



## Determination 2008/114

### Determination regarding the code compliance of a 9-year-old house with monolithic cladding at 49 Panorama Drive, Nelson



#### 1. The matters to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004<sup>1</sup> (“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, K and L MacLean, (“the applicants) acting through an agent. The other party is the Nelson City 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 for a 9-year-old house because it was not satisfied that it complied with Clause B2 Durability and Clause E2 External Moisture of the Building Code<sup>2</sup> (First Schedule, Building Regulations 1992).

<sup>1</sup> The Building Act 2004 is available from the Department’s website at [www.dbh.govt.nz](http://www.dbh.govt.nz).

<sup>2</sup> The Building Code is available from the Department’s website at [www.dbh.govt.nz](http://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.

1.3 The matters for determination under sections 177 and 188 of the Act are:

**1.3.1 Matter 1: The wall cladding**

Whether the wall cladding as installed on the house (“the cladding”) complies with Clauses B2 and E2 of the Building Code. By “the cladding as installed” I mean the components of the systems (such as the backing materials, the plaster, the flashings and the coatings), as well as the way the components have been installed and work together.

**1.3.2 Matter 2: The durability considerations**

Whether the building elements 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 expert commissioned by the Department to advise on this dispute (“the expert”), and the other evidence in this matter. With regard to the cladding, 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 work consists of a 2-storey house with an attached single-storey garage, which is situated on an excavated sloping site in a medium wind zone for the purposes of NZS 3604<sup>3</sup>. Construction is generally conventional light timber frame with some specifically engineered elements, and includes concrete slabs and foundations, monolithic cladding and aluminium windows. The house is fairly complex in plan and form, with 25° pitch pressed-metal tile hipped and gabled roofs that have eaves and verge projections of about 750mm overall above most walls.

2.2 An enclosed deck, with monolithic-clad balustrades and a tiled floor sits above the living area on the north elevation. The deck sides of the balustrade are clad in painted fibre-cement sheet cladding and the outer cladding extends down over the living room walls, against which a lean-to veranda/pergola is attached. The lean-to veranda continues around the family room and kitchen on the east elevation.

2.3 The drawings call for the deck balustrade framing to be H3 treated, and the specification calls for wall framing to comply with NZS 3602, which at the time of construction would permit untreated timber provided that the moisture content of the timber was kept below 18%. The expert has noted that the timber framing is Douglas fir. Given the date of construction in 1999 and the lack of other evidence, I consider the external wall framing to be untreated.

2.4 The monolithic cladding is a system described as solid plaster over a solid backing. In this instance the solid backing consists of 150mm x 25mm H3 treated spaced sarking installed diagonally and fixed through the building wrap directly to the framing timbers. The sarking is covered by a slip layer of heavy duty bitumen based building paper and metal-reinforced 25mm to 30mm thick solid plaster with a flexible paint coating.

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<sup>3</sup> New Zealand Standard NZS 3604:1999 Timber Framed Buildings

### **3. Background**

3.1 The territorial authority issued a building consent for the house (No. 981421) on 21 January 1999, under the Building Act 1991. I have not seen a copy of the consent.

3.2 A structural engineer reviewed the excavations, retaining wall, foundations and steel beams during construction. The authority carried out other inspections during construction, including a pre-plastering inspection on 5 May 1999, which noted:

Paper condition good over diagonal sarking H3 treated radiata, rebated foundation detail, crimped netting used. All head flashings in place.

The last inspection recorded was on 17 June 1999, which stated that re-inspection was required and noted “Progressing well. Stucco almost complete.”

3.3 Although the house was completed in 1999, it appears that a final inspection was not sought and the owners did not seek a code compliance certificate until 2008.

3.4 In a letter to the applicants, dated 30 June 2008, the authority noted that the durability requirements of the Building Code commenced from the time of issue of the code compliance certificate, which was not appropriate for the 9-year-old house. The authority also noted that a number of higher risk cladding features had been identified, which increased the risk of moisture penetration into the building. The authority concluded that it could not issue of code compliance certificate because it:

cannot be satisfied on reasonable grounds that the work now meets all the requirements of the building code, especially B2 durability and E2 external moisture.

3.5 The Department received an application for a determination on 14 August 2008.

### **4. The submissions**

4.1 The applicant forwarded copies of:

- the consent drawings and specification
- the consent application documentation
- the authority’s summarised computer record of inspections
- the letter from the authority dated 30 June 2008
- the engineer’s producer statements.

4.2 The authority acknowledged the application, but made no submission.

4.3 A draft determination was issued to the parties for comment on 28 October 2008. The draft was issued for comment and for the parties to agree a date when the house complied with Building Code Clause B2 Durability.

4.4 The parties accepted the draft and agreed that the house complied with Clause B2 on 1 September 1999.

## 5. The expert's report

- 5.1 As mentioned 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 6 October 2008 and furnished a report that was completed on 8 October 2008.
- 5.2 The expert noted the following variations from the consent drawings:
- The roof cladding is pressed metal tiles in lieu of profiled metal.
  - The decorative “chimney” has not been constructed.
  - The small window on the east wall of the living room has not been installed.
- 5.3 The expert noted that construction appeared to be “of a good quality”, with the cladding generally showing that “there has been consideration given to sealing and weathering of the stucco cladding to prevent water entry at junctions and service penetrations”, although the flashings at the deck “could have been better considered”. The expert described the stucco as being in “excellent condition”, with limited hairline cracking despite the paint finish appearing to be original.
- 5.4 The expert noted that the windows are face-fixed, with satisfactory metal head flashings above exposed windows. The expert removed a small section of cladding at the jamb to sill junction of a north window, and noted the heavy weight “tar-based” building wrap and satisfactory embedment of mesh within the plaster. At the jamb, there is an additional strip of wrap over the slip layer, which is folded and returned back in behind the window flange (which I note was a common traditional method of flashing jambs of windows in stucco cladding at the time of construction). The expert noted that the jamb and head flashings appeared satisfactory. At the sill, a profiled H3 treated timber plate is wrapped with the slip layer and plastered to form a projecting “sill”. I accept that the exposed junction is typical of similar locations elsewhere in the building.
- 5.5 The expert noted that, although there is no evidence of control joints in the stucco, all shrinkage should have occurred by now and a vertical hairline crack beneath a south window jamb may indicate the presence of a control joint. I note that the drawings call for control joints in the plaster to be installed at 4m centres, (refer paragraph 6.4.4).
- 5.6 The expert inspected the interior of the house, taking non-invasive moisture readings internally, and no evidence of moisture was observed. The expert took 9 invasive moisture readings through the cladding at areas considered at risk, and noted the following elevated readings:
- 19% at the jamb to sill junction exposed at the living room north window, and moisture on the timber sill below the slip layer
  - 18% in the framing below one of the pergola beam penetrations.

I note that the lowest readings were recorded at 12%, and moisture levels that vary significantly generally indicate that external moisture is entering the structure and

further investigation is required. I also note that the inspection was carried out in spring, and I therefore consider that the moisture levels recorded are likely to represent higher levels than expected at dryer times of the year.

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

- there are minor isolated cracks in the cladding
- the paint coating appears original and is deteriorating in some areas
- there is a small area of damage to the plastered foundation wall beneath the family room door
- there is no allowance for drainage from the window sill flanges, and moisture is penetrating into the projecting timber sill of at least one exposed window
- there is no kickout at the bottom of some of the apron flashings, and the end of the gutter is buried in the plaster
- the pergola beams penetrate the cladding without flashings, and are reliant only on sealant for weathertightness
- the inner face of the deck balustrade is clad with painted 4.5mm fibre-cement sheet, which butts against the deck tiles and is deteriorating at the bottom edge
- the metal capping to the balustrade butts against the wall cladding with no saddle flashing, and also inadequately covers the underlying timber capping
- the deck overflow pipe through the balustrade is unsealed, with gaps apparent
- there are unsealed gaps at vent pipe penetrations through the soffits.

5.8 The expert made the following additional comments:

- Although the top of barge flashings are embedded into the plaster, the junction is well-sealed and the flashing slopes away from the cladding.
- Although there is no clearance from the bottom of the cladding to the west entry paving and beside the garage doors, there is no evidence of moisture penetration and the paving is well drained and protected by deep overhangs.

5.9 A copy of the expert's report was provided to the parties on 13 October 2008.

## **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 Solutions<sup>4</sup>, 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:

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<sup>4</sup> 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](http://www.dbh.govt.nz).

- 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 external building envelope 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. The Department and its antecedent, the Building Industry Authority, have also described weathertightness risk factors in previous determinations<sup>5</sup> (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 In relation to these characteristics I find that this house:
- is built in a medium wind zone
  - is a fairly complex 2-storey building
  - has monolithic cladding fixed directly to the framing
  - has eaves projections of more than 750mm above most walls
  - has an enclosed deck, with solid balustrades, which sits above living areas
  - has a pergola attached to some of the lower walls
  - has external wall framing that is untreated Douglas fir, which will have only limited resistance to the onset of decay if the framing absorbs and retains moisture.
- 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 claddings can be used on a building in order to comply with E2/AS1. Higher levels of risk will require more rigorous weatherproof

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<sup>5</sup> Copies of all determinations issued by the Department can be obtained from the Department's website.

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, although a drained cavity is now required for the subject cladding system by E2/AS1 for all risk levels, this was not a requirement at the time the house was constructed.

## **6.4 Weathertightness performance: exterior cladding**

6.4.1 Generally the cladding appears to have been installed in accordance with good trade practice. However, taking account of the expert's report, I conclude that remedial work is necessary in respect of:

- the paint coating and the minor isolated cracks in the cladding
- the damage to the plastered foundation wall beneath the family room door
- the lack of drainage at the window sills, with moisture penetrating into the projecting sills of some exposed windows
- the bottom of the apron flashing on the south elevation, with no kickout and the gutter embedded in plaster
- the unflashed penetrations of the pergola beams through the cladding
- the lack of clearance of the balustrade cladding to the deck paving
- the inadequate cladding to the inner side of the deck balustrade
- the inadequate balustrade capping and the lack of saddle flashings
- the unsealed deck overflow pipe
- the unsealed gaps at vent pipe penetrations through the soffits.

6.4.2 I note that, although most windows are sheltered beneath deep roof overhangs, several windows, beneath the verges to the southeast and the open pergola to the northwest, are exposed to the weather. I consider that these windows require further investigation of the jamb to sill junctions above the projecting sills to ensure that any moisture penetrating at the jambs is able to drain to the outside without being trapped at the sill level.

6.4.3 I note the expert's comments in paragraph 5.8, and I accept that these features are adequate in these particular circumstances.

6.4.4 With regard to control joints, I note that the consent drawings call for their installation, the authority inspected the stucco before it was complete, there is no indication of uncontrolled movement cracks and the expert noted a vertical hairline crack. I therefore consider that, despite limited visible evidence, control joints are likely to have been installed within the plaster base coat. However, if that is not the case I consider that the seriousness of the omission is offset to some extent by the fact that the stucco cladding appears to have been installed according to good trade practice, and has been in place for 9 years with no signs of significant cracking or moisture entry.

- 6.4.5 During the early part of the period since construction, all drying shrinkage in the plaster and supporting framing would have occurred, and the cladding's future performance will be governed solely by response to environmental factors such as imposed temperature and moisture effects, wind, earthquake forces and seasonal foundation movements.
- 6.4.6 Notwithstanding the fact that the cladding is fixed directly to the timber framing, thus limiting drainage and ventilation behind the cladding, I have noted certain compensating factors that assist the performance of the cladding in this particular case:
- Apart from the noted exceptions the cladding is installed to good trade practice.
  - Moisture penetration seems limited to areas where defects have been identified.
- 6.4.7 I consider that these factors help compensate for the lack of a drained cavity and can assist the building to comply with the weathertightness and durability provisions of the Building Code.

## **Matter 1: The wall cladding**

### **7. Discussion**

- 7.1 I consider the expert's report establishes that the current performance of the cladding is not adequate because it is allowing water penetration into the building at present. Consequently, I am satisfied that the house does not comply with Clause E2 of the Building Code.
- 7.2 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 the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.
- 7.3 Because the faults identified with the cladding occur in discrete areas, I am able to conclude that satisfactory rectification and investigation of the items outlined in paragraphs 6.4.1 and 6.4.2 will result in the house being brought into compliance with Clauses B2 and E2.
- 7.4 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).

## Matter 2: The durability considerations

### 8. Discussion

- 8.1 There are concerns about the durability, and hence the compliance with the Building Code, of certain elements of the building taking into consideration the completion of the building during 1999.
- 8.2 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).
- 8.3 These durability periods are:
- 5 years if the building elements are easy to access and replace, and failure of those elements would be easily detected during the normal use of the building
  - 15 years if building elements are moderately difficult to access or replace, or failure of those elements would go undetected during normal use of the building, but would be easily detected during normal maintenance
  - the life of the building, being not less than 50 years, if the building elements provide structural stability to the building, or are difficult to access or replace, or failure of those elements would go undetected during both normal use and maintenance.
- 8.4 In this case the delay between the completion of the building work in 1999 and the applicant’s request for a code compliance certificate in 2008 has raised concerns that various elements of the building are now well through or beyond their required durability periods, and would consequently no longer comply with Clause B2 if a code compliance certificate were to be issued effective from today’s date.
- 8.5 The 9-year delay between the substantial completion of the building work consented in early 1999 and the authority’s refusal of a code compliance certificate raises the matter of when all the elements of the building complied with Clause B2. I have not been provided with any evidence that the authority did not accept that those elements complied with Clause B2 at a date in 1999.
- 8.6 It is not disputed, and I am therefore satisfied, that all the building elements complied with Clause B2 on 1 September 1999, refer paragraph 4.4.
- 8.7 In order to address these durability issues when they were raised in previous determinations, I sought and received clarification of general legal advice about waivers and modifications. That clarification, and the legal framework and procedures based on the clarification, is described in previous determinations (for example, Determination 2006/85). I have used that advice to evaluate the durability issues raised in this determination.
- 8.8 I continue to hold that view, and therefore conclude that:
- (a) the territorial authority has the power to grant an appropriate modification of Clause B2 in respect of all the building elements.

- (b) it is reasonable to grant such a modification, with appropriate notification, because in practical terms the building is no different from what it would have been if a code compliance certificate for the house had been issued in 1999.

8.9 I strongly recommend that the territorial authority records this determination and any modifications resulting from it, on the property file and also on any LIM issued concerning this property.

## **9. What is to be done now?**

9.1 A notice to fix should be issued that requires the owners to bring the house into compliance with the Building Code, identifying the items listed in paragraphs 6.4.1 and 6.4.2 and referring to any further defects that might be discovered in the course of 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 territorial authority to accept or reject.

9.2 I would suggest that the parties adopt the following process to meet the requirements of paragraph 9.1. Initially, the territorial authority should issue the notice to fix. The owners should then produce a response to this in the form of a detailed proposal, 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.

9.3 I note that the expert has identified some variations between the consent drawings and the building as constructed, and I leave that matter to the authority to resolve with the owners as it considers appropriate.

9.4 Once the matters set out in paragraphs 6.4.1 and 6.4.2 have been rectified to its satisfaction, the territorial authority is to issue a code compliance certificate in respect of the building consent as amended.

## **10. The decision**

10.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the building does not comply with Clauses B2 and E2 of the Building Code, and accordingly confirm the territorial authority's decision to refuse to issue a code compliance certificate.

10.2 I also determine that:

- (a) all the building elements installed in the building, apart from the items that are to be rectified as described in this determination, complied with Clause B2 on 1 September 1999.
- (b) the building consent is hereby modified as follows:

The building consent is subject to a modification to the Building Code to the effect that, Clause B2.3.1 applies from 1 September 1999 instead of from the time of issue of the code compliance certificate for all the building elements, except the

items to be rectified as set out in paragraphs 6.4.1 and 6.4.2 of Determination 2008/114.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 10 December 2008.

John Gardiner  
**Manager Determinations**