## 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** **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 10, 11 and 12 (Stage 3B) of the Matua Estate Subdivision at 179 Matua Road, Huapai.

2. The extent of my inspections during construction and the results of all tests carried out are described our report ref: L17550p dated 6th November 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: 17550AB/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.

   (c) Landscape retaining wall design parameters are given below:

   - $c' = 0kPa$
   - $S_u'$ (to calculate pole embedment) = 100kPa
   - $\phi' = 30°$
   - $\gamma' = 18kN/m^3$
   - Timber pole wall active ($K_a$) horizontal soil loads.
   - Lateral earth pressures should be modified for appropriate ground slope above and/or below the wall and should account for future possible (vehicle or back slope) surcharge loading.

   (c) A geotechnical ultimate bearing capacity of 300kPa may be used for foundation design on Lots 92, 93, 94, 100 to 105, 114 to 117, 130, 131, 134 to 136, 153, 154 and 156. An ultimate bearing capacity of 300kPa is also applicable to Lots 95, 96, 97, 99, 137 and 152 however stiffened waffle slab type foundation systems are the preferred option on these lots.

(d) Due to the presence of soft natural subsoils within the likely influence of shallow foundations on Lots 106, 107, 112, 132, 133 and 155 an ultimate bearing capacity of 210kPa should be adopted. Using stiffened waffle slab type foundation systems is a preferred option on these lots.

(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 Classification for all lots (excluding 98, 108-111) is M (moderately expansive).

(i) All shallow foundations should extend a minimum of 750mm below finished ground level.
(ii) Alternatively foundation design may be undertaken in accordance with AS 2870:2011 sections 3 and 4 for Site Class M.

(g) Lots 98 and 108 to 111 will require specific foundation design comprising floor slabs to be fully suspended and/or supported on driven timber piles.

(i) Driven piles should comprise H5 timber piles, designed to an appropriate set to support the anticipated building loads using the Hiley Formula.

(ii) The piles should be driven to a minimum depth of 1.2m below cleared ground level for bracing purposes.

(iii) We anticipate the required set should be achieved from 6.0m below existing ground level. However the driving of test piles is advised.

(h) Lots 133, 134, 155 and 156 are underlain by a layer of brown silt and clayey silt with some organic inclusions. This layer is typically up to 1.0m deep. While this soil layer appears organic, it exhibits an ultimate bearing capacity of up to 300kPa and is considered suitable for foundation bearing. However if organic material is encountered this material should be removed from beneath residential floor slabs.

(i) 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), 3.(g) and 3.(h) 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.

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:** 6 November 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 – Suitability Statement Summary*

| Lot No. | Requirements | Ultimate Bearing Capacity (kPa) | AS2870 -2011 Class | Indicative Topsoil Depth (mm) |
|---|---|---|---|---|
| 92 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm | 300 | M | 250 |
| 93 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 300 |
| 94 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 350 |
| 95 | Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 raft foundation | 300 | M | 200 |
| 96 | Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 raft foundation | 300 | M | 350 |
| 97 | Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 raft foundation | 300 | M | 350 |
| 98 | Specific design within 45 degree zone of influence of Stormwater line. Elsewhere specific piled foundation design or AS 2870 raft foundation | - | M | 300 |
| 99 | AS 2870 raft foundation | 300 | M | 300 |
| 100 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 250 |
| 101 | Elsewhere AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 250 |
| 102 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 250 |
| 103 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 200 |
| 104 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 300 |
| 105 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 350 |
| 106 | AS 2870 raft foundation | 210 | M | 350 |
| 107 | AS 2870 raft foundation | 210 | M | 300 |
| 108 | Specific piled foundation design. | – | M | 350 |
| 109 | Specific piled foundation design. Specific design within 45 degree zone of influence of Stormwater line. | – | M | 250 |
| 110 | Specific piled foundation design. Specific design within 45 degree zone of influence of Stormwater line. | – | M | 250 |
| 111 | Specific piled foundation design. Specific design within 45 degree zone of influence of Stormwater line. | – | M | 200 |

| Lot No. | Requirements | Ultimate Bearing Capacity (kPa) | AS2870 -2011 Class | Indicative Topsoil Depth (mm) |
|---|---|---|---|---|
| 112 | AS 2870 raft foundation | 210 | M | 200 |
| 114 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 200 |
| 115 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 250 |
| 116 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 200 |
| 117 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm.. | 300 | M | 200 |
| 130 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 200 |
| 131 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 250 |
| 132 | AS 2870 raft foundation | 210 | M | 200 |
| 133 | AS 2870 raft foundation | 210 | M | 300 |
| 134 | Specific geotechnical input/design zone on southern boundary. Elsewhere AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm.. | 300 | M | 200 |
| 135 | AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 200 |
| 136 | Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm.. | 300 | M | 200 |
| 137 | AS 2870 raft foundation | 300 | M | 200 |
| 152 | Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 raft foundation | 300 | M | 200 |
| 153 | Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm.. | 300 | M | 200 |
| 154 | Specific design within 45 degree zone of influence of Stormwater line. Elsewhere AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm.. | 300 | M | 200 |
| 155 | Specific design within 45 degree zone of influence of Stormwater line. Specific geotechnical input/design zone on southern boundary. Elsewhere AS 2870 raft foundation | 210 | M | 300 |

| Lot No. | Requirements | Ultimate Bearing Capacity (kPa) | AS2870 -2011 Class | Indicative Topsoil Depth (mm) |
|---|---|---|---|---|
| 156 | Specific geotechnical input/design zone on southern boundary.<br>Elsewhere AS 2870 raft foundation or NZS 3604 with minimum foundation depth of 750mm. | 300 | M | 200 |