Department of Building and Housing
Te Tari Kaupapa Whare

Determination 2011/010

Refusal to issue a code compliance certificate due to differential settlement of foundations in a nine-year old house at 199 East Hopai Rd, Ngatea

1. The matters to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004[1] (the Act) made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing ("the Department"), for and on behalf of the Chief Executive of that Department.

1.2 The parties to the determination are:

- the current owner, Narsha Farms Ltd ("the applicant") acting through a legal advisor
- the Hauraki District Council, carrying out its duties and functions as a territorial authority and building consent authority ("the authority").

1.3 I also consider that Mr and Mrs Hayward, the previous owners of the property in question are persons with an interest in this determination.

[1] The Building Act, Building Code, Compliance documents, past determinations and guidance documents issued by the Department are all available at www.dbh.govt.nz or by contacting the Department on 0800 242 243

1.4 This determination arises from the decision of the authority to refuse to issue a code compliance certificate for a 9-year-old house because it was not satisfied that it complied with certain clauses[2] of the Building Code (Schedule 1, Building Regulations 1992).

1.5 The matter to be determined[3] is therefore whether the authority was correct to refuse to issue a code compliance certificate. In deciding this, I must also consider whether the building complies with Clause B1 Structure.

1.6 In making my decision, I have considered the submissions of the parties, the report of the expert commissioned by the Department to advise on this dispute ("the expert"), and the other evidence in this matter. I also note that relevant clauses of the Building Code are set out in Appendix A.

2. The building

2.1 The building is a small single storey house with an area of 128m^2. The house is timber framed, constructed on a 100mm thick concrete floor slab poured over compacted hardfilling and supported around its perimeter by 600mm x 300mm concrete strip footings. The house is clad with fibre-cement weatherboards and the joinery is aluminium. The building has a simple pitched lightweight metal roof, with eaves and external gutters.

2.2 The drawings indicate that the foundations were to be founded on minimum 400mm of compacted aggregate (crusher dust) with the slab sitting on a further 300mm of the same material. The plan specifies that the fill material should be compacted in 150mm layers to achieve an allowable foundations bearing pressure of 100kPa.

2.3 The building is sited on a flat, rural section. It has been assumed by a geotechnical engineer (see paragraph 5.5) that the foundation soils comprise the flood plain alluvial deposits of the Hauraki Plains. Records from the authority note that the site is wet land with a low bearing capacity.

3. Background

3.1 A building consent (number BC15395) was issued by the authority in June 2001 under the Building Act 1991. The building consent documentation included a cross section through the house detailing a timber sub floor on piles. However, this has been subsequently crossed out and replaced by an amended drawing showing the foundations as described in paragraphs 2.1 to 2.2.

3.2 A siting and pre-floor inspection was undertaken by the authority on 2 July 2002, followed by a drainage inspection on 9 July 2002.

[2] In this determination, unless stated otherwise, references to the sections are sections of the Act and references to clauses are to clauses of the Building Code

[3] Under section 177(b)(i) of the Act (prior to 7 July 2010)

3.3 The structural engineer who designed the foundations did not provide a Producer Statement for design (PS1) as part of the building consent application, nor did the authority request the engineer to inspect the foundations or provide a Producer Statement for construction review (PS4) on completion.

3.4 A final inspection was not undertaken until 1 April 2009, at which time the inspector recorded indications of differential settlement of the foundations (roof guttering with negative fall, windows and doors sticking). As a result of this inspection the authority suspended processing of the code compliance certificate.

3.5 The applicant formally applied for a code compliance certificate on 14 September 2009 which was declined by the authority on 21 September 2009 on that grounds that the building did not comply with the Building Code due to the differential settlement.

3.6 The authority engaged the services of a firm of engineering consultants ("the consultants") to 'consider and present options to mitigate the risk of settlements that adversely affect dwellings constructed on the Hauraki Plains'. The consultants provided a report to the authority dated 8 October 2009. This report set out various options, together with estimated costs, that could alleviate or lessen differential settlements of buildings built on the Hauraki Plains.

3.7 On 21 October 2009, a firm of barristers and solicitors wrote to the authority on behalf of the previous owners of the house. The letter questioned why the authority could not issue a code compliance certificate, as the house had passed all its intermediate inspections. The letter also noted that the previous owners were not aware of any problems during the eight years that they had occupied the house.

3.8 The application for a determination was received by the Department on 9 April 2010.

4. The submissions

4.1 The applicant's legal advisor wrote to the Department on 3 September 2010 and rejected any approach that considered Clause B1 in terms of "ongoing settlement". The submission referred to the requirements of Clauses B1.3.1 and B1.3.2 and stated that the differential settlement of the house had caused the "loss of amenity" referred to in Clause B1.3.2. It was noted that there were problems with internal doors and windows and falls to the roof gutters. In addition, the settlement and damage that had occurred showed that the requirements of Clauses B1.3.4 and B1.3.7 regarding ground conditions and construction stability had not been met. Finally, the legal advisor suggested that the settlement of the house that had occurred could potentially breach the requirements of Clauses B2 and E2.

4.2 The applicant forwarded copies of:

- the plans, which excluded the engineer's drawing of the foundations, the specification, and the consent documentation
- the authority's records in respect of the consent inspections
- the relevant correspondence.

4.3 The authority attached the consultants' report of 8 October 2009 (see paragraph 3.6) to an email to the Department dated 19 July 2010. The authority noted that the report was not specific to the property in question but rather looked at general issues facing owners and the authority in the local area. While there was no specific PS1 issued for the house in question, the authority may have considered that house in terms of an adjacent property that had been completed just prior to the building consent application. The authority had no record of whether the structural engineer who designed the original slab and footings had carried out any site inspections.

4.4 The authority provided copies of the building consent plans that included the foundation drawing prepared by the structural engineer.

4.5 A draft determination was issued to the parties for comment on 18 October 2010. The authority accepted the draft without comment in a response received by the Department on 15 November 2010. The agent accepted the draft without comment in a response received on 16 February 2011.

4.6 The previous owners did not accept the draft determination and their legal advisors in a covering letter to the Department dated 20 April 2011 referred to a Statement of Defence that had been filed in the High Court on behalf of their clients.

4.7 It was noted that Clause 13 of the Statement was the relevant reference. In summary, the clause stated:

- From when the applicants took possession of the property from the previous owners in 2005, to the time that the applicants completed the settlement of the property on 7 February 2008, the applicants had not raised any concerns in respect of the house.
- From 7 February 2008, the applicants had undertaken a series of listed activities on the property that had 'resulted in an increased loading on the ground immediately adjacent to the house'.
- Accordingly, the previous owners considered that they have no liability to the applicants for the latter's losses.

4.8 I have carefully noted this submission and comment as set out in paragraph 6.5.

5. The expert's report

5.1 As mentioned in paragraph 1.6, I engaged an independent expert who is a chartered professional engineer, to confirm or otherwise whether differential settlement had occurred and if this was the result of seasonal conditions or was the result of longer term issues.

5.2 The expert visited the site on 11 June 2010 and provided a report that was completed on 22 June 2010. A copy of this report was forwarded to the parties on 25 June 2010. Following a request for further information, the expert emailed the Department on 28 July 2010 (refer paragraph 5.7).

General

5.3 The expert's inspection of the dwellings exterior revealed that:

- all windows and doors were racked, with many at their limits of movement
- a considerable number of joints were opening up in the weatherboard cladding
- the downpipes, which were located at the ends of the long wall, have had to be shifted to the centre because of the reverse falls in the gutter.

5.4 The interior examinations revealed that there were:

- a considerable number of cracks, both vertical and horizontal, to the internal wall linings around doors, windows and openings
- door and window issues as noted in the exterior inspection
- uneven falls to bench tops and counters.

Geotechnical comment

5.5 The expert sought comment from a geotechnical engineer. The geotechnical engineer, who had not visited the property, assumed the existence of the site conditions described in paragraph 2.3. Based on this assumption, the engineer noted that:

- the distributed load of the composite raft system (that is footings, slab and compacted aggregate more or less acting as one unit) was the likely main contributor to the settlement
- the degree of settlement that had occurred under the estimated uniformly distributed load implied a highly compressive foundation soil
- the settlement pattern described is similar to that occurring when there is a uniformly distributed load on a homogenous compressible soil.

The expert's conclusion

5.6 The expert concluded:

- The foundation design did not take into consideration the probably differential settlement caused by the placement of the fill.
- The magnitude of the final total and differential settlement of this structure were beyond the scope of the report. However, the total and differential settlements were not seasonal and there would be longer-term issues.
- There are no prescribed criteria for establishing the acceptance or otherwise of serviceability limit state-differential settlements in the Building Code. However, the extent of the differential settlement currently evident in the structure, together with the loss of amenity experienced by the applicants, is sufficient to argue that the foundations do not comply with Clause B1.

The supplementary report

5.7 In an email to the Department dated 28 July 2010, the expert stated it was his opinion that 'most if not all of the primary settlement should have occurred'. The expert went on to suggest that, due to the type of soils present on the site, secondary consolidation was likely to occur in the future. While, due to the lack of soil data, it was difficult to estimate the extent of future settlement, it should be less than the primary consolidation experienced to date.

6. Discussion

6.1 I consider that the consultants' report of 8 October 2009 (see paragraph 3.6) is too general to be fully relevant to the property in question.

6.2 In the letter of 21 October 2009 sent to the authority on behalf of the previous owners, it was stated that these owners were unaware of any settlement problems during the eight years that they owned the house. This statement has not been verified by any other source, but if it is correct, the major settlement problems that have occurred would be relatively recent.

6.3 I conclude that the expert's report establishes the total and differential settlements to be the result of longer term issues, rather than the result of seasonal fluctuations. Consequently, I am satisfied that the foundations of the house do not comply with Clause B1.

6.4 The previous owners have submitted that activities undertaken by the applicants since 7 February 2008 have resulted in an increased loading on the ground immediately adjacent to the house. However, I note that the expert's report was based on the foundation design and the nature of the highly compressive foundation soil beneath them. Accordingly, I do not accept that the activities of the applicants from February 2008 affect my decision regarding the non-compliance of the house with Clause B1.

6.5 This determination has only considered the settlement that has occurred to date, and which can be viewed as initial short-term settlement that has affected the house. Due to the lack of any definitive information, I am unable to determine at this stage the effects of any long-term deflection caused by possible on-going settlement. I note that this missing information should be obtained prior to the issuing of the notice to fix by the authority.

6.6 In addition, further investigation is required as to the effect, if any, of the settlement on the performance of structural elements and bracing, as this is presently unknown.

7. What is to be done now?

7.1 The authority should issue a notice to fix requiring the owner to bring the house into compliance with the Building Code. This notice needs to take into account that more research and data is required to determine the effects of long-term deflection. It

needs also to assess the effect on the building elements of the settlement that has occurred to date.

7.2 In response to the notice to fix, the owner should engage a suitably qualified person to undertake a thorough investigation of the foundations and soil to produce a detailed proposal determining the long-term effects of any future settlement and describing how any defects are to be remedied. The proposal should be submitted to the authority for approval. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

7.3 Once the agreed matters have been rectified to the satisfaction of the authority, and the original consent is amended to accommodate any amendment or new building work that is undertaken, the authority may issue a code compliance certificate in respect of the building consent and any necessary remedial work undertaken.

8. The decision

8.1 In accordance with section 188 of the Building Act 2004, I determine that the concrete slab and foundations do not comply with Clause B1 of the Building Code, and accordingly I confirm the authority's decision to refuse to issue a code compliance certificate.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 2 May 2011.

John Gardiner
Manager Determinations

Appendix A: The legislation

A.1 The relevant performance requirements of the Building Code Clause B1 Structure include:

B1.3.1 Buildings, building elements and sitework shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction or alteration and throughout their lives.

B1.3.2 Buildings, building elements and sitework shall have a low probability of causing loss of amenity through undue deformation, vibratory response, degradation, or other physical characteristics throughout their lives, or during construction or alteration when the building is in use.

B1.3.3 Account shall be taken of all physical conditions likely to affect the stability of buildings, building elements and sitework, including:

(a) Self-weight,

(b) Imposed gravity loads arising from use.

(d) Earth pressure,

(e) Water and other liquids,

(m) Differential movement,

(q) Time dependent effects including creep and shrinkage, and

(r) Removal of support.

B1.3.4 Due allowance shall be made for:

(a) The consequences of failure,

(c) Effects of uncertainties resulting from construction activities, or the sequence in which construction activities occur,

(d) Variation in the properties of materials and the characteristics of the site, and

(e) Accuracy limitations inherent in the methods used to predict the stability of *buildings*.

B1.3.6 *Sitework*, where necessary, shall be carried out to:

(a) Provide stability for *construction* on the site, and

(b) Avoid the likelihood of damage to *other property*.

B1.3.7 Any *sitework* and associated supports shall take account of the effects of:

(a) Changes in ground water level,

(b) Water, weather and vegetation, and

(c) Ground loss and slumping.