



## Determination 2009/63

### The issue of a notice to fix for a 10-year-old house at 1014B Great North Road, Point Chevalier, Auckland



#### 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 applicant is the owner, D Hetherington (“the applicant”), and the other party is the Auckland 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<sup>2</sup> (First Schedule, Building Regulations 1992). Specifically, the notice to fix cites contraventions of Clauses B1 “Structure”, B2 “Durability”, E1 “Surface water”, E2 “External moisture”, G13 “Foul Water” and H1 “Energy Efficiency”.

<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).

1.3 The matters for determination, in terms of section 177(a) and 177(b)(iii) of the Act<sup>3</sup> are:

**1.3.1 Matter 1: The wall cladding**

Whether the wall 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 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. (I consider this matter in paragraph 7.)

**1.3.2 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 (I consider this matter in paragraph 8).

**1.3.3 Matter 3: The durability considerations**

Whether building elements comply with Building Code Clause B2 Durability, taking into account the age of the building work (I consider this matter in paragraph 9).

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 other evidence in this matter. I have evaluated this information using a framework that I describe in paragraph 6.

## **2. The building work**

2.1 The building work consists of a single-storey detached house that is situated on a sloping site in a low wind zone for the purposes of NZS 3604<sup>4</sup>. The wall structure is a proprietary wood-based panel system, with a timber framed floor and roof, aluminium windows and monolithic wall cladding. The house has a simple rectangular shape, with a 15° pitch profiled metal gabled roof. Eaves and verge projections are about 600mm, except for a projecting wall on the west elevation.

### **2.2 The wall panel system**

2.2.1 The walls are formed from wood-based structural panels, which are a proprietary system consisting of 32mm thick panels connected by proprietary structural connectors. The panels are formed from reconstituted wood fibres with an inner core of wood strands sandwiched between surface layers of medium density fibre. In the case of this house, the interior surfaces of panels are flush-jointed and painted, with monolithic cladding applied to the exterior sides.

2.2.2 The wall panel manufacturer’s 2005 manual and the BRANZ Appraisal Certificate<sup>5</sup> note that the exterior panels are required to have external vertical timber battens. However, it appears that battens were not a requirement of the manufacturer at the

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<sup>3</sup> 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.

<sup>4</sup> New Zealand Standard NZS 3604:1999 Timber Framed Buildings

<sup>5</sup> BRANZ Appraisal Certificate No. 481 (2005)

time of construction. The panels are supplied pre-painted for temporary protection against moisture entering the panels before the application of a building wrap.

- 2.2.3 The Appraisal Certificate also notes that the durability of the wall system is dependent on the panels remaining dry in service and states that

...the exterior cladding system, including joints, openings and perimeter junctions must be maintained to ensure adequate protection is continually provided against water ingress.

- 2.2.4 In this instance the fixing of the cladding directly to the panels and the lack of building wrap has made the cladding an integral element of the panel system.

### **2.3 The cladding system**

- 2.3.1 The exterior cladding is a hybrid form of EIFS<sup>6</sup> consisting of 40mm thick polystyrene (“EPS”) backing sheets fixed directly to the wall panels and finished with an applied mesh-reinforced plaster system and a flexible acrylic paint coating. The manufacturer’s instructions for the plaster system indicate a 3-coat system with an overall thickness of about 6mm.

- 2.3.2 The supplier has provided a 15-year materials guarantee and the applicant (who is also the plasterer) has provided a 15-year workmanship guarantee for the plaster system. The completion date of application of the plaster is noted as 30 May 1998.

## **3. Background**

- 3.1 The authority issued a building consent for the house (No. 1998/3605889) during 1998, under the Building Act 1991. I have not seen a copy of the consent or the consent documents.
- 3.2 I have seen no records of inspections during construction. It is therefore not clear whether inspections were carried out by the authority or by a building certifier. According to the applicant, the house was completed and occupied during 1998.
- 3.3 I am not aware of any correspondence with the authority until the applicant sought a code compliance certificate in 2002. The authority carried out a final inspection of the house on 27 August 2002, with subsequent re-inspections on 12 August and 2 December 2004. The authority issued a ‘Notice to Rectify’ dated 14 December 2004, which identified various concerns regarding the cladding.
- 3.4 During 2005, the applicant engaged a building consultant (“the consultant”) to assist in resolving the issues. Following some correspondence clarifying the type of cladding system and requesting another inspection, the authority wrote to the inspection company to explain its concerns regarding the durability of the cladding in view of its age.

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<sup>6</sup> External Insulation and Finish System

### **3.5 The notice to fix**

3.5.1 After several visits to the site, the authority re-inspected the house on 11 February 2009 and, on 6 March 2009, issued a notice to fix that identified various defects, which are summarised as follows:

- lack of battens to the exterior of the wall panels
- lack of confirmation of structural bracing during construction
- lack of a drainage gap above the window head flashings
- inadequate sealing of the window jambs
- lack of sill flashings
- unsealed penetrations through the cladding
- uncoated cladding in one area
- lack of cladding clearance in some areas
- need for verification of the thermal insulation requirements
- inadequate overflow level and height of surround to the gully trap
- lack of provision for drainage and ventilation of the cladding
- changes to the building consent.

3.5.2 The notice also outlined the requirements for durability of the various building elements and noted that an application for ‘a Waiver and modification’ could be applied for from the authority, to allow the durability periods to commence from the date of substantial completion.

3.6 The Department received an application for a determination on 6 April 2009.

## **4. The submissions**

4.1 The applicant accompanied his application with a statement that outlined the background of the project and described his extensive experience as a plasterer over the past 49 years and with the type of plaster used on the cladding. The applicant explained that, on advice from the authority, he had engaged independent consultants who had mislaid various documents. All requirements resulting from the inspections had been met and the applicant stated that he had lived in the house for the past ten years with ‘no problems with it leaking’.

4.2 The applicant forwarded copies of:

- some drawings of the house
- the records of the final inspections and re-inspections
- some of the correspondence with the authority
- the notice to fix dated 6 March 2009
- various guarantees, statements and other information.

- 4.3 The authority forwarded a CD-Rom that was entitled “Property File”. The CD-Rom was of little value as it contained no documents relating to the building work considered in this determination.
- 4.4 Copies of the submissions and other evidence were provided to each of the parties. Neither the applicant nor the authority made any further submissions in response to the submissions of the other party.
- 4.5 A draft determination was issued to the parties for comment on 19 June 2009.
- 4.6 The authority accepted the draft in a letter dated 2 July 2009 but noted that the notice to fix included areas of contravention to Clauses B1, B2, E1, E2, G13 and H1. However the authority did not provide any further information regarding specific items that contravened those Clauses.
- 4.7 The applicant responded to the draft determination in an email dated 27 July 2009 restating his experience as a plasterer and noting:

...I’m told by an inspector he has never seen or checked a tri-board house like 1014 Great North Road. I explained the system to him and even pointed out two fine little cracks (60ml) at the base of the door, caused not, as said by him through thin plaster, but by junctions at each side of the door and only 60ml to the bottom of the polystyrene.

## **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 Architects. The expert inspected the house on 7 May 2009 and provided a report dated 15 May 2009.

### **5.2 The windows**

- 5.2.1 The expert noted that the windows are face-fixed with metal head flashings and no sill or jamb flashings. The windows are sheltered by the eaves on the east and west elevations, but more exposed on the north and south gable walls.
- 5.2.2 The expert removed a small section of cladding (“the cut-out”) at the jamb to sill junction of a window on the east elevation and was able to observe the underlying wall panel, noting an open joint to the side of the window and a galvanised steel joint strap below the window.
- 5.2.3 The expert noted that the window had been installed against the EPS backing sheets, with plaster forced in behind the window flanges and no seals behind the jamb flanges. I accept that the exposed junction is typical of similar locations elsewhere in the house.

### **5.3 The cladding**

- 5.4 The expert noted that the plaster appeared to be ‘reasonably true and flat, where not damaged or cracked’. The expert assessed the cladding against the plaster

manufacturer's 1997 recommendations for a similar EIFS cladding system, which he considered to be the closest 'benchmark' available for the system used on this house.

5.5 At the window cut-out, the expert was able to observe the cladding installation, noting that the joint between the EPS sheets aligned with the underlying wall panel joint. The EPS sheets were fixed with ring shank flat head nails, with no washers.

5.6 The expert observed that the plaster coating appeared to be a single layer, which generally varied from 2 to 3mm. However, the thickness reduced to less than 1mm at the 'drag marks'. I accept that the exposed plaster is typical of similar locations elsewhere in the house.

## **5.7 Moisture**

5.7.1 The expert inspected and took non-invasive moisture readings of the interior unlined wall panels and no evidence of current moisture was observed. However, some swelling was observed in a panel beside the living room doors on the north elevation, indicating some past moisture penetration into the panel.

5.7.2 The expert took invasive moisture readings into the wall panels at areas considered at risk, and readings varied from 8% to 14%.

5.7.3 The expert also took invasive moisture readings in the timber boundary joists, and noted that readings varied from 15% to 19%. The expert noted that this was likely to be the result of exposure to ground moisture, rather than the result of moisture related to the cladding above.

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

### **Cladding system construction**

- there is no building wrap between the wall panels and the cladding
- the EPS sheets are fixed directly to the wall panels, with no washers to fixings and joints aligning with panel joints in some areas
- the plaster is applied as a single layer and is too thin
- there are cracks in the cladding in some areas
- there is insufficient clearance from paving or ground to the bottom of the cladding in some areas, with the cladding below the paving at the northern end
- there is an area of unfinished plaster behind the gas box
- some penetrations through the cladding are unsealed

### **Windows and doors**

- the plaster butts against the head flashings, with no allowance for drainage from the cladding above
- there are no seals installed behind the jamb flanges.
- there is an open joint in the wall panel at the jamb exposed by the cut-out.

## 5.9 Other code clauses

- 5.9.1 The expert observed that, although the top of the sloping paving is above the surround to the gully trap, the paving has a 'good slope' and the area is protected beneath generous eaves. The expert considered that there was little likelihood of surface water penetration in these circumstances.
- 5.9.2 The expert assessed the overall insulation value of the exterior walls using R-values of the construction materials, and concluded that the walls appeared to comply with the insulation requirements applying at the time of construction in 1998.
- 5.10 The expert commented on the items identified in the notice to fix and generally agreed with the items identified, with the exception of the wall insulation and the gully traps as discussed above.
- 5.11 A copy of the expert's report was provided to the parties on 18 May 2009.

## 6. Evaluation for code compliance

6.1 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 durability (Clause B2 insofar as it relates to Clause E2).
- The remaining relevant Building Code requirements.

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

6.2 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solutions<sup>7</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:

- 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.

6.3 As described in paragraph 2.2, the wall structure of this house uses a proprietary wood-based panel system. The relevant Acceptable Solution E2/AS1 is limited to buildings that fall within NZS 3604 and the cladding of this house must therefore be considered as an alternative solution.

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<sup>7</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).

## Matter 1: The cladding

### 7. Weathertightness

#### 7.1 General approach

7.1.1 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>8</sup> (for example, Determination 2004/1) relating to cladding and these factors are also used in the evaluation process.

7.1.2 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.

#### 7.2 Weathertightness risk

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

##### **Increasing risk**

- the house has a structure formed from wood-fibre-based panels, which must remain dry to preserve their strength.
- the walls have monolithic cladding fixed directly to the structural wall panels

##### **Decreasing risk**

- the house is in a low wind zone
- the house is 1-storey high
- the house is simple in plan and form
- there are 600mm eaves and verge projections above the walls
- the house has no attached decks.

7.2.2 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.

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<sup>8</sup> Copies of all determinations issued by the Department can be obtained from the Department’s website.



7.2.3 When evaluated using the E2/AS1 risk matrix, the weathertightness features outlined in paragraph 7.2.1 show that all elevations of this house demonstrate a low weathertightness risk rating. However, while characteristics that reduce risk may protect against expected weather conditions, I take the view that they are unlikely to protect against less routine events such as storms or washing of exterior surfaces.

### **7.3 Weathertightness performance**

7.3.1 It is clear from the expert's report that the cladding installed on the house is unsatisfactory in terms of its weathertightness risk. While there is no firm evidence that the house is leaking at the present time, there are a number of significant defects and omissions (refer paragraph 5.8) that are likely to endanger the ongoing performance of the cladding and considerable work is required to make the house code compliant.

7.3.2 The expert's report has established that the cladding has not been installed in accordance with good trade practice or to the manufacturer's instructions. The defects and omissions that are likely to endanger the ongoing performance of the cladding will present a consequential risk to the structural integrity of the wall panels.

7.3.3 I consider that the lack of current moisture penetration is likely to be due to the low risk profile of the house, as outlined in paragraph 7.2.1.

### **7.4 Durability of the cladding and the consequences of failure**

7.4.1 While the building demonstrates a low weathertightness risk, the cladding is an integral part of panels that form the structure of the house. The panels themselves have a very limited capacity to withstand the ingress of moisture without experiencing some degradation. The cladding is glued directly to the panels forming the structure of the house, and consequently there is no secondary barrier, such as a building wrap or a drainage cavity, that would provide a second line of defence if water penetrates the cladding itself. The panels themselves may well experience damage before it is evident that water has penetrated the cladding.

7.4.2 Because of the vulnerability of the particular type of construction used in this house, the likelihood and consequences of water penetration under more unusual conditions must also be taken into account.

7.4.3 Under the requirements of the Building Code a cladding is required to have a 15-year life, while the structural components of a house are to last for the life of the building, being not less than 50 years.

7.4.4 Clause B2.3.2 requires that individual building elements which are components of a building system and are difficult to access or replace must either:

- (a) All have the same durability, or
- (b) Be installed in a manner that permits the replacement of building elements of lesser durability without removing building elements that have greater durability and are not specifically designed for removal and replacement.

7.4.5 In this instance it can be argued that the cladding and the panels form a single building element, of which the greater durability requirement is at least 50 years. The performance of the cladding with respect to meeting the requirements of both E2 External Moisture and B2 Durability, and the consequential affect on B1 Structure, is therefore critical.

## **7.5 Conclusion**

7.5.1 I am satisfied that the current performance of the cladding is inadequate because it has not been installed according to good trade practice or to the manufacturer's instructions and has significant defects at present. In particular, it demonstrates the key defects listed in paragraph 5.8. While there are few of the known weathertightness risk factors present in this house, this has to be considered in combination with the significant faults identified in the cladding system. However, I have not received sufficient evidence to show that the cladding is allowing the ingress of moisture and, as a consequence, does not comply with clause E2 of the Building Code.

7.5.2 However, 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 are likely to allow the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.

7.5.3 I am also of the opinion that any moisture penetrating the cladding is likely to provide significant risks to the durability of the structural wall panels and their ability to meet their required durability period of a minimum of 50 years.

7.5.4 I find that, because of the extent and apparent complexity of the faults that have been identified with this cladding, I am unable to conclude, with the information available to me, that remediation of the identified faults, as opposed to partial or full re-cladding, could result in compliance with the relevant clauses of the Building Code. I consider that final decisions on whether code compliance can be achieved by either remediation or re-cladding, or a combination of both, can only be made after a more thorough investigation of the cladding.

## **Matter 2: The remaining Building Code matters**

### **8. Discussion**

8.1 I note the expert's comments as outlined in paragraph 5.9, and consider that the gully trap and wall insulation are adequate in the circumstances. I am therefore satisfied that the building complies with Clauses E1, G13 and H1 of the Building Code.

#### **8.2 The structural panels**

8.2.1 I note the authority has raised the matter of compliance of the structural wall panels with bracing requirements. I have been presented with no evidence on this matter; however, I believe the matter can be readily resolved by the owner seeking specific engineering advice.

- 8.2.2 I note that the durability, and therefore the performance, of the wall panels is dependent on the panels remaining dry in service (refer paragraphs 2.2.3 and 7.4).

### **Matter 3: The durability considerations**

#### **9. Discussion**

- 9.1 The authority has 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 1998.
- 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 underlying wall panels 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. The notice to fix**

- 10.1 Taking into account the expert’s report, I am satisfied that the authority made an appropriate decision to issue the notice to fix. However, as outlined in paragraph 8.1, I am satisfied that the gully traps and thermal insulation are adequate, so the notice should be modified (refer to paragraph 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 the findings of this determination. The notice to fix can require the owner to bring the house into compliance with the Building Code, but, as noted in previous determinations, I consider that a notice to fix cannot specify how compliance is to be achieved.

11.3 In response to the modified notice to fix, as discussed in paragraph 7.5.4, the owner 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. The owner should also take advice as to compliance of the structural panels as discussed in 8.2.1 and provide this to the authority. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

11.3.1 I note that the expert has identified various changes from the building consent, and I leave these matters to the parties to resolve.

## **12. The decision**

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

- the cladding does not comply with Building Code Clause B2 insofar as it relates to Clause E2, and consequently;
- the wall system, including the cladding and the panel system itself, does not comply with Building Code Clause B2 insofar as it relates to Clause B1
- the authority is to modify the notice to fix, dated 6 March 2009, 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 12 August 2009.

John Gardiner  
**Manager Determinations**