction zone. AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	500
188	Batter restriction zone. AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
189	Batter restriction zone. Retaining wall setback zone restrictions. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	300
190	Batter restriction zone. Retaining wall setback zone restrictions. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
191	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	100
192	Batter restriction zone. Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm. Minimum finished floor level requirement.	300	H1	300
193	Batter restriction zone. Retaining wall setback zone restrictions. Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm. Minimum finished floor level requirement.	300	H1	300

Lot No.	Requirements	Ultimate Bearing Capacity (kPa)	AS2870 -2011 Class	Topsoil Depth (mm)
194	Batter restriction zone. Retaining wall setback zone restrictions. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	100
195	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	200
196	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	300
197	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	150
198	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	150
199	Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	200
200	Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 900mm.	300	H1	200
201	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
202	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	300
203	Batter restriction zone. Elsewhere AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
204	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	210	M	200
205	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	210	M	200
206	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
207	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	210	M	200
208	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	210	M	300
209	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
210	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
211	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
212	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	150
213	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	300

Lot No.	Requirements	Ultimate Bearing Capacity (kPa)	AS2870 -2011 Class	Topsoil Depth (mm)
214	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm	300	M	200
215	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
216	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	100
217	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	50
218	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
219	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
220	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	250
221	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	200
222	AS 2870 foundation design or NZS 3604 with minimum footing depth of 600mm.	300	M	150