

## **Appendix A**

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

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

I, S.E.Gibb, of CMW Geosciences (NZ) Limited, Auckland, hereby confirm that:

1. As a Chartered Professional Engineer experienced in the field of geotechnical engineering, I am a Geo-professional as defined in section 1.2.2 of NZS 4404 and was retained by the Developer as the Geotechnical Engineer on Stage 4ii of the Karepiro Development.
2. The extent of investigations carried out to date are described in the Coffey Geotechnical Investigation and Design reports referenced GENZSILV12728, dated 30 March 2010, 13 June 2010 and 27 August 2010 and the subsequent design reports referenced in Section 2 of this report. The conclusions and recommendations of those documents have been re-evaluated in the preparation of this report. The results of all tests carried out are also appended.
3. In my professional opinion, not to be construed as a guarantee, I consider that:

- (a) The earth fills shown on the appended Total Fill Depth As-built Plan have been placed in compliance with NZS 4431, the Legacy Rodney District Council Plans and related documents.
- (b) The completed earthworks give due regard to land slope and foundation stability considerations on the building platform areas, but as shown on the appended building restriction zones plans, areas on most lots have gradients steeper than 1(v) in 4 (h) (and generally up to 1(v) in 1(h)) or are adjacent to land having such gradients. Accordingly, restrictions incorporating Specific Design Zones (Slope) have been applied as depicted on the as-built plans as follows:

**Specific Design Zone (Slope) areas** have been applied on Lots 37 to 53 and 58 to 61 inclusive. No building construction and no earthworks (i.e. cut or fills of any depth) should take place within the designated **Specific Design Zone (Slope) areas** unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the implications of the proposals on both global stability conditions and soil creep on the building platform, the interaction with service pipes and associated trench backfills, control of surface water, construction sequencing, timing and temporary support requirements construction of all earthworks, foundations and retaining walls and if necessary, comment on what aspects require engineering inspections and certification.

This limitation also applies to long term landscaping works, including any proposed minor cuts either on or near batter toes to be retained by new landscaping walls that might not normally require engineering, and to landscaping fills on or immediately above the batter slopes.

- (c) **No Build / Bush Covenant Zone** areas defined on Lots 44, 45, 52 to 54, 58 to 61, 125 and 126 inclusive are designated no-build zones on the basis of potential for instability, the presence of reinforced earth slopes and/ or because of the presence of covenanted bush.

No building construction and no earthworks may take place in these areas.

- (d) **Specific Design Zone (Retaining)** areas have been applied on Lots 37 to 53, 55 to 58, 125, 126 and 127 inclusive for the protection of the function of the retaining walls. No building construction and no earthworks (i.e. cut or fills of any depth) should take place within the designated **Specific Design Zone (Retaining)** areas unless endorsed by a

Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the stability implications of the earthworks and building proposals on the retaining walls.

- (e) The function of the subsoil drains installed beneath Lots 40, 41, 43 to 54, 56 to 61, 125 and 126 inclusive must not be impaired by any building development or landscaping works. Any bored or driven piles must be positioned to avoid damaging the draincoils. Where any subsoil drain is intercepted by building works, it must be reinstated under the direction of a Chartered Professional Engineer to ensure the integrity of the subsoil drainage system.
- (f) The formed drainage outlets on Lots 52, 53 and 125 must be kept free of debris and otherwise maintained as necessary to ensure their ongoing function.
- (g) Geogrid reinforcement is present beneath portions of the building platforms on Lots 54, 125 and 126. Foundation designers should note the presence of the reinforcement to avoid damage to the geogrids from footing excavations and trenching. It is expected that the upper grid is buried by at least 0.4m from finished ground levels. Raft foundation systems are recommended on these lots.
- (h) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for shallow foundation design on the building platforms of Lots 37 to 54, 58 to 61 and 125 to 127.

Due to the presence of variable strength natural subsoils within the likely zone of influence of future shallow foundations on lots 55, 56 and 57 the geotechnical ultimate capacity has been limited to 200 kPa.

If for any reason higher geotechnical bearing capacities are required, further specific site investigation and design of foundations should be carried out prior to Building Consent application.

- (i) The expansive site Class for all lots has been assessed as AS2870 Class M (Moderate). We recommend that building designers note on the Building Consent drawings the need to maintain appropriate moisture levels across building subgrades and in footing excavations (as described in Section 5.11.3 of the Geotechnical Completion Report) for reference by foundation contractors.
- (j) The backfilling and compaction of the storm water and sanitary sewer trenches on this subdivision has been carried out to appropriate standards having regard for the prevailing ground conditions and associated compaction induced pipe loadings.

However, no building development should take place within the 45 degree zone of influence of drain inverts unless endorsed by specific design 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 trench backfill. A copy of drawing SW22 extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision this document is provided in Appendix B for clarification. Details for water and wastewater pipes are available in the Watercare Code of Practice for Land Development and Subdivision, with drawings WW53, WW54 and WW60 from this document provided in Appendix B for clarification.

Lots containing drainage line restrictions include 38 to 44, 47, 56 to 58, 126 and 127 inclusive.

- (k) Subject to the geotechnical limitations, restrictions and recommendations contained in clauses 3(b), 3(c), 3(d), 3(e), 3(f), 3(g), 3(h), 3(i) and 3(j) above:
- (i) The filled and natural ground is generally suitable for residential buildings constructed in accordance with NZS 3604 and the requirements of AS2870 for the appropriate expansive soil class.
  - (ii) Where shallow foundations are appropriate, design may be carried out in accordance with AS 2870 (Class M) or alternately, a specific foundation and structural design may be undertaken by a Chartered Professional Engineer.
4. Road subgrades have been formed with appropriate regard for slope stability and settlement risks.
5. As required by the Resource Consent, the fencing installed on top of all retaining walls greater than 1.2 metres in height on Lots 46 and 49 to 51 inclusive shall be maintained in place for perpetuity. Should any fence require to be replaced it shall be replaced with like for like fencing. No fence or wall shall be erected within any rear yard of the above mentioned lots in addition to the fencing installed on top of the retaining walls. Owners of such lots may however plant within the rear yard to provide privacy should it be required providing such planting does not compromise the structural integrity of the retaining wall.
6. This statement of Professional opinion shall be read in conjunction with the Geotechnical Completion Report and shall not be copied or reproduced except in conjunction with the full geotechnical completion report.

The following table summarises the conditions on each of each residential lots.

**For and on behalf of**  
**CMW Geosciences (NZ) Limited**



**Sam Gibb**

Senior Geotechnical Engineer, CPEng

GCR Summary Table

Condition	Specific Design Zone (slope)	Bush Covenant / No Build Zone	Specific Design Zone (retaining)	Subsoil Drains Present	On-site Drainage Outlet Present	Geogrid Reinforcement Present	Geotechnical Ultimate Bearing Capacity (kPa)	AS2870 Expansive Class	Service Line Restrictions	Indicative Topsoil Depth (mm)
GCR SOPO Clause	3(b)	3(c)	3(d)	3(e)	3(f)	3(g)	3(h)	3(i)	3(j)	
Lot number										
37	●		●				300	M		250
38	●		●				300	M	●	200
39	●		●				300	M	●	100
40	●		●	●			300	M	●	150
41	●		●	●			300	M	●	250
42	●		●				300	M	●	250
43	●		●	●			300	M	●	200
44	●	●	●	●			300	M	●	200
45	●	●	●	●			300	M		200
46	●		●	●			300	M		150
47	●		●	●			300	M	●	200
48	●		●	●			300	M		150
49	●		●	●			300	M		300
50	●		●	●			300	M		200
51	●		●	●			300	M		100
52	●	●	●	●	●		300	M		200
53	●	●	●	●	●		300	M		200
54		●		●		●	300	M		200
55			●				200	M		250
56			●	●			200	M	●	200
57			●	●			200	M	●	250
58	●	●	●	●			300	M	●	150
59	●	●		●			300	M		100
60	●	●		●			300	M		100
61	●	●		●			300	M		200
125		●	●	●	●	●	300	M		200
126		●	●	●		●	300	M	●	250
127			●				300	M	●	150