Department of Building and Housing
Te Tari Kaupapa Whare

Determination 2009/47

The issue of a notice to fix for a house at 58 Milan Drive, Glen Eden, Auckland

1. The matter 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. The applicant is the owner, the Mr T Courtney ("the applicant"), and the other party is the Waitakere City Council ("the authority"), carrying out its duties as a territorial authority or building consent authority.

1.2 This determination arises from the decisions of the authority to refuse to issue a code compliance certificate and issue a notice to fix for a 10-year-old house because it is not satisfied that the building work complies with the requirements of certain clauses of the Building Code[2] (First Schedule, Building Regulations 1992). Specifically, the notice to fix cites contraventions of Clauses D1 Access, E1 Surface water, E2 External moisture, E3 Internal moisture, F4 Safety from falling, and G12 Water supply.

1.3 In order to determine whether the decision to issue the notice to fix was correct, I consider the matters for determination are:

1.3.1 **Matter 1: The fibre-cement cladding**

Whether the fibre-cement cladding as installed on the building complies with Clause B2 Durability and Clause E2 External Moisture of the Building Code. By "the fibre-cement cladding as installed" I mean the components of the system (such as the backing materials, the flashings, the joints and the plaster and/or the coatings) as well as the way the components have been installed and work together.

Matter 2: The remaining Building Code matters

Whether certain building elements in the house, other than the claddings, comply with the relevant clauses of the Building Code.

Matter 3: The durability considerations

[1] The Building Act 2004 is available from the Department's website at www.dbh.govt.nz.
[2] The Building Code is available from the Department's website at www.dbh.govt.nz.
In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code

Whether the building elements in the house comply with Clause B2 "Durability" of the Building Code, taking into account the age of the building work.

1.4 In making my decision, I have considered the submissions of the parties, the report of the independent expert commissioned by the Department to advise on this dispute ("the expert"), and the other evidence in this matter. I have evaluated this information using a framework that I describe more fully in paragraph 6.1.

2. The building work

2.1 The building is a two storey detached house with an attached garage, attached ground floor timber slated decks, and an enclosed balcony on the first floor. The site is in a low to medium wind zone for the purposes of NZS 3604[3]. The construction consists of a timber frame, with monolithic and brick cladding. The house is on timber piles, except for the garage, which is founded on reinforced concrete. The house has a 20° pitched, metal tiled roof and aluminium joinery, with eaves that vary between the thicknesses of the fascia to a maximum width of 600mm including the spouting.

2.2 The exterior cladding is predominantly fibre-cement sheeting with a textured coating. There is an isolated area of brick veneer cladding to the lower western elevation of the garage. The first floor balcony to the northern elevation has a butyl rubber membrane floor and a fibre-cement clad timber balustrade. The lower level deck, which is over a metre from the finished ground level, has been constructed on the east and northern elevation. The deck is timber slatted and has fibre-cement cladding to match the exterior of the dwelling.

2.3 Evidence suggests a degree of boron treatment of the timber. The timber framing that supports the deck is marked Pinex H1. The remaining area of decking has been finished with hardwood timber decking, and the expert noted that it appeared to be treated to a level of H3, however, isolated nogs appeared to be a lesser level of treatment as they had visible decay. I consider that this indicates that the timber framing used in the building was treated to a level that may have provided some resistance to decay.

3. Background

3.1 A building consent was issued for the house in 1998 (No. COM-1998-1655).

3.2 According to the records of inspections carried out during construction, the house was built between October 1998 and December 2001.

3.3 Based on the records of inspection carried out during construction, the 'gibnail' inspection was not signed off, and the 'final plumbing and drainage', and 'final building' inspections failed.

3.4 The records for the final plumbing inspection on 31 December 2001 note:

> Complete ensuite, sismic [sic] restraint H.W.C, overflow on bedroom deck, plaster gully trap surround, seal pipe penetration exterior walls.

3.5 The records for the final building inspection on 31 December 2001 note:

1. Raise balustrading to 1 metre
2. Check re harditex control joints
3. Install handrail to stairway

[3] New Zealand Standard NZS 3604:1999 Timber Framed Buildings

4. Vent fans to exterior
5. Nail of braceline in garage
6. Complete 12kw connectors and 5kw connections to sub floor
7. Surveyors cert for siting.

3.6 The inspection records show the authority undertook final building and plumbing inspections on the 29 February 2008.

3.7 Following the final inspections, which both failed, the authority wrote to the applicant stating:

> There are some areas of concern with regards to the monolithic cladding system that has been installed, without any inspections having been undertaken.
> On this basis, [the authority] is unable to be satisfied that the cladding, as installed, complies with clause E2 (External Moisture) of the New Zealand Building Code and has to refuse to issue the Code Compliance Certificate, on the dwelling, "as is".
> In addition there are several other matters outlined on the attached 'Notice to Fix'.

3.8 The authority issued a notice to fix to the applicant, dated 10 March 2008, which cited non-compliance with Clauses E2, D1, F4, G12, E1, and E3 and includes a list of 18 particulars of contravention or non-compliance.

3.9 The applicant commissioned a "Building Envelope Inspection Report" by a specialist building consultant. The report noted

> There are some typical fine cracks…, discolouring to the joints of the [fibre-cement] sheet cladding, and no expansion joints as required by the manufacturer… There are also some fine cracks starting along the cladding paint coating joints around the aluminium window & door frames… The wider cracks under the window will be allowing the moisture into the wall with the high reading noted in the top level bedroom… There is a moisture reading also noted in the master bedroom under the end window… There are some small damage spots to the cladding… The decks need some attention to maintenance and the decking on the lower level needs a gap to the cladding…

3.10 The Department received an application for determination on 19 March 2009.

4. The submissions

4.1 The applicant made a submission that included copies of:

- the notice to fix and the letter about the refusal to issue a code compliance certificate
- the report from a specialist building consultant.

4.2 The applicant also submitted the records of inspections carried out on the building work, which were received by the Department on 24 March 2009.

4.3 Copies of the submissions and other evidence were provided to the parties.

4.4 A draft determination was issued to the parties for comment on 15 May 2009. Both parties accepted the draft without comment.

5. The expert's report

5.1 As discussed in paragraph 1.4, I engaged an independent expert to provide an assessment of the condition of those building elements subject to the determination. The expert is a member of the New Zealand Institute of Building Surveyors. The

expert inspected the house on 2 March 2009 and furnished a report that was completed on 23 April 2009.

5.2 The expert noted that the clearances of the cladding are considered to be adequate.

5.3 The expert took invasive moisture readings at 15 locations around the house, and noted elevated readings were recorded in four locations indicating that external moisture is entering the structure. The elevated readings were:

- 21% at the right hand side of the balustrade adjacent to the exterior of the dwelling
- 20% at the floor joist to the left hand side of the kitchen window on the eastern elevation
- 21% to the bottom plate under the left hand side of the lower level bedroom window
- 22% at the bottom plate at the south eastern corner adjacent to the deck balustrade.

5.4 Most of the invasive testing moisture results were less than 18%, however the expert observed that, given the lack of rain over recent months, readings that would normally be considered acceptable or marginal were also assessed against the adjacent visible defects where they were taken.

5.5 The expert took nine timber samples from different sites around the house and submitted the samples for laboratory testing. All nine samples were found to be unsound, exhibiting various levels of decay. The analysis found the condition of the decayed samples was typical of Radiata pine following consistent exposure to moisture levels above 18% for at least three to five years. The laboratory report concluded that the timber was not fit for purpose and that all the timber from which the samples were taken should be replaced in accordance with established remediation practice.

5.6 Commenting specifically on the wall cladding, the expert noted that:

Cladding system construction, control joints

- there are no control joints to the fibre-cement cladding
- there are numerous cracks to the fibre-cement cladding
- there are visible openings between the fascia and the cladding
- there are vertical joints above and below the window corners

Flashings at windows

- there are no flashings to the sills
- the sills have been partially sealed by the textured coating
- there is no sealant behind the window jambs
- there are no turn-ups to the end of the head flashings

Balcony junctions

- there is no lap to the overflow outlet from the floor membrane

- there is cracking at the junction of the balustrade and the exterior wall and the membrane is not continuous
- there is a lack of fall to the balustrade tops

Deck junctions

- there are no flashings at the junction of the hardwood decking joists and boundary joists of the dwelling
- there is no protective coating on the fibre-cement cladding beneath the hardwood decking

5.7 Commenting on compliance with other Building Code Clauses, the expert noted the following:

- the deck balustrade is not of a sufficient height to comply with Clause F4/AS1
- the internal staircase has no handrail and does not comply with Clause D1
- the timber framing to the balustrade walls is fastened to the deck joists, rather than being bolted to the boundary and intermediate joists

5.8 The expert also noted that part of the driveway sloped towards the house and not all surface water would be conveyed to an appropriate outfall as it could flow towards the gap between the concrete driveway and the exterior cladding.

5.9 Two items listed on the notice to fix have been remedied. Restraints have been installed to the hot water cylinder and the shower linings have been adequately sealed.

5.10 A copy of the expert's report was provided to each of the parties on 8 May 2009.

6. Evaluation for code compliance

6.1 Evaluation framework

6.1.1 I have evaluated the code compliance of this building by considering the following two broad categories of the building work:

- The weathertightness of the external building envelope (Clause E2) and realted durability (Clause B2).
- The remaining relevant code requirements.

In the case of this house, weathertightness considerations are addressed first.

6.1.2 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solutions[4], which will assist in determining whether the features of this house are code-compliant. However, in making this comparison, the following general observations are valid:

- Some Acceptable Solutions cover the worst case, so that they may be modified in less extreme cases and the resulting alternative solution will still comply with the Building Code.

[4] An Acceptable Solution is a prescriptive design solution approved by the Department that provides one way (but not the only way) of complying with the Building Code. The Acceptable Solutions are available from The Department's Website at www.dbh.govt.nz.

- Usually, when there is non-compliance with one provision of an Acceptable Solution, it will be necessary to add one or more other provisions to compensate for that in order to comply with the Building Code.

Matter 1: The fibre-cement cladding

7. Weathertightness

7.1 The approach in determining whether building work is weathertight and durable and is likely to remain so, is to apply the principles of weathertightness. This involves the examination of the design of the building, the surrounding environment, the design features that are intended to prevent the penetration of water, the cladding system, its installation, and the moisture tolerance of the external framing. The Department and its antecedent, the Building Industry Authority, have also described weathertightness risk factors in previous determinations[5] (for example, Determination 2004/1) relating to cladding and these factors are also used in the evaluation process.

7.2 The consequences of a building demonstrating a high weathertightness risk is that building solutions that comply with the Building Code will need to be more robust. Conversely, where there is a low weathertightness risk, the solutions may be less robust. In any event, there is a need for both the design of the cladding system and its installation to be carefully carried out.

7.3 Weathertightness risk

7.3.1 This house has the following environmental and design features which influence its weathertightness risk profile:

Features tending to increase risk

- the house is two storeys high
- the house has a moderately complex envelope shape with two cladding types
- the roof to wall intersection is fully exposed to lower level roof areas and balcony balustrades
- the eaves width varies between the thickness of the fascia to a maximum width of 600mm
- the house has an enclosed balcony at first floor level and timber decks at ground floor

Features tending to decrease risk

- the house is in a low to medium wind zone

7.3.2 The house has been evaluated using the E2/AS1 risk matrix. The risk matrix allows the summing of a range of design and location factors applying to a specific building design. The resulting level of risk can range from "low" to "very high". The risk level is applied to determine what claddings can be used on a building in order to comply with E2/AS1. Higher levels of risk will require more rigorous weatherproof detailing; for example, a high risk level is likely to require a particular type of cladding to be installed over a drained cavity.

[5] Copies of all determinations issued by the Department can be obtained from the Department's website.

7.3.3 When evaluated using the E2/AS1 risk matrix, the weathertightness features outlined in paragraph 7.3.1 show that north and south elevations of the house demonstrate a high weathertightness risk rating and the east and west elevations of the house demonstrate a medium weathertightness risk. The current edition of E2/AS1 would require the provision of a drained and ventilated cavity for this cladding (I note that at the time of construction E2/AS1 did not include this cladding). However, this was not a requirement at the time of construction in 1998.

7.4 Weathertightness performance

7.4.1 It is clear from the expert's report that the fibre-cement cladding installed on the house is unsatisfactory in terms of its weathertightness because elevated moisture levels were recorded and decayed timber framing identified.

7.4.2 Taking into account the expert's report and comments as outlined in 5.3 to 5.6, I conclude that the following items require rectification with respect to weathertightness:

- the defects in the fibre-cement cladding, including the lack of control joints, the cracks to the fibre-cement, the openings between the fascia and the cladding, and the incorrect sheet layout
- the defects to the windows, including the sealing of the sills, the lack of sealant to the window jambs, and the lack of turn-ups to the head flashings
- the defects to the balcony, including the cracking at the junctions, the lack of fall to the balustrade tops and the lack of lap to the overflow
- the defects to the deck, including the lack of flashings at the joist junctions, and the lack of protective coating to the cladding beneath the deck.

7.4.3 Further investigation is necessary to determine the extent of decay and the full extent of the repairs required.

7.5 Weathertightness conclusion

7.5.1 I consider the expert's report establishes that the current performance of the fibre-cement cladding is not adequate because there is evidence of moisture penetration and decay, and the fibre-cement cladding has not been installed according to good trade practice. In particular, the fibre-cement cladding demonstrates the key defects listed in paragraph 5.6, which are likely to have contributed to the moisture penetration evident within the external walls of this building.

7.5.2 I have also identified the presence of a range of known weathertightness risk factors in this house. The presence of the risk factors on their own is not necessarily a concern, but they have to be considered in combination with the faults identified in the cladding system. It is that combination of risk factors and faults that indicate that the structure does not have sufficient provisions that would compensate for the lack of a drained and ventilated cavity. Consequently, I am not satisfied that the cladding system, as installed, complies with clause E2 of the Building Code.

7.5.3 In addition, the building work is also required to comply with the durability requirements of Clause B2. Clause B2 requires that a building continues to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement for the house to remain weathertight. Because the cladding faults on

the house may allow further ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.

7.5.4 I consider that final decisions on whether code compliance can be achieved by either remediation or re-cladding can only be made after a more thorough investigation of the cladding to verify the extent of the damage. This will require a careful analysis by an appropriately qualified expert. Once that decision is made, the chosen remedial option should be submitted to the territorial authority for its comment and approval.

Matter 2: The remaining Building Code matters

8. Discussion

8.1 Notwithstanding non-compliance with Clause E2, it is clear from the expert's report that there are a several contraventions of the Building Code including:

- the deck balustrade is not of a sufficient height to comply with Clause F4
- the internal staircase has no hand rail to comply with Clause D1
- the timber framing to the balustrade walls are fastened to the deck joists, rather than being bolted to the boundary and intermediate joists. The owner needs to verify, to the satisfaction of the authority, that the fixing of the balustrade walls complies with Clause B1 as an alternative solution.

8.2 Given the decay evident in the timber framing the house does not comply with Clause B1.

Matter 3: The durability considerations

9. Discussion

9.1 There are concerns about the durability, and hence the compliance with the Building Code, of certain elements of the building, taking into consideration the substantial completion of the building work in 2001.

9.2 The relevant provision of Clause B2 of the Building Code requires that building elements must, with only normal maintenance, continue to satisfy the performance requirements of the Building Code for certain periods ("durability periods") "from the time of issue of the applicable code compliance certificate" (Clause B2.3.1).

9.3 In previous determinations (for example Determination 2006/85) I have taken the view that a modification of this requirement can be granted if I can be satisfied that the building complied with the durability requirements at a date earlier than the date of issue of the code compliance certificate, that is agreed to by the parties and that, if there are matters that are required to be fixed, they are discrete in nature.

9.4 Because of the extent of the defects in the cladding, and the possible consequential impact on the building's timber framing and therefore its structure, I am not satisfied that I have sufficient information on which to make a decision about this matter. However, the matter may be referred to the Department for a further determination once the cladding and all associated work has been made code-compliant.

10. Conclusion

10.1 The following table summarises conclusions on the items listed within the notice to fix dated 10 March 2008 and refers to related paragraphs within this determination:

Notice to fix		My conclusion about the remedial work required	Paragraph reference
Item	**Summarised requirement**		
1	Lack of cavity		7.3.2, 7.3.3, and 11.1
2	Lack of horizontal control joints	Remedial work required	5.6
3	Lack of vertical control joints	Remedial work required	5.6
4	Fascia set into cladding	Remedial work required	5.6
5	Cladding not clear of apron	Remedial work required	5.6
6	No drainage plane between cladding and head flashing	Remedial work required	5.6
7	No sill/jamb/flashings	Remedial work required	5.6
8	No inseal between joinery and cladding	Remedial work required	5.6
9	Lack of clearance from cladding to ground level	Adequate	5.2
10	Bottom edge of cladding not sealed	Remedial work required	5.6
11	Cladding penetrations not sealed/flashed	Remedial work required	5.6
12	Lack of clearance from cladding to balcony surface	Adequate	5.2
13	Lack of clearance from cladding to timber deck	Adequate	5.2
14	Deck barrier not 1 metre high	Remedial work required	5.7
15	Internal stairway handrail not installed	Remedial work required	5.7
16	No overflow provision installed to deck	Further remedial work required	5.6
17	Restraints not installed to hot water cylinder	Rectified	5.9
18	Shower liners not adequately sealed	Rectified	5.9

10.2 I am satisfied that the building does not comply with the Building Code. In my opinion the authority made an appropriate decision to issue the notice to fix. Some of the items on notice to fix have been rectified and I am of the view that some items are adequate, so the notice should be modified (refer to 11.2).

11. What is to be done now?

11.1 I note that the authority has issued a notice to fix that required provision for a cavity to provide for ventilation, drainage and moisture dissipation. Under the Act, a notice to fix can require the owner to bring the house into compliance with the Building Code. The Building Industry Authority has found in a previous Determination (2000/1) that a Notice to Rectify, the equivalent of a notice to fix, cannot specify how that compliance can be achieved. I concur with that view.

11.2 The notice to fix should be modified and reissued to the owner to take account of the findings of this determination, including the remedial work that has been completed. The notice to fix can require the owner to bring the house into compliance with the Building Code, but cannot specify how compliance is to be achieved.

11.3 The owner in response to the modified notice to fix, and as discussed in paragraph 7.5.4, should engage a suitably qualified person to undertake a thorough investigation of the cladding to determine the extent of the defects and produce detailed proposal describing how the 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.

11.4 It is important to note that the Building Code allows for more than one means of achieving code compliance.

12. The decision

12.1 In accordance with section 188 of the Act, I hereby determine that:

- the fibre-cement cladding does not comply with Building Code Clauses B2 and E2
- the building work does not comply with Building Code Clauses B1, D1, and F4
- the authority is to modify the notice to fix, dated 10 March 2008, to take account of the findings of this determination.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 30 June 2009.

John Gardiner
Manager Determinations