



## Determination 2015/055

### Regarding the code compliance of building work in a new house at 124 Navigation Drive, Whitby, Porirua



#### Summary

This determination considers whether there was sufficient information provided in a building consent application to establish the compliance of the proposed building work, and whether the building work as constructed complies with the Building Code.

#### 1. The matter 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 and Assurance, Ministry of Business, Innovation and Employment (“the Ministry”), for and on behalf of the Chief Executive of the Ministry.
- 1.2 The parties to the determination are:
  - the owner of the house, L Nortje (“the applicant”)
  - Porirua City Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.
- 1.3 I have included the builder, J O’Toole, (“the builder”) as a person with an interest in the matter. Mr O’Toole was granted approval as a licensed building practitioner (“LPB”) on 23 August 2012; his approval is currently suspended for the period from 23 September 2014 until 23 September 2015. The builder was not an LPB at the time the original work was consented in 27 March 2012.
- 1.4 This determination arises from the decision of the authority to issue a code compliance certificate for the construction of a new house. The applicant holds the view that the building work as consented and as-built does not comply with the

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<sup>1</sup> The Building Act, Building Code, compliance documents, past determinations and guidance documents issued by the Ministry are all available at [www.building.govt.nz](http://www.building.govt.nz) or by contacting the Ministry on 0800 242 243.

relevant clauses<sup>2</sup> of the Building Code (First Schedule, Building Regulations 1992). Though the determination application was initially in respect of the authority's decision to issue the code compliance certificate as well as the compliance of the building work it was later amended by the applicant to address only the compliance of the building work.

1.5 The matters to be determined<sup>3</sup> are therefore:

- Whether the particular elements of the building work (specifically the veranda/roof junction and the exterior staircase) as proposed in the building consent would comply with the relevant clauses of the Building Code if built in accordance with the approved plans.
- Whether particular elements of the building work as-built comply with the relevant clauses of the Building Code.

1.6 In making my decision I have considered the submissions of the parties, the report of a building surveyor engaged by the applicant ("the building surveyor"), the report of the independent expert engaged by the Ministry ("the expert"), and the other evidence in this matter.

1.7 Relevant clauses of the Building Code referred to in this determination are set out in Appendix A.

## **1.8 Matters outside this determination**

1.8.1 The applicant's submissions have been extensive and covered matters of workmanship and contractual issues. Those issues are outside the matters that can be considered under section 177 of the Act.

1.8.2 The applicant has also referred to compliance with section 397<sup>4</sup> of the Act in respect of the use of recycled materials and some other specific items. That issue is outside the ambit of those matters that can be considered under section 177 of the Act; however, the applicant can consider proceedings for breach of warranties under section 398. In addition, the applicant also has the option to lay a complaint to the Building Practitioners Board under section 315 of the Act if the applicant believes this is warranted.

1.8.3 The recycled elements and other items specified by the applicant form part of the building work and must comply with the Building Code; accordingly the compliance of those building elements is considered as part of the matter as set out in paragraph 1.5.

## **2. The building work**

2.1 The building is a single storey light timber framed house located on a steep slope in a high wind zone and corrosion zone C (medium exposure) as described in NZS 3604<sup>5</sup>. The building is founded on a concrete slab and foundations generally, with suspended timber floor on piles below the master bedroom.

2.2 The external walls are clad with a mix of brick veneer and fibre-cement weatherboards. The hipped roofs are clad with prefinished corrugated steel. The joinery is double-glazed aluminium.

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<sup>2</sup> In this determination, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

<sup>3</sup> Under section 177(1)(a) of the Act

<sup>4</sup> Section 397 Implied warranties for building work in relation to household units, was repealed on 1 January 2015 but continues to apply as if it had not been repealed to contracts entered into on or after 30 November 2004 but before 1 January 2015.

<sup>5</sup> New Zealand Standard NZS 3604:2011 Timber framed buildings

- 2.3 There is a large timber deck to the west elevation with an elevated walkway around the north elevation. The deck is partly covered by a verandah, and the verandah roof is clad with corrugated polycarbonate. From the deck there are steps down to a lower deck that was constructed without consent under Schedule 1 of the Act. (I note here that I have not considered in this determination whether construction of the lower deck falls within exempt building work set out in Schedule 1.)
- 2.4 The application for determination was in relation to specific building elements as listed in paragraph 4.4.4. The details for those building elements are set out in the summary of the expert's report (refer paragraph 5).
- 2.5 The applicant later added a new building element to be considered (refer paragraph 4.4.6), namely the insulation installed to several exterior walls and to the ceiling of one room.

### 3. Background

- 3.1 The authority issued building consent no. BCA0068/12 for the house on 27 March 2012 ("the original consent") and construction took place during 2012. I note that the consent application was lodged on 22 February 2012: if it had been lodged after 28 February 2012 any restricted building work was required to be undertaken by a licenced building practitioner.
- 3.2 The authority carried out a number of inspections during construction. An inspection record dated 6 November 2012, for what was to have been the final inspection, said the building work was incomplete. The record noted that:
- Pergola roof – signs of ponding flat areas on either side of the valley.
- 3.3 A further inspection record dated 13 November 2012 also notes 'Pergola roof at valley need[s] sufficient fall to prevent ponding'. A final inspection was carried out on 22 November 2012, with the record noting that remedial items from the previous inspection had been carried out, and the inspection passed. The authority issued a code compliance certificate on 21 December 2012.
- 3.4 The applicant had concerns regarding the compliance of the building work and the workmanship, and raised those concerns with the authority and the builder. The applicant engaged a property inspection company to carry out an inspection of the house. The inspection company visited the site on 5 February 2013 and provided an undated report which noted the following points relevant to the matters being determined:
- 'Pitch change and shallow valley flashings raise weathertightness risks to soffits.' Pitch of veranda roof measured at 5°.
  - 'Very low pitch valley flashing will struggle to keep up with demand in heavy rain.'
  - 'Weak design [at the junction with the metal roof where it is cut back] could allow moisture into soffit.'
  - Deck barrier: 'minimal fixings to some areas, however meets codes.'
- 3.5 Subsequently the veranda was altered in 2013 with the veranda roof removed and framing rebuilt to achieve a nominal pitch of 8°. This was done under a new building consent (no. BCA0179/13 issued on 17 May 2013) for which a code compliance certificate is yet to be issued.

- 3.6 Other alterations were carried out in 2013; namely the lower deck, deck storeroom and staircase to it. These were not included in the consent described above on the basis that those alterations fell within Schedule 1 of the Act for work that does not require consent.
- 3.7 The applicant continued to have concerns regarding the compliance of the building work and the workmanship, and engaged a building surveyor to carry out an assessment of the building work. The surveyor visited the property on 6 December 2013, 3 January, 14 February, and 7 May 2014.
- 3.8 The building surveyor's conclusions relevant to the matters being determined are listed in Appendix C.
- 3.9 The Ministry received an application for a determination on 1 August 2014.

## 4. The submissions

- 4.1 In a submission with the application for determination, the applicant set out those matters that he considered to be the matters to be determined and provided background information to the dispute.
- 4.2 The applicant has provided a large volume of material to support the application for determination, and in further submissions. I have provided a list of the documents provided in Appendix B.
- 4.3 A further letter, dated 1 September 2014, clarified the matters and I have set out the specific items and the applicant's views in summary paragraph 4.4.4 below.

### 4.4 The first draft determination and submissions

- 4.4.1 A draft determination was issued to the parties for comment on 23 March 2015.
- 4.4.2 In a response dated 6 May 2015, the applicant accepted the findings but noted two issues he considered had not been included in the conclusion; namely the depth of one rebuilt valley tray and the adequacy of the screw fixing to the polycarbonate sheets.
- 4.4.3 On 8 May 2015 the applicant emailed a further submission regarding the builder's accountability as a licensed building practitioner from the date he became licensed, and also noting an error in the draft determination in regards to tolerances for the deck handrail.

### The applicant

- 4.4.4 I summarise the compliance matters considered in this determination and the applicant's views as follows:

#### *Veranda/roof junction*

- The polycarbonate veranda/profiled metal roof junction (adjoining the dining/passage/main bedroom area) as approved in the original building consent did not comply with Clause E2.3.1 or E2.3.2
  - The specified means of compliance was stated as E2/AS1 and the junction design did not accord with that Acceptable Solution.
  - The plans were inconsistent, with the detail drawing for the junction using a standard metal to metal roof/veranda junction whereas a specific design was required.

- The veranda/roof junction as built in 2012 and remediated in 2013 does not comply with Clause E2.3.1 due to the leaking of the junction over the eaves area during wind driven rain events, nor with E2.3.2 due to the penetration of water which is likely to cause damage in the long term to the soffit boards.
  - In the absence of underlay and turn-up troughs in the metal to metal detail, the flashing as-built relies on a form of sealant (bituminous corrugated foam infill strips/profile closures) to prevent wind-driven rain from entering at the pitch change. The closures are not designed for this purpose and retained moisture will cause corrosion.
  - The metal roof was cut back with the junction partially above the soffit. Consequently part of the enclosed eave, vertically above the soffit boards, is exposed to the junction and there is no underlay. The wind driven rain is able to enter the junction and leak onto the top of the soffit boards.
  - The valley depth at the master bedroom end is insufficient.
  - The polycarbonate sheets have been installed with wrong overlaps for wind direction and insufficient fixings to the mid purlins.

#### ***Deck balusters***

- The deck railings have horizontal spacing exceeding 100mm in places (to a maximum of 111mm) and do not comply with Acceptable Solution F4/AS1 paragraph 1.2.1(b).
- The inadequate and rusting nail fixings do not comply with Clause F4.3.4(c)&(d) and durability requirements of Clause B2.3.1.
  - Some balusters are fixed with single nails at one end.
  - Some nail fixings are not driven in properly.
  - Several of the nails are not galvanised and are rusting.

#### ***Internal window***

- The window does not comply with Clause D1.3.3(b) in terms of the objective in Clause D1.1(a)
  - The projection of the window falls within the dimensions in paragraph 1.5.1 of D1/AS1, however it has not been 'designed to minimise risk of injury or impact'.
  - The bottom edges of the window frame are cut at 45° angles and joined without the edges having been rounded off. These edges are at 1.3m (shoulder height to a younger person or teenager) and present a safety risk.

#### ***External kitchen door***

- The door does not comply with Clause E2.3.2 or E2.3.5 and compromises the safety and durability of the kitchen floor.
  - The door does not drain water sufficiently onto the bottom sill when the door is closed.
  - The door retains water in the bottom of the frame following wind driven rain – the retained water then spills onto the floor when the door is opened.

- The ongoing wetting of the kitchen floor presents an issue with regards to safety (slipping) and durability of the floor.

#### ***The deck stairs***

- The stairs were not constructed until after the code compliance certificate was issued for the original consent.
- It was not possible for the stairs as set out in the plans with a maximum allowable pitch of 37° to fall over the 2m 'indentation' length in the deck and still have sufficient head height for a person to walk upright beneath the upper deck.
- The stairs to the deck do not meet the minimum requirements in the Acceptable Solution D1/AS1 and do not comply with Clause D1:
  - The lower flight of the as-built stairs is very narrow with a tread width of 655mm compared to 750mm for the upper flight of stairs.
  - There is no lighting for the stairs.

#### ***External acoustic double doors***

- The exterior rusting screw fixings and bottom metal plate do not comply with Clause B2.
- The door does not have sufficient ground clearance to open freely under all weather and humidity conditions; under certain humidity conditions the door scrapes on the floor or cannot be opened at all.

#### ***Thermal performance***

- The consented plans show calculations for H1 that are based on the incorrect orientation of north in those plans. It is therefore not clear whether the house as-built complies with clause H1.

4.4.5 On 24 November 2014 the applicant made a further submission in response to the expert's report. The applicant accepted some findings in the expert's report, commented on others, and disputed some. I have summarised the relevant comments where the applicant disputed the findings of the expert as follows:

#### ***Veranda/roof junction***

- The issue is not whether the water drips on the deck, but the pathway the water follows and the building elements that may be affected before the leak goes through the junction to drip on the deck. The question remains whether the enclosed roof eave to which the veranda is attached forms part of the building envelope and is affected by the moisture ingress.
- During heavy and wind driven rain situations water is entering the enclosed eaves area and penetrates to the top of the soffit linings due to the design of the veranda/roof junction.
- The means of compliance was stated as being E2/AS1 and accordingly this has to apply to demonstrate compliance with the Building Code.
- The valley depth at the master bedroom end is still insufficient.

***Deck balusters***

- Larger rusting nails had been removed, but smaller nails joining the vertical balusters to the bottom rails still remained.
- Of the 43 infill panels, only 10 have two nails fixing the top rail to the banister, 4 panels have a mixture of single or two nails to the top rail, and the remaining have two nails to the bottom rail and one nail to the top rail. In isolated instances there is a single nail fixing to the top and bottom rails.

***Internal window***

- The mitred join has not been designed to minimise the risk of injury; it is not by design that the sharp corner on the right hand side faces slightly more downward than horizontal, and the left hand side is debatable whether it feels sharper downwards than horizontal. The window was never designed to be an internal window.
- Two persons with medical qualifications have given the view that a person with an appropriate shoulder height at the level of the mitred join, with clothing on, would require stitches if they walked into the window.

***External kitchen door***

- The door does not comply with Clause E2.3.5 as it retains water when in a closed position and transfers that water to the floor when opened. The treated timber floor is not watertight, and can potentially allow dampness over time to reach the interior framing and cause degradation.
- The amount of water is not insignificant, and drying the floor after each use is not 'normal maintenance'.

***The deck stairs***

- The lower staircase is too narrow for a person of a larger stature to negotiate.
- If descending from the upper deck, the bottom surface of the landing is 820mm, and the upper deck overhangs the landing by 150mm which effectively reduces the landing to 670mm.
- Adequate lighting is required for staircases, and none of the lighting illuminates the landing.

***External acoustic double doors***

- There were no visible scrape marks on the floor as it was the left-hand leaf of the door set; it is the right-hand leaf with the door handle that is used for pedestrian access.

4.4.6 On 29 May 2015 the applicant provided another submission by email, outlining concerns regarding the insulation installed during construction and requesting that I consider the compliance of the insulation as installed. The applicant submitted that the wrong type of insulation was installed to the sloping cathedral style ceiling in the music room, as well as to 'several exterior walls', and that while performing well acoustically, the insulation used is not intended for exterior walls or ceilings and the applicant is concerned that it is not performing thermally.

#### 4.4.7 The applicant provided:

- Photographs of the acoustic insulation installed to the music room and to some other exterior walls, and a floor plan marked with the relevant exterior walls.
- Excerpts from the “contract specification” dated 3 February 2012 which specified:
  - R2.2 insulation batts to walls and R2.6 to ceilings in general (the drawings show R3.2 batts to ceilings).
  - The “Fittings” section of the contract specification details acoustic treatment (a varying combination of double framing, specialist linings, wall and ceiling insulation, and glazing) to “walls” and the ceiling of the music room, and specific walls (internal and external) to living/dining, master bedroom, and ensuite. (I note that the contract specification refers to the insulation batts as “silencer bats” and “Noiseline<sup>6</sup> bats”, and the lining as “Gib Noiseline”).
- Product data sheets for the insulation batts installed.
- Email correspondence regarding a separate matter (G4 Ventilation) that was subsequently resolved.

#### **The authority**

#### 4.4.8 The authority responded to the draft by email on 7 May 2015. The authority noted that the various Acceptable Solutions are not mandatory and set out its views as follows (in summary):

##### ***Deck balusters and balustrade***

- In regards to the balusters that have single fixings:
  - The Ministry’s guidance material is not recognised as a means of establishing compliance with the Building Code, and F4/AS1 does not cover the fixing of balusters.
  - Rather than being a compliance issue, this is a workmanship issue and should be addressed under section 397.
- In regards to the spacing between the top rail, hand rail, bottom rail and deck exceeding 100mm:
  - It would not be reasonable for an officer of the authority to have to measure the distances at every single balustrade or rail; sample measurements are taken on the basis and expectation that the building work has been undertaken by competent and experienced contractors.
  - While there is evidence to suggest that some aspects of the deck balustrade do not comply with the Acceptable Solution, there is no evidence to suggest that the performance requirements of F4.3.4(e) will not be met.
  - Rather than a compliance issue, the variation is a workmanship issue that should be addressed under section 397.

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<sup>6</sup> The term is used in error as it applies to a proprietary wall lining



***External kitchen door***

- There is an inconsistency in the draft between paragraphs 7.7.8 and 7.11, and as the final decision at paragraph 8.1 is silent, the authority takes this to mean the Ministry is satisfied there is no breach of Clause D1.3.3(d).

***The deck stairs***

- The stair landing was necessary to incorporate the second stair to the lower deck.
- The landing is 80mm short of that allowable by D1/AS1, however the ‘obstruction’ caused by the upper deck is not necessarily a dangerous obstruction as the stair is not a main private stair.
- The 140 x 45mm timber on its flat acting as a handrail is smooth and the outside edge of the member could be considered graspable.
- The users are generally familiar with the stairs and their shortcomings. Compliance with D1.3.3(b) and D1.3.3(j) should be considered in terms of the use and users of the stairs and landing only.
- If the determination concludes the handrail is not compliant, then simple solutions are available that should be promptly addressed under section 397.

***External acoustic double doors***

- It appears the applicant elected to install the wood fibre core door instead of the aluminium framed glazed door that was consented.
- The future likely defects (refer paragraph 7.9) relate to manufacturing defects and poor workmanship; this should be addressed under the provisions of section 397.

**The builder**

4.4.9 No comment on the first draft was received from the builder.

**4.5 My response to the parties submissions**

4.5.1 I have amended the determination as I consider appropriate, including correcting the error in the table at paragraph 7.11 and removing the reference error noted by the applicant. I respond to some of the general points raised in the authority’s submission as follows:

- Section 19(2) of the Act states that in considering compliance ‘a building consent authority – (b) may have regard to any guidance information published by the chief executive under section 175’. The guidance document referred to was issued under section 175 of the Act.
- While workmanship issues can be addressed under section 397, that does not detract from the need for the building work to comply with the Building Code nor from the applicant’s ability to have a determination made under section 177(1)(a).
- In general terms, where there are issues of workmanship that are obvious at the time the authority inspects the building work I consider this to be an indication that an authority may need to carry out a more detailed inspection in order to be satisfied whether compliance has in fact been achieved in the as-built construction.

- In regards to tolerances and workmanship issues, the Ministry has recently issued a guidance document “Guide to tolerances, materials and workmanship in new residential construction 2015” which may assist the applicant in working through some of these issues.

#### **4.6 The second draft determination and submissions**

- 4.6.1 A second draft determination which included consideration of the compliance of the insulation as installed was issued to the parties and the builder for comment on 23 June 2015.
- 4.6.2 The applicant’s response was received on 7 July 2015. The applicant noted that there appeared to be an error or omission in the conclusions regarding the external acoustic door and the verandah roof. The applicant commented on the thermal insulation of the music room, noting that although the house as a whole may comply the music room is used in isolation from the rest of the house, and the temperature and humidity control would be affected by the room being cooler. The applicant intends to follow up on this issue through the provisions of section 397 of the Act.
- 4.6.3 I have taken into account the submissions received and amended the determination to address the omission noted by the applicant.
- 4.6.4 The authority and the builder responded on 3 and 4 August 2015 respectively; both noting they had no further comment to make.

### **5. The expert’s report**

- 5.1 As mentioned in paragraph 1.6, I engaged the services of an expert who is a registered architect to assist me. The expert carried out a site visit on 8 October 2014 and assessed the building work that is the subject of this determination. A report was provided on 13 November 2014 which was sent to the parties on the same day.
- 5.2 The applicant made a submission on 24 November 2014 in response to the expert’s report (refer paragraph 4.4.5). The expert responded on 23 December 2014 and I have taken that response into account in the summary below.

#### **5.3 Comparison of as-built with consented plans**

- 5.3.1 The expert noted the following differences between the original consent drawings and that work completed and for which a code compliance certificate was issued:
- The slope of the veranda roof was less than the 8° shown on the drawings, and the change in pitch detail was not as drawn.
  - The deck balusters are timber as opposed to the metal balusters consented.
  - The deck staircase was not as shown on the drawings, either in layout, tread depth, or width.
  - The external acoustic double door (door D3) is indicated on the plans as an aluminium framed glazed door, but a flush timber door with vision panels was installed.

#### **5.4 Roof/veranda junction (E2)**

##### **As approved in the consent**

- 5.4.1 The consented detail for the roof/veranda junction is similar to Figure 44 in the Acceptable Solution E2/AS1 (refer Appendix A); however, the detail is inconsistent with other drawings provided in the consent application. Functional features of the

drawn detail, such as the turn up at the ends of profiles and the use of underlay, could not or would not be used with the polycarbonate sheets specified in other drawings. Without alternative features, the design of the detail in the consent application was incomplete and could not be relied on to provide a weathertight junction.

- 5.4.2 The expert questioned whether the veranda roof fell within the limitation on application of the functional requirement set out in Clause E2.2, as it is inevitable that wind-blown rain can reach the deck at the open sides and ends, and the construction of the deck is intended to be durable in those conditions. The expert considered that the durability and amenity of the deck are unlikely to be impaired significantly by minor leaks through the roof/veranda junction leak, and accordingly it was unlikely that the detail included in the consent would fail to comply with E2.2.

### **As originally constructed in 2012**

- 5.4.3 The expert considered that the evidence provided by the applicant shows a significant amount of water leaking through the roof at the valleys and adjacent to the valleys and in his opinion meant the roof did not comply with the requirement of Clause E2.3.1 to shed precipitated moisture. The expert considered the cause was most certainly the low pitch of the veranda roof at 5° and the construction of the valley flashing without significant upstands, rather than the junction detail.

### **As re-built in 2013**

- 5.4.4 The expert noted that two alterations were made during the rebuild of the veranda; the pitch was increased to nearly 8°, and the valleys were rebated into the rafters to enable an upstand at both sides of the valley flashing. The owner had advised the expert that he remained concerned that run off from the bottom edge is wetting the soffit framing where it runs over the edge of the veranda stringer, rather than being dressed into the gutter as normal.
- 5.4.5 The expert carried out invasive moisture testing to the soffit framing where slight moisture staining was present. The expert noted that the stringer was almost certainly treated to hazard level H3.2 and the readings were likely to be higher because of this, and that the readings would also represent peak seasonal variation. No elevated readings were recorded and the expert considered that compliance with Clauses E2 was being achieved.
- 5.4.6 The expert noted that drips onto the deck and associated framing materials were unlikely to cause damage due to the treatment of the timber, and the loss of amenity would be small given that the deck is subject to wind-blown rain at the ends and open side.

## **5.5 Deck balusters**

### **Spacing between balusters**

- 5.5.1 The expert measured the spacing between the top rail and the handrail, and between the bottom rail and the deck, at 43 locations. The spacing ranged between 92mm to 111mm, with almost all measurements between the top rail and the handrail along the north elevation being over 100mm.

### **Baluster fixings**

- 5.5.2 The expert observed that the balusters were generally nailed with two nails at top and bottom, though some locations there were double nails used at one end and single nails at the other.
- 5.5.3 In response to the applicant's further submission on the number of nails used, the expert accepted the applicant's nail count and confirmed that two 3.15 x 75mm nails are required at the top and at the bottom of each baluster. Accordingly all those which have only one nail top or bottom will require extra nails.

### **Rusting non-galvanised nails**

- 5.5.4 The expert noted that non-galvanised nails used externally in CCA treated timber would not meet the requirements of Clause B2 Durability.

### **Use of recycled materials**

- 5.5.5 The recycled materials include parts of the veranda roof framing, polycarbonate sheets, and parts of the deck balustrade. The expert noted the materials were supplied to the contract new, and the timbers were labelled similarly to timber that was sample tested and found to be CCA treated likely to hazard level H3.2.
- 5.5.6 The expert considered that the re-use of those pieces of timber, with redundant nails cut off and redundant nail holes, does diminish the finish of the veranda and deck to a small degree, but not sufficiently to constitute any loss of amenity in terms of the Act.

## **5.6 Internal window projecting into the corridor**

- 5.6.1 The internal window projects in the corridor 50mm, with a sill height of 1300mm above the floor and a radiused edge. The expert considered that the radiused edge and the sharp corners at each end of the sill face downward would prevent significant injury to someone falling against or walking into the window in most circumstances. The expert also noted that the projection fell within the limits set out in paragraph 1.5.1 of Acceptable Solution D1/AS1.

## **5.7 External kitchen door**

- 5.7.1 The expert carried out a water test on the kitchen door, noting that it did not leak when closed, but when it opened the water that was trapped in the bottom glazing bead extrusion drained out on the floor. The expert was of the view the cause was water being retained in the void by surface tension and which is then propelled by centrifugal force toward the drain hole when the door is opened.
- 5.7.2 The expert noted that the wooden floor is varnished with a water resistant coating and is unlikely to be damaged 'provided the floor is maintained'. In that respect the expert considered that although the water might be a nuisance, in terms of compliance with Clause E2 it would not cause 'undue dampness'.
- 5.7.3 The expert noted that the volume of water 'is not very much more than would occur if it was left open during rain, or if a user walked across the threshold wearing wet boots or shoes'.

## **5.8 The deck stairs**

- 5.8.1 The expert assumed the stair case was intended as a main private stair case providing the main access to the garden from the house; it now provides access to the new lower deck built subsequently without consent.

- 5.8.2 The expert compared the critical dimensions of the deck stairs, both the consented design and as-built, with those set out in the Acceptable Solution D1/AS1 as follows:

	D1/AS1 (assuming a 'main private stair')	As consented	As built
<b>Number of risers</b>		7 and 8	12
<b>Width</b>	No minimum (850mm recommended)	900	815 top flight 655 bottom flight
<b>Riser</b>	190 max	190 max	178mm
<b>Going</b>	280 min	280 min	254mm
<b>Pitch</b>	37° max	-	35°
<b>Handrail</b>	80mm max width (figure 26)	100mm x 50mm	140mm x 45mm
<b>Landing</b>	900mm min	-	820mm max / 670mm min. (refer paragraph 4.4.5)

#### As approved in the consent

- 5.8.3 The expert noted that the stair as consented did not comply with Clause D1 because the hand rail was too wide to be considered graspable. The expert commented that the consent drawings indicated the base of the stairs adjacent to the 33m ground contour on the site plan (470mm below the stated finished floor level of the upper deck), and accordingly that if built in accordance with the plans the stairs would have complied with the Building Code.

#### As built

- 5.8.4 The as-built stairs did not comply with the building consent with respect to the number of risers, the going, and the handrail size. The stairs also provide access to the new lower deck (constructed under Schedule 1) rather than to the garden as consented.
- 5.8.5 The expert concluded that the handrail does not comply with Clause D1 as it is, and that although narrow at 655mm the bottom flight is probably not in contravention of the Building Code as there is no minimum stated in D1/AS1.
- 5.8.6 In responding the applicant's comments the expert agreed that the non-compliance of the landing length with D1/AS1 could be added to table above.

### 5.9 The external acoustic double door

- 5.9.1 The expert measured the clearance between the door and the floor at 0.45mm, and noted that it would not be surprising if in some conditions it binds on the floor. However the expert observed no marks on the floor that would indicate this happens frequently, and the door opened without undue force at the time of his visit.
- 5.9.2 The expert commented that the glazing detail on the outside of the door appeared the same as the internal glazing detail and lacked sealant between the aluminium bead and the glass. The expert considered it was likely to permit water to leak to the wood fibre core and to lead to expansion of the core and premature deterioration.

- 5.9.3 In responding to the applicant's comments (refer paragraph 4.4.5) the expert agreed that the screws used to secure the metal weather strip retainer on the doors were rusting and should be replaced with stainless steel screws.

## **5.10 Thermal performance**

- 5.10.1 The expert evaluated the thermal performance of the house given the applicants' concerns regarding the orientation of the house compared with that indicated on the consent documents. The expert's evaluation firstly used the orientation indicated on the certificate of title and majority of the plans and then with rotation to 45 degrees, with the outcome that the house is compliant with H1 in both orientations.

## **6. The compliance of building work proposed in the building consent**

- 6.1 In deciding whether the veranda/roof junction and the exterior staircase as proposed in the building consent would comply with the relevant clauses of the Building Code if built in accordance with the approved plans, I have taken account of the plans and specifications, the report of the building surveyor, and the opinion of the expert.

### **6.2 Veranda/roof junction**

- 6.2.1 Clearly there was conflicting information in the consent documentation in regards to the veranda/roof junction detail. Establishing whether the building work would comply with the Building Code would have required resolution of the anomaly regarding the materials specified in the drawings and the junction detail.
- 6.2.2 I note the expert's comment regarding the limits on application of Clause E2.2, and I consider this is relevant in terms of the deck. In this instance the junction is situated outside the perimeter of the external wall framing, but is above the eaves. Though the effect of moisture ingress at the eaves would unlikely be of concern in terms of damage to structural members, it would lead to the premature deterioration of the building elements in the eaves. In terms of Clause E2.3.2, the weathertightness of the junction is required to satisfy that performance requirement in relation to the building elements above which it is situated. Accordingly I am of the view that the veranda/roof junction is required to comply with Clause E2.3.2 in that the roof and the junction were required to prevent penetration of water that could cause undue dampness or damage to the building elements that form the eaves to the house.
- 6.2.3 Given that the documentation held conflicting information, I conclude that there was inadequate information to establish on reasonable grounds that the building work would comply with Clause E2.3.2 if built in accordance with the plans.

### **6.3 Exterior stairs**

- 6.3.1 The expert has reviewed the consent documents and concluded that the exterior stairs, if built in accordance with the approved plans, would have complied with the Building Code with the exception of the handrail not being graspable. I agree with the expert's conclusion. I do not accept the authority's view that the outer face of the member could be considered graspable.

## **7. The compliance of the as-built elements**

### **7.1 Roof/veranda junction**

- 7.1.1 The building surveyor's report noted that there were indications of leaks into the roof eaves and an area adjacent to the dining room, and that high moisture readings in the roof eaves adjacent to the dining room were most likely a result of wind-driven rain entering the roof eaves from the top of the polycarbonate roof. The owner remains concerned that moisture is entering the junction at the enclosed eaves area and penetrates to the top of the soffit linings. The owner considered the valley depth at the master bedroom end of the verandah roof is insufficient.
- 7.1.2 The moisture readings of the soffit framing taken by the expert where there was slight moisture staining did not record elevated moisture levels; this indicates that the framing has not retained moisture to a level that could cause decay. However, I consider there is insufficient evidence available to establish whether water entering the junction is penetrating to the top of the soffit lining. I accept that moisture penetrating to the soffit linings would cause undue dampness and would be likely to cause damage and premature deterioration of that building element; evidence of undue dampness or damage to the soffit lining would indicate non-compliance of the roof/veranda junction with Clause E2.3.2.
- 7.1.3 I suggest that the soffit is removed in one or more locations and the performance of the junction, including adjacent the verandah valleys, be recorded during a rain event.
- 7.1.4 I consider the detail provided in the approved consent drawings was not an adequate representation of this junction with respect to the materials shown, and the slope of both roofs. The structural and flashing details shown were also not used for the onsite construction.

### **7.2 Veranda roof**

- 7.2.1 The verandah roof is open and will allow wind driven rain to fall on the deck and deck framing. However, there is still a requirement under Clause E2.3.1 for the roof to shed precipitated moisture.
- 7.2.2 The video footage provided by the applicant shows the veranda roof, prior to being re-built, was allowing a significant volume of water to leak through at the valley. I consider that at the time the footage was taken the veranda roof did not comply with the requirements in Clause E2.3.1.
- 7.2.3 The veranda roof has since been re-built. Though still present, the leaks are less significant in terms of the volume of water falling through to the deck. The volume of water is unlikely to cause a significant loss of amenity given that it is an open deck. I consider the issue of the ongoing leaks from the veranda roof to be a matter of poor workmanship rather than non-compliance with Clause E2.3.1.
- 7.2.4 In response to the draft determination, the applicant has provided additional video footage taken on a windy day in October 2013 which shows the polycarbonate sheets lifting significantly in the wind; the applicant holds the view that there are insufficient fixings and that the sheets have been incorrectly lapped for the wind direction, and that the re-built veranda roof does not comply with Clause B1.3.3(h).
- 7.2.5 I accept the evidence provided by the applicant and conclude that the fixings of the polycarbonate sheets are inadequate and do not comply with Clause B1.3.3(h). I also consider that, given the movement of the sheets in high winds, it is unlikely compliance with Clause B2 will be achieved.

### **7.3 The deck balustrade**

#### **Spacing between balusters**

- 7.3.1 The space between the top rail and the handrail, and between the bottom rail and the deck, range between 92mm to 111mm, with almost all measurements between the top rail and the handrail along the north elevation being over 100mm.
- 7.3.2 I accept that minor variations along rails over longer distances are likely to mean that there are some areas where distances between are greater than the 100mm set out in F4/AS1. However, the significant lengths where the gaps are consistently greater than 100mm are beyond that which could be considered minor variations.
- 7.3.3 I acknowledge the authority's comment that compliance by means of the Acceptable Solution is not mandatory; however I consider that in this instance, and with no mitigating features, the spacing between the rails and the deck, and the rails and the bottom deck where those spaces are greater than 100mm over significant lengths do not comply with the performance requirement of Clause F4.3.4(e).

#### **Fixing of balusters**

- 7.3.4 I accept the evidence provided of single nail fixings to some balusters in the upper deck, and the expert's comment that all those balusters which have only one nail top or bottom will require extra nails.
- 7.3.5 I consider that the balusters that are single nailed, whether single nailed at the top, the bottom, or both, do not comply with Clause F4.3.4(d) nor do they comply with B1.3.3(j).
- 7.3.6 The authority contends that F4/AS1 does not cover the fixing of balustrades. This is correct; the balustrades are required to comply with Clause B1 Structure. It is noted that up until 1 August 2011, Acceptable Solution B1/AS2 'Timber Barriers' provided design solutions for barriers.

### **7.4 Use of recycled materials**

- 7.4.1 Some materials have been re-used by the builder in the remedial work, specifically the verandah roof framing, parts of the deck balustrade, and the polycarbonate roofing.
- 7.4.2 I accept the expert's findings regarding the levels of timber treatment, and I consider that re-use of those materials, whilst it may impact on the desired finish of the building work, does not affect the compliance. The applicant has submitted that the re-use of the polycarbonate sheeting has caused the fixing holes to be elongated. I have considered this factor in my decision at paragraph 7.2.5 above. If the elongated holes contribute to the inadequacy of the fixing, then the sheets are likely to need replacing.

### **7.5 Use of non-galvanised fixings**

- 7.5.1 The evidence provided indicates that non-galvanised nails have been used. I agree with the expert's comment that non-galvanised nails in CCA treated timber would not meet the requirements of Clause B2 Durability. I note also that a failure to meet the performance requirements of Clause B2 will impact in the future on the deck barrier's compliance with respect to Clause F4.



## 7.6 The projecting internal window

- 7.6.1 The consent drawings describe the internal window no differently from the remaining external windows. The passage that the window projects into is 1300mm wide. There is no dispute that the projection from the internal window falls within the allowable dimensions for such projections given in paragraph 1.5.1 of D/AS1. However, the question is whether the sharp corners at each end of the sill satisfy the performance requirements of D1.3.3(b).
- 7.6.2 I consider the window edges are little different to the square edges that are likely to arise from the presence of projections that are considered in D1/AS1; the commentary to Paragraph 1.5.1 includes electrical sockets and signs, both of which can have square edges. While the window edges are a sharper than a folded metal edge; they are at 90°, they are clearly visible, and protrude into an access way of ample width. The edges concerned can be easily radiused, covered, or protected by a rail, or similar.
- 7.6.3 I am of the view that the window projection is not ‘dangerous’ in terms of Clause D1.3.3(b).

## 7.7 The external kitchen door

- 7.7.1 There appears to be no dispute that the kitchen door traps water within the glazing bead which drains out on part of the floor when the door is opened. This will occur when rain is blown against the northeast facing door: the prevailing wind in this locality is a north-westerly. The door is protected by an eaves overhang of approximately 600mm. The door has two drains; on opening the door the water exits the drain furthest from the hinge (“the outer drain”).
- 7.7.2 Clause E2.3.2 requires that exterior walls prevent the penetration of water that could cause ‘undue dampness, damage to building elements, or both’. The wooden floor is varnished with a water-resistant coating, and I acknowledge the expert’s view that the wooden floor is unlikely to be damaged ‘provided the floor is maintained’.
- 7.7.3 This raises the question of whether the maintenance required to ensure the water does not cause the flooring to deteriorate prematurely is beyond what would be considered ‘normal maintenance’ for the purposes of Clause B2.3.1.
- 7.7.4 I do not consider the impact of the water on the floor would be any worse than the anticipated wear due to foot traffic, or from cleaning by wet-mopping. I take maintenance of the floor to mean the proper maintenance of the coating, and allowing the floor to dry when it gets wet.
- 7.7.5 Clause D1.3.3(d) requires that access routes shall ‘have adequate slip-resistant walking surfaces under all conditions of normal use’. In general, water is likely to enter any entrance at times the door is open and the entrance is subject to wind-driven rain, as well as being brought in on people’s clothing and rain coats, shoes, and umbrellas – such events can be considered normal use.
- 7.7.6 Paragraph 2.1.3 of the Acceptable Solution D1/AS1 states that:
- The walking surface for a level *access route* which may become wet during normal usage (for example, outdoor *access routes* or entranceways where water can be tracked indoors when it is raining) shall be selected from the list of acceptable wet slip resistant surfaces given in Table 2.

Table 2 (refer Appendix A) says that clear finished timber is not acceptable in such situations.

- 7.7.7 While water exits the door and falls on the floor as described in paragraph 7.7.1, I also consider the floor to the entry can be expected to become wet under normal use: in any event some water is expected to fall from any wet inward-opening door. It is accepted that the outer drain can deposit more water on the floor than might reasonably be expected from normal use. On the other hand the water is deposited in a confined part of the floor, and it can only occur when the door is subjected to wind-driven rain: in this instance the door is protected by eaves and does not face the prevailing wind.
- 7.7.8 The applicant does not consider the floor to breach Clause D1.3.3(d) under normal use. Given the likely occurrence of the water from the outer drain and its effect, I do not consider this of itself to be sufficient to constitute a breach of Clause D1.3.3(d). The partial closing of the outer drain, of the use of a door mat or similar, should alleviate the problem.

## **7.8 The stairs from the deck**

### **General**

- 7.8.1 Function requirement D1.2.1 says:  
Buildings shall be provided with reasonable and adequate access to enable safe and easy movement of people.
- Performance Clause D1.3.1 says:  
Access routes shall enable people to:
- (a) safely and easily approach the main entrance of buildings from the apron or construction edge of a building,
  - (b) enter buildings,
  - (c) move into spaces within buildings by such means as corridors, doors, stairs, ramps and lifts,

Performance Clause D1.3.3 goes on to describe the attributes of an access route.

- 7.8.2 For the purposes of performance Clause D1.3.1(c), I consider that the stairs from the deck to the lower deck serve spaces within what is considered 'the building' and as such form an access route: the attributes described in Clause D1.3.3 therefore apply.

### **The stair landing projection**

- 7.8.3 Paragraph 4.3.4 of D1/AS1 states that landing lengths shall be no less than 900mm. In addition Clause D1.3.3(b) requires that access routes 'shall be free from dangerous obstructions and from any projections likely to cause an obstruction'.
- 7.8.4 The evidence provided from the applicant is that the landing is 820mm and that the upper deck overhangs the landing by 150mm at a height of 920mm to 1170mm. I conclude therefore that the landing does not comply with Clause D1.3.3(b).

### **The stair width**

- 7.8.5 While there is no width for stairs set out in the Acceptable Solution D1/AS1, Clause D1.3.3(a) requires access routes shall have 'adequate activity space'. The commentary to paragraph 4.2.1 of D1/AS1 refers to 850mm as a minimum width as an escape route for fire purposes in certain buildings, and is a 'practical minimum requirement for any private stairway' and that 'narrow private stairways can make the movement of furniture difficult ...'.
- 7.8.6 In this instance the width of the bottom flight of stairs is 655mm. There is no performance clause that prevents the use of a 655mm door in a residential dwelling. Items such as furniture can be moved between levels by adjacent routes, and the

stairs do not form part of a fire escape route. While narrow, I do not consider that a stairs breach D1.3.3(a) in providing an inadequate access route between the upper and lower level decks.

### **The handrail**

- 7.8.7 The handrail as constructed is 140x45mm. Paragraph 6.0.8 of D1/AS1 sets out acceptable dimensions of handrails with the “relevant width” across the top surface being no more than 80mm.
- 7.8.8 The handrail as constructed falls well outside the dimensions set out in D1/AS1. I am of the view that the handrail is not ‘graspable’ and accordingly it does not comply with the requirements of Clause D1.3.3(j) of the Building Code (refer paragraph 6.3.1).

### **Deck stairs: lighting**

- 7.8.9 The consent documents do not show any lighting to the external stairs. Clause D1.3.3(g) requires stair treads to have a leading edge that can be easily seen. There is a requirement in Clause G8.3 that ‘illuminance at floor level shall be no less than 20 lux’, however, this is a minimal level of light.

## **7.9 External acoustic door**

- 7.9.1 The clearance between the external acoustic door is minimal, and I accept the expert’s comment that it would not be surprising if in some conditions it binds on the floor. In addition there is a likelihood of expansion of the wood fibre core which is likely to exacerbate the issue and lead to premature deterioration of the door.
- 7.9.2 Given those factors I consider the external acoustic door does not comply with Clause B2.3.1 insofar as it applies to Clause D1.3.1(c).
- 7.9.3 While the authority has stated that these are manufacturing defects and poor workmanship that should be addressed under section 397, I note this does not lessen the requirements under the Building Code.

## **7.10 Thermal performance**

- 7.10.1 The applicant had concerns regarding the orientation of the building as constructed when compared to the orientation as set out in the consent documents. The expert has carried out an evaluation, and I accept the expert’s findings that any orientation of the plan up to 90° anticlockwise would still comply.
- 7.10.2 The applicant then raised concerns regarding the type of acoustic insulation fitted to the ceiling of one room and some exterior walls (refer paragraph 4.4.6) and whether it was adequate in terms of thermal performance. I note that the batts being used to provide acoustic treatment is not clearly described in the “contract specification” (refer paragraph 0).
- 7.10.3 From the information in the documents and photographs provided it appears that the insulation used to the exterior walls is a 100mm thick proprietary acoustic insulation with an R-Value of 2.4. On that basis I hold the view that while not recommended by the manufacturer for use in exterior walls, in this case the insulation with an R-Value of 2.4 would comply with the performance requirements of clause H1 of the Building Code if correctly installed.
- 7.10.4 The same insulation is also installed in the sloping ceiling of the music room, and would not comply with the Schedule Method (H1/AS1). In addition, the thermal performance at the ceiling will be influenced by any penetrations through the insulation layer. However while the insulation installed to the music room ceiling

would not comply with the Acceptable Solution, when the house overall is considered I hold the view that the insulation, if correctly installed, would meet the performance requirements of Clause H1 of the Building Code.

7.10.5 I note here that the heating, as specified, is concentrated at the southern end of the house and there is no heating specified for the northern end of the house; combined with the insulation between rooms this may result in a noticeable variation with the northern end feeling cooler.

## 7.11 Conclusion

Item	Code Clause	Compliance
Roof/veranda junction	E2.3.2	Insufficient evidence of undue dampness or damage to soffit lining
Veranda roof	E2.3.1	Complies
	B1.3.3(h) and B2	Does not comply
Spacing between balusters	F4.3.4(e)	Does not comply
Fixing of balusters	F4.3.4(d) and B1.3.3(j)	Does not comply
Use of recycled materials	B2.3.1	Complies, with possible exception of the polycarbonate veranda roof sheets
Use of non-galvanised nails	B2.3.1	Does not comply (implications for continued compliance of deck with Clause F4)
Internal window	D1.3.3(b)	Complies
External kitchen door		
- Water ingress	E2.3.2	Complies
- Durability	B2.3.1	Complies
- Slip resistance	D1.3.3(d)	Complies
Deck stairs		
- Landing projection	D1.3.3(b)	Does not comply
- Narrow width	D1.3.3(a)	Complies
- Handrail	D1.3.3(j)	Does not comply
- Lighting	D1.3.3(g), G8.3	Complies
External acoustic door	B2.3.1 (as it applies to D1.3.1(c))	Does not comply
Thermal performance		
- Orientation	H1.3.3	Complies
- Insulation	H1.3.1	Complies

## 8. The decision

8.1 In accordance with section 188 of the Building Act 2004, I hereby determine that:

- in respect of the veranda/roof junction, there was inadequate information in the consent documentation to establish on reasonable grounds that the building work would comply with Clause E2.3.2 if built in accordance with the plans
- the exterior stairs, if built in accordance with the approved plans, would not have complied with Clause D1 of the Building Code in respect of the handrail
- the following building elements as constructed do not comply with the Building Code (relevant clauses in brackets):
  - deck balusters (F4.3.4(e), F4.3.4(d) and B1.3.3(j))
  - use of non-galvanised nails (B2.3.1, with implications for non-compliance of deck barrier with Clause F4)
  - deck stairs (D1.3.3(b), D1.3.3(j))
  - external acoustic door (B2.3.1 insofar as it applies to D1.3.1(c))
  - the verandah roof (B1.3.3(h) and B2)

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 7 September 2015.

John Gardiner  
**Manager Determinations and Assurance**

## Appendix A

### A.1 The relevant clauses of the Building Code include:

#### Clause B1 – Structure

**B1.3.3** Account shall be taken of all physical conditions likely to affect the stability of *buildings*, *building elements* and *sitework*, including:

- (h) wind,
- (j) impact,

#### Clause B2 – Durability

**B2.3.1** *Building elements* must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the *specified intended life* of the *building*, if stated, or:

- (a) the life of the building, being not less than 50 years, if:
  - (i) those *building elements* (including floors, walls, and fixings) provide structural stability to the *building*, or
  - (ii) those *building elements* are difficult to access or replace, or
  - (iii) failure of those *building elements* to comply with the *building code* would go undetected during both normal use and maintenance of the *building*.
- (b) 15 years if:
  - (i) those *building elements* (including the *building* envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or
  - (ii) failure of those *building elements* to comply with the *building code* would go undetected during normal use of the *building*, but would be easily detected during normal maintenance.
- (c) 5 years if:
  - (i) the *building elements* (including services, linings, renewable protective coatings, and *fixtures*) are easy to access and replace, and
  - (ii) failure of those *building elements* to comply with the *building code* would be easily detected during normal use of the *building*.

#### Clause D1 – Access routes

##### Access route (Definition in Clause A2):

A continuous route that permits people and goods to move between the apron or *construction edge* of the *building* to spaces within a *building*, and between spaces within a *building*.

##### Objective

**D1.1** The objective of this provision is:

- (a) safeguard people from injury during movement into, within and out of *buildings*,
- ...

##### Performance

**D1.3.1** Access routes shall enable people to:

- (a) safely and easily approach the main entrance of buildings from the apron or *construction edge* of a *building*,

(c) move into spaces within buildings by such means as corridors, doors, stairs,

**D1.3.3** Access routes shall:

(a) have adequate activity space,

(b) be free from dangerous obstructions and from any projections likely to cause an obstruction,

(d) have adequate slip-resistant walking surfaces under all conditions of normal use,

(j) have smooth, reachable and graspable *handrails* to provide support and to assist with movement along a stair or ladder,

**Clause E2 – External Moisture**

**Objective**

**E2.1** The objective of this provision is to safeguard people from illness or injury that could result from external moisture entering the *building*.

**Functional requirement**

**E2.2** *Buildings* must be constructed to provide *adequate* resistance to penetration by, and the accumulation of, moisture from the outside.

**Limits on application**

Requirement E2.2 does not apply to *buildings* (for example, certain bus shelters, and certain *buildings* used for horticulture or for equipment for washing motor vehicles automatically) if moisture from the outside penetrating them, or accumulating within them, or both, is unlikely to impair significantly all or any of their *amenity*, durability, and stability.

**E2.3.1** Roofs must shed precipitated moisture. In locations subject to snowfalls, roofs must also shed melted snow.

**E2.3.2** Roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to *building elements*, or both.

**E2.3.5** *Concealed spaces* and cavities in *buildings* must be constructed in a way that prevents external moisture being accumulated or transferred and causing condensation, fungal growth, or the degradation of *building elements*.

**Clause F4 – Safety from falling**

**F4.3.4** Barriers shall:

...

(c) be constructed with *adequate* rigidity,

(d) be of *adequate* strength to withstand the foreseeable impact of people and, where appropriate, the static pressure of people pressing against them,

(e) be constructed to prevent people from falling through them, and

...

**Clause H1—Energy efficiency provisions**

**H1.3.1** The *building* envelope enclosing spaces where the temperature or humidity (or both) are modified must be constructed to—

(a) provide *adequate thermal resistance*; and

(b) limit uncontrollable airflow.

**H1.3.2E** *Buildings* must be constructed to ensure that their *building performance index* does not exceed 1.55. (Limit on application: Performance H1.3.2E applies only to *housing*.)

**H1.3.3** Account must be taken of physical conditions likely to affect energy performance of *buildings*, including—

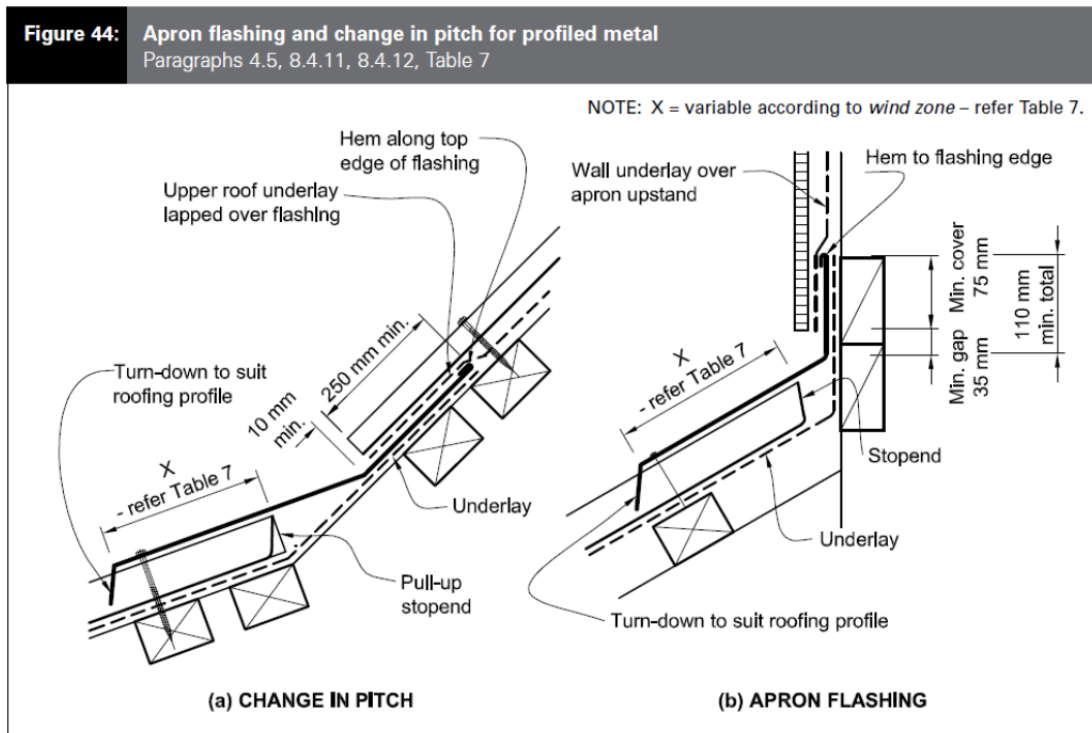
...

(b) the building orientation and shape; and

...

(f) heat gains from solar radiation.

**A.2** The relevant Figure from Acceptable Solution E2/AS1 includes:



**A.3** The relevant information from Acceptable Solution D1/AS1 includes:

### Definitions

**Main Private stair** A *private stairway* intended to provide access to and between frequently used spaces such as living areas, kitchens and garages, and includes all exterior *private stairways*.

**Access Route** A continuous route that permits people and goods to move between the apron or construction edge of the *building* to spaces within a *building*, and between spaces within a *building*.

**Paragraph 2.1.3** The walking surface for a level *access route* which may become wet during normal usage (for example, outdoor *access routes* or entranceways where water can be tracked indoors when it is raining) shall be selected from the list of acceptable wet slip resistant surfaces given in Table 2.



**Excerpt from Table 2**

<b>Table 2: Acceptable Slip Resistance for Walking Surfaces</b> Paragraphs 2.1.2, 3.1.4 and 4.1.4 c)		
<b>Walking surface<sup>(12)</sup></b>	<b>Level surface<sup>(1)</sup></b>	
	<b>Acceptable dry slip resistance</b>	<b>Acceptable wet slip resistance</b>
<b>Timber</b>		
Uncoated smooth	Yes	No
Uncoated profiled <sup>(4)</sup>		
– across profile	Yes	Yes
– along profile	Yes	No
Coated (paint, polyurethane, etc)	Yes	No
Coated and sand/grit impregnated <sup>(5)</sup>	Yes	Yes

## Appendix B

### B.1 Documents provided by the applicant:

Date received Documentation (date)	Attachments
<b>Application</b>	
1/8/2014 Application form D1 and supporting documents listed adjacent.	Submission (17 pages, undated) Building consent plans (stamped as approved 27/3/2012) Application for building consent (lodged 22/2/2012), drawings and specifications Building surveyor's report (dated 2014) Email correspondence between applicant and supplier of the soffit linings (12/3/2014, 4/4/2014) Final inspection records (13/11/2012) Code compliance certificate for building consent BCA0068/12 (21/12/2012) Residential property inspection report (5/2/2013) Proposed scope of remedial work (undated) Notice of approval for building consent BCA0179/13 (17/5/2013) Inspection record (10/6/2013) Various email correspondence between applicant, to the LBP, authority, and others (2012-2014) Guidance document on Barrier Design (March 2012) Article on building code-compliant deck barriers (April/May 2013) Correspondence from the authority to the applicant regarding OIA request (14/4/2014) 'Progress report' by a registered valuer on the remedial work (19/2/2013)
2/9/2014 CD ROM (71 files) and 2 x USB	
2/9/2014 Track and trace receipts for D2 forms	
2/9/2014 Letter revising matters to be determined (1/9/2014)	Email 1 May 2014: applicant to LBP Comparison site plans with change to orientation R value calculations dated 27 March 2012
<b>Submission in response to expert's report</b>	
24/11/2014 Letter from applicant commenting on findings in the expert's report (24/11/2014)	Photographs of plans stamped 18/5/2013 and of examples of rust where nails were removed and some still present Article on owner builder regulations (April/May 2007) City of Mount Gambier leaflet: attachment of verandahs to dwellings (August 2009) Elevation and floor plan for deck and stairs Processing checklist, truss design statement and layout Building consent no.BCA0179/13 issued 17/5/2013 and related documents
24/11/2014 2 CD ROMs of photographs/video footage (19 & 20/11/2014)	
24/11/2015 Email from applicant	
<b>Submission in response to first draft determination</b>	
6/5/2015 Letter requesting the determination consider the depth of one rebuilt valley tray and the compliance of the fixings to the rebuilt polycarbonate sheet verandah roof	Installation instructions for the proprietary polycarbonate roofing sheets installed
6/5/2015 USB	2 MVI dated 9/10/2013
<b>Request to consider new matter</b>	
29/5/2015 Email requesting determination be made regarding compliance of insulation as installed	Photographs Specifications – annotated Product information for insulation
3/6/2015 Email regarding insulation	

<b>Submission in response to second draft determination</b>	
7/7/2015 Letter commenting on inconsistency in discussion and conclusion regarding external acoustic door and verandah roof. Additional comment on insulation and depth of rebuilt verandah valley tray.	n/a

## Appendix C

**C.1** The building surveyor's findings relevant to the matters being determined (refer paragraph 3.8):

<b>Veranda/roof junction</b>
<p>There are indications of leaks into the roof eaves and an area adjacent the dining room. Fastenings are currently fitted at every third or fourth corrugation, so some new fastenings should be added.</p> <p>Calculations indicate a 30mm upstand is needed for the catchment area for roofs at the master bedroom area; actual upstand size is 25mm and is slightly under but close to the capacity required. The porch roof valley gutter will not have adequate capacity for occasions when rainfall intensity &gt;100mm/hr.</p> <p>The upturn at one side of the valley gutter finishes to the underside of the plastic roof corrugations and does not have a 90° turnout along the top edge.</p> <p>There is a risk of wind-driven rain entering from the apron flashing at the junction of the corrugated plastic roof and metal roof. An 'apron flashing' has been fitted at this junction.</p> <p>The flashing as it is installed is the appropriate flashing for the change in pitch for profiled roofing.</p> <p>A similar function to that given by end up-turns of lower profiled metal sheets can be created by installing corrugated bituminous 'soakers' placed over the ends of the plastic roofing that are effectively sealed to the corrugations.</p> <p>A possible cause of high moisture readings in the roof eaves adjacent to the dining room area (58% with comparative readings of 6-17%) is most likely from wind-driven rain entering the roof eaves from the top of the polycarbonate roof.</p> <p>During heavy rain, at the roof junction near the dining room water drips from the underside of the plastic roof below the join with the corrugated metal roof. Around the same location there is silt and debris between the PVC and metal corrugated roof, showing that water is able to track in along the roof sheet overlaps.</p> <p>At the porch roof join with the roof eaves, the ends of the corrugated plastic roof sheets bend upward where they are on top of the porch roof timber stringer. Consequently some plastic sheets do not mesh properly and this causes leaks into the porch from one of the sheet lap joins.</p> <p>There was evidence of rainwater leaks from laps in the polycarbonate roof.</p>
<b>Deck balusters</b>
<p>Gaps or spacings between the horizontal rails are acceptable for providing a safe barrier. Between the deck floor and lower rail the maximum is 108mm. Though it does not comply with F4/AS1, it does not follow that it does not comply with the Building Code.</p> <p>Some of the nails securing the vertical balusters are not galvanised and have corroded. Galvanised nails are required for fastening all components in the deck.</p> <p>If non-galvanised nails have been left in the timber, ongoing corrosion is likely and will compromise durability in the long term.</p> <p>Nails fitting balusters have not been fitted effectively and should have an even part or proportion in each section of timber.</p> <p>Workmanship is untidy and does not give secure fastening and attachment. Half of each nail should be in the baluster and the other half should be in the rail.</p> <p>The number of fastenings for balusters should comply with 'building code designs'. Each vertical baluster should be fixed with three nails at either end.</p> <p>Some of the horizontal timber rails have only one nail securing the rail to the post where four are required.</p> <p>Some of the horizontal timber rails have splits caused by nail fastenings, indicating that holes were not pre-drilled.</p>

<p><b>Internal window</b></p> <p>The window frame projects about 58mm into the hallway and is within protrusion limits [set out in D1/AS1], the floor height to the underside of the window frame is about 1300mm.</p> <p>Because of the size of the projection the window complies; however the sharp edges could be safeguarded to prevent people from injury during movement.</p>
<p><b>Kitchen door</b></p> <p>Water leaks from the drain hole of the outside face of the door onto the inside floor from the base of door when opened.</p> <p>The timber flooring is compressed bamboo, tongue and groove boards and is fitted on top of the concrete floor.</p> <p>High moisture readings over the timber floor (25-43%), with comparative readings at 20-21%</p> <p>A possible explanation is that surface tension at the bottom of the door style prevents water draining onto the sill until the door is opened.</p> <p>When the floor is wet, the slippery surface could cause injury. Clause B2 Durability could be compromised in the long-term.</p> <p>Internally opening doors have a typically high risk for leaking when they are exposed to wind-driven rain.</p>
<p><b>External acoustic double doors</b></p> <p>Screws fitting an aluminium strip at the base of each of the doors have corrosion. Water tracking along the screw fastenings into the doors is likely and will cause damage and decay in the long term. Any water held between the aluminium strips and the plywood exterior of the doors is likely to cause damage.</p> <p>Swelling and difficulty with opening doors often happens with timber doors, (particularly Pine) that are exposed to exterior weather and wind-driven rain without shelter.</p> <p>The doors open and operate normally with a very slight scraping at the floor. Larger clearances cannot be achieved with acoustic doors without compromising their effectiveness.</p>