



Determination 2009/67

Determination regarding the code compliance of a 9-year-old house with monolithic cladding at 44 Opito Bay Road, Whitianga



1. The matters to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“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 Thames Coromandel District Council (“the authority”), carrying out its duties as a territorial authority or building consent authority, and the other party are the owners, M and M Ellett (“the owners”). I consider that the builder of the house (“the builder”) is a person with an interest in this determination.
- 1.2 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 able to be satisfied that the original construction or remedial work undertaken on the building had resulted in the monolithic cladding complying with Clauses B2 and E2 of the Building Code² (First Schedule, Building Regulations 1992).

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.

- 1.3 The matter for determination, in terms of sections 177(a) and 188(1)(b) of the Act³, is whether the cladding as installed on the house (“the cladding”) complies with Building Code Clause B2 “Durability” and Clause E2 “External Moisture”. By “the cladding as installed” I mean the components of the system (such as the backing sheets, the joints and the coatings), as well as the way the components have been installed and work together.
- 1.4 In order to determine the code compliance of the remedial work undertaken on the house, I need to address the question of whether the type and extent of the repairs have been sufficient to rectify the past moisture problems, together with any consequential damage. To answer that question, I need to address the compliance of all of the cladding as outlined above. This determination is therefore not restricted to the remedial work.
- 1.5 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 other evidence in this matter. I have evaluated this information using a framework that I describe in paragraph 6.1.

2. The building work

- 2.1 The building work consists of a house that is 2-storey in part and situated on a gently sloping coastal site in a very high wind zone for the purposes of NZS 3604⁴. Construction is generally conventional light timber frame, with concrete foundations and floor slabs, monolithic cladding, aluminium windows and a profiled metal roof.
- 2.2 The house is fairly complex in plan and form, with a curved roof to the upper level and a hipped lean-to over the garage, which extends around the south east corner and has garage doors at both ends. A small gable extends above the garage from the upper south wall, and incorporates lean-to conservatory glazing at the gable end. There are 500mm eaves projections to the upper level, with a verge projection above the recessed north wall.
- 2.3 The monolithic wall cladding consists of 7.5 mm thick fibre-cement sheets fixed directly through the building wrap to the framing, and finished with a textured coating system.

2.4 The decks

- 2.4.1 A large deck extends to the north from the upper level bedrooms, with the deck floor above the ground floor living room. The central part of north edge of the deck and the living room below is curved, with open metal balustrades to the curved section. Elsewhere, the balustrades are timber-framed and monolithic-clad, with a metal capping and handrail to the top. A timber pergola extends from the outer edge of the deck.

³ 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.

⁴ New Zealand Standard NZS 3604:1999 Timber Framed Buildings

- 2.4.2 A smaller deck, with a timber slat floor and open metal balustrades, extends from the conservatory as an infill to the southwest corner. The majority of the deck is open beneath, although a corner sits above the garage.

2.5 The framing timbers

- 2.5.1 The building work includes wall framing installed when the house was constructed in 1999 and new framing installed as part of the 2008 remediation work described in paragraph 3.10. The builder has confirmed that the original wall framing was untreated. The expert has also noted that the framing timber in the unlined garage is untreated.
- 2.5.2 The expert took timber samples from the original and new framing and forwarded them to a testing laboratory for analysis. The biodeterioration consultant's analysis confirmed the original sample as untreated and the new framing as likely to be equivalent to at least H1.2. Based on this evidence, I consider that the original wall framing is untreated, while the new framing is treated to H1.2.

3. Background

- 3.1 The authority issued a building consent for the house (No. B502001692) on 7 February 1995, under the Building Act 1991. I have not seen a copy of the building consent. The building work was not started and a new consent application was submitted and approved on 4 February 1999.
- 3.2 The authority carried out various inspections during construction, including a pre-line inspection on 30 September 1999 and what appears to be the final plumbing and drainage inspection on 14 May 2000. According to the owners, the house was substantially completed in July 2000.
- 3.3 The authority did not carry out a final inspection until 16 November 2005, and the inspection summary noted that the cladding was flush-finished fibre-cement sheet, which the authority would need to consider. A subsequent note on the inspection summary states 'CCC not to include cladding'.
- 3.4 In a letter to the owners dated 12 December 2005, the authority refused to issue a code compliance certificate 'due to the uncertainty of the cladding system being watertight', and stated:
- To enable Council to consider issuing a certificate you are required to provide a report on the cladding and flashing systems used in respect to the dwelling by a suitably qualified person.
- 3.5 The owners responded by supplying a statement from the coating applicator which confirmed that the coating had been applied to the manufacturer's specifications.
- 3.6 In a letter to the owners dated 17 January 2006, the authority noted its continuing concerns due to the nature of the building design, and suggested that a moisture monitoring system be installed to 'ascertain if there are any water ingress problems evident'. The authority also requested permission for a representative of the cladding manufacturer to inspect the cladding.

3.7 The cladding manufacturer's report

3.7.1 The cladding manufacturer subsequently visited the house to make a 'technical observation' of the cladding. In an undated letter to the authority, the cladding manufacturer noted that the coating system appeared to be well maintained and the cladding visually appeared to be 'performing to expectations'.

3.7.2 However, the manufacturer also noted 'several installation points' that did not meet its specifications, which are summarised as follows:

- The cladding overlap at the base does not meet the current E2/AS1 requirements.
- There are no vertical or horizontal control joints installed.
- Head flashings do not project past the window jambs.

3.8 The owners subsequently engaged a moisture monitoring company ("the monitoring company") to install moisture probes and to monitor moisture levels in the framing. On 14 March 2006, the owners informed the authority that the probes had been installed.

3.9 The moisture monitoring report

3.9.1 The monitoring company provided a report subsequent to reading the moisture probes in March and June 2006. (I have seen only extracts from the report). The report explained that attention should be given to areas where readings exceeded 18% for untreated framing timbers.

3.9.2 The March 2006 readings indicated that eight areas had moisture contents over 18%, while the June 2006 readings showed 14 areas with elevated moisture readings. Ten areas were beneath window or door jambs, and seven areas were associated with the decks (with several associated with both windows and decks). In three locations, moisture readings were above 35%. The lowest readings ranged from 8% to 13%.

3.10 The 2008 remediation work

3.10.1 A list of recommended remediation work appears to have been included as part of, or following, the moisture monitoring report. However, it is not clear who prepared this list, or when it was produced.

3.10.2 According to the builder, the remediation list did not include any work requiring a building consent and, as the authority had verbally advised that if the work was done 'a CCC would be given', a building consent was not sought for the remediation work.

3.10.3 The builder commenced repair work based on the report's recommendations and areas of decay were found when some of the cladding was removed. The builder apparently asked the authority to inspect the framing but, as an inspector was not available, was advised to proceed and asked to take 'lots of photographs'.

3.10.4 The photographs taken during the repair work indicate that repairs were mainly limited to the north (deck) end of the house, where:

- cladding was removed from the balustrades, the northwest corner and some of the wall below the deck, along with some ceiling lining under the deck
- timber wall and balustrade framing was replaced where decay was found, with wall framing replacement limited to areas of obvious decay (and no testing for decay carried out)
- the large window to the west wall of the lounge was removed and re-installed and the builder has stated that the east window was also re-installed
- new building wrap and cladding was installed, along with new coating, and the exterior was repainted and interior walls were relined as necessary.

3.10.5 According to the builder, no testing for decay was carried out where damaged timber was removed. However, timber close to the removed framing was coated with a timber preservative. On completion of the work the builder supplied the photographs to the authority and requested a final inspection.

3.11 In an email to the owners, dated 19 March 2008, the authority expressed its continued concern about the history of leaking in the building and the adequacy of the remediation, as no building consent had been issued for the work and no inspections had been carried out.

3.12 It appears that continuing discussions failed to resolve the issues. In August 2008, with the agreement of the authority, the builder engaged another property inspection company (“the inspection company”) to inspect and report on the weathertightness of the house.

3.13 The thermal imaging report

3.13.1 The inspection company inspected the house on 10 September 2008 and provided a ‘Moisture ingress thermal imaging report’ to the builder dated 22 December 2008.

3.13.2 The report noted that no invasive testing had been carried out and that the thermal imaging, non-invasive testing and visual inspection undertaken was only a guide in order to identify any remaining areas of concern. According to the builder, the inspection company was not asked to read the installed moisture probes that remained after the remedial work.

3.13.3 The results indicated no areas of concern, with the testing showing ‘no thermal anomalies’ and non-invasive moisture contents recorded from 9% to 14%. The report concluded that the house ‘appears to be in good condition with no further signs of abnormal or high moisture content levels’.

3.14 The builder again requested a code compliance certificate for the house and, in a letter to the owners dated 3 March 2009, the authority noted that the past weathertightness issues appeared to have been addressed by the remedial work. However, the authority proposed applying for a determination because:

... the remedial work was undertaken without a building consent, Council was denied the opportunity to inspect the work as it proceeded and cannot verify compliance with the building code...

- 3.15 In a letter to the authority dated 9 April 2009, the owners explained that the cladding had originally been changed from stucco due to cost and ‘bad publicity’ about stucco at the time. The owners also noted that the house had been substantially completed in late July 2000.
- 3.16 The Department received an application for a determination from the authority on 27 April 2009.

4. The submissions

- 4.1 The authority made a submission in a letter to the Department dated 20 April 2009, which outlined the background to the situation and described its concerns. The authority noted the past history of moisture penetration and the defects raised by the cladding manufacturer, adding that it was not clear whether the replaced cladding had been installed over a cavity as would now be required.
- 4.2 The authority forwarded copies of:
- the drawings
 - the inspection summary
 - extracts from the moisture monitoring report
 - a series of construction photographs of the remedial work
 - the thermal imaging report dated 22 December 2008
 - some of the correspondence with the owners and the builder.
- 4.3 The owners acknowledged the application and made a submission in a letter to the Department dated 30 April 2009, noting that final approval had been repeatedly sought by the builder following the original construction of the house. The owners explained that, when the remedial work was undertaken, the builder discovered the decayed timber and called for an inspection of the framing, noting:
- He had the house open and was told that as the Council could not get their inspectors out and the house was insecure he should proceed without a permit for the reinstatement and take lots of photographs. This he did and the photographs are contained in the application.
- 4.4 A draft determination was issued to the parties for comment on 18 June 2009. The authority accepted the draft without comment.
- 4.5 The owners acknowledged and accepted the draft determination but believed that they had followed the authority’s advice and had repairs completed, but that the advice had not been adequate and that they had ‘been unable to keep ahead of the changing regulations’. The owners said they now needed to seek additional advice.
- 4.6 The builder responded in a letter to the Department dated 11 August 2009, which clarified some of the background to the situation and I have incorporated this as I consider appropriate. The builder also noted (in summary):
- Technical information on the cladding was not readily available at the time it was installed and most information was given verbally by suppliers.

- The cladding replaced during the remedial work could not be installed over a cavity as this would have required the re-cladding of the entire walls.
- The authority was never denied the opportunity to inspect the remedial work as it was aware of the remedial work.
- When this house was constructed, the details in the drawings were followed. However, what was considered to be good practice 10 years ago is not acceptable now; and more details are now provided, from designers and manufacturers, on waterproofing and fixing claddings.
- There are now standard details to ensure weathertightness, but these were not available when the house was built.

5. The expert's report

5.1 As mentioned in paragraph 1.5, 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 and inspected the house on 18 May 2009, providing a report that was completed on 28 May 2009.

5.2 The expert noted that, apart from the change from stucco cladding, the house appeared to accord with the drawings and the cladding visually appeared to be 'in good order and well fitted'.

5.3 The 2008 remediation work

5.3.1 The expert examined the construction photographs supplied by the builder, and noted that the framing beyond the decayed area did not seem to have been replaced, although the general 'rule of thumb' was to replace one metre back from decay unless the limits of decay have been accurately established by sample analysis. The photographs also did not show whether any framing left in place had been treated with a timber preservative.

5.3.2 The expert removed two timber samples from cut-outs beside the re-installed west door/window unit and a third sample from a cut-out 500mm to the south (within the original framing). The expert forwarded the three timber samples to a biodeterioration laboratory for analysis of treatment and decay (refer paragraph 5.4.4).

5.3.3 At the window cut-outs, the expert observed new building wrap and flashing tape applied to the window opening. A small area of texture coating was removed, and sealant was observed between the window flange and the backing sheets, which had been applied prior to the installation of the face-fixed window.

5.4 Moisture and timber sample testing

5.4.1 The expert inspected and took non-invasive moisture readings of the interior rooms associated with the deck and no evidence of recent moisture was observed.

5.4.2 The expert took readings from 22 moisture probes remaining within the original bottom plates after the remedial work. The following elevated moisture readings were recorded (the past readings of March and June 2006 are shown in brackets):

- 23% at the south garage window (compared with 21% and 22%)
- 20% in the south west corner below the deck beam/wall junction (16% and 19%)
- 17% in the north east corner below the deck corner (13% and 21%)
- 26% at an east lounge window below the deck corner (11% and 17%)
- 19% at the north garage door (13% and 12%)
- 18% at a west bedroom window in the upper floor (19% and 17%).

I note that the lowest readings of other moisture probes ranged from 8% to 13%. Moisture levels that vary significantly generally indicate the moisture is entering the structure and further investigation is required.

5.4.3 The expert also took 9 invasive moisture readings through the cladding at areas considered at risk, and 4 of these were elevated as follows:

- 19% at the cut-out in the original bottom plate 500mm from the re-installed west window
- 17% and 24% beside the west garage door
- 23% at the south deck to wall junction.

5.4.4 As outlined in paragraph 5.3.2, the expert removed 3 timber samples and forwarded these to a biodeterioration laboratory for analysis of treatment and decay. The laboratory report confirmed that:

The samples of new framing:

- were treated to an equivalent of at least H1.2
- contained recently active fungal growths, indicating minor but unacceptable elevation in moisture levels since remediation work

The sample of original bottom plate:

- was untreated and had ‘deep advanced decay’ which would have caused loss of most of the structural integrity in affected areas
- was consistent with exposure to ‘serious’ moisture levels (typically above 30%) for at least 2 to 3 years
- contained traces of the toxigenic mould stachybotrys
- further investigation is needed to determine the extent of necessary timber replacement.

5.4.5 With regard to the 2008 remediation work, the laboratory report also stated:

It is vital to establish the limits and causes of affected wood which may require extensive removal of cladding and/or other building materials and/or iterative analysis. It is sometimes necessary to remove a substantial proportion of sound

wood during remediation, to ensure that a critical mass of compromised wood is removed...

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

General

- the clearances below the bottom of the cladding and the ground are insufficient in some areas
- there are no vertical or horizontal control joints in the cladding
- there are continuing elevated moisture levels shown in some remaining moisture probes

Windows

- while the reinstalled windows have seals behind the jamb flanges, there is no evidence that the remaining windows have similar jamb seals (or allowance for drainage below the sills)
- the head flashings do not project sufficiently beyond the window jambs

The north deck

- the clearances below the bottom of the cladding to the deck membrane and door sill are insufficient in some areas, allowing moisture to wick up into the fibre-cement backing sheets
- the posts to the open metal balustrade to the curved section are fixed through the deck membrane
- there is a gap at the end of the deck door sill
- a membrane-lined gutter is formed at the curved edge of the deck, with no flashing at the junction of the membrane and the cladding (I also note that there are watermarks on the membrane indicating likely ponding on the deck floor)

The south deck

- the timber decking over the south deck butts hard against the cladding, with no allowance for drainage, and moisture has penetrated into the framing below
- there are elevated moisture levels below the ends of the beam under the deck, indicating a lack of weathertightness of these junctions.

5.6 A copy of the expert's report was provided to the parties on 4 June 2009.

6. Evaluation for code compliance

6.1 Evaluation framework

6.1.1 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solutions⁵, which will assist in

⁵ 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.

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.
- 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.

6.2 Evaluation of the cladding for E2 and B2 Compliance

6.2.1 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. Weathertightness risk factors have also been described in previous determinations⁶ (for example, Determination 2004/1) relating to cladding and these factors are also used in the evaluation process.

6.2.2 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.

6.3 Weathertightness risk

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

Increasing risk

- the house is in a very high wind zone
- the house is 2-storeys in part
- the house is fairly complex in plan and form
- the walls have monolithic cladding fixed directly to the framing
- a large deck, with monolithic-clad balustrades, is located above an enclosed habitable space
- most of the external wall framing is not treated to a level effective in resisting decay if it absorbs and retains moisture

Decreasing risk

- there are eaves and verge projections to shelter most of the upper walls.

⁶ Copies of all determinations issued by the Department can be obtained from the Department's website.

- 6.3.2 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 cladding systems 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.
- 6.3.3 When evaluated using the E2/AS1 risk matrix, the weathertightness features outlined in paragraph 6.3.1 show that all elevations demonstrate a high weathertightness risk rating. I note that, if the details shown in the current E2/AS1 document were adopted to demonstrate code compliance, the fibre-cement cladding would require a drained cavity. The E2/AS1 document current at the time of consent did not include this cladding type.

6.4 Weathertightness conclusion

- 6.4.1 Taking into account the expert’s report, I am satisfied that the current performance of the cladding installed on this house is inadequate. The continuing water penetration into the timber framing and decay in the original framing indicates systemic failures, and considerable work will be required to make the building code compliant. In particular, the cladding demonstrates the key defects listed in paragraph 5.5, which are likely to have contributed to the moisture penetration still evident within the external walls of this building.
- 6.4.2 I have 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 significant 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 cavity. Consequently, I am not satisfied that the cladding system as installed complies with either Clause B2 or Clause E2 of the Building Code.
- 6.4.3 While most of the recent repair work appears to have been constructed to good trade practice and has achieved a high quality finish, I consider that the full extent of the problems apparent in the original construction have not been sufficiently or adequately addressed, as evidenced by the continuing elevated moisture levels in the moisture probes installed prior to the remediation work, along with the decay analysis report from the biodeterioration consultant.
- 6.4.4 I consider that a more thorough investigation of the cladding and the condition of the underlying framing is required before the method of remediation can be decided, either by targeted repairs, re-cladding, or a combination of both. The investigation should involve the systematic survey of all risk locations in order to determine the full extent of work required to the cladding, timber damage to the framing and necessary timber replacement. This will require a careful analysis by an appropriately qualified expert. Once that decision is made, the chosen repair option should be submitted to the authority for its consideration and approval.

6.4.5 I note that the Department has produced a guidance document on weathertightness remediation⁷. I consider that this guide will assist the owners in understanding the issues and processes involved in remediation work and in exploring various options that may be available to them when considering the upcoming work required to the house.

7. What is to be done now?

7.1 A notice to fix should be issued that requires the owners to bring the cladding into compliance with the Building Code, 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.

7.2 I would suggest that the parties adopt the following process to meet the requirements of paragraph 7.1. Initially, the authority should issue the notice to fix. The owner should then produce a response to this in the form of a detailed proposal, based on further investigation as necessary (including investigation of the original framing timbers), and produced in conjunction with a competent and suitably qualified person, as to the rectification or otherwise of the specified issues. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

7.3 I note that the remedial work done to date was completed without either the owner seeking an amendment to the original building consent, or a new building consent being sought. Notwithstanding the owner's reported verbal advice to the authority on the matter, it appears that the authority did not receive details of the then proposed remedial work and did not inspect this work as it proceeded. As outlined above, the authority should be formally advised of the remedial work, in the form of a detailed proposal, so that the nature and extent of the repair work is able to be agreed before any work commences onsite, and the nature of inspections carried out during construction agreed.

8. The decision

8.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the cladding as installed does not comply with Clauses E2 and B2 of the Building Code, and accordingly 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 24 August 2009.

John Gardiner
Manager Determinations

⁷ 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