



## **Determination 2008/105**

26 November 2008

### **Determination regarding the weathertightness of decks in a townhouse complex at 39 Garnet Road, Westmere, Auckland**



#### **1. The matter to be determined**

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004<sup>1</sup> (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing, for and on behalf of the Chief Executive of that Department. The applicants are the owners of 7 individual townhouses in the complex (“the applicants”), represented by one of the owners, G Gaylor (“the applicants’ representative”), and the other party is Auckland City Council (“the authority”) carrying out its duties and functions as a territorial authority or building consent authority. I have included Master Build Services (“the guarantor”) as a person with an interest in this matter, acting through its legal advisor (“the guarantor’s solicitor”).

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<sup>1</sup> The Building Act 2004 is available from the Department’s website at [www.dbh.govt.nz](http://www.dbh.govt.nz)

- 1.2 The determination arises from the authority's decision to issue a code compliance certificate for the remedial work ("the remedial work") carried out on the building. The decision to issue the code compliance certificate is disputed by the applicants.
- 1.3 The matter for determination is whether the remedial work undertaken on the first floor decks of the units including the stairs ("the decks") complies with Clauses B2 Durability and E2 External Moisture of the Building Code<sup>2</sup> (Schedule 1, Building Regulations 1992). By "the remedial work" I mean the components of the deck floor system (such as the deck joists, the substrate material, the membrane, the screed and the tiles) as well as the way the components have been installed and work together.
- 1.4 I note that the building underwent major remedial works under a single building consent, which included replacement of the original cladding. The new cladding is not part of this determination. However, I have considered those parts of the work that affect the performance of the decks. This principally applies to the loads imposed on the decks' timber structure and the subsequent deflection which impacts on the weathertightness performance of the decks.
- 1.5 I also note that the building contains 8 units in total, with 7 townhouses of identical design and one at the eastern end of different design. The latter was not part of the remedial work that is the subject of this determination.
- 1.6 In making my decision, I have considered the following:
- the applicants' submissions
  - photographs taken during construction of the decks
  - the guarantor's solicitor's submissions
  - the report by the independent consultant commissioned by the guarantor to advise on the decks
  - the project managers' report on the deck matters
  - the reports of the independent expert commissioned by the Department to advise on this dispute ("the expert")
  - various information and clarification from the membrane supplier
  - the other evidence in this matter.

I have evaluated the information using a framework that I describe more fully in paragraph 12.1.

## **2. The building**

- 2.1 The 3-storey townhouse complex is situated along a long, narrow, gently east-sloping site in a moderate wind zone for the purposes of NZS 3604<sup>3</sup>. The 7 essentially

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<sup>2</sup> The Building Code is available from the Department's website at [www.dbh.govt.nz](http://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.

<sup>3</sup> New Zealand Standard NZS 3604:1999 Timber Framed Buildings

identical units are staggered in plan at the party walls and step down the slope; with driveway access provided from the street to garages on the south elevation. Construction includes specifically engineered concrete tilt slab party walls between the units, with the remaining construction conventional light timber frame, incorporating concrete slabs and foundations, solid plaster claddings, and aluminium windows. The plan and form is complex, with parapets above external walls and various decorative cornices, buttresses and other features.

2.2 The remedial work included replacement of the original solid plaster cladding with the same cladding type but installed over a cavity.

2.3 Given the original date of construction in 2000, and the lack of other evidence, I consider that the original external wall framing is likely to be untreated. I note that the remedial work was undertaken in 2005 and 2006, and I consider that the timber used in the remedial work is likely to be treated.

## **2.4 The decks**

2.4.1 Each unit has a small semi-circular “Juliet” balcony, with a tiled floor and open metal balustrades, cantilevered from the second floor of the north elevation. These balconies are not part of this determination.

2.4.2 The decks are approximately 5x2.7 metres in plan, and extend to the north from the first floor living room of each of unit and have tiled floors and open metal balustrades,. Each deck is situated over a ground floor bedroom, and includes tiled stairs at the eastern end that provide access to the garden below.

2.4.3 The remedial work included replacement of the deck floors, which now comprise 6mm ceramic tiles laid on a sand/cement screed (of variable thickness) over a torched-on membrane applied to a 17mm plywood substrate. (I note that the consent drawings show the deck tiles laid directly over the membrane, with movement joints to be incorporated).

2.4.4 The membrane and tiles to the stairs were replaced as part of the remedial work. However, the timber framing and plywood substrate to the stairs were not replaced.

2.4.5 The deck membrane is a “torch on” membrane. It is a 3mm modified waterproofing bituminous membrane that is adhered to the substrate and at lapped joints using the application of heat. The membrane was imported and distributed by the membrane supplier.

2.4.6 The expert has noted that the original timber framing to the exterior stairs appears to be “tanalised to the old H3”, while the original joists to the decks appear to be untreated, with evidence of site-applied timber preservative applied to some areas during the remedial works. I note that the consent drawings specify H3.2 treated plywood. I also note that, although revised details of the “Juliet” balconies state “apply frame saver to all existing deck framing timbers”, there is no treatment indicated for the first floor deck framing.

### 3. Background

- 3.1 The original building appears to have been constructed in 2000..
- 3.2 The authority issued a building consent for the remedial work under the Building Act 1991, numbered BLD20050001901 and dated 28 January 2005. It appears that building work commenced in July 2005. The applicants' representative was elected as the unit owners' representative for the duration of this work.
- 3.3 Remedial work on each deck commenced as the condition of the underlying timber was determined. The replacement of damaged timber and plywood, and the installation of the deck membrane were underway from August 2005.
- 3.4 Due to the size of the decks, the membrane system required lapped joints that did not result in a surface that was flat enough for the proposed tiled finish, so a thin plaster screed was used to provide a level surface and falls. The work on the decks was completed by about March 2006.
- 3.5 On 11 September 2006, while reviewing the second floor balconies, the membrane supplier's technical representative expressed concerns about the system of tiling and screed over the membrane used on the first floor decks.
- 3.6 Following correspondence between the applicants' representative, the membrane suppliers and a multi-disciplinary consultancy firm engaged by the guarantor ("the project managers"), the guarantor engaged an independent building consultancy company ("the consultant") to "review remedial work to the main decks in terms of what has been applied in product, compatibility and workmanship".
- 3.7 The consultant inspected the first floor decks on 9 October 2006 and provided a report dated 17 October 2006. The consultant reviewed documentation and correspondence and discussed the deck construction with the various parties, noting that the works were nearing completion but that a code compliance certificate had not been issued. The consultant included the following comments:
- Sealant movement joints in the tiles extend only the depth of the tiles.
  - Sealant joints were missing in some areas.
  - Photographs indicate that the screed is laid directly over the membrane.
  - The screed varies between 10mm and 25mm, and is presumably laid with a fall and will be thicker at the wall sides.
  - Several tiles are dislodged on the stairs.
  - A warranty for workmanship will be provided by the membrane applicator, (an approved applicator for the product).
  - The membrane supplier has advised that the application does not meet the recommendations for a 15-year warranty for the whole deck waterproofing and tiling system.

- Without a separating layer between the screed and the membrane, any deflection and cracking of the screed has the potential to rupture the membrane (which would invalidate the warranty).
- The construction does not accord with any of the cited documents, specification and consented plans either individually or as a combination.

The consultant concluded that there was a concern that the deck floors would not meet the durability requirements of the building code and recommended that, if the issues could not be satisfactorily addressed, re-laying the decks to the supplier's recommendations should be considered.

3.8 The membrane applicator has supplied a 15-year "Workmanship and application warranty" dated 15 December 2006 to cover defective workmanship in the application of the deck membrane. Although the membrane supplier did not supply a guarantee on completion of the decks (refer paragraph 3.10), a 15-year general materials guarantee for the membrane layer was subsequently issued by the membrane supplier on 17 July 2008, with further clarification subsequently provided (refer paragraph 8.11).

3.9 Following a meeting with the project managers, the authority issued site instructions dated 21 March 2007 for the following items:

1. Flexible sealant required to perimeters of all decks with coverage of grout (x 7).
2. Provide control joint to centre of decks (x 7) with grout topping.
3. Provide sealant to downpipes at bases to lower decks and cover with grout.
4. Extend gutters to outer lower decks where applicable (x 7) to full depth of decks.
5. Provide 35mm cladding to deck clearances (x 7) lower decks.
6. Provide EDM washers to all balustrade railings that penetrate into decks.
7. Manufacturer's warranty required for membranes to Juliet balconies and lower decks [membrane supplier].

3.10 At a meeting between the guarantor, the consultant and the authority on 3 May 2007, the authority confirmed that the tiles and the screed needed to be uplifted. On 10 May 2007, in response to this decision, the membrane supplier provided a scope of recommended work for the deck's reinstatement in an email to the consultant, on the basis that a decision had been reached "to uplift the existing tiles and screed". The supplier stated that a 15-year product warranty would be supplied, based on the following specification requirements for the work to the decks:

- Remove the existing tiles and screed.
- Over-surface the membrane with a second layer of membrane.
- Install a protective slip layer over the membrane.
- Install a 30mm to 50mm reinforced concrete screed providing required falls and expansion joints to correspond with tiling expansion joints (with a structural engineer to confirm loadings imposed by the screed and tiles).

- Lay tiles with expansion chases at 2m maximum and at vertical junctions.
- 3.11 In a letter to the project managers dated 11 May 2007, the guarantor confirmed the outcome of a meeting with the authority, which:
- ...confirmed that it is not acceptable to Council for the required perimeter relief joints to be retro installed and that the screeds would need to be up-lifted. [The building official] confirmed that the screeds should then be re-instated in accordance with [the membrane supplier's] recommendations so that a 15-year warranty can be provided on the deck surface (including the tiles and screeds).
- 3.12 On 25 June 2007 the authority approved a proposal from the project manager to retrofit movement joints without removing the tiles or screed.
- 3.13 When the applicants were informed of the proposal, the applicants' representative advised the guarantor that the proposed work would not meet the membrane supplier's requirements for a warranty and requested that this issue be addressed before work proceeded. The request was refused.
- 3.14 In a letter to the authority dated 29 August 2007, the applicants' representative outlined the owners' concerns regarding the code compliance of the proposed work to the decks, and requested urgent clarification of the authority's position with regard to the matter.
- 3.15 The authority responded in an email to the applicants' representative dated 5 September 2007, which noted that the site instruction as outlined in paragraph 3.8 still "stands", but also stating that it was now satisfied that:
- ...the B2 (Durability) requirement for retro-fitting of the expansion/control jointing to the 1st floor decks is achievable.
- 3.16 In a letter dated 14 September 2007 to the guarantor's solicitor, the solicitor acting for the applicants questioned the value of the membrane installer's warranty without the backing of a supplier's warranty, and forwarded copies of the letter to all parties, including the authority.
- 3.17 The guarantor's solicitor responded in a letter dated 24 September 2007 (with a copy forwarded to the authority), which included the following points:
- A warranty is not a requirement for a code compliance certificate.
  - A copy of the membrane installer's warranty has been provided to the authority and no issues have been raised.
  - The builder will provide a producer statement for construction including the deck membranes.
  - The membrane installer has confirmed that the membrane was laid in accordance with the manufacturer's requirements.
  - The membrane manufacturer's concerns relate only to an appropriate manner of repair should the screed be removed for further remedial work. As a non-invasive method of repair has been formulated, the screed does not need to be removed and the membrane supplier's comments are not relevant.

- The method of repair was developed and agreed in with the authority.
  - The applicants are not entitled to insist on any particular method of repair.
- 3.18 The retro-fitting of movement joints, together with the other items required by the authority as outlined in paragraph 3.8, was subsequently carried out and approved by the authority after a final inspection on 3 December 2007.
- 3.19 The authority issued a code compliance certificate for all of the remedial work to the building on 26 February 2008.
- 3.20 On 4 March 2008 an application for a determination was received by the Department.

#### **4. The submissions**

- 4.1 The applicants' representative made a detailed submission that outlined the background of the dispute, described the deck construction and its defects, outlined the owners' concerns regarding the durability of the deck membrane system, noted that the decks are a high risk building element, pointed out the lack of documentation for the "alternative solution" used for these decks and described early signs of deterioration of the deck surfaces, concluding:
- The owners of 1-7/39 Garnet Road believe that the weather proofing system to the first floor decks and the detail at the bottom of the adjoining cladding is not Code Compliant. And given the views expressed by the membrane manufacturer, supported by apparent early signs of deterioration, there is a high probability that the membrane on these decks will fail.
- 4.2 The applicants forwarded copies of:
- the drawings and specification for the remedial work
  - the deck consultant's report dated 17 October 2006
  - some of the authority's inspection records
  - the code compliance certificate dated 26 February 2008
  - correspondence with the authority
  - correspondence with the guarantor's representative and its solicitor
  - other correspondence between the authority, the project managers and the guarantor's representative
  - correspondence with the membrane supplier
  - various other sketches, statements, warranties and information.
- 4.3 The authority made no submission, and forwarded a CD-Rom that was entitled "Property File" that contained documents that were pertinent to this determination.
- 4.4 Copies of the initial and subsequent submissions and other evidence have been provided to each of the parties.

## **4.5 Submissions in response to application**

- 4.5.1 In a letter to the applicants dated 26 May 2008, the guarantor's solicitors stated that issuance of the code compliance certificates confirmed that the authority is satisfied that the remedial work complies with the Building Code and noted that they had been informed that the applicants' representative was attempting to have the certificates reversed. The solicitor noted the considerable expense involved in the engagement of respected and experienced project managers and consultants, who are satisfied that the remedial work is code compliant.
- 4.5.2 Following receipt of a copy of the above letter, the Department asked the applicants to consider including the guarantor as a related party with an interest in the determination. The applicants agreed to this in an email to the Department dated 3 June 2008.

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

- 5.1 As discussed in paragraph 1.6, 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.
- 5.2 The expert inspected the decks on 2 April 2008, and furnished a report that was completed on 9 April 2008. The expert noted that his inspection was limited to the first floor decks including stairs and the bottom of the cladding adjoining the deck floors.
- 5.3 The expert noted a number of areas that differed from the consent drawings, including:
- the bottom of the cladding adjoining the deck floors
  - the screed applied over the deck membranes.
- 5.4 The expert noted that the quality of the wall cladding adjoining the decks was generally "all high", apart from areas outlined in paragraph 5.9.
- 5.5 The expert removed a section of ceiling from the bedroom in the west unit to observe the timber framing and plywood below the deck, and noted that the framing appeared to have been treated with site-applied timber preservative that had been "applied in places" and the plywood substrate appeared to be treated. The expert also inspected the framing below the stairs, noting that it appeared to be treated to the equivalent of the "old H3" level. I accept that the areas inspected in this unit are typical of similar locations throughout the building.
- 5.6 The expert noted that the bottom of the wall cladding above the decks had been cut back to achieve the clearance from the bottom of the cladding to the deck tiles. (I note that this was required by the authority as outlined in paragraph 3.8).
- 5.7 The expert also noted that the 2-storey wall above the deck over-sails the wall below the deck by about 400mm for the length of wall that projects out as a "bay", and imposes point loads on either side of the large first floor doors that open to the deck.



The expert inspected the bedroom ceiling (of the west unit), and measured a sag of about 20mm beneath the side of the doors with tape coming away from a plastered joint. The expert also noted that, when the section of ceiling was removed, the sloping fillet above the deck joists appeared to run from nothing to about 40mm across the width of the room, which did not appear to correspond with the very low slope to some areas of the deck surface above.

## **5.8 Moisture levels**

- 5.8.1 Where the section of ceiling was removed to expose the deck framing, the expert noted no evidence of moisture penetration through the deck. The expert took non-invasive and invasive moisture readings of the deck joists, and no elevated readings were noted.
- 5.8.2 The expert noted that the timber framing below the stairs was wet, and appeared to be continually damp.
- 5.9 Commenting specifically on the first floor decks, the expert observed that:
- the screed applied over the deck membrane does not comply with the membrane manufacturer's recommendations
  - the deck joists appear to be under-sized for the imposed loads, and have a noticeable sag beneath the upper walls
  - the decks are ponding and water is being absorbed into the underlying screed
  - the tiles on the stairs are inadequately adhered, with loose tiles apparent
  - where cut back, the bottom of the adjoining cladding is unsealed, lacks cavity closures and has exposed metal mesh and base mouldings likely to corrode.
- 5.10 The expert also noted that the timber stair framing appears to be inadequately treated for the level of continual moisture apparent in the timber.
- 5.11 A copy of the expert's report was provided to each of the parties on 11 April 2008.
- 5.12 In a letter to the Department, dated 27 April 2008, the applicant generally concurred with the expert's report. The applicant emphasised that the decks did not shed water properly, with the screed absorbing water via the mortar joints and holding it for an extended period of time so contributing to the failure of the tile adhesion. The applicant also noted the minimum deck fall of 1:60 (1°) required in E2/AS1 and the more conservative 1:30 (2°) slope recommended by the authority in its practice note (BLD-142-PN; dated 31 July 2007).
- 5.13 In the response to the second draft determination (refer paragraph 6.3), the guarantor's solicitor included the following comments on the expert's report (in summary):
- The screed over the membrane complies with the membrane supplier's recommendations.
  - The fillets were used only to introduce a slope to the decks.

- The loose tiles were on the stairs not the decks, and have since been fixed.
- The tiles on the stairs are not laid over a mortar bed. They are glued to the membrane, using an appropriate adhesive (that is also compatible with the deck screed).
- The lack of fall on the decks is not evidence that the decks are failing to shed water or ponding.

## **6. Report of the applicant's engineer**

6.1 Following the application for a determination the applicants' representative engaged a structural engineer ("the engineer") to undertake a preliminary review of the first floor deck structure. Based on the drawings and sketches provided, the engineer calculated the loads and reported to the applicants' representative in a letter dated 9 April 2008, noting that further on-site investigation is needed to confirm the assumptions underlying his calculations. Based on those assumptions, the engineer stated:

Our calculations show for the ultimate limit state the deck joists are under strength by 25% of their capacity and for the serviceability limit state the deflection is also beyond acceptable limits.

6.2 The applicants later engaged the engineer to undertake a more detailed review of the first floor deck structure and provided further information for the analysis. Based on the drawings and sketches provided, the engineer calculated the loads and reported to the applicants' representative in a letter dated 17 August 2008, concluding:

Our calculations show for the ultimate limit state the deck joists are under strength by 16% of their capacity (at 400ctrs) and for the serviceability limit state the deflection is also beyond acceptable limits.

## **7. The first draft determination**

7.1 A first draft determination was issued to the parties for comment on 20 May 2008. The applicants accepted the draft on 23 May 2008 and the authority accepted the draft on 3 June 2008.

7.2 The guarantor's solicitors responded to the first draft determination in a letter to the Department dated 19 June 2008, which attached a report from the project manager and made the following comments (in summary):

- It was regretted that the guarantor, the project managers and the builders were not consulted earlier in the determination process.
- The applicants were consulted and kept informed on the nature and scope of remedial work, but their representative reached certain mistaken conclusions which have been repeated in the submission material. (A copy of the letter to the applicants dated 24 September 2007, which I have summarised in paragraph 3.17, was attached as an example).
- Some items in the expert's report relate to the original consent work, and not to the current consent for the remediation work.

- A report by the project manager (dated 17 June 2008, refer paragraph 7.3) shows that there is only the minor issue of the sealing at the base of the cladding where further work is required. The contractor is prepared to remedy this promptly.
- The 17 June 2008 report shows that all other matters raised in the draft determination are not valid, as the remedial work meets the Building Code and the authority was correct to issue the code compliance certificate.
- Once the minor matter of the base sealing is addressed, the determination should uphold the grant of the code compliance certificate.

### **7.3 The project manager's review of the decks**

The guarantor's solicitor's submission in response to the first draft determination attached a report dated 17 June 2008 from the project managers to the guarantor, which concentrated on the items outlined in paragraphs 6.5.1 and 6.6.1 of the first draft determination. The project managers carried out a visual inspection of the first floor decks, and made the following summarised comments on the items in the draft determination:

#### **7.3.1 The deck screed separating from the membrane**

The screed is unreinforced and installed in accordance with BRANZ Good Practice Tile Guide, which limits unreinforced screeds to 25mm thick. The levelling screed varies from 10mm to 25mm and there is no evidence that the screed is separating from the membrane.

#### **7.3.2 Inadequate slope to decks with ponding**

The slope of each deck was measured, and recorded as varying between 0.3° and 1.2°, with the majority at 0.8°.

Only one area on Unit 1's deck was found to be ponding to about 2mm in an area of about 600mm in diameter, caused by one tile being slightly proud. The small amount of water cannot be termed "ponding", and therefore all decks have adequate slope to shed precipitated moisture.

#### **7.3.3 Inadequate adherence of and cracks in some tiles**

All cracked and loose tiles were replaced in April 2008, after the expert's visit. No other loose tiles were found, but 2 cracked tiles were noted which appear to have occurred after the remedial work was complete.

#### **7.3.4 Bottom of cladding unfinished**

This was due to the cladding being cut back to provide the correct clearance above the deck tiles. It is agreed that this work will be carried out.

#### **7.3.5 Durability of stair framing**

The timber structure and plywood substrate are the original construction. Only the membrane and tiles were part of the remedial works. There is no sign of any moisture penetration through the new membrane, but the sub-floor space is open and will become damp. The waterproof membrane is fully protecting the stair structure.

### 7.3.6 Structural performance of decks

No deflection was detected in the decks and when a live load was imposed, and there was no deflection or spring detected. When the new joists replaced the decayed timber, no deflection was detected.

The joist size and spacing complies with NZS 3604:1999, while the original design was based on the less stringent requirements of NZS 3604:1990. The deck joists are not undersized and are not deflecting.

### 7.3.7 Other issues

The authority carried out water tests on the deck to Unit 1, after which the code compliance certificate was issued.

The dead load imposed on the decks from the bay windows has not changed from the original consent, and has not affected the performance of the structure, which continues to comply with the Building Code.

### 7.3.8 Conclusions

- All work to the decks, with the exception of the unsealed bottom of the cladding, complies with the Building Code.
- The code compliance certificate should remain issued, subject to completion of the above item (refer paragraph 7.3.4).

7.4 I have considered the guarantor's solicitor's submission and the project manager's report, and have included and responded to the matters raised as I consider appropriate.

## 8. The second draft determination

8.1 A second draft determination was issued to the parties on 24 June 2008. The authority accepted the draft without comment on 9 July 2008.

8.2 The applicants generally accepted the second draft on 7 July 2008 and attached a letter to the Department from the applicants' representative, which noted various minor matters that I have incorporated as I consider appropriate. The applicants' representative also made the following comments on the stair framing in response to the project manager's report:

- Although only the stair tiles and membrane were replaced, the specification stated "remove and rebuild external stairs as detailed", and the consent drawings indicate new stair framing.
- As the framing should have been replaced, the matter of inadequate treatment identified in the first draft determination should be retained as part of the remedial work required in the determination.

8.3 On 8 July 2008 the guarantor's solicitor wrote to the applicants, noting that the guarantor was concerned that the owners were "becoming caught in a contest of professional points of view" between the project managers and the applicant's representative whose concern was that the decks might fail at some point in the

future. The solicitor pointed out that the owners at present have a code compliance certificate, the decks are not leaking and no further remedial work is required; and the authority, the project managers and the builder “all have a liability to you in the unlikely event that, in the future, the decks fail in some way as a result of their efforts”. The solicitor went on to invite the applicants to withdraw their application noting that, if the code compliance certificate overturned there would be an effect on the value or ability to sell the properties, a notice to fix would be issued by the authority which the owner would be required to remedy. The solicitor also reaffirmed that the guarantor would not arrange or pay for any further remedial work.

8.4 The guarantor’s solicitors responded to the second draft determination in a letter emailed to the Department on 18 July 2008, and attached copies of the following additional information:

- Minutes of Project Control Group meetings No. 5 to No. 21.
- A producer statement and guarantees for the deck membrane system.
- Information on the membrane.
- A producer statement for remedial work to the building.

8.5 The solicitors also made some comments on the experts’ report which are noted in paragraph 5.13.

8.6 In their letter, the guarantor’s solicitors also expanded on various matters covered in the project managers’ report dated 17 June 2008 (refer paragraph 7.3), described the ongoing involvement of the applicants’ representative throughout construction work on the decks and discussed technical aspects of the construction of the deck remedial work. The solicitor included the following aspects in regard to the evidence relating to the durability of the decks (in summary):

- The expert’s report confirmed that the decks are not leaking.
- The expert’s report states that the workmanship in the deck is high and the membrane used is of high quality.
- The membrane supplier has supplied a 15-year Product Performance Warranty for the membrane material, in full knowledge of the as built situation. (I note that the guarantee is dated 18 July 2008).
- The membrane installer provided the advice on the membrane and system used for the decks and has supplied a producer statement and 15-year warranty for the membrane installation.
- The main contractor for the remedial work has supplied a producer statement, which includes the remedial work carried out to the decks.
- The project managers’ report (refer paragraph 7.3) confirms that the deck construction complies with the code.
- The tiling system to the decks complies with the BRANZ Good Practice Guide.
- The decks have performed satisfactorily over the last 2 years, with no signs of systemic failure of the membrane or the overall system used, or of pooling, movement or separation of the screed.

8.7 Responding to the above letter, the applicants' representative wrote to the Department on 28 July 2008, including comments on his and the membrane supplier's concerns about the deck floor system, and other aspects of the background to the matter. I have considered these comments and incorporated them as I consider appropriate.

8.8 Within the above letter, the applicants' representative also included the following comments in response to issues raised by the guarantor's solicitor (in summary):

- No matter what terminology is used, the screed absorbs water and is laid directly over the membrane without a slip layer or any reinforcing as recommended by the membrane supplier.
- The screed is rigid relative to the timber framing below, which is why it is not recommended by the membrane supplier or BRANZ. The BRANZ Good Practice Guide for tiling ("the guide") refers to mortar/screed requirements over a concrete substrate, not to timber frame substrates.
- The reason that the guide does not require a slip layer or screed reinforcing is that BRANZ does not recommend this form of construction at all.
- While the screed is not currently separating from the membrane, earlier instances of this problem were documented in September 2006.
- It is not the number of tiles failing that is most critical, but rather the deterioration of the mortar joints and the likely, undetected separation of the screed from the membrane that would result from the screed retaining water.

8.9 The project managers responded to the above comments in a letter to the guarantor's solicitors dated 25 August 2008. I have considered these comments and incorporated them as I consider appropriate. The project managers made the following summarised comments:

- The BRANZ Good Practice Tiling Guide:
  - requires reinforcing only for mortar/screeds thicker than 25mm
  - does not mention any requirement for a slip layer for a mortar/screed
  - clearly shows options for tiling over a timber base
  - does not require a membrane to be applied over a screed.
- A screed, correctly primed to allow adhesion, is necessary over a torch-on membrane to provide a level surface that allows direct contact with the tiles.
- There was a lack of step-down from the inside floor levels despite upstands being provided. This meant that options were limited and the method chosen is an alternative solution needed to suit the situation.
- No national standards for tiling existed at the time of the remediation design.
- The full depth movement joints are installed around the perimeter of the decks, adjacent to the cladding.
- The movement joints within the deck area are 3mm into the screed. These joints were retrofitted to two decks.

8.10 In a letter to the membrane supplier dated 29 July 2008, the applicants referred to the earlier scope of work for the decks (refer paragraph 3.10), which was apparently required in order to achieve a 15-year product performance Warranty. The applicants described the as-built decks, noting that the recommendations had not been followed, and expressed surprise at the apparent change in the membrane supplier's position evidenced by the recent issue of the product warranty. Considering the concerns expressed earlier on the lack of reinforcing to the screed and the lack of a slip layer between the screed and the membrane, the applicants asked for clarification on the following issues:

- Was the warranty issued with knowledge of the as-built deck construction?
- If so, was approval given for the work done installing the movement joints?
- is the warranty valid despite the lack of reinforcing to the screed and the lack of a slip layer between the screed and the membrane?

8.11 In a letter to the applicants' representative dated 20 August 2008, the membrane supplier responded to the issues outlined in paragraph 8.10, and included the following summarised points:

- The file on the work has been reviewed and this has highlighted some areas of concern that had been disclosed in the past.
- A meeting with the builder has been recently held, after which the decks were visually inspected and discussed with the applicants' representative.
- The membrane supplier was not a party to the project contract and had not been engaged in any capacity to provide specific advice, although it does provide technical support when requested.
- Technical support was provided to assist those involved in the project, but this was apparently based on insufficient (and therefore incorrect) information.
- There is an ideal process for providing onsite quality control from the design stage onwards but, as that did not happen, the builder was bound by the contract documents.
- The membrane has been installed by an approved applicator in keeping with recommended systems at the time and any subsequent problems regarding the screed are not the supplier's responsibility.
- The warranty is issued based on the terms within, and covers the installation and finish of the membrane only. A "full product systems performance warranty" has not been provided.

The membrane supplier also noted that:

Nothing above implies that what has been installed is substandard and will not perform as required. It may very well do so.

If it doesn't in part and problems develop, they may be able to be rectified and decks perform as required. Whatever, these issues of concern or problems arising must be resolved with [the builder].

## **9. The expert's supplementary report**

- 9.1 On 14 August 2008, the applicants reported that a leak had occurred into a bedroom below the deck of one of the units, causing paint to bubble and the ceiling to sag. The expert returned to the property on 21 August 2008 to inspect the area with the builder. The expert noted that the leak appeared to have been a recent occurrence following a period of very severe rainfall, rather than gradual ongoing water penetration.
- 9.2 The expert noted that linings had been removed from the affected ceiling and walls and the builders were in the process of drying the timber. Water had saturated the plywood deck substrate and was running down the adjoining deck joists and wall framing. Water had pooled onto the plasterboard ceiling lining, which had sagged. Damage appeared to have been restricted to the wall and ceiling linings in the vicinity of the leak.
- 9.3 The builder reported to the expert that he had water tested the suspected point of ingress, and water had "hosed in" where expected underneath. The suspect area was the deck tile upstand to a short return at the end of the concrete party wall to the adjoining deck, and tiles had been removed from this to expose the membrane upstand.
- 9.4 The expert generally agreed with the builder on the cause of the leak, noting that:
- the membrane upstand was glued against the concrete wall, with the tiles adhered to the membrane
  - the membrane upstand was not continuous around the corner of the return at the end of the party wall
  - rainwater from the wall above had penetrated behind the tile and part of the membrane into the framing below
  - the exposed area of membrane was able to be pulled away from the concrete.
- 9.5 The expert noted that the upstand was not flashed or set into a chase in the concrete wall, which created a vulnerability to water entering the top of the tile upstand and potentially penetrating behind the membrane should there be a weakness in adhesion.
- 9.6 The expert's supplementary report was tabled at the hearing, and a copy was provided to each of the parties on 27 August 2008.

## **10. The hearing**

- 10.1 The guarantor's solicitor requested a hearing, which was held on 26 August 2008. I was accompanied by a Referee engaged by the Chief Executive under section 187(2) of the Building Act 2004. The guarantor's solicitor attended, together with four representatives of the project managers and a representative of the builder. Four of the owners appeared, including the applicants' representative. The authority was represented by two of its officers. A staff member, a consultant of the Department and the expert also attended.



- 10.2 Prior to the hearing, the attendees visited the project to view the decks. There was rain during the visit, and the group was able to observe the effect of rainwater falling onto the deck tiles. The group was also able to view the underlying construction beneath the area of sag to a bedroom below one of the decks (refer paragraph 5.7) and the timber beneath the stairs. The location of the recent leak into another unit (refer paragraph 9) was also viewed, although the underlying construction was not visible as repair work had been completed and new linings had been installed in the bedroom under the deck.
- 10.3 The guarantor's solicitor's verbal submission was predominantly based on expanding the issues raised in their detailed submission in response to the two draft determinations. The guarantor's solicitor called upon the project managers and the builder at various times during the hearing to expand on points raised.
- 10.4 In addition to the points summarised in paragraphs 7.3 and 8.5, the guarantor's solicitor, and the project managers, raised the following summarised points:
- The project managers' review of the work done has confirmed that any problems are isolated rather than indications of systemic failure.
  - The work on the decks was performed from the top, and was limited by the existing floor and deck levels. While a raised nib improved clearances, the minimal step at the deck doors still limited the amount of deck fall achievable. The falls achieved are as good as were practically possible, and do allow water to shed to the outside of the decks as seen during the rain at the site visit.
  - The membrane supplier has now seen the deck and is now fully aware of the plaster screed and tile system used and has not withdrawn the Product Performance Warranty.
  - The fillets above the joists were in place originally and were just replaced as necessary. Any original structural problems are a matter for the applicants and the authority to resolve outside the building work covered by the remediation contract.
  - Water entering the mortar joints will tend to sit above the screed until evaporated, due to the primer coating on the screed. Any moisture possibly absorbed by the screed will have no influence on the membrane below.
  - The recent failure at the up-stand end is the result of poor workmanship in that one particular area only and the builder and project managers are convinced that the failure will not be repeated in similar areas elsewhere in the building. The project manager, builder and the authority agreed that the detail used was commonly used elsewhere with no apparent problems.
- 10.5 The authority participated in the discussions during the hearing discussions but made no formal submission, noting that it would proceed based on the Department's final conclusions on the matters. The authority stated that the decks were not unusual in their construction and condition, and it had been satisfied that the work was compliant at the time it issued the code compliance certificate.
- 10.6 Prior to the hearing, the applicants had forwarded copies of various additional photographs and correspondence to all of the parties, which were discussed during

the hearing. The applicants' representative also participated in the discussions during the hearing and made a brief submission on behalf of the applicants, noting that their issues had already been covered in their submissions and information supplied.

- 10.7 The applicants' representative described the owners' concerns on the current and future condition of their decks, noting that deterioration was obvious to the owners. Their concerns had been raised as early in the construction process as possible and seeking a determination had been a last resort. While they were grateful to the guarantor for the work done on re-cladding the building, they felt that "the fix had fallen short" as far as the decks were concerned.

## 11. The fourth<sup>4</sup> draft determination

- 11.1 A fourth draft determination was prepared following the hearing, and circulated to the parties on 5 September 2008. The authority made no comment on the draft, and the guarantor accepted the draft without comment on 19 September 2008.

- 11.2 The applicants responded to the draft determination in a letter to the Department dated 22 September 2008 from the applicants' representative, who considered that the draft had overlooked, misinterpreted and/or misunderstood earlier evidence and appeared to ignore obligations of the parties. In addition to the points summarised elsewhere in the determination, the applicants' representative made the following summarised comments:

### **The deck screed (paragraph 11.2.1 of the fourth draft)**

- The BRANZ Good Practice Tiling Guide sections applicable to the decks are covered in the guidelines on wet area tiling, which recommends waterproofing applied over any mortar bed and directly under the tiles to avoid the mortar remaining wet.
- The membrane supplier has confirmed that it was not involved in the screed and tile system, and its warranty includes a clause invalidating the warranty if work is carried out to the membrane without prior written consent.

### **The deck slopes (paragraph 11.3.1 of the draft)**

- The draft states that compensation for non-compliance with E2/AS1 relies on the quality of materials and workmanship. The lack of fall to the decks is not compensated in this way.
- The deck construction includes a moisture-absorbent screed that absorbs and traps water, increasing the loads, adding to deflection in the framing and further reducing the slope.
- The deck falls were not limited by the lack of a step down, as new upstands were installed and the door sills raised during the remedial work. The upstand heights were flexible and should have allowed for adequate falls.

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<sup>4</sup> A third draft determination was not issued.

- The deck slopes recorded are significantly below E2/AS1, the membrane manufacturer's warranty requirements, the BRANZ Good Practice Tiling Guide and the authority's guidelines.

#### **The tiles (paragraph 11.4.1 of the draft)**

- The need to replace tiles each year is not "normal maintenance", it indicates a material failure of the deck system.
- The cracks in the plaster between the tiles include full width cracks across all of the decks indicating the cracks are caused by deflection in the decks, and are therefore likely to extend through the screed (as earlier predicted by the membrane supplier).

#### **The stair framing (paragraph 11.5.1 of the draft)**

- The stairs were included in the scope of works within the specification. The detail in the drawings is of a new stair construction, and the site meeting minutes record that each stair was assessed individually as to whether replacement would be necessary.
- The durability requirements are not dependent on ease of access to the structural elements. Decisions not to replace the stairs were made to save costs, without consideration of the durability requirements.

#### **The recent leak (paragraph 11.6.1 of the draft)**

- The membrane supplier specifies a chase in masonry, for the membrane to be flashed into and sealed with a bead of sealant. The detail at the tile upstand does not follow the membrane supplier's recommendations therefore breaching the terms of the membrane warranty.
- The suggested solution of additional protection would not meet the membrane manufacturer's recommendations.
- The current detail has proved inadequate, failure can go undetected for some time and may already have failed in other decks.

#### **Structural performance of the decks (paragraphs 12.2 and 12.3 of the draft)**

- The remedial works constitute alterations to an existing building, which must continue to comply with the building code to at least the same extent as before the alteration.
- The remedial work has included the addition of a screed, which has reduced the extent to which the joists complied with Clause B1. The screed was not shown in the consent drawings.

#### **Discussion (paragraphs 13.3 and 13.5 of the draft)**

- The expert additional report on the recent leak clearly identifies a failure in the deck membrane that demonstrates a lack of compliance with Clause E2 as well as Clause B2.
- The faults identified with the remedial work are greater and wider than occurring in "discrete areas".

- 11.3 The guarantor's solicitors responded to the above letter in an email to the Department dated 29 September 2008, which stated that there were no new matters raised and no basis for changing the fourth draft determination and concluded:

Therefore, the fourth draft should now be issued as a final determination, allowing the isolated issues identified to be dealt with immediately. [The project managers] and [the builder] will liaise and work with Council and the applicant owners (as they have done during the entirety of the project) to ensure that all are happy with the steps taken to resolve the issues identified in the draft determination.

## 12. Evaluation framework

- 12.1 I have evaluated the code compliance of the decks by considering the following two broad categories of the building work:

- The weathertightness of the remedial work undertaken to the decks (Clause E2) and durability (Clause B2 in so far as it relates to Clause E2).
- The structural performance of the decks.

### 12.2 Evaluation of the decks for E2 and B2 compliance

- 12.2.1 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solutions<sup>5</sup>, which will assist in determining whether the features of the building work 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 some other provision to compensate for that in order to comply with the Building Code.

- 12.2.2 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 decks within the building, the surrounding environment, the deck design features that are intended to prevent the penetration of water, the membrane and tile system, its installation, and the moisture tolerance of the external framing. The Department and its antecedent, the Building Industry Authority, have also described weathertightness risk factors in previous determinations<sup>6</sup> (for example, Determination 2004/1) relating to cladding and those factors relevant to the decks are also used in the evaluation process.

- 12.2.3 The consequences of a building element 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

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<sup>5</sup> An Acceptable Solution is a prescriptive design solution approved by the Department that provides one way (but not the only way) of complying with the Building Code. The Acceptable Solutions are available from The Department's Website at [www.dbh.govt.nz](http://www.dbh.govt.nz).

<sup>6</sup> Copies of all determinations issued by the Department can be obtained from the Department's website.

less robust. In any event, there is a need for both the design of the deck floor system and its installation to be carefully carried out.

### **12.3 Weathertightness risk**

12.3.1 In relation to these characteristics I find that the first floor decks of this building:

- are built in a medium wind zone
- extend from the first floors of 3-storey high townhouses
- have enclosed deck floors situated over ground floor bedrooms
- have open metal balustrades
- have deck framing that is untreated (apart from some site-applied preservative), so providing limited protection against decay if the framing absorbs and retains moisture
- have stair framing that is treated, but not to a level that will provide protection against decay if the framing absorbs and retains moisture on a continual basis.

12.3.2 The decks have been evaluated using the deck risk factor within the E2/AS1 risk matrix, to allow the evaluation of the risk level applying to a specific deck design. The resulting level of risk can range from “low” to “very high”. Higher levels of risk will require more rigorous weatherproof detailing.

12.3.3 When evaluated using the E2/AS1 risk matrix, the weathertightness features outlined in paragraph 12.3.1 show that the first floor decks demonstrate a high weathertightness risk rating. Poorly executed building work introduces a risk that cannot be taken into account in the consent stage but must be taken into account when the deck as actually built is assessed for the purposes of issuing a code compliance certificate.

## **13. Weathertightness performance of the decks**

13.1 Some of the remedial work associated with the first floor decks has not been undertaken in accordance with good trade practice or to the membrane supplier’s recommendations. Taking account of the expert’s reports, I conclude that remedial work is necessary in respect of the following:

- the bottom of the cladding adjoining the deck (refer paragraph 5.9).
- the top edge of the deck membrane and tiling where the tiled upstands meet the concrete party walls (refer paragraph 13.6.1).

### **13.2 The deck screed**

13.2.1 With regard to the deck screed, I note the expert’s comments (refer paragraph 5.9), the submissions from the project managers (refer paragraph 7.3.1), the guarantor’s solicitor (refer paragraph 8.5), and the discussions at the hearing; and I make the following observations:

- The BRANZ Good Practice Tile Guide limits the thickness of unreinforced screeds to 25mm.
- The project managers maintain that the screed is no more than 25mm thick.
- The BRANZ Good Practice Tile Guide recommends that a waterproofing membrane be installed immediately below the tiles, but makes no comment on the use of a membrane beneath an unreinforced screed.
- The authority accepted the system used for the repairs to the decks, prior to issuing the code compliance certificate.
- The membrane supplier has confirmed that the membrane was installed by an approved applicator in keeping with recommended systems at the time.
- The membrane supplier has now confirmed that, while the warranty covers only the membrane layer, it has reviewed the deck floor system, and raises no specific concerns about the membrane's condition within the system used.
- A warranty for the membrane is but one factor to consider when assessing the likely code compliance of the deck membrane.

13.2.2 Given the clarification received from the membrane supplier, I am now able to accept that the general principle of applying an unreinforced screed that is up to 25mm thick over the deck membrane without a slip layer is likely to be acceptable for this situation.

### 13.3 The deck slopes

13.3.1 I note the expert's comments in regard to the deck slopes, and the submissions from the project managers (refer paragraph 7.3.2) and the guarantor's solicitor (refer paragraph 8.5), and I make the following observations:

- Clause E2.3.1 requires that roofs, which include decks that form roofs to lower spaces, "shall shed precipitated moisture".
- In order to meet this requirement, a slope of 1° for decks is specified in E2/AS1. In certain circumstances, it is advisable to increase that minimum slope, as reflected in the more conservative 2° slope recommended by the authority in its practice note (BLD-142-PN; dated 31 July 2007).
- The range of deck slopes reported in the project manager's report was measured between 0.3° and 1.2°; with the majority at 0.8°.
- Paragraph 12.2 describes the evaluation of these decks for compliance with Clauses E2 and B2, including the assessment of the high weathertightness risk of these decks.
- When there is non-compliance with one provision of an Acceptable Solution, it will usually be necessary to add one or more other provisions to compensate for that. In the case of these decks, some compensation is provided by the quality of the materials and workmanship.
- The deck floors are supported by flexible timber framing that is prone to deflection and movement likely to increase the potential for ponding and future moisture problems at such low pitches.

- Constraints imposed by the small difference between the original internal floor level and the external deck levels have influenced the deck falls provided, which are lower than would be expected if the deck were to be built as part of a new building.
- The site visit prior to the hearing revealed that the decks do not appear to be ponding at present, with rainwater seen to be draining freely over the edge of the decks.
- The current cracks in the mortar joints may be the result of shrinkage rather than an indication of deflection in the deck framing.

13.3.2 Based on the above, I accept that the slopes provided to the decks, while not ideal, have been limited by the constraints imposed by the original building, and appear to be sufficient to prevent ponding and to ensure that the decks shed water. I therefore accept that the falls provided are currently adequate in these particular circumstances. However, I consider that there are grounds for concerns regarding the ongoing adequacy of the falls provided, and I address this matter in paragraph 14.4.

### 13.4 The tiles

13.4.1 I note the project manager's report states that all cracked and loose tiles were replaced in April 2008, after the expert's visit (refer paragraph 7.3.3), and I make the following observations:

- the tiles to the decks were completed in March 2006, and faults were first reported in the consultant's report of September 2006 (refer paragraph 3.7)
- the final inspection was on 3 December 2007
- the code compliance certificate was issued on 26 February 2008, the date from which the durability provisions apply to the building elements
- the expert inspected the decks, reporting on cracked and loose tiles, on 2 April 2008. That date was
  - about 2 years after completion of the tiles
  - 4 months after the final inspection
  - about 5 weeks after the code compliance certificate was issued.
- remedial work to the tiles had been undertaken on at least 3 occasions, with failures occurring each year since tiling was completed.
- The visit to sight the decks prior to the hearing has shown that the tiles appear to be adhering at the time of the visit although there are cracks in the grout between some tiles.

While I now accept that the tiles generally appear adequate, the history of repairs are such that I consider that on-going maintenance is likely to be required, in order to ensure compliance with the durability requirements of the code.

### **13.5 The stair framing**

- 13.5.1 I note the expert's comment in paragraph 5.10 on the apparent inadequate level of treatment for the on-going exposure to dampness of parts of the timber stair framing. However, I note that this framing was original and only decayed timber was replaced as part of the remedial work (refer paragraph 7.3.5).
- 13.5.2 The guarantor's solicitors maintain that, as only one damaged timber stair stringer was replaced, the level of treatment of the original stair framing relates to the original code compliance of the building and not to the remedial work carried out; and should therefore not be part of the matter to be determined.
- 13.5.3 The applicant maintains that the consent drawings and specification call for the framing to be replaced, and the treatment of the stair framing should therefore be part of the corrective work now required. I note that the consent drawings label the stair stringers as "H3.2", but are not clear on any requirement to replace all of the stair framing.
- 13.5.4 While it would have been advisable to investigate and address any apparent deficiencies in the treatment levels when documenting the remedial work, I take the view that the level of treatment of the original retained stair framing is not part of the matter to be determined.

### **13.6 The recent leak**

- 13.6.1 With regard to the recent leak, I note the expert's comments in paragraph 9.5 on the vulnerability of the top of the tile and membrane upstand to the concrete party walls, and the discussions at the hearing; and I make the following observations:
- The project managers maintain that this was an isolated instance of poor workmanship in one area only, and not a systemic failure likely to occur in the other decks.
  - The authority noted during the hearing that the detail was not unusual, and had been accepted during the remedial building work.
  - The edges of the tiles forming the upstand are flat, with the top of the underlying membrane not protected by flashings or sealants.
  - Protection against water entering behind the membrane relies only on the quality of the adhesion of the membrane against the concrete.
  - The expert noted the poor adhesion of the membrane adjoining the area of the recent leak.
  - The recent leak illustrates the severe consequences of such a leak.
- 13.7 Based on the above and after assessing the risks and consequences, I consider that additional protection of the top edge of the upstands (at the least by the application of an appropriate sealed barrier or sealant that can be regularly inspected and maintained) is necessary as a first line of defence against moisture penetrating behind the membrane should there be any weakness in its adhesion.



## 14. Structural performance of the decks

14.1 The expert has reported on the deflection and possible under-sizing of the deck joists.

14.2 I note the project manager's report states that the dead load imposed on the decks from the bay windows has not changed from the original consent, and that there is no deflection detected (refer paragraph 7.3.6). I also note the expert's investigation of a ceiling as outlined in paragraph 5.5, and I make the following observations:

- The expert has identified and recorded a 20mm sag in a ceiling beneath the deck, which was sighted at the visit to the building prior to the hearing.
- The expert has noted that, although fillets to provide deck slopes were installed (apparently as part of the original construction), the slope of the fillets above the deck joists is not reflected in the resulting low slopes to the surfaces of the decks (refer paragraph 5.7).
- The first engineer's report to the applicants' representative, as outlined in paragraph 6.1, raised possible structural concerns about the deck joists.
- The second engineer's report has confirmed that the deck joists are under strength by 16% of their capacity, while deflection is beyond acceptable limits.
- the project managers maintain that no evidence of structural problems were evident during design of the remedial work or during the remedial construction.
- the guarantor's solicitor maintains that any structural issues are related to the original building and are not part of the building work in the remedial contract, and therefore not part of the matters to be determined
- the building has undergone extensive remedial work that includes re-cladding over a drained cavity and the application of a deck screed, and the building must continue to comply with the Building Code to at least the same extent as before the alteration.
- the applicants maintain that the remedial work has reduced the extent to which the joists comply with the structural provisions of the Building Code.

14.3 I accept that this structural issue has generally resulted from the original building construction, but I have insufficient evidence to determine whether this has been significantly changed by the remedial building work.

14.4 While the structural compliance of the remedial work is not part of this determination, the resulting deflection has a direct bearing on the ongoing compliance of the decks as outlined in paragraph 13.3.2.

14.5 The possibility of further deflection brings into question the possibility of ponding on the deck surfaces in the future, and I therefore consider that further structural investigation is necessary and justified in respect of this matter.

## 15. Conclusions

- 15.1 It has become clear that there are some matters raised by the applicants that are more to do with building quality, than with code compliance, and I note that the minimum requirements necessary for code compliance do not necessarily constitute “best practice”.
- 15.2 In the case of the code compliance of the construction for the first floor decks of this building, it was important to look for evidence that establishes whether the deck membrane has been installed in accordance with the manufacturer’s instructions, and that the resulting deck structure complies with the Building Code as outlined in paragraph 1.3.
- 15.3 In this particular case, that evidence has come from:
- the assessment of the membrane installation by the membrane supplier (refer paragraph 3.5)
  - the assessment of the deck floor construction by the consultant (refer paragraph 3.7)
  - the recent supply of a general materials guarantee from the membrane supplier (refer paragraph 3.8), and the letter from the supplier dated 20 August 2008
  - the inspection of the accessible components by the expert
  - the engineer’s reports on the deck joists (refer paragraphs 6.1 and 6.2)
  - the project manager’s report on the deck slopes (refer paragraph 7.3.2).
- 15.4 I consider the expert’s report establishes that the current performance of the remedial work to the first floor decks is adequate because it is preventing water penetration through the deck construction at present. Consequently, I am satisfied that the first floor decks comply with Clause E2 of the Building Code.
- 15.5 I also consider the expert’s and engineer’s reports establish that the structural performance of the deck joists may not be adequate. I therefore consider that the first floor decks may not comply with Clause B1 of the Building Code, and any possible future deflection may impact on the ongoing weathertightness of the decks.
- 15.6 Until compliance with Clause B1 is investigated and verified I consider it prudent to take the view that compliance has not been achieved.
- 15.7 In addition, the decks are 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 decks to remain weathertight. Because the first floor decks and associated cladding faults are likely to allow the ingress of moisture in the future, the first floor decks do not comply with the durability requirements of Clause B2.
- 15.8 Because the faults identified with the remedial work occur in discrete areas, I am able to conclude that satisfactory investigation and rectification of the items outlined

in paragraphs 13.1 and 14.5 will result in the first floor decks being brought into compliance with Clause B2.

- 15.9 Effective maintenance of claddings is important to ensure ongoing compliance with Clauses B2 and E2 of the Building Code and is the responsibility of the building owner. The Department has previously described these maintenance requirements, including examples where the external wall framing of the building may not be treated to a level that will resist the onset of decay if it gets wet (for example, Determination 2007/60).

## **16. What is to be done now?**

- 16.1 The authority should issue a notice to fix requiring the owners to bring the first floor decks into compliance with the Building Code, identifying the defects listed in paragraphs 13.1 and 14.5, and referring to any further defects that might be discovered in the course of that work, but not specifying how those defects are to be fixed. It is not for the notice to fix to prescribe directly how the defects are to be remedied and the first floor decks brought to compliance with the Building Code. That is a matter for the owners (with their guarantor's representative) to propose and for the authority to accept or reject.
- 16.2 With respect to the performance of the structure, I am of the view that a further detailed investigation is required to determine the cause of the deflection currently evident in the timber decks and the expected future deflection.

## **17. The decision**

- 17.1 In accordance with section 188 of the Act, I determine that the remedial work to the first floor decks of this building does not comply with Clauses B1 and B2 of the Building Code, and accordingly reverse the authority's decision to issue the code compliance certificate.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing  
on 26 November 2008

John Gardiner  
**Manager Determinations**