

## 5.6 Road Subgrades

Penetration resistance tests were undertaken at regular intervals on the road subgrades and the results were subsequently forwarded to Cato Bolam Consultants Limited for pavement design purposes. Areas demonstrating low equivalent CBR values were undercut, and replaced with sand and/or increased metal depths. Coffey were only involved with providing factual results from penetration resistance testing on the road subgrades.

## 5.7 Topsoil

Topsoil depths in likely building platform areas were checked by the drilling of a borehole in the approximate centre of each lot. Our findings, which are indicative only and subject to variation at other locations, show that likely topsoil depths are between 150mm and 350mm.

Site specific findings are presented in the Suitability Statement Summary.

## 5.8 Contractor's Work

We have relied on the Contractor's work practices and assume that the works have been carried out in accordance with:

- (i) The approved Contract drawings and design details,
- (ii) The approved Contract specifications,
- (iii) Authorised Variations to (i) and (ii) during the execution of the works,
- (iv) The conditions of Resource, Earthworks and Building Consents where applicable,
- (v) The relevant Coffey Geotechnics reports, recommendations and site instructions,

and that all as-built information and other details provided to the Client and/or Coffey Geotechnics are accurate and correct in all respects.

## 6 STATEMENT OF PROFESSIONAL OPINION AS TO THE SUITABILITY OF LAND FOR BUILDING DEVELOPMENT

I, S.G. Lander, of Coffey Geotechnics (NZ) Limited, Auckland, hereby confirm that:

1. I am a Chartered Professional Engineer experienced in the field of geotechnical engineering as defined in section 1.2.3 of NZS 4404 and was retained by the Owner/Developer as the Geotechnical Engineer on Stages J2, J5C and J7 of the 1161 Coatesville-Riverhead Highway, Riverhead subdivision.
2. The extent of preliminary investigations carried out to date are described in Geotechnical Investigation Report number GENZAUCK15395, dated 22 May 2012, and the conclusions and recommendations of that document have been re-evaluated in the preparation of this report.
3. In my professional opinion, not to be construed as a guarantee, I consider that:
  - (a) The earth fills shown on the appended fill as-built plan have been placed in compliance with NZS 4431, Rodney District Council's Standards for Engineering Design and Construction (as adopted by Auckland Council) and related documents.

- (b) The completed earthworks give due regard to land slope and foundation stability considerations within the residential lots.
- (c) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for foundation design on Lots 12, 16, 18, 19, 20, 21, 22, 23, 24 and 61. However, due to the presence of organic natural subsoils below 1 metre depth within the likely zone of influence of future shallow foundations (and a rapid transition between natural and filled ground on Lot 17) on lots 17, 25, 26, 27, 48, 49, 50, 62 and 63 the geotechnical ultimate bearing pressure here should be limited to 210 kPa with a view to utilising raft type shallow foundation solutions, unless higher values can be demonstrated by specific site investigations, foundation designs and by construction inspections by a Chartered Professional Engineer experienced in geomechanics. Any organic soils that are exposed in footing excavations should be undercut and replaced with approved compacted hardfill.
- (d) The backfilling and compaction of the stormwater and common services trenches on this subdivision has where possible been carried out to appropriate standards having regard for the prevailing ground conditions and associated compaction induced pipe loadings.
- Nevertheless, no building development should take place within the 45 degree zone of influence of drain inverts unless endorsed by specific site investigations, foundation designs and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics to ensure that lateral stability and differential settlement issues are addressed and that building loads are transferred beyond the influence of the pipe and beyond the extent of the trench backfill.
- (e) Specific engineering assessment or design is required on Lots 16 and 17 if piled foundations are proposed within the 45 degree zone of influence of the subsoil drain located on the western and north-east boundaries of Lot 17 and north-west boundary of Lot 16. These drains do not pose a risk to shallow foundations that are in accordance with 3(c) above.
- (f) Subject to the geotechnical limitations, restrictions, recommendations and expansive soil assessments associated with 3(b), 3(c), 3(d) and 3(e) above:
- (i) The filled and undisturbed original ground within residential lot boundaries is generally suitable for residential buildings constructed in accordance with NZS 3604 and related documents.
- (ii) On all lots foundation design may be carried out in accordance with AS 2870 (Class M) or in accordance with NZS 3604 provided that in this latter case the minimum foundation depth below cleared ground level following topsoil removal and benching of building platform areas is 600mm. The exception to the latter is those lots having reduced bearing pressures and a view to raft foundation solutions, as recommended in 3(c) above.
4. Road subgrades have been formed having due regard for slope stability and settlement, although CBR values do vary between natural and filled ground, site conditions and on construction trafficking as is to be expected. It is likely that subgrade CBR's will be significantly lower than 7 within any areas of non-stabilised natural ground.

The professional opinion contained within 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.

The appended table summarises the status of each residential lot covered by this Suitability Statement.

For and on behalf of Coffey

Prepared By:



**L. Rausch**

Geotechnical Engineer



**C.J. Edwards**

Engineering Geologist

Reviewed and Authorised By:



**S.G. Lander**

Principal Geotechnical Engineer  
MIPENZ, CPEng.

**Table 2: Suitability Statement Summary**

<b>Lot No.</b>	<b>Comments</b>	<b>Topsoil Depth (mm)</b>	<b>Ultimate Bearing (kPa)</b>	<b>AS2870 :2011 Class</b>
12	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
16	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm. Specific engineering assessment or design required for piled foundations within the 45 degree zone of influence of the subsoil drain on western and north-east boundaries (this does not apply to shallow foundations, refer Section 6, no. 3(e)).	250	300	M
17	AS 2870 raft foundation design or specifically designed proprietary raft foundation solution on account of organic soils and potential rapid transition between natural and filled ground. Specific engineering assessment or design required for piled foundations within the 45 degree zone of influence of the subsoil drain on north-western boundary (this does not apply to shallow foundations, refer Section 6, no. 3(e)).	350	210	M
18	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
19	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
20	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
21	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
22	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
23	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
24	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	150	300	M
25	AS 2870 raft foundation design or specifically designed proprietary raft foundation solution.	200	210	M
26	AS 2870 raft foundation design or specifically designed proprietary raft foundation solution.	200	210	M
27	AS 2870 raft foundation design or specifically designed proprietary raft foundation solution.	200	210	M
48	AS 2870 raft foundation design or specifically designed proprietary raft foundation solution.	200	210	M
49	AS 2870 raft foundation design or specifically designed proprietary raft foundation solution.	200	210	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870 :2011 Class
50	AS 2870 raft foundation design or specifically designed proprietary raft foundation solution.	250	210	M
61	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
62	AS 2870 raft foundation design or specifically designed proprietary raft foundation solution.	200	210	M
63	AS 2870 raft foundation design or specifically designed proprietary raft foundation solution.	200	210	M