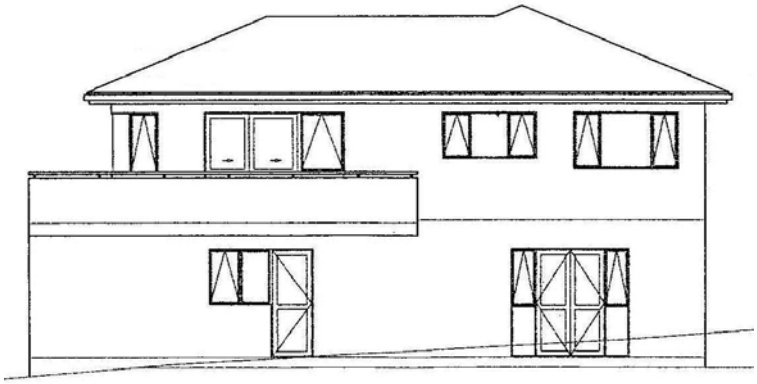
Department of Building and Housing
Te Tari Kaupapa Whare

Determination 2011/088

The refusal to issue a code compliance certificate for an 11-year-old house at 703A Hillsborough Road, Mt Roskill, Auckland



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. The applicants are the owners, N Logan and D Wilton-Logan ("the applicants") acting through an agent, and the other party is the Auckland Council ("the authority"), carrying out its duties as a territorial authority or building consent authority.

1.2 This determination arises from the decision of the authority to refuse to issue a code compliance certificate and to issue a notice to fix for an 11-year-old house because it was not satisfied that the building work complied with certain clauses[2] of the Building Code (First Schedule, Building Regulations 1992). The authority's concerns relate to the weathertightness of the exterior building envelope.

1.3 The matter to be determined[3] is therefore whether the authority was correct in its decision to refuse to issue a code compliance certificate and to issue a notice to rectify[4] ("the notice to fix") for the house.

[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.
[2] 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.
[3] Under sections 177(2)(d) and 177(2)(f) of the Act
[4] The equivalent to a notice to fix under the Building Act 2004

1.4 In deciding this matter, I must therefore consider whether the external claddings to the house comply with Clause B2 Durability and Clause E2 External Moisture of the Building Code. The claddings include the components of the exterior building envelope (such as the wall cladding, windows, decks, and flashings), as well as the way the components have been installed and work together.

1.5 The authority has stated that its concerns about the compliance of the building work relate to the weathertightness of the exterior building envelope. However, the notice to fix also cites contraventions of Clauses B1 Structure, E3 Internal Moisture, G4 Ventilation and H1 Energy Efficiency of the Building Code, although there are no specific identified items relating to these clauses. This determination is therefore limited to Clause E2 and Clause B2 (insofar as it applies to E2).

1.6 The notice to fix also outlined requirements for durability of building elements, taking into account the age of the building work. I leave this matter to the parties to resolve once the claddings have been made code compliant.

1.7 In making my decision, I have considered the submissions of the parties, the 'House Evidential Report' dated 17 December 2010 which provides the results of monitoring the moisture detection system installed by the applicants, the report of the 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 two-storey, detached house is situated on a level site in a low wind zone for the purposes of NZS 3604[5]. The L-shaped house is fairly simple in plan and form; and is assessed as having a moderate to high weathertightness risk (see paragraph 6.2).

2.2 The construction is generally conventional light timber frame, with a concrete slab and foundations, monolithic wall cladding, profiled metal roofing, and aluminium windows. The 23^{o} pitch hipped roof has eaves of more than 600mm above most walls, reducing to the gutter width only to part of the south and east elevation. A hipped lean-to canopy extends above the garage door and main entry.

2.3 The wall cladding consists of 7.5 mm thick fibre-cement sheets fixed through the building wrap to the framing, and finished with an applied textured coating system. Inter-storey bands are formed in the cladding with polystyrene-faced fibre-cement; and are fixed over the unsealed fibre-cement sheets, prior to the application of the coating system.

2.4 Two decks, with monolithic-clad balustrades, extend from the upper level of the house. A small enclosed deck ("the master bedroom deck") is situated mostly above lower rooms at the south east, with the main roof extending above the membrane floor supported by a monolithic-clad wing wall at the southern end.

2.5 A larger deck ("the lounge deck") is situated above the eastern end of the garage and extends around the north east corner and along part of the north elevation, where it is

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

supported on timber posts. The deck floor above the garage is membrane-clad, while the extended deck floor is spaced timber slats.

2.6 The timber supplier's quotations state that most of the framing is 'chem free', with a limited quantity noted as 'H1 boric' and 'H3 CCA'. Laboratory analysis confirmed a sample extracted from a ground floor bottom plate as boric-treated and one from the deck framing as CCA-treated, with two other samples untreated. Given this evidence and the construction in 2001, I consider the wall framing is generally untreated.

3. Background

3.1 The authority issued a building consent (No. AC/00/02557) in April 2000 for the house under the Building Act 1991. I note that the agent states that the owner and his father built the house, with most of the construction carried out during 2001.

3.2 I have seen no records of what inspections were carried out during construction, but it appears that the house was substantially completed during 2002, although a final inspection was not carried out until 2004 due to a delay in extending the lounge deck. The authority carried out a final inspection on 11 June 2004, identifying a number of outstanding items and also noting 'non cavity exterior wall cladding'.

3.3 In a letter to the applicants dated 23 July 2004, the authority noted that it had identified the house 'as having monolithic exterior wall claddings installed without a cavity' and advised that further investigation was required. The authority explained that information available about weathertightness problems associated with this type of cladding was not available at the time the building consent was issued.

3.4 The authority carried out a 'cladding inspection' on 24 September 2004 and wrote to the applicant on 9 November 2004 stating that it could 'not be satisfied that the cladding system as installed … meets the Functional Requirement of Clause E2 External Moisture of the Building Code'.

3.5 The authority attached a notice to fix dated 9 November 2004 and a photographic record of defects. The identified defects included (in summary):

- lack of vertical control joints
- no capillary gap to bottom of cladding
- flat tops to deck balustrades
- lack of drainage above and below windows
- lack of clearances to bottom of cladding
- cracks at cladding joints
- lack of saddle flashings at balustrade to wall junctions
- handrails penetrating balustrade tops
- unflashed and/or unsealed penetrations and meterbox
- lack of drainage between timber decking/framing and cladding.

3.6 The notice required the applicant to:

> Provide adequate drying and drainage to the monolithic cladding and wall framing space to ensure compliance with the building code and ensuring all issues relating to the above are resolved.

3.7 The authority wrote to the applicants on 1 February 2007, and 23 June 2008, noting that it had received no response to the notice to fix. However, it appears that some remedial work was carried out, which included:

- retrofitting vertical control joints
- installing a gravel-filled drainage channel to increase ground clearances in some areas.

3.8 In late 2009 a moisture detection system was installed in the exterior wall framing to provide evidence the house was weathertight. This involved the installation of more than 70 permanent moisture probes, into the bottom plates of both levels of the house. The probes record moisture content at about 4mm from the outer face of the bottom plates and are periodically monitored.

3.9 Probe readings were taken at 3-month intervals from December 2009 to December 2010, with a number of readings recorded from 18% to 80%. During March 2010 (at the end of summer) there were very few elevated readings while in September 2010 (at the end of winter), more than 40% of the 70 probes recorded moisture levels over 18%, with the highest readings at about 75%. The results of the investigation using the moisture probes was reported to the applicants in the House Evidential Report, dated 17 December 2010.

3.10 Some internal linings were removed where readings were high, and the applicants observed no signs of moisture penetration. The applicants therefore consider that the framing is dry; and are of the view some probes were installed too close to hold down bolts and nail fixings, which resulted in 'false readings'.

3.11 The applicants apparently discussed the House Evidential Report with the authority, without resolution. The Department received an application for a determination on 7 April 2011.

4. The submissions

4.1 The applicants made a submission dated 21 March 2011, which outlined the background to the situation. The applicants stated that the house has always been well maintained and considered that any high probe results were due to interference from adjacent bolts and fixings (see paragraph 3.10). They believed that a 'knee jerk reaction to the 'leaky house syndrome' had kicked in' by 2004 and the authority had therefore automatically refused to issue a code compliance certificate due to the lack of a cavity. The applicants stated:

> This property was built to the plans and specifications of the day, and each stage was signed off by an [authority] representative. The property is now approximately 10 years old and shows no sign of being a 'leaky' home.

4.2 The applicants forwarded copies of:

- the consent drawings
- the final inspection record
- the notice to fix dated 9 November 2004
- some correspondence from the authority
- the House Evidential Report dated 17 December 2010
- photographs of bottom plates exposed where linings had been removed.

4.3 A draft determination was issued to the parties for comment on 16 June 2011. The parties accepted the draft without comment; the last response being received on 29 September 2011.

5. The expert's report

5.1 As mentioned in paragraph 1.7, I engaged an independent expert to assist me. The expert is a member of the New Zealand Institute of Building Surveyors. The expert inspected the house on 29 April 2011, providing a report dated 18 May 2011.

5.2 General

5.2.1 The expert noted that variations from the consent drawings included:

- the omission of steps to north deck
- the addition of lean-to canopy above garage doors and entry door
- although shown in drawings, the timber slat section of the lounge deck was constructed as a later addition.

5.2.2 The expert also noted that:

- vertical control joints had been retrofitted
- a gravel-filled drainage channel had been cut into some of the concrete paving
- parts of the cladding had been repainted at the time of remedial work.

5.2.3 The expert noted that the aluminium joinery had metal head flashings and had been face-fixed over the fibre-cement backing sheets, with the textured coating applied after installation. The expert scraped coating from a jamb junction, observing that 'a thin bead of silicone had been applied to the back of the window flange'.

5.3 Decay analysis

5.3.1 The expert removed four timber samples for analysis, taken from cut-outs made at the following areas:

- bottom plate at the lounge deck balustrade/canopy roof junction (sample 1)
- bottom plate at lounge deck framing/north wall junction (sample 2)
- bottom of stud to north east garage corner (sample 3)

- bottom plate under a west window jamb (sample 4).

5.3.2 The report dated 30 September 2010 found that sample 1 and sample 3 were 'most likely untreated', sample 2 was CCA-treated to an equivalent of H3.2 and sample 4 was boric-treated to an equivalent of H1.2 (see paragraph 2.6).

5.3.3 The tests also found that:

- sample 1 (untreated) contained 'advanced decay', which had 'caused loss of the bulk of the original structural integrity in affected areas'
- sample 3 (untreated) contained 'well established decay' which may be restricted to near the end grain
- samples 2 and 4 had 'fungal growth, but no structurally significant decay', due likely to the 'presence of boron or CCA preservative'.

5.3.4 The report noted that 'it is important to establish the limits of fungal infection and/or decay and establish the causes'; concluding that results suggested all the samples had 'been exposed to moisture conditions inconsistent with sound building practice and/or weathertight design, and appropriate remediation is needed to correct this.'

5.4 Moisture levels

5.4.1 The expert inspected the interior linings of the external walls but found no evidence of moisture damage or ingress.

5.4.2 The expert took 16 invasive moisture readings at areas considered at risk. The lowest readings varied from 12% to 15%, indicating the likely equilibrium moisture level to be around 14%. The expert recorded the following:

- 20% in bottom plate under sill/jamb junction of a west window (sample 4).

Master bedroom deck

- 20% in deck floor framing
- 18% at balustrade/wing wall junction
- 21% in bottom plate at balustrade/canopy roof junction

Lounge deck and garage below:

- 26% in bottom plate at balustrade/canopy roof junction (sample 1), with:
  - 24% in canopy beam below
  - 21% in bottom plate at south east garage corner below
- 32% and stained plywood substrate at junction with timber decking, with:
  - severe decay revealed in cut-out to adjacent deck framing
  - 24% at corner stud to north east garage corner below (sample 3)
- 25% at junction of deck floor framing with north wall (sample 2).

5.4.3 Moisture levels above 18%, or which vary significantly from equilibrium levels, generally indicate that external moisture is entering the structure and investigation is needed. I also note that moisture readings were taken during the autumn and are

expected to increase during wetter seasons, in a similar fashions to that recorded for the probe readings (see paragraph 3.9).

5.5 Commenting specifically on the external envelope, the expert noted that:

The cladding

- despite retrofitted control joints, some sheet joints are cracked and/or peaking
- fibre-cement backing sheets are installed hard against the foundation wall
- the bottom edge of the apron flashings to the canopy are not weatherproof, with a poorly formed kick-out and the cladding terminating behind the gutter
- penetrations are insufficiently sealed/flashed

Windows and doors

- windows lack drainage gaps above head flashings and below sill flanges
- there are no effective seals between jamb flanges and the cladding
- although readings at two sill/jamb junctions were low, probes had recorded elevated moisture. The removal of internal linings would have allowed the framing in these locations to dry

The decks

- deck and balustrade to wall junctions lack saddle flashings, with high moisture levels and decay apparent in some areas, including below junctions
- balustrade and wall claddings butt against the deck membrane
- balustrade cappings are flat and are penetrated by handrail bracket fixings
- at the junction of the original lounge deck with the timber deck extension:
  - the first timber deck slat butts against the edge of the deck membrane
  - balustrades and cappings are butt-jointed, with no flashings
  - moisture is penetrating into the membrane substrate and associated wall and balustrade framing, with severe decay at the junction
  - there is no allowance for drainage between the timber decking and the wall cladding.

5.6 The expert also noted that cladding and floor clearances were still insufficient around the garage door and the main entry door. However, I note that this area is sheltered under the canopy and I consider that the clearances are adequate in this case. I similarly consider that cladding clearances are adequate for the master bedroom deck, where deck to wall junctions are sheltered beneath the deep roof overhang.

5.7 The expert also commented on the particular items identified in the notice to fix, and I have taken those comments into account in paragraph 7.1.

5.8 A copy of the expert's report was provided to the parties on 23 May 2011.

6. The external envelope

6.1 The evaluation of building work for compliance with the Building Code with regard to weathertightness, and the associated risk factors, have been described in numerous previous determinations (for example, Determination 2004/1).

6.2 Weathertightness risk

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

Increasing risk

- the house is two-storeys high
- the walls have monolithic cladding fixed directly to the framing
- one upper level wall and most lower level walls are not sheltered by eaves
- there are two upper level enclosed decks situated over habitable spaces
- the external wall framing is unlikely to be treated to a level that provides resistance to decay if it absorbs and retains moisture

Decreasing risk

- the house is in a low wind zone
- the house is reasonably simple in plan and form
- there are eaves to shelter most of the upper walls.

6.2.2 Using the E2/AS1 risk matrix to evaluate these features, two elevations are assessed as having a moderate weathertightness risk rating and two a high risk rating. If details shown in the current E2/AS1 were adopted to show code compliance, a drained cavity would be required for all elevations. However, this was not a requirement at the time of construction.

6.3 Weathertightness conclusion

6.3.1 I consider the expert's report establishes that the current performance of the building envelope is not adequate because there is evidence of moisture penetration and decay in the timber framing. Consequently, I am satisfied that the house does not comply with Clause E2 of the Building Code.

6.3.2 The building envelope is also required to comply with the durability requirements of Clause B2, which 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 will allow the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.

6.3.3 Final decisions on whether code compliance can be achieved by remediation or re-cladding, or a combination of both, can only be made after a more thorough investigation of the external envelope, including the decks, and of the underlying

timber framing. This requires a careful analysis by an appropriately qualified expert, with the chosen remedial option submitted to the authority for its approval.

6.3.4 I note that the Department has produced a guidance document on weathertightness remediation[6]. I consider that this guide will assist the owners in understanding the issues and processes involved in remediation work to the cladding, and in exploring various options that may be available when considering the upcoming work required to the house.

6.3.5 Effective maintenance of claddings is important to ensure ongoing compliance with Clauses B2 and E2 of the Building Code and is the responsibility of the building owner. The Department has previously described these maintenance requirements, including examples where the external wall framing of the building may not be treated to a level that will resist the onset of decay if it gets wet (for example, Determination 2007/60).

7. The notice to fix

7.1 Taking into account the expert's comments, the following table summarises my conclusions on items listed in the notice to fix dated 9 November 2004; referring also to the relevant code clauses and related paragraphs within this determination:

Notice to fix		**My conclusions**	**Code Clauses**	**Paragraph references**
Item	**Summarised requirement**			
1	**Not to manufacturer's specifications**			
	No vertical control joints	Remedial work required.	**E2, B2**	Paragraph 5.5
	Lack of capillary gap to cladding base	Remedial work required.	**E2, B2**	Paragraph 5.5
	Lack of inseal to cladding base	Remedial work required.	**E2, B2**	Paragraph 5.5
	Flat surfaces to balustrade tops	Remedial work required	**E2, B2**	Paragraph 5.5
	Lack of drainage above head flashings	Remedial work required	**E2, B2**	Paragraph 5.5
	Lack of drainage under sill flanges	Remedial work required	**E2, B2**	Paragraph 5.5
	Lack of clearances to bottom of cladding	Adequate for ground floor. Remedial work required to some deck areas	**E2, B2**	Paragraphs 5.5 and 5.6
	Lack of clearances to floor level	Adequate	**E2, B2**	Paragraph 5.5
2	**Not per acceptable solutions**			
	Cracks to cladding joints	Remedial work required	**E2, B2**	Paragraph 5.5
3	**Not to accepted trade practice**			
a)	Lack of saddle flashings to deck junctions	Remedial work required.	**E2, B2**	Paragraphs 5.5
b)	Handrail penetrations through balustrade cappings	Remedial work required	**E2, B2**	Paragraph 5.5
c)	Unflashed and/or unsealed penetrations	Remedial work required	**E2, B2**	Paragraphs 5.5
d)	Lack of drainage gap between timber decking and walls	Remedial work required	**E2, B2**	Paragraph 5.5
e)	Lack of drainage gap between timber deck stringer and walls	Remedial work required	**E3**	Paragraph 5.5
f)	Unflashed and/or unsealed penetrations	Remedial work required	**E2, B2**	Paragraph 5.5

[6] External moisture – A guide to weathertightness remediation. This guide is available on the Department's website, or in hard copy by phoning 0800 242 243

Notice to fix (continued)		My conclusions	Code Clauses	Paragraph references
Item	Summarised requirement			
4	**Ventilated cavity system**			
	Lack of cladding drainage & ventilation	Investigation required	**E2, B2**	Paragraphs 6.3.3

7.2 I am satisfied that the house does not comply with the Building Code and that the authority made an appropriate decision to issue the notice to rectify. However, I am also of the view that some items identified in the notice are likely to be adequate and I have also identified additional items that need to be addressed, so the notice should be modified accordingly (refer to paragraph 8.1).

8. What is to be done now?

8.1 The notice to fix should be modified to take account the findings of this determination, identifying the items listed in paragraph 5.5 and referring to any further defects that might be discovered in the course of investigation and rectification, but not specifying how those defects are to be fixed. It is not for the notice to fix to stipulate directly how the defects are to be remedied and the house brought to compliance with the Building Code. That is a matter for the owner to propose and for the authority to accept or reject. It is important to note that the Building Code allows for more than one means of achieving code compliance.

8.2 I suggest that the parties adopt the following process to meet the requirements of paragraph 8.1. Initially, the authority should revise and re-issue the notice to fix. The applicants should then produce a response to this in the form of a detailed proposal for the house as a whole, produced in conjunction with a competent and suitably qualified person, as to the rectification or otherwise of the specified matters. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

8.3 I also note that the expert has identified some changes from the consent drawings, and I leave these to the parties to resolve once the appropriate remedial work is satisfactorily completed.

9. The decision

9.1 In accordance with section 188 of the Act, I hereby determine that the external envelope to the house does not comply with Clause E2 and Clause B2 of the Building Code, and accordingly I confirm the authority's decision to refuse to issue a code compliance certificate.

9.2 I also determine that the authority is to modify the notice to fix, dated 9 November 2004, 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 September 2011.

John Gardiner
Manager Determinations