Department of Building and Housing
Te Tari Kaupapa Whare

Determination 2009/46

Determination regarding the code compliance of a 5-year-old house with monolithic cladding at 108 Black Barn Road North, Havelock North

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 owner, A and L Lowe Family Trust ("the applicant"), and the other party is the Hastings District Council ("the authority"), carrying out its duties as a territorial authority or building consent authority. The purchaser of the building, A Kyle ("the purchaser") is also a party to the matter.

1.2 This determination arises from the decision of the authority to refuse to issue a code compliance certificate for a 5-year-old house because it was not satisfied that it complied with Clauses B1, B2 and E2 of the Building Code[2] (First Schedule, Building Regulations 1992).

[1] The Building Act 2004 is available from the Department's website at www.dbh.govt.nz.
[2] The Building Code is available from the Department's website at www.dbh.govt.nz.
In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

1.3 The matters for determination are:

1.3.1 Matter 1: The cladding

Whether the cladding as installed on the house ("the cladding") complies with Building Code Clause B2 Durability and Clause E2 External Moisture. By "the cladding as installed" I mean the components of the systems (such as the backing materials, the plaster, the flashings and the coatings), as well as the way the components have been installed and work together. (I consider this matter in paragraph 6.4.)

1.3.2 Matter 2: The deck structure

Whether the cantilevered deck complies with Building Code Clause B1 Structure, taking into account the possibility of decay to the deck's framing as a result of moisture ingress through the deck – cladding junction. (I consider this matter in paragraph 7.)

1.4 In making my decision, I have considered the submissions of the parties, the report of the expert commissioned by the Department to advise on this dispute ("the expert"), and other evidence in this matter. With regard to the cladding, I have evaluated this information using a framework that I describe in paragraph 6.1.

2. The building work

2.1 The building work consists of a large house that is 2-storeys in part and situated on a gently sloping excavated site in a high wind zone for the purposes of NZS 3604[3]. The building is one of a group of similar houses constructed at the rear of a vineyard, and shares the west boundary wall with an adjacent house. Construction is generally conventional light timber frame, with a concrete slab and foundations, a concrete masonry boundary wall, monolithic cladding and aluminium windows.

2.2 The U-shaped plan faces north, with living areas and a bedroom opening onto a large paved area. The eastern "leg" of the U accommodates dining, kitchen and laundry areas and the western leg provides bedrooms, with the living room linking the two areas. The garage and main entry are to the south, with a small upper level above which accommodates a master bedroom and ensuite.

2.3 The house is fairly complex in form and has gabled roofs with parapet walls at the gable ends and no eaves. The profiled metal roofs are pitched at 18^{o}, except for an 8^{o} pitch northern slope above the living room. The concrete block boundary wall forms a plastered parapet above the west roof, with a membrane lined gutter that falls to rainwater head at the north and south ends where the wall extends for several metres.

2.4 A cantilevered juliette balcony ("the deck"), with a tiled floor and open metal balustrades, extends to the south from the upper level master bedroom to form a canopy above part of the recessed main entry. A steel lintel beam spanning the 4m recess and supporting the cantilevered deck joists is framed and boxed to form a decorative monolithic-clad beam above the entry.

[3] New Zealand Standard NZS 3604:1999 Timber Framed Buildings

2.5 I note that the specification calls for the framing to be "H1 treated". The expert has advised that the timber framing had the appearance of being boric treated, which he considered was supported by the limited damage despite high moisture. I therefore accept that the external wall framing is likely to be boric treated.

2.6 The monolithic cladding is a proprietary system described by the manufacturer as an 'exterior lightweight plaster system'. The cladding system consists of 4.5mm fibre-cement sheets fixed through the building wrap directly to the framing timbers, and covered with fibreglass mesh-reinforced modified plaster finished with a flexible coating system. While the system is described and detailed in the building consent documentation, I note that as-built installation differs significantly from the manufacturer's details.

3. Background

3.1 The authority issued a building consent for the house (No. ABA 20031572) on 17 September 2003 under the Building Act 1991.

3.2 The authority carried out various inspections during construction, including a plastering inspection on 29 November 2003, with the inspection summary noting:

> Called to site to look at stucco flashings. Was not convinced that plastic flashings will make job weatherproof as I believe water will still penetrate behind. Spoke with team leader and he will come and have a look.

3.3 The inspection record makes no further mention of the plaster, and the authority carried out a final inspection on 2 September 2004. The summary record describes the building as a 'neat tidy job completed to high standard' and notes that the plaster system is 'apparently approved for use'. The final inspection checklist notes that various documentation was still required, including producer statements for 'cladding/batts'. The job file subsequently notes the gas certificate and drainage as-built as 'faxed'.

3.4 According to the applicant, the builder has advised that all of the outstanding documentation was provided within 24 hours of the final inspection and he therefore expected the code compliance certificate to be issued directly to the owner. At the same time, the applicant assumed that the builder had uplifted the certificate.

3.5 The applicant remained unaware of the lack of a code compliance certificate until late 2008 when a copy was sought in order to settle the sale of the house. The authority advised the applicant that no certificate had been issued and carried out another final inspection of the house on 6 November 2008, including invasive testing below the deck into the entry beam. Moisture was found to be trapped inside the cladding around the beam.

3.6 In a letter to the applicant dated 21 November 2008, the authority refused to issue a code compliance certificate and attached a 'Notice pursuant to sections 95A & 436 Building Act 2004', which provided the reasons for the refusal, summarised as follows:

The final re-inspection on 6 November 2008 identified defects, including:

- numerous cracks in the cladding
- gaps and cracks at the parapet/fascia junctions
- fascia boards embedded into unsealed plaster cladding
- very high moisture readings in the entrance lintel beam under the deck
- the apparent repairs to some areas of the cladding
- the high wind zone of the house and the lack of roof overhangs.

The authority concluded that it could not be:

> ... satisfied that the dwelling meets or met the requirements of the NZ Building Code that was in force at the time the building consent was issued, in particular, B2 Durability, E2 External Moisture and B1 Structural Integrity.

The authority also noted that pending the receipt of producer statements and energy certificates it was likely that a code compliance certificate could have been issued following the final inspection in September 2004.

3.7 The Department received an application for a determination on 13 February 2009.

4. The submissions

4.1 The application was accompanied by a summary of the history of the project. The statement noted that the authority has been unable to explain what documentation was missing and why the code compliance certificate was not issued in 2004. The applicant notes that as there were no concerns with the construction at that time, the authority was therefore obliged (under section 93 of the Building Act 2004) to issue the code compliance certificate within 20 days of receiving the documentation on 3 September 2004, or to provide reasons for the refusal (refer paragraph 8). The statement concluded:

> It would seem unreasonable, some four years later, the Council should refuse to issue the certificate when the legislation clearly envisages that an owner should know within 20 days whether and why Council refuses to issue one.

4.2 The applicant forwarded copies of:

- the drawings and specifications
- the consent documentation
- the inspection records
- the correspondence from the authority
- various other statements and technical information.

4.3 The authority acknowledged the application, and was provided with a copy of the applicant's submission, but made no submission in response.

4.4 A draft determination was issued to the parties for comment on 20 April 2009.

4.5 The parties accepted the draft without comment; the last response was received by the Department on 22 June 2009.

5. The expert's report

5.1 As mentioned in paragraph 1.4, I engaged an independent expert to provide an assessment of the condition of those building elements subject to the determination. The expert is a member of the New Zealand Institute of Building Surveyors. The expert inspected the house on 5 March 2009 and furnished a report that was completed on 13 March 2009. The expert noted that his inspection was limited to establishing the compliance of the house with Clauses B1, B2 and E2.

5.2 The expert noted that the house generally appeared to be constructed in accordance with the consent drawings, except for the lack of parapet cappings. The expert noted that colour variations indicated that repairs to cracks in the cladding had been attempted using paint, but the cracks had reappeared.

5.3 The expert noted that the layout of the backing sheets appeared satisfactory, control joints had been installed and ground clearances and overlaps at the bottom of the cladding appeared satisfactory.

5.4 The expert was able to observe the plaster thickness and fibreglass mesh at a cut-out beneath the entrance lintel, which was made by the authority during its final inspection. The expert noted that subsequent to the removal of this cladding by the authority the edge joists, which are treated, were drying out and despite showing residual moisture (refer to paragraph 5.6.3 – The deck) there were no signs of deterioration. Some time before the inspection, sections of lining had also been removed beside the upper bedroom balcony doors and beneath the garage window.

5.5 The windows and doors

5.5.1 The expert noted that the windows were recessed, with plastered reveals and metal head flashings. The depths of the reveals varied, with some windows described as 'shallow recessed' and others 'deep recessed'.

5.5.2 The shallow recessed windows appear to be face-fixed over the fibre-cement backing sheets, with the plaster subsequently applied and sealant applied at the junctions.

5.5.3 The deep recessed windows have sills of varying slopes, with the window embedded in the plaster and sealant applied at the junction with the window flanges.

5.5.4 The expert removed a small section of cladding at the sill of a deep recessed window in the upper level bathroom, where efflorescence suggested moisture penetration at the jamb to sill junction. A corroding galvanised sill flashing was observed and the expert considered that efflorescence at the corner indicated that moisture entered at that junction. I accept that the exposed junction is typical of similar locations elsewhere in the building.

5.6 Moisture

5.6.1 The expert noted that a moisture detection company had installed detection units into bottom plates of the exterior wall framing throughout the house. (I note that I have seen no information on these units, reports of the results of moisture monitoring or the reasons that the units were installed to the house.)

5.6.2 The expert inspected the interior of the house and noted evidence of current or past moisture problems in the following areas:

- water stains on the back of the building wrap in the garage wall cut-out
- water marks, fungi on the wrap and signs of decay to exposed framing in the garage cupboard
- signs of past moisture at the cut-outs beside the balcony doors
- insects suggesting a possibly damp environment within the walls.

5.6.3 The expert took invasive moisture readings through the cladding or with deep probes from the inside at areas considered at risk, and 10 of these were elevated as follows:

The windows and doors

- more than 50% in the plaster at the sill cut-out of the upper bathroom window
- 38% in the sill framing below the buried sill flashing (with non-invasive readings around most other windows showing similar results)

The parapets

- more than 50% below both ends of the parapet wall of the west wing
- more than 50% in the plaster below a crack at the corner of the west parapet, with ants apparent in the probe holes
- 19% in the framing of the garage cupboard cut-out below the above reading (despite the framing being exposed to dry)
- more than 50% at the north end of the west parapet, at the junction with the extended boundary wall parapet and adjacent to a rainwater head

The deck

- more than 50% in the plaster at the east junction of the deck to wall
- 30% in the framing below the west junction of the deck to wall
- 21% in the timber of the entrance lintel below the deck (reduced from the authority's reading due to the drying effect of the cut-out).

Moisture levels that vary significantly generally indicate that external moisture is entering the structure and further investigation is required of the cladding/deck covering join.

5.6.4 I note that this inspection was carried out at the end of summer, and I therefore consider that moisture levels may be higher at other times of year.

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

- there are numerous cracks in the cladding, including at window reveals, with evidence of attempts at repairing some past damage
- some penetrations through the cladding are not sealed and the gas supply box lacks a head flashing

The windows and doors

- the metal head flashings cannot drain as they are embedded within the plaster, including around the end projections, with cracks at the junctions

- the metal sill flashings are embedded under the plaster and are corroding, with moisture and signs of decay apparent in the framing below
- the shallow recessed windows appear to have been installed against unsealed fibre-cement backing sheets, with the plaster subsequently applied, and the junctions are cracking and reliant on sealant
- the junctions of the window jamb and sills are not weatherproof, with cracks and efflorescence apparent, and the sill flanges are sealed against the plaster
- although the site is in a high wind zone, windows to the east elevation are marked as suitable for medium wind zones, which needs investigating

The parapets

- the parapets have no cap flashing, with a membrane possibly installed beneath the solid plaster top, and moisture is penetrating into the framing
- part of the east parapet adjacent to a corner has a flat top, and the junction at the corner has cracked, with high moisture levels recorded
- the ends of the parapets are not weathertight, with efflorescence and severe cracking apparent at some junctions and signs of moisture penetration into the corner wall framing below
- the bottom of the apron flashings at the ends of the parapets lack kickouts, with unsealed gaps and cracks in the plaster
- the timber fascia boards behind the gutters have been installed against the backing sheets, and the fascias are almost fully embedded within the plaster
- the junction of the west boundary wall extension with the south parapet is not weathertight, with cracks and efflorescence apparent

The deck

- the bottom of the plaster cladding butts against the deck tiles with no clearance, and there is evidence of past leaks into the bottom plate
- the junctions of the sides of the deck with the wall appear to lack saddle flashings, with high moisture levels recorded
- moisture has been penetrating into timber at the entrance lintel beam under the deck which could result in rusting of the steel beam in time if the flashing details are not made good.

5.8 A copy of the expert's report was provided to the parties on 17 March 2009.

Matter 1: The cladding

6. Evaluation for code compliance

6.1 Evaluation framework

6.1.1 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solutions[4], which will assist in

[4] An Acceptable Solution is a prescriptive design solution approved by the Department that provides one way (but not the only way) of complying with the Building Code. The Acceptable Solutions are available from The Department's Website at www.dbh.govt.nz.

determining whether the features of this house are code-compliant. However, in making this comparison, the following general observations are valid:

- Some Acceptable Solutions cover the worst case, so that they may be modified in less extreme cases and the resulting alternative solution will still comply with the Building Code.
- Usually, when there is non-compliance with one provision of an Acceptable Solution, it will be necessary to add one or more other provisions to compensate for that in order to comply with the Building Code.

6.2 Evaluation of the building for E2 and B2 Compliance

6.2.1 The approach in determining whether building work is weathertight and durable and is likely to remain so, is to apply the principles of weathertightness. This involves the examination of the design of the building, the surrounding environment, the design features that are intended to prevent the penetration of water, the cladding system, its installation, and the moisture tolerance of the external framing. The Department and its antecedent, the Building Industry Authority, have also described weathertightness risk factors in previous determinations[5] (for example, Determination 2004/1) relating to cladding and these factors are also used in the evaluation process.

6.2.2 The consequences of a building demonstrating a high weathertightness risk is that building solutions that comply with the Building Code will need to be more robust. Conversely, where there is a low weathertightness risk, the solutions may be less robust. In any event, there is a need for both the design of the cladding system and its installation to be carefully carried out.

6.3 Weathertightness risk

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

Increasing risk

- the house is in a high wind zone
- the house is 2-storeys high in part
- the house is fairly complex in form, with a roof form that includes varying slopes, monolithic-clad parapets and complex wall to roof junctions
- there are no eaves projections to shelter the walls.
- the walls have monolithic cladding fixed directly to the framing
- a cantilevered timber framed deck extends from the upper floor

Decreasing risk

- the external wall framing is treated to a level effective in resisting decay if it absorbs and retains moisture.

6.3.2 The house has been evaluated using the E2/AS1 risk matrix. The risk matrix allows the summing of a range of design and location factors applying to a specific building

[5] Copies of all determinations issued by the Department can be obtained from the Department's website.

design. The resulting level of risk can range from "low" to "very high". The risk level is applied to determine what claddings can be used on a building in order to comply with E2/AS1. Higher levels of risk will require more rigorous weatherproof detailing; for example, a high risk level is likely to require a particular type of cladding to be installed over a drained cavity.

6.3.3 The weathertightness features outlined in paragraph 6.3.1 show that two elevations demonstrate a moderate weathertightness risk rating and two elevations a high risk rating. I note that, although a drained cavity is now required by E2/AS1 for solid plaster cladding at all risk levels, this was not a requirement at the time the house was constructed.

6.4 Weathertightness conclusion

6.4.1 Taking into account the expert's report, I am satisfied that the current performance of the cladding installed on this house is inadequate because there is evidence of moisture penetration. In particular, the cladding demonstrates the key defects listed in paragraph 5.7, which are likely to have contributed to the significant and widespread moisture penetration evident within the external walls of this building.

6.4.2 I have identified the presence of a range of known weathertightness risk factors in this house. The presence of the risk factors on their own is not necessarily a concern, but they have to be considered in combination with the significant faults identified in the cladding system. It is that combination of risk factors and faults that indicate that the cladding does not have sufficient provisions that would compensate for the lack of a drained and ventilated cavity. Consequently, I am not satisfied that the cladding as installed complies with either Clause B2 or Clause E2 of the Building Code. I have given further consideration to the question of B2 compliance under Matter 2 of this determination.

6.4.3 I consider that a more thorough investigation of the cladding to establish the extent any timber damage that may have already been sustained is required before the method of remediation can be decided, either by targeted repairs, re-cladding, or a combination of both. This requires a careful analysis by an appropriately qualified expert and should involve the systematic survey of all risk locations in order to determine the full extent of the repairs required. Once that decision is made, the chosen repair option should be submitted to the authority for its consideration and approval.

6.4.4 The investigation should also include the condition of the deck joists in order to confirm the structural adequacy of the deck structure.

6.4.5 I note that the Department has produced a guidance document on weathertightness remediation[6]. I consider that this guide will assist the owner in understanding the issues and processes involved in remediation work and in exploring various options that may be available to them when considering the upcoming work required to the house.

[6] External moisture – A guide to weathertightness remediation. This guide is available on the Department's website, or in hard copy by phoning 0800 242 243

Matter 2: The deck structure

7. The structural condition of the deck

7.1 Discussion

7.1.1 The authority has expressed concerns about the structural integrity of the deck structure following its final inspection, which identified high moisture levels in the underside of the beam beneath the deck (refer paragraph 3.6).

7.1.2 I note that the beam below the deck also forms the lintel above the recessed entry. This is a boxed steel beam, which would corrode if subject to long term moisture penetration into its surrounding timber. Although there are no indications of any significant decrease in strength of the beam or joists in the four years since construction, repairs are needed to ensure that the moisture conditions in the timber surrounding the steel beam are alleviated in order to prevent future deterioration.

7.1.3 I note that the expert's report establishes that there is significant water penetration into the framing of the cantilevered deck and into the entrance lintel beam below the deck. However, the expert has not identified any evidence of current damage to the deck framing that would lead me to conclude that the deck structure is inadequate.

7.2 Conclusion

7.2.1 I consider the expert's report establishes that the structure of the deck is adequate because there is no evidence of damage to the steel beam or the timber joists at present. Consequently, I am satisfied that the deck complies with Clause B1 of the Building Code.

7.2.2 However, the deck structure is also required to comply with the durability requirements of Clause B2. Clause B2 requires that a building continues to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement for the deck to remain structurally adequate. Because the cladding faults associated with the deck will continue to allow the ingress of moisture in the future, the deck structure does not comply with the durability requirements of Clause B2. I have considered the cladding's performance above.

8. The applicant's submission

8.1 As outlined in paragraph 4.1, the applicant maintains that, under section 93 of the Building Act 2004, the authority was obliged to issue a code compliance certificate within 20 working days of receiving the required documentation in 2004, or to provide reasons for the refusal. However, I note that the building consent for this house was issued under the Building Act 1991.

8.2 Section 436 of the Act applies to building work carried out under building consents issued under the former Act, and states:

> **436 (2)** An application for a code compliance certificate in respect of building work to which this section applies must be considered and determined as if this Act had not been passed.

8.3 I therefore take the view that the obligations now imposed by the Act in regard to considering code compliance certificates did not apply to the building work carried out under the building consent for this house.

9. What is to be done now?

9.1 A notice to fix should be issued that requires the owner to bring the house into compliance with the Building Code, identifying the items listed in paragraph 5.7 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 stipulate directly how the defects are to be remedied and the house brought to compliance with the Building Code. That is a matter for the owner to propose and for the authority to accept or reject.

9.2 I would suggest that the parties adopt the following process to meet the requirements of paragraph 9.1. Initially, the authority should issue the notice to fix. The owner should then produce a response to this in the form of a detailed proposal, based on further investigation as necessary (including investigation of the deck timbers), and produced in conjunction with a competent and suitably qualified person, as to the rectification or otherwise of the specified issues. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

10. The decision

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

- the deck does comply with Clause B1 of the Building Code
- the deck does not comply with Clause B2 of the Building Code
- the house does not comply with Clauses E2 and B2 of the Building Code

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 Department of Building and Housing on 30 June 2009.

John Gardiner
Manager Determinations