Department of Building and Housing
Te Tari Kaupapa Whare

Determination 2011/091

Regarding the durability of fibre-cement sheet cladding to an addition to a house at 13 Regent Street, Hawera

1. The matters to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004[1] ("the Act") made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing ("the Department"), for and on behalf of the Chief Executive of that Department. The applicant is the South Taranaki District Council ("the authority"), carrying out its duties as a territorial authority or building consent authority. The other party is the owner of the house Mr M Seaver ("the owner").

1.2 This determination arises from the decision of the authority to refuse to issue a code compliance certificate for a 3-year-old addition to a house ("the addition") because it was not satisfied that the building work complied with certain clauses[2] of the Building Code (Schedule 1, Building Regulations 1992). The authority's concerns relate to the ongoing durability of the fibre-cement sheets making up the cladding, due to the length of time the sheets were exposed to the weather before the final paint coatings were applied.

1.3 In my view the durability of the fibre-cement sheets cannot be considered just in terms of the effects of its exposure to date, but also in respect of its ongoing performance as part of the building envelope. The performance of the building

[1] The Building Act, Building Code, Compliance documents, past determinations and guidance documents issued by the Department are all available at www.dbh.govt.nz or by contacting the Department on 0800 242 243.
[2] In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

envelope will have a direct bearing on the expected durability of the fibre-cement sheets. I therefore consider the matter to be determined[3] is whether the cladding to the addition complies with Clauses B2 Durability and E2 External Moisture.

1.4 In making my decision, I have considered the submissions of the authority, the report of the expert commissioned by the Department to advise on this dispute ("the expert") and the other evidence in this matter.

2. The building work

2.1 The original house was built in the 1940's and is situated on a sheltered level site in a low wind zone for the purposes of NZS 3604[4]. The subject addition extends from the southwest corner of the existing house, resulting in a U-shaped plan. The 140m^2 addition is simple in plan and form and is assessed as having a low weathertightness risk (see paragraph 7.2).

2.2 Construction of the addition is conventional light timber frame, with concrete foundations and floor slab, monolithic cladding and aluminium windows, with planted timber facings and sills to match the appearance of the original timber joinery. The clay tiled hipped roof has eaves of about 500mm except above the south wall of the new garage. A timber slat deck infills the recessed area between the existing house and the addition. Given the date of construction of the addition in 2007, I consider the wall framing is treated.

2.3 The cladding

2.3.1 The wall cladding consists of 9mm thick fibre-cement sheets fixed through 20mm timber cavity battens and the building wrap to the framing. The building consent documents specified the cladding as a proprietary flush-finished fibre-cement system with an applied textured coating system.

2.3.2 As constructed, the fibre-cement sheet joints were reinforced with tape and flush-finished with jointing compound, with a sealer applied to the unfinished cladding. A 'splatter' pattern of plaster to match the original house was later applied to the sealed backing sheets. The cladding was then finished with a coat of acrylic paint.

3. Background

3.1 The authority issued a building consent (No. 070225) for the addition in 2007. I have not seen copies of the building consent or inspection records, but it appears that construction commenced about September 2007.

3.2 The fibre-cement backing sheets, joints, exterior joinery and timber facings were installed by about mid-March 2008. Following a dispute with the owner, the original builder withdrew from the project and about one month later the owner says he applied a clear sealer coating over the incomplete cladding to provide temporary weather protection to the fibre-cement sheets and flush-finished joints.

[3] Under section 177(1)(a) of the Act
[4] New Zealand Standard NZS 3604:1999 Timber Framed Buildings.

3.3 The exposed unfinished cladding

3.3.1 In a letter to the owner dated 28 July 2008, the authority asked for confirmation from the manufacturer that 'the durability of [the] exterior cladding product has not been compromised due to being exposed to the elements for more than the specified 90 days'.

3.3.2 The original builder also expressed concerns about the durability of the exposed unfinished cladding in a letter to the authority dated 30 July 2008. The builder advised that '138 days [had elapsed] since the cladding was completed' and no 'texture coating' had been applied. The builder also advised that although a sealer had been applied it was the builder's belief this was 'not a waterproof sealer …'.

3.3.3 The authority has confirmed that inspections were undertaken on 26 February 2008, 14 March 2008, and 31 July 2008 which supports these dates. Therefore it is reasonable to conclude that the cladding was sealed some time from one month to about 130 days after the cladding was installed.

3.3.4 Following an inspection on 30 July 2008, which 'confirmed the cladding had been installed correctly and the joins plastered to specification', the authority wrote to the owner on 4 August 2008, attaching the cladding manufacturer's installation instructions and repeating its concerns about the exposure of the fibre-cement sheets. Before any further coating was applied, the authority required written confirmation from the manufacturer that the fibre-cement sheets were suitable 'to have the textured coating system applied' and that the sheets would meet 'minimum structural and durability requirements'.

3.3.5 In a letter dated 4 September 2008 following a meeting with the owner, the authority confirmed its position that the coating could not proceed without manufacturer's confirmation. However, the authority suggested that alternatively the owner

> ...could seek the advice of a structural engineer who would be willing to certify that the cladding is suitable to apply the final coating. The structural engineer would be required to provide to the [authority] a Producer Statement under the Building Act which would certify that the coating could be applied.

3.3.6 Following a further meeting, the owner elected to engage an engineer and the authority confirmed this on 9 September 2008, stating

> Please provide a letter of intent from your selected registered engineer confirming that they will supervise the application of the selected applied exterior coating system and at completion of the work provide to [the authority] a PS4 Producer Statement Construction Review.

3.4 Completion of the cladding

3.4.1 The owner engaged an engineer who investigated the sealer coating with the coating and cladding manufacturers. In a letter to the owner dated 4 September 2008, the engineer stated he had been advised that the sealer would have adequately protected the fibre-cement sheets.

3.4.2 In a letter to the authority dated 3 October 2008, the original builder noted that a 'flick coat of plaster' was being applied directly to the unfinished cladding, which was then painted. He also pointed out that the specified cladding system required the

textured coating system to be applied by a 'registered applicator' and repeated his concern about the length of time the cladding had remained unfinished.

3.4.3 The authority queried the finishing of the cladding with the engineer and a file note dated 6 October 2008 states that the engineer:

> ...confirmed that as a Registered Engineer, he would be certifying at completion of the work a producer statement, a PS4, for construction review for the system he has designed as an alternative solution and will provide to [the authority] confirmation of compliance with E2 of the Building Act 2004.

3.4.4 The engineer provided the owner with a letter dated 18 December 2008, which was titled 'PS4'. I note that the letter still referred to 'textured coating', made no mention of any 'construction review' of the coating application and stated:

> This is to certify that, in my opinion, the sealing, textured coating and paint finish to the exterior walls of the extensions to the residence at the above address complies with the requirements of the building code with respect to external moisture.

3.5 Post-completion communication

3.5.1 In letters to the owner dated 4 February and 6 April 2009, the authority noted that a building owner must apply for a code compliance certificate once all building work was complete.

3.5.2 On 22 April 2009 the engineer forwarded copies of his communication with the owner to the authority, including the 'PS4' described in paragraph 3.4.4. The authority responded on 25 April 2009, noting that any discussions with the cladding manufacturer had been only verbal and stating:

> Therefore, unless they provide written verification of their statements proving compliance with B2 durability to both you and [the authority], [the authority] is not prepared to grant a Code Compliance Certificate.

3.6 The authority carried out a final inspection on 27 May 2011. The authority noted a number of defects, including a number of penetrations that required sealing and defects to sheet joints. The work required re-inspection once the defects were fixed.

3.7 The Department received an application for a determination on 7 June 2011.

4. The submissions

4.1 In its submission dated 1 June 2011, the authority outlined the background to the situation and included the following points (in summary):

- The owner elected to 'splatter coat' the sealed backing sheets and joints with a 'mortar mix to give the illusion of stucco plaster and then apply paint'. The work was not done by an 'approved coating applicator' for this product. This differs from the consent documents.
- The engineer's recommendations for coating the cladding were not followed 'both in terms of the type of system used and its application' and the engineer is not willing to 'certify compliance with B2 durability'.
- The cladding appears to be waterproof and well maintained in relation to the paint system used, although the paint is only 'a couple of years old'. However,

there remains the question of whether the cladding system is compliant with regards to B2 durability.

4.2 The authority forwarded copies of:

- the consent drawings
- correspondence with the owner and with the engineer
- photographs of the cladding during and after construction.

4.3 The owner has not made a submission in response to the application.

4.4 The Department requested advice from the parties for any evidence that would confirm the time that the fibre-cement cladding remained exposed to the weather. In an email to the Department dated 8 August 2011 the authority outlined its understanding of the situation, and said that a staff member believed that the cladding had 'remained unfinished … for more than 90 days' but 'had the owner applied a sealer coat prior to this the authority was] uninformed'. The owner did not respond to the request.

4.5 A draft determination was issued to the parties for comment on 30 August 2011.

4.6 The authority accepted the draft determination; noting an error of fact, which has been amended, and requesting the wording of the decision be changed to record that if rectification of the identified faults be completed then compliance would be achieved. I note that this wording is contained within paragraph 7.4.3.

4.7 As I had not received a submission from the owner I made a further request on 23 September 2011 for the owner to respond to the draft determination. The owner did not respond.

5. The expert's report

5.1 As mentioned in paragraph 1.4, I engaged an independent expert to assist me. The expert is a member of the New Zealand Institute of Building Surveyors. The expert inspected the addition on 30 June 2011, providing a report dated 19 July 2011.

5.2 The wall cladding

5.2.1 The expert noted that the sheet joints had been 'professionally jointed' using a tape reinforced system, with silicon-filled control joints installed in walls over 5.4m long. The control joints appeared to be in good condition with no signs of failure.

5.2.2 The expert noted that the aluminium joinery is face-fixed over the fibre-cement sheets, with planted timber facings and sills to match the appearance of the timber joinery in the original house. Metal head flashings extended over the top facings.

5.2.3 The expert observed a container of the sealer that was used over the incomplete cladding and identified it as a clear acrylic polymer product suitable for applying to porous surfaces, including over fibre-cement sheets and plastered joints. The owner

advised the expert that a single coat of semi-gloss acrylic paint had been applied over the splatter plaster and the sealed fibre-cement sheets.

5.3 Moisture levels

5.3.1 The expert noted fine cracks in the jointing compound, with the majority below the window sills. Non-invasive testing indicated that moisture levels were elevated around windows, which corresponded with the joint cracking.

5.3.2 The expert took invasive moisture readings below a sample window in the north bedroom wall, recording moisture levels within the fibre-cement sheets of more than 40%, with moisture levels reducing to about 18% within the cavity battens behind.

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

- a cavity closure is missing to a small area on the west wall of the garage
- some areas of fibre-cement are unpainted and may also be unsealed (including some bottom edges) and only one coat of paint was applied to the cladding
- there are fine cracks in the jointing compound, particularly below windows
- the ends of the head flashings are unsealed or poorly sealed
- timber window facings and sills are fixed over unsealed/unpainted fibre-cement; and water is penetrating behind the facings (which lack weathergrooves), with deterioration at the bottom of some timber jamb facings
- some pipe penetrations through the cladding are unsealed.

5.5 The expert concluded that, providing the above items are satisfactorily attended to and the cladding is appropriately maintained, he considered that the external wall cladding should ‘perform at the very least as long as it is legally required’.

5.6 A copy of the expert’s report was provided to the parties on 21 July 2011.

6. The expected durability of the fibre-cement cladding

6.1 The authority applied for the determination initially as result of concern about the possible effects of prolonged exposure of the fibre-cement sheets to the weather. The manufacturer recommends that the sheets should be sealed within 90 days of installation.

6.2 I have consulted the manufacturer on the likely effect of over exposure and have taken the following advice into account:

- Prolonged exposure to the weather can lead to deterioration, with a possible reduction in the effective useful life.
- The immediate effects of exposure to the weather may not be evident if the period of exposure is not excessive.
- The overall durability of the fibre-cement sheets will depend on a combination of length of time exposed to the weather, and the care taken with the ongoing maintenance.

6.3 According to the BRANZ appraisal for the product it has an expected serviceable life of at least 50 years. However, it is acknowledged that fibre-cement sheets have not been installed and finished fully in accordance with the manufacturer's installation instructions.

6.4 In the case of the fibre-cement cladding, I note the following:

- The addition has a low weathertightness risk and the fibre-cement cladding is installed over a cavity.
- It is possible the cladding may have been fully exposed to the weather for longer than 90 days but there is no evidence to this effect. While the cladding was observed as not having received its finishing coats, a sealer intended to provide temporary protection had been applied at some point within the 138 day period described by the original builder (refer paragraph 3.3.2)
- The sealer used was an acrylic polymer which was suitable for this type of surface.
- The expert observed no signs of deterioration in the fibre-cement sheets.
- The expert concluded that the cladding would meet the requirements of the Building Code provided it was properly maintained and the points of water entry fixed.

6.5 Taking the above observations into account I concur with the expert and accept that the fibre-cement sheets will meet the minimum 15 years durability period required by Clause B2.3.1, provided the necessary remedial work described herein is properly completed, and that the cladding and the building envelope is properly maintained.

7. The weathertightness of the cladding

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

7.2 Weathertightness risk

7.2.1 The addition to this house has the following environmental and design features which influence its weathertightness risk profile:

Decreasing risk

- the house is in a low wind zone
- the addition is single-storey and simple in form
- most walls have eaves projections to shelter the cladding
- the monolithic wall cladding is fixed over a drained cavity
- the external wall framing is likely to be treated to a level that provides resistance to decay if it absorbs and retains moisture.

Increasing risk

- the aluminium windows are face-fixed to the monolithic cladding and may lack sealant.

7.2.2 When evaluated using the E2/AS1 risk matrix, these features show that all elevations of the addition demonstrate a low weathertightness risk rating. I note that this addition would not have required a drained cavity in order for a monolithic cladding system to comply with the requirements of E2/AS1, yet one has been provided.

7.3 Weathertightness performance

7.3.1 Despite the wall cladding not being coated in accordance with the manufacturer's instructions, the cladding generally appears to have been installed to reasonable trade practice. However, taking account of the expert's report, I conclude that remedial work is necessary in respect of the items outlined in paragraph 5.4. I note also that some investigation may be required into the installation and sealing of the window joinery.

7.4 Weathertightness conclusion

7.4.1 I consider the expert's report establishes that the current performance of the external wall cladding is not adequate because there is evidence of moisture penetration into the fibre-cement sheets and into the timber cavity battens. Consequently, I am satisfied that the addition does not comply with Clause E2 of the Building Code.

7.4.2 In addition, the cladding is also required to comply with the durability requirements of Clause B2 Durability. Clause B2 requires that a building continues to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement for the addition to remain weathertight. Because the wall cladding faults will continue to allow the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.

7.4.3 Because the faults identified with the wall cladding occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 5.4, including investigation into the window joinery as described in paragraph 7.3.1, will result in the building envelope being brought into compliance with Clauses B2 and E2 of the Building Code.

7.4.4 I emphasise that each determination is conducted on a case-by-case basis. Accordingly, the fact that a particular cladding has been established as being code compliant in relation to a particular building does not necessarily mean that the same cladding system will be code compliant in another situation.

7.5 Maintenance

7.5.1 Effective maintenance of claddings is important to ensure ongoing compliance with Clauses B2 and E2 of the Building Code, and the Department has previously described such requirements in earlier determinations (for example, Determination 2007/60).

7.5.2 As discussed in paragraph 6.2, the overall durability of the fibre-cement sheets is dependent on the exposure to the weather during construction, and attention paid to the ongoing maintenance. Ongoing maintenance is the responsibility of the building owner. In this instance the owner should pay particular attention to the maintenance of the coating system to the fibre-cement, as well as the overall weathertightness of the building envelope as recommended by the expert.

8. What is to be done now?

8.1 The authority should issue a notice to fix that requires the owner to bring the addition into compliance with the Building Code, identifying the cladding defects listed in paragraph 5.4 and investigation in paragraph 7.3.1 and referring to any further defects that might be discovered in the course of investigation and rectification, but not specifying how those defects are to be fixed. It is not for the notice to fix to specify how the defects are to be remedied and the building brought to compliance with the Building Code. That is a matter for the owner to propose and for the authority to accept or reject.

8.2 I suggest that the parties adopt the following process to meet the requirements of paragraph 8.1. The owner should produce a response to the notice to fix in the form of a detailed proposal, as to the rectification or otherwise of the specified matters. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

9. The decision

9.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the cladding to the addition does not comply with Clauses E2 and B2 of the Building Code.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 11 October 2011.

John Gardiner
Manager Determinations