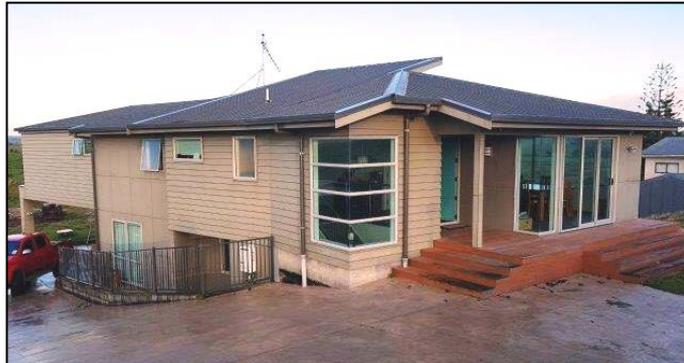




## Determination 2018/051

# The refusal to issue a code compliance certificate for a 9-year-old house with mixed claddings at 170 Pukehina Parade, Te Puke



### Summary

This determination considers the compliance of a consented building where there was delay in completing the consented work. The determination considers the authority's reasons for declining to issue the code compliance certificate for the work; the authority's reasons were principally concerned with the building's compliance with Building Code Clause E2 — External moisture.

### 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, Katie Gordon, Manager Determinations, 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 owners of the building, B and G Rust (“the applicants”)
  - Western Bay of Plenty District Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.
- 1.3 This determination arises from the decision of the authority to refuse to issue a code compliance certificate for a 9-year-old house. The refusal arose because the authority is not satisfied that the building work complies with certain clauses<sup>2</sup> of the Building Code (First Schedule, Building Regulations 1992). The authority's concerns relate to the weathertightness and durability of the claddings.
- 1.4 The matter to be determined<sup>3</sup> is therefore whether the authority was correct to refuse to issue a code compliance certificate for the work.

<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.

<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 sections 177(1)(b) and 177(2)(d) of the Act

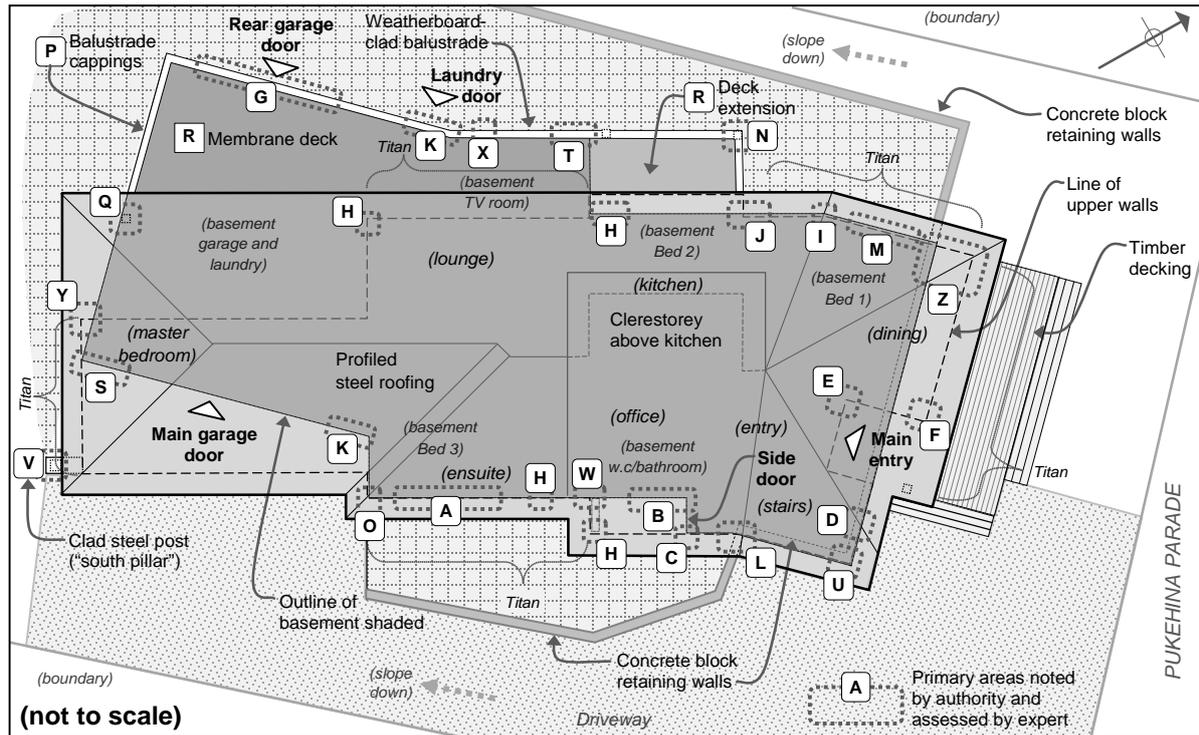
- 1.5 In deciding this matter, I must consider whether the external building envelope of the house complies with Clause B2 Durability and Clause E2 External moisture of the Building Code. The building envelope includes the components of the systems (such as the fibre cement panel cladding, the fibre cement weatherboards, the deck, the windows and the roof cladding) as well as the way the components have been installed and work together.
- 1.6 The building work referred to in this determination includes work covered under the following building consent and amendment:
- Consent No. 77381 (“the 2008 consent”) issued on 6 May 2008.
  - Amendment to 77381 (“the 2011 amendment”) issued on 30 August 2011 for ‘Extension of decking, reposition of kitchen facilities, substituting beams, updating [sheet cladding] information, change of bifold window to sliding’.
- 1.7 In its refusal to issue a code compliance certificate, the authority limited its concerns to items associated with the clauses outlined above and this determination does not address other clauses of the Building Code.
- 1.8 In making my decisions, I have considered the submissions of the parties, the report of the expert commissioned by the Ministry to advise on the building work (“the expert”) and the other evidence in this matter.

## 2. The building work

- 2.1 The building work consists of a two storeys high detached house situated on an excavated coastal site in a high wind zone for the purposes of NZS 3604<sup>4</sup>. The house is fairly complex in plan and form and is assessed as having a medium to high weathertightness risk.
- 2.2 Construction is generally conventional light timber frame, with some specifically-engineered structural steel posts and beams to support the upper level and roof. The basement level has a split-level reinforced concrete floor slab and footings and concrete masonry retaining walls set into the slope. The floor to the upper level is timber framed, with profiled metal roofing, aluminium joinery and a mix of fibre cement weatherboard and panel wall claddings.
- 2.3 The 16° pitch hipped roof has eaves of about 750mm overall, except above some projecting walls. The northern section of the roof geometry is complex, with complex hip intersections and a raised clerestory section above the kitchen. At the west corner, the roof is supported on steel beams and a steel corner post, with walls of the lounge and master bedroom adjacent the deck deeply recessed beneath the roof overhang.
- 2.4 A membrane-clad deck extends around the west corner above enclosed basement areas as shown in Figure 1. The deck floor slopes towards the outer edges, where it drains beneath the balustrades into external gutters. Balustrades are clad in weatherboards on the outer faces, with direct-fixed fibre cement sheet cladding to inner faces.

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

**Figure 1: Approximate site plan**

2.5 As shown in Figure 1, the house accommodates the following:

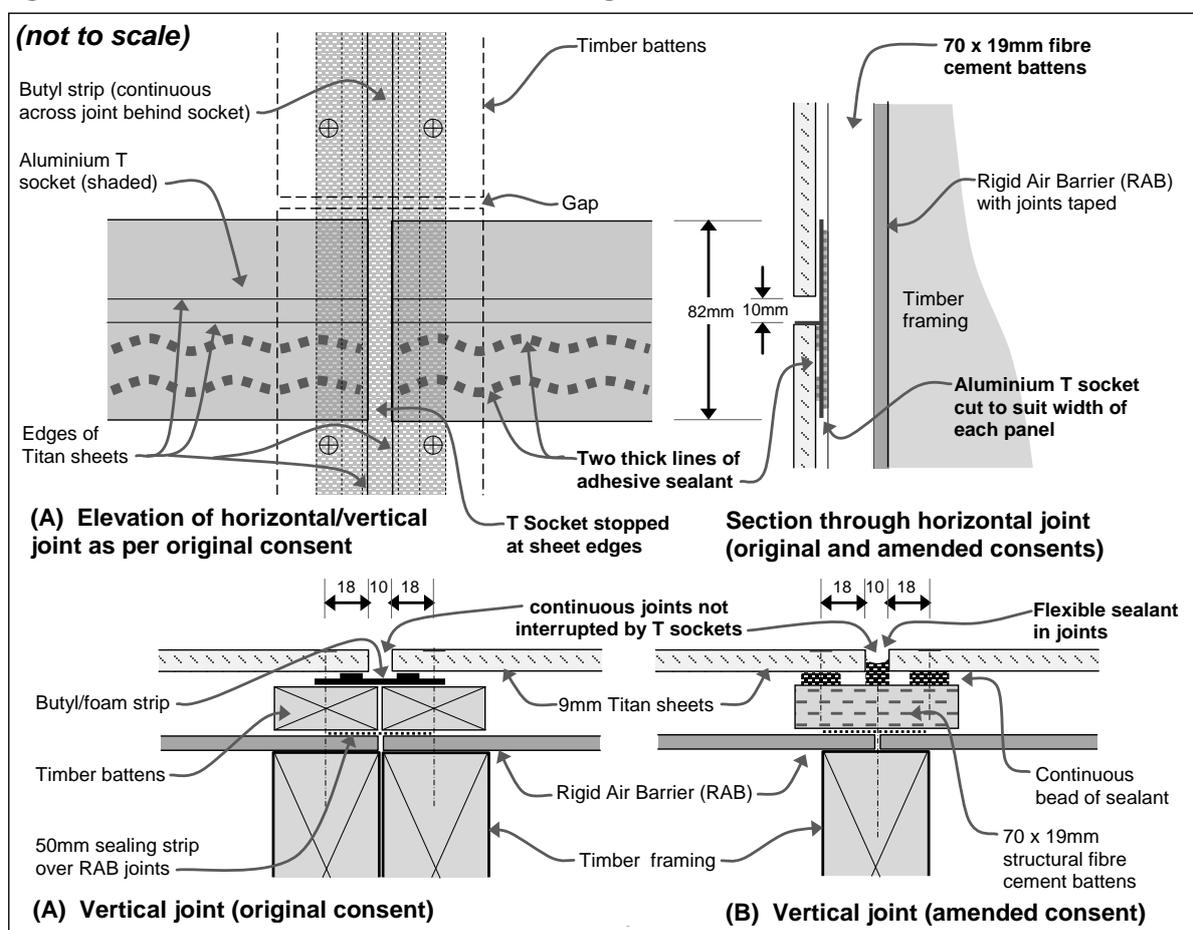
- In the basement level:
  - a concrete block retaining wall along the northeast, extending beyond the building envelope to form exterior walls around excavated paved areas
  - bedrooms 1 and 2 and a TV room to the north, with doors to northwest paving
  - bathroom, toilet and bedroom 3 to the southeast
  - garage with laundry facilities to the southwest end, with the main garage door to the southeast, a laundry door and rear garage door to the southwest, and three steps up to the remaining rooms in the north end of the basement
  - staircase in the east corner, with a side entry door to the southeast.
- In the upper level:
  - main recessed entry and foyer to the northeast, with stairs in the east corner
  - toilet, office and ensuite bathroom to the southeast
  - an upper deck to the northwest, extending below the west corner roof overhang
  - dining, kitchen and lounge areas to the northwest, with the lounge opening onto the upper deck and dining area opening onto northeast timber decking
  - the master bedroom and dressing room to the southwest, with the bedroom opening onto the membrane deck beneath a deep roof overhang.

- 2.6 The drawings called for ‘all timber to be H1.2<sup>5</sup> treated minimum, H3.2 where indicated’. The specification calls for ‘general framing’ to be ‘H1’, ‘timber clear of ground and exposed’ to be ‘H3’ and ‘timber with ground contact’ to be ‘H5’. The expert noted that framing exposed during his inspection appeared to be treated. Given the authority’s inspections during framing installation in 2008, I consider the external wall framing is treated to a level that will provide resistance to fungal decay.

## 2.7 The wall claddings

- 2.7.1 The sheet cladding to all basement walls and some upper level walls is a proprietary cladding system (“the sheet cladding”), which comprises 9mm fibre-cement sheets fixed through fibre-cement battens and a rigid air barrier (“RAB”) to framing. The sheet cladding system includes expressed joints between the sheets, with purpose-made flashings and accessories to edges and junctions.

**Figure 2: General details in consent drawings**



- 2.7.2 The 2008 consent documentation included the manufacturer’s specification for the sheet cladding and the drawings included details from those specifications as shown in Figure 2(A) but the cladding was installed using structural battens and face-sealed joints. Amended vertical joints as shown in Figure 2(B) were retrospectively approved under the 2011 consent amendment.
- 2.7.3 The remaining walls are clad in 16mm thick proprietary horizontal fibre cement weatherboards fixed through battens and the building wrap to the framing timbers.

<sup>5</sup> Timber treatment classes to New Zealand Standard NZS 3602: Part 1: 2003 Timber and wood-based products for use in building

The battens form a cavity between the weather boards and the building wrap. The weatherboard system includes purpose-made flashings and accessories.

### **3. Background**

#### **3.1 The 2008 consent**

- 3.1.1 The authority issued the original building consent (No. 77381) to the former owners on 6 May 2008 and carried out various inspections during 2008. The last inspection recorded was a pre-line inspection on 21 January 2009 which passed.
- 3.1.2 Construction stalled at which time it appears that the upper level was 'closed in' but garage doors had not yet been installed. No further progress on the original consent was recorded for the next two years and the consent records were stamped as 'lapsed'<sup>6</sup>. During that time, some ranchsliders were removed from the house.

#### **3.2 The 2011 amendment**

- 3.2.1 In December 2010, the applicants purchased the partly finished house and during the same month purchased and reinstalled the missing ranchsliders, which closed in the upper level. The basement garage doors were installed in February 2011, which closed in the exterior. Photographs from that time show:
- main and rear garage doors installed
  - internal framing and wall/roof insulation
  - interior exposed structural steel newly painted with protective coatings
  - deck balustrades without timber capping shown in the original drawings; with inner cladding visible, exposed flashing tape to top plates.
- 3.2.2 In a letter to the applicants dated 1 March 2011, the authority confirmed that the consent had been "re-activated" and it carried out pre-line and post-line inspections during 2011. The applicants were unable to obtain the tiler's producer statement so did not seek a code compliance certificate at this time. A final inspection of the house was sought four years later when the applicants wished to sell the property.

#### **3.3 The 2015 final inspection**

- 3.3.1 The authority carried out the first final inspection on 21 December 2015 and the site notice arising from the inspection identified a number of concerns including ground levels, unsealed openings and penetrations, the sheet cladding, missing cavity closers and other miscellaneous items. The site notice noted that a 'full weather tight report will be required'.
- 3.3.2 The site notice also identified missing documentation and noted:

On the basis of the inspection (evidence of leak, non-maintenance, durability failure, etc), the current weathertightness performance of the building envelope (roof/wall cladding, external joinery, etc.) is not considered adequate. You are advised to consider engaging a competent person with suitable experience in weathertightness to fully investigate and determine the level of compliance with the building code Clauses E2 and B2.

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<sup>6</sup> I do not consider the consent had lapsed. Section 52 of the Act provides for the lapse of a building consent when building work to which it relates does not commence within 12 months after the date of issue of the building consent. In this case the building work had commenced within 12 months after the date of issue. This has been considered in Determination 2012/068: Regarding the refusal to issue a code compliance certificate due to a lack of inspections of the foundations to a house (29 October 2012).

- 3.3.3 In a letter to the authority dated 27 July 2016, the applicants responded to the findings of the final inspection. The applicants had engaged a building surveyor on 23 February 2016. The building surveyor and the applicants' builder reviewed the inspection findings and provided detailed responses to the authority's concerns.
- 3.3.4 In regard to the reasons for requiring a weathertightness report, the applicants disputed the extent to which the house had been exposed to the elements, noting the inspection record dated 7 November 2011 confirmed that 'external cladding, flashings and weatherproofing around opening and junctions, and moisture content of timber all passed inspection.'
- 3.3.5 The building surveyor recommended completion of outstanding items, then referral back for reassessment of need for a weathertightness report.
- 3.3.6 The applicants provided the authority with the electrical energy certificate, the gas energy certificate, and the deck and roof membrane producer statement.

### 3.4 The 2016 refusal to issue a code compliance certificate

- 3.4.1 Following some minor remedial work, the applicants re-applied for a code compliance certificate on 27 July 2016. The authority responded on 22 August 2016 stating that, following a review of the consent records, it was unable to issue a code compliance certificate because:

Due to the age of the building, the time that has passed since the works was (*sic*) completed and the failed items identified at the site inspection (as listed below); for [the authority] to be satisfied on reasonable grounds that weathertightness requirements of the building are met, extensive weathertightness investigation will be necessary. [The authority] does not have the expertise and equipment to carry out the invasive weathertightness investigation, testing and analysis of the building. Therefore, [the authority] is not able to [be satisfied] that weathertightness requirements of the Building Code Clause E2 are met.

- 3.4.2 The authority required a weathertightness report to include a full assessment of the building envelope, evidence of invasive testing, details of defects identified and recommendations for any remedial work.
- 3.4.3 The authority attached the record of the 2015 final inspection (see paragraph 3.3) and identified the following non-compliant items:
- b. B2 Durability issues with Cladding (damaged in areas as listed).
  - c. Cladding not correctly flashed around garage door and not installed correctly to other areas of build. Not as per E2 or manufacturers specifications.
  - d. Cavity closers/vent strip appears to be missing in places. Not as per E2.
  - e. Review of the building file indicated that there was a period of time (approx. 2 years) the building was left open to the elements (cap flashing to balustrade not completed, windows sashes had been removed by installer). It had been identified that water entry had occurred to the balustrade and that some areas of the steel work had surface rust due to the buildings (*sic*) location in a Corrosive Environment Zone D. Photos had been provided of repainted steel work, but no clear indication in [the authority] site notices if these exposed areas of the build had been inspected. There was also no mention of other internal frame fixings which were exposed to environment.
  - f. There also appears to be conflicting roofing membrane certification for the installation of the deck membrane roofing and if it complies with E2/AS1... ... [the authority] can therefore not confirm who carried out work and if the work completed complies with E2/AS1.

### 3.5 The 2018 refusal to issue a code compliance certificate

- 3.5.1 On 5 October 2017, the applicants met with authority officials to discuss the way forward. In response the applicants engaged a second building surveyor, who viewed the house on 15 November and according to the applicants ‘took many non-invasive moisture measurements and had no concerns regarding water ingress.’
- 3.5.2 The second building surveyor met with authority officials on 14 December 2017. The file note of that meeting noted that the second building surveyor was ‘not prepared to confirm compliance with B2’ and had highlighted the following cladding issues (in summary with typical areas shown in Figure 1 provided in brackets):
- Ends of head flashings (Areas A, B, D, E and F).
  - Bottom of cavities (Areas C, H, and O).
  - Condition of sheet cladding (Areas M and D).
  - Ground clearances (Areas K, L, N, S and Z).
  - Deck membrane, junctions and balustrades (Areas J, P, R, Q and Y).
  - Joinery jamb/cladding junctions (Areas C, G, K, S and T).
- 3.5.3 In a letter to the applicants dated 18 January 2018, the authority refused to issue a code compliance certificate for the house, noting the meeting with the second building surveyor and stating:
- Based on this discussion and previous weather tight remedial items identified, [the authority] is therefore not satisfied on reasonable grounds that the above building complies with E2/B2 of the New Zealand Building Code.
- 3.6 Following receipt of the above letter it appears the weathertightness report was not completed. The situation remained unresolved and the Ministry received an application for a determination from the applicants on 27 March 2018.

## 4. The submissions and the draft determination

### 4.1 The initial submissions

- 4.1.1 The applicants set out the background to the situation and attached a ‘summary of events’ since their purchase of the property in 2010. The applicants concluded that:
- We think that the [authority] is incorrect in their concern regarding the buildings (*sic*) framing being exposed for a long time because:
1. The property was somewhat protected for much of the time from building ceasing until being closed in with polythene covers over the areas with missing window sliders
  2. We were able to see all potential water ingress issues prior to and during recommencing the building process
  3. We did replace a small number of floor boards due to water damage but that was all that was required
  4. The framing was retested for moisture content prior to lining
  5. The [second building surveyor] has taken a large number of non-invasive moisture readings and has stated that he has no concerns regarding moisture ingress.
- 4.1.2 The applicant provided copies of:
- documentation for the 2011 amendment to the 2008 building consent
  - the 2008 and 2011 inspection records

- correspondence with the authority
- an email dated 23 February 2016 from the first building surveyor
- various other invoices, producer statements certificates and information.

4.1.3 The authority made no submission, but forwarded copies of the property file, which contained additional documents pertinent to this determination, including:

- the original 2008 building consent
- the 2008 drawings and specifications
- the final inspection record dated 21 December 2015
- the refusal to issue a code compliance certificate dated 22 August 2016
- file note dated 5 October 2017 of meeting with the applicants
- file note dated 14 December 2017 of meeting with second building surveyor
- the second refusal to issue a code compliance certificate dated 18 January 2018.

## **4.2 The draft determination and submissions received**

4.2.1 A draft determination was issued to the parties for comment on 14 September 2018.

4.2.2 Both parties accepted the draft without comment; the applicant replied on 27 September 2018 and the authority on 5 October 2018.

## **5. The expert's report**

### **5.1 General**

5.1.1 As mentioned in paragraph 1.8, I engaged an independent expert to assist me. The expert is a member of the New Zealand Institute of Building Surveyors and inspected the house on 19 and 28 July 2018, providing a report completed on 5 September 2018. A copy of the report was sent to the parties on 5 September 2018.

5.1.2 The expert noted that his instructions were to assess the reasons provided by the authority for refusing the code compliance certificate.

5.1.3 The expert noted that the house was 'generally well presented and maintained', with claddings and linings 'straight and fair of finish'. However construction quality was considered 'poor', with 'critical departures from the manufacturer's instructions that have compromised the weathertightness of the cladding.'

5.1.4 The expert noted that the overall shape and form of the building appears to be largely in accordance with the consented drawings, with observed discrepancies including:

- face sealed vertical joints in sheet cladding in lieu of back sealing
- drained cavities not installed to:
  - inner side of balustrades
  - southeast side door wall (Area C)
  - garage south corner column (Area V)
  - deck extension columns (Area N)

- for the upper deck:
  - deck extended in front of northwest kitchen windows (Area R)
  - balustrade cappings installed in lieu of timber (Area P)
  - deck floor drains under clad balustrade into external gutter.

## 5.2 Moisture investigations

5.2.1 The expert visually inspected internal linings to external walls and took non-invasive moisture readings at sample areas, noting no evidence of elevated moisture. The expert also lifted carpet at areas considered at risk, observing no indication of moisture on carpet backing or smooth edges.

5.2.2 The expert took 18 sample invasive moisture readings into bottom plates at areas associated with concerns identified by the authority. 16 of these readings varied from 8% to 15% except for:

- 18% beside the side door (Area C)
- 22% in the south corner bottom plate of the garage (Area S)
- 26% to the post under the deck extension (Area N)
- 60% to the bottom plate of the south pillar (Area V).

(Moisture levels over 18% generally indicate that external moisture is entering the structure and further investigation is required; readings over 40% indicate that the timber is saturated and decay will be inevitable over time. I note that the inspection was carried out in winter, with moisture readings therefore likely to represent the peak of seasonal variation.)

5.2.3 The expert removed small sections of trim and sheet cladding at sample locations to observe the underlying construction to the following areas (see Figure 1):

### North corner to dining area (Area Z)

- Cut-out 1: at the bottom of the corner, where shavings looked ‘suspiciously dark’. The following was observed:
  - fibre-cement battens
  - RAB with closed-cell foam tape to joints
  - corner stud and particle board floor edge
  - shavings had come from flooring, but no sign of decay detected.
- Cut-out 2: to same sheet panel at vertical/horizontal recessed corner joint:
  - a single bead of sealant applied to the lower half of the socket stops short of corner, with gap allowing water to track down the corner

(I note the horizontal flange of the ‘T’ socket continues over the vertical corner joint in contrast with Figure 2(A).)

- Cut-out 3: to same sheet panel at adjacent vertical/horizontal recessed joint:
  - the single bead of sealant ‘stops well short’ of vertical joint ‘allowing water entry by capillary action and gravity into the drained cavity’

(I note the horizontal flange of the ‘T’ continues past vertical joint.)

### South corner to garage (Area S)

- Cut-out 4: at the bottom of the corner, where joint sealant had deteriorated and moisture levels were elevated. The following was observed:
  - very high moisture levels on rear surface of sheet cladding
  - fibre-cement battens, with cavity closer butted against batten edge
  - RAB with closed-cell foam tape to corner joint
  - moisture elevated in timber, which appears sound
  - moisture apparently transferred through battens and RAB into timber.
- Cut-out 5: to same sheet panel at vertical/horizontal recessed corner joint:
  - no sealant applied to lower half of the socket, allowing clear path for moisture to drain behind the cladding

(I note horizontal flange of the 'T' continues over vertical corner joint, with a small gap visible behind socket.)

### Wing wall at the southeast bathroom (Area H)

- Cut-out 6: at recessed corner joint to check socket sealing showed:
  - no sealant applied to lower half of the socket
  - significant moisture able to penetrate and drain behind the cladding.

### The south corner pillar (Area V)

- Cut-out 7: to exposed face of south corner pillar where moisture levels were slightly elevated. The following was observed:
  - cladding fixed through building wrap directly to the timber
  - closed-cell foam tape visible at corner
  - timber dark and visibly wet, with 60% moisture content in bottom plate.
- Cut-out 8: to same sheet panel at vertical/horizontal recessed corner joint:
  - socket joint above Cut-out 7 dye-tested, with coloured water tracking down inside face of cladding to bottom plate
  - no sealant applied to socket
  - top of wrap in front of socket with no tape, allowing moisture behind wrap and into timber.

## 5.3 The weatherboard wall cladding

5.3.1 In regard to the proprietary fibre-cement weatherboard cladding system, the expert noted that (in summary):

- consent documents included the manufacturer's 2006 installation instructions, but the details shown on the drawings are for another weatherboard product by the same manufacturer<sup>7</sup> - the drawings include:
  - details for both 7.5 and 9.0mm thick weatherboards on 70 x 19mm cavity battens

<sup>7</sup> The manufacturer's specification and a note on a consented drawing showing building sections (not dated or numbered) is for the installed proprietary weatherboard system (16mm thick bevel-back boards) whereas the details provided are for a different system (7.5 and 9.0mm thick planks). The installation details are none-the-less similar despite the different thickness.

- window details showing face-fixed metal windows
- sill flange minimum overlap of 10mm and no drainage gap at the junction
- stop ends to head flashings
- timber jamb scribes sealed to weatherboards.

5.3.2 The expert noted that most windows in the weatherboard cladding were ‘at high level and not easily inspected.’ However, he also noted that the joinery installation appeared ‘generally tidy, with scribes installed to jambs and head flashing junctions sealed where visible’, noting that:

- head flashing to east corner window butts against a cavity batten, with junction ‘reasonably well sealed’ (Area D)
- scribes are installed to jambs and appear to be sealed to weatherboards
- timber moulding has been installed at the staircase window to conceal a 9mm gap beneath sill flanges, (in lieu of cut board used as packer as shown in Figure 29 of consent drawings – Area U)
- weatherboard cladding appeared ‘well installed over drained cavities and no significant issues were noted.’

## 5.4 The sheet wall cladding

5.4.1 In regard to sheet wall cladding as documented, the expert noted (in summary):

- The 2008 consent documents included the manufacturer’s 2006 installation instructions with details from the instructions provided as part of the consent drawings, including:
  - the sheet cladding on 45 x 18mm timber cavity battens, with double studs at panel vertical joints
  - 50mm wide butyl rubber strip behind the fibre cement panels
  - detailing of the horizontal/vertical intersections.

(I also note that Sheet 1 of the approved consent drawings referred to ‘E2 Acceptable Solutions’ for details not specifically included in documents. I therefore expect the window installation to be in accordance with Figure 116 of the Acceptable Solution for Clause E2, E2/AS1, which includes:

- 5mm drainage gap above head flashings, with ends extended 20mm minimum past jamb flanges to terminate with stop ends
- sill flange minimum overlap of 10mm and no drainage gap at junction
- jamb flange minimum overlap of 10mm, with seals installed under flange.)
- The 2011 consent amendment included a revised vertical joint detail to reflect the cladding as installed in 2008 – see Figure 2(B), with:
  - 70 x 19mm fibre cement cavity batten fixed to single stud
  - 9mm sheets fixed through 6mm thick sealant into the batten
  - vertical joints face sealed with specified flexible adhesive sealant.

- The sheet cladding system included no joinery details and was based on a rain screen principle of pressure moderation where some ‘water penetration into the drained cavity is tolerable’ because:

In essence the bulk of the water is stopped at the Rainscreen layer while the airbarrier mechanism equalizes the pressure in the cavity with the pressure outside the Rainscreen thus limiting water ingress.

- The rain screen principle was removed from the 2011 specifications, which required ‘appropriate flashings’ to joinery and included window details.

5.4.2 In regard to the sheet cladding as installed, the expert noted (in summary, with relevant locations identified in Figure 1 shown in brackets):

- Head flashing/cladding junctions (A, B, E, F, G):
  - there are some 3-5mm drainage gaps above head flashings
  - head flashings with no stop ends extend about 30mm past jambs
  - some ends butt against cavity battens, which act as stop ends
  - some ends are exposed and poorly sealed (Areas A, C, E, F)
  - some ends are poorly sealed but well sheltered (Area B)
  - rear garage door lacks drainage gap above head flashing (Area G)
  - bedroom 1 flashing has unsealed end and gap at socket junction (Area M).

(I note that E2/AS1 calls for 5mm drainage gap above head flashings, with ends extended 20mm minimum past jamb flanges and stop ends.)

- Jamb/cladding junctions:
  - (I note that E2/AS1 calls for jamb flanges to have minimum overlap of 10mm, with seals installed between flange and cladding)
  - bedroom 3 jambs have some 1mm overlap and lack seals (Area A)
  - TV room jambs have overlaps but no seals (Areas X, T)
  - some jambs have unsealed gaps at socket joints (Areas A, C, K, T)
  - main garage door has unsealed jamb junctions and large gaps at recessed socket joints (Area S)
  - rear garage door has jamb facings but gaps at socket joints (Area G).
- Bottom of sheet cladding cavities (Areas H, and T):
  - Fibre cement cavity battens generally protrude through the cavity closers, rather than terminating above proprietary plastic vent strips as shown in drawings
  - there are gaps between battens and closers in some areas, which need sealing to prevent rodent entry into cavities (Areas H, T, C).
- Lack of cavity:
  - there is no cavity to the short wall beside the rear door, which should not be a problem if unsealed head flashing and jamb are repaired (Area C)
  - lack of cavities to ground-treated posts under deck extension should not be a problem (Area N)

- the steel post supporting upper south corner is framed and clad to form decorative pillar, with sheet cladding direct-fixed against building wrap and evidence of moisture entry and damage to framing (Area V).
- Condition of sheet cladding (Areas I, J):
  - there is a short unflashed horizontal junction at the head flashing (Area I)
  - there is a small diagonal crack at end of the head flashing (Area J)
  - if maintained, the above is unlikely to lead to significant water entry
  - no significant deterioration or delamination noted elsewhere.
- Ground clearances (Areas K, L, N and S):
  - although cladding finishes close to paving levels in some locations, no evidence of associated moisture was found
  - there is no clearance at the garage door but the area is sheltered under a deep overhang, paving is well drained and there is no indication of moisture in the interior (Area K)
  - although cladding at the laundry door contacts the concrete, this is at a step up from garage/laundry slab – indicating cladding is subfloor and of no consequence to water entry (Area K)
  - cladding with insufficient clearance is exposed beside the retaining wall so attention is required (Area L)
  - at northwest cladding to dining area, the cladding extends over the subfloor down to the mowing strip – risking moisture transferral via the adjacent retaining wall into the adjacent basement cavity (Area Z)
  - flashing was installed at above the retaining wall/cladding junction; and clearances below the wall vary from 65 to 100mm, with good paving falls away from the cladding, and no evidence of moisture penetration into bedroom 2
  - direct-fixed cladding to posts supporting the deck extension butts against paving and moisture levels were elevated – although timber drillings appeared ‘in excellent condition’ with no indication of damage (Area N)
  - a small gap to the masonry at the step to bedroom 3 requires plastering and a corroded nail is embedded in concrete (Area O).
- Unsealed penetrations:
  - there are unsealed pipe penetrations below the hot water unit (Area L)
  - the meter box lacks an effective head flashing (Area X).

5.4.3 In regard to sheet cladding socket joints as installed (see Figure 2), the expert noted that:

- vertical joints are face-sealed as shown in Figure 2(B), rather than incorporating underlying seals as shown in Figure 2(A)
- face sealing does not appear critical but requires increased maintenance, with some sealant gaps currently requiring attention (Area M)

- horizontal joints appeared to be well installed, but destructive investigation revealed that aluminium sockets had not been installed in accordance with manufacturer's instructions
- both 2006 and 2011 specification details called for:
  - a T socket to be cut to suit panel width (stopped at sheet edges to allow free drainage down 10mm vertical joint)
  - the lower panel to be installed complete with the socket as follows:
 

Apply two 6mm thick lines of adhesive sealant on the bottom portion of the Aluminium T socket to seal. Take care to ensure continuous seal is formed between the panel and Aluminium T socket. The sealant must continue between socket flange and top panel edge.
- inspection and destructive investigation revealed that:
  - T sockets had not been cut to suit panel width – instead the socket continues across vertical sealant joints, interrupting free drainage in recessed joints
  - a single bead of sealant had been applied, with gaps to some areas that allow water to penetrate behind the top of the lower panels
  - water running down the vertical sealant joint would also track along horizontal flange where the T socket crosses the joint, so increasing amount of water able to penetrate the top of the lower panels.
- further investigation is needed to confirm the full extent of water penetration and possible damage before considering possible repair methods.

## 5.5 The upper deck

5.5.1 Prior to 2011 the upper deck was limited to the extent of the northwest basement, but the upper deck was extended in front of the kitchen as part of the 2011 amendment (Area R). The extension is supported on two exterior posts with direct fixed fibre-cement cladding taken down to ground level.

5.5.2 In regard to balustrade cappings (Area P) – the expert considered the cappings to be performing adequately, noting:

- cappings look reasonably well installed, have sufficiently deep turndowns to prevent moisture entry, junctions sealed, tops generally sloping at 5° towards the inside, and low moisture levels in balustrade framing
- saddle flashings to balustrade/wall junctions appear satisfactory, with low moisture levels and ends turned up behind weatherboards (Areas J and Y)

5.5.3 In regard to deck membrane (Area R) – the expert considered the deck to be performing adequately noting that the membrane appears in good condition and is 'reasonably well installed'. The deck slopes appear adequate, with no signs of water ponding and no evidence of leaking into basement garage and the remaining room below.

## 5.6 Other items

5.6.1 In regard to internal items, the expert observed no problems associated with the tiled showers. He also noted that there were no signs of leaking into ceilings below the upper bathroom.

5.6.2 In regard to maintenance, the expert noted minor issues with corroding downpipe and gutter brackets, and a leaking downpipe.

## **5.7 The expert's conclusions**

5.7.1 The expert considered that his investigations had revealed areas:

...that have implications for compliance with the New Zealand Building Code. While some of the above items do not follow an acceptable solution or necessarily good practice, they can still comply with the performance requirements of the [Building Code].

5.7.2 The expert considered that the following 'may require remedial work' (in summary):

- in regard to joinery:
  - unsealed ends of head flashings
  - lack of cover of jamb flanges over sheet cladding
  - unsealed cladding/jamb junctions
- gaps to cavity closers allowing rodent entry
- lack of cladding clearances in exposed locations
- unsealed pipe penetrations and meter box
- inadequately sealed horizontal joints to sheet cladding, allowing moisture to penetrate behind the cladding.

## **6. Discussion**

### **6.1 General**

6.1.1 The matter in dispute is whether the authority correctly exercised its power in its decision to refuse to issue the code compliance certificate for the house. In deciding this matter I have therefore considered whether the building envelope of the house as completed complies with the amended 2008 consent and also with the relevant provisions of the Building Code.

6.1.2 In assessing the above, I have taken into account the age(s) of various elements in the external building envelope. An application can be made to the authority for a modification of durability requirements to allow durability periods for the structure and claddings to commence from the date of the pre-line inspection in January 2009. Although that matter is not part of this determination (see paragraph 1.7), I have taken the anticipated modification into account when considering the compliance of the claddings.

### **6.2 Compliance with Clause E2 External moisture**

6.2.1 The evaluation of the external building envelope for compliance with the Building Code and the risk factors considered in regards to weathertightness have been described in numerous previous determinations (for example, in Determination 2004/1).

### **6.3 Weathertightness performance**

- 6.3.1 The inspection records indicate that the building envelope was substantially complete by the pre-line inspections in January 2009 and I have taken that into account when considering the weathertightness performance as wall and roof claddings are now almost 10 years old.
- 6.3.2 The expert has investigated the wall claddings and found the installation and performance of the weatherboard cladding and the deck generally satisfactory; with evidence indicating that these have performed adequately to date and are generally likely to continue to do so for at least the next five years if normal maintenance is continued. However, this opinion does not extend to the sheet cladding.

### **6.4 The sheet cladding**

- 6.4.1 It is clear from the expert's report that the sheet cladding generally, including joinery junctions, has not been installed in accordance with the manufacturer's recommendations in some respects critical to its weathertightness performance and therefore its expected durability.
- 6.4.2 Taking account of the expert's report, I conclude that considerable work is required to make the sheet cladding adequately weathertight and durable. Before any work is undertaken, investigation will be required that includes a systematic survey of the sheet cladding, with timber testing of all risk locations identified to determine the full extent of systemic defects, any moisture penetration and the repairs required.

### **6.5 Weathertightness conclusion**

- 6.5.1 I consider the expert's report establishes that the current performance of the sheet cladding is not adequate because there is evidence of moisture penetration through the cladding system. Consequently, I am satisfied that the cladding currently does not comply with Clause E2 of the Building Code.
- 6.5.2 The durability requirements of Clause B2 require a building to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement to remain weathertight and structurally sound. Wall and roof claddings are required to remain weathertight for a minimum of 15 years and the underlying construction is required to remain structurally adequate for a minimum of 50 years.
- 6.5.3 Although the sheet cladding is now more than 9 years old, the expert's destructive investigations indicate that moisture is likely to have penetrated the sheet cladding since it was installed. Although cavities appear to have protected the wall framing to date, drained cavities are not designed to handle the level of moisture penetration expected to penetrate via the systemic joint defects identified – nor to continue to protect the structure for another 40 years. I am therefore satisfied that the cladding does not comply with the durability requirements of Clause B2.
- 6.5.4 Final decisions on whether code compliance can be achieved by remediation or re-cladding, or a combination of both, can only be made after a more thorough investigation of the sheet cladding and of the condition of the underlying timber framing. This requires a careful analysis by an appropriately qualified expert, with the chosen remedial option submitted to the authority for its approval. Pending the outcome of such investigations, I am unable to conclude whether discrete targeted repairs will be likely to result in the sheet cladding being brought into compliance with Clauses E2 and B2.

- 6.5.5 The expert has identified a number of areas where maintenance is required. Effective maintenance of the house is important to ensure ongoing compliance with the Building Code and is the responsibility of the building owner. The Ministry has previously described maintenance requirements associated with the external building envelope (for example, in Determination 2007/60).

## **7. The durability considerations**

- 7.1 The relevant provision of Clause B2 — Durability 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).
- 7.2 In many previous determinations 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.
- 7.3 In the case of this house, because of the systemic nature of the defects identified in the sheet cladding, the consequential extent of further investigation required and the potential impact of such an investigation on the external envelope, I consider there is insufficient information on which to make a decision about this matter at this time.

## **8. What happens next?**

- 8.1 The authority may deal with this matter via a notice issued under section 95A of the Act. The notice should include the investigations and defects identified in this determination and refer to any further defects that might be discovered in the course of investigation and rectification, but not specify how those defects are to be fixed – that is a matter for the applicants to propose and for the authority to accept or reject.
- 8.2 The applicant should develop and submit a detailed proposal to the authority to address the matters of investigation and non-compliance, produced in conjunction with a suitably qualified person experienced in weathertightness remediation and submitted to the authority for its consideration and approval.

## **9. The decision**

- 9.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the fibre cement sheet wall cladding, including the joinery installation within that cladding, does not comply with Clauses E2 and B2 of the Building Code and accordingly I confirm the authority’s decision to refuse to issue a code compliance certificate.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 25 October 2018.

Katie Gordon  
**Manager Determinations and Assurance**