

Determination 2008/73

Decision to refuse to issue a code compliance certificate due to concerns about the durability of macrocarpa lintels to a rammed earth house at 72 Nisbet Road, RD9, Whangarei



1. The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“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 applicants are the owners, J and M Kettlewell and the other party is the Whangarei District Council (“the authority”) carrying out its duties and functions as a territorial authority or building consent authority.
- 1.2 The matter for determination is whether the authority was correct in its decision to refuse to issue a code compliance certificate for a 5-year-old house because it was not satisfied that the exterior lintel beams comply with Clause B2 Durability of the Building Code² (First Schedule, Building Regulations 1992).
- 1.3 The applicant has restricted the matter to be determined to the durability of the lintels, and the authority has raised no other concerns regarding the building. I also note that there is no dispute as to whether the lintels comply with clause B1 Structure

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.

of the Building Code. This determination is therefore limited to the durability of the timber lintels.

- 1.4 I therefore consider that the matter for determination is whether the macrocarpa lintels as installed to the doors and windows (“the lintels”) comply with Clause B2.
- 1.5 In making my decision, I have considered the submissions of the parties, the report of the independent expert commissioned by the Department to advise on this matter (“the expert”), and the other evidence in this matter. I have evaluated this information using a framework that I describe more fully in paragraph 7.1.
- 1.6 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.

2. The building

- 2.1 The building consists of a single storey detached house situated on a gently sloping rural site, which is in a very high wind zone for the purposes of NZS 3604³. The construction of the house includes specifically engineered rammed earth walls, a concrete slab and foundations and aluminium joinery. The roof has eaves projections of 650mm or more above all walls.
- 2.2 The lintels over doors and windows are formed as ‘boxes’ set into the 300mm thick earth walls. The box lintels are made up from 200mm x 50mm or 250mm x 50mm beams on either side, with a spacer beam between to form the underside surface. The outside face of each box lintel is flush with the face of the earth wall, and the lintels are set directly beneath the eaves soffit.

2.3 The lintel timber

- 2.3.1 According to the owner and the builder, the timber used for the lintels is heart macrocarpa, over which a clear coating system, suitable for timber, has been applied. The owner advised the expert that the coating system is made up of 1 coat of “Intergrain Dimension 4 Timber pre-treatment” followed by 2 coats of “Intergrain UVC Exterior Transparent Timber Finish”.
- 2.3.2 I note that the coating system is produced by Intergrain Timber Finishes Pty. Ltd. Australia. The first coat is a penetrating water-repellent resin system that includes fungicides. According to the manufacturer, the product stabilises timber by reducing water absorption, cupping, splitting, checking and staining and inhibits development of dry rot, mildew, sap stain and fungi.
- 2.3.3 The top coats are formulated on a UV curing acrylic polymer which is claimed to resist ultra violet radiation, cracking, peeling and fungi attack whilst retaining long term flexibility. The products are intended for use on exterior timbers such as cedar, oregon, cypress and treated pine.

³ New Zealand Standard NZS 3604:1999 Timber Framed Buildings

3. Background

- 3.1 The authority issued a building consent (No. 051222) in October 2001, according to the authority's date stamp on the consent floor plan. I have not seen a copy of the building consent.
- 3.2 I have received no records of inspections (if any) carried out by the authority during construction, but it appears that the construction of the house took place over some years and a code compliance certificate was not sought until 2008.
- 3.3 I am not aware of any correspondence between the authority and the applicants but, according to the applicants, the "final approval" of a code compliance certificate was refused as the lintels were made of macrocarpa – and the authority suggested that a determination on the suitability of the lintel timber should be sought.
- 3.4 The Department received an application for a determination on 23 June 2008.

4. The submissions

- 4.1 In a letter accompanying the application, the applicant outlined the situation, noting:
- The macrocarpa used in the building is all heartwood.
 - The lintels are protected under the soffits.
 - The timber is finished with an ultraviolet resistant clear coating system.
 - The ends of the beams are protected by the solid walls.
 - The beams are only exposed on the external face.
- 4.2 The applicant forwarded copies of:
- a consent plan and some drawings
 - photographs of the macrocarpa lintels.
- 4.3 A copy of the applicant's submission was provided to the authority. The authority made no submission in response.
- 4.4 The draft determination was issued to the parties on 7 July 2008. Both parties accepted the draft without comment.

5. The expert's report

- 5.1 As discussed in paragraph 1.5, 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 exposed lintels on 23 June 2008, and furnished a report that was completed on 29 June 2008.
- 5.2 The expert noted that the lintels were all sheltered beneath eaves, and there was no sign of any moisture penetration or deterioration in the timber. The expert also noted

that the timber was “generally clean, with some knots, occasional light splits and of a golden colour”, and that a “clear surface treatment was evident”.

- 5.3 The expert took invasive moisture readings at the bottom edge of the exposed timber at 2 of the most exposed locations, and the moisture contents were recorded as 14% and 15%. I note that this moisture testing was carried out during winter, and the expert recorded the weather conditions on the day of inspection as “rain and overcast”.
- 5.4 The expert concluded that “the areas examined appear to be complying with the durability code requirements”.
- 5.5 A copy of the expert’s report was provided to each of the parties on 30 June 2008.

6. The relevant requirements

- 6.1 The relevant provisions of the Building Code are:

B2 Durability

Performance

- B2.2 Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building.
- B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code...
- (a) The life of the building, being not less than 50 years if:
- (i) Those *building elements* (including floors, walls, and fixings) provide structural stability to the building...

- 6.2 The relevant sections of NZS 3602⁴ are:

109 Requirements for wood-based building components not exposed to weather or ground atmosphere but with a risk of moisture content conducive to decay, to achieve a 50-year durability

109.1

Table 1D lists the species or type, grade, in-service moisture content and preservative treatment required for wood-based building components not directly exposed to the weather but at risk of raised moisture content conducive to decay.

109.2

This section applies to situations where there is a risk of timber framing or wood-based products becoming damp and staying damp during the service life of the building...

- (c) Timber-framed elements exposed to exterior weather conditions on one face; but where the penetration of moisture during the life of the building is likely and detection of elevated moisture levels is difficult....

⁴ NZS 3602: 2003 Timber and wood-based products for use in building

7. Evaluation for code compliance

7.1 Evaluation framework: durability of exposed timbers

7.1.1 As outlined above, the relevant provision of Clause B2 of the Building Code requires that building elements must, with only normal maintenance, continue to satisfy the performance requirements of the Building Code for certain periods (“durability periods”) from the time of issue of the applicable code compliance certificate. In the case of the timber lintels, this durability period is a minimum of 50 years as they provide structural stability to the building.

7.1.2 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solution⁵, in this case B2/AS1, which provides NZS 3602⁶ as an acceptable solution for meeting the durability requirements of timber used in the building. Table 1 of NZS 3602 specifies H3.2 treated radiata pine for beams exposed to exterior weather conditions and dampness but not in ground contact, but allows heart cypress species (including macrocarpa) for members not directly exposed to the weather. The exposed heart macrocarpa timber lintel beams in this house must therefore be assessed as an alternative solution.

7.1.3 While it is useful to make some comparisons with the relevant Acceptable Solution to assist in determining whether a particular building element is durable, in making this comparison, the following general observations are valid:

- Some Acceptable Solutions are written conservatively to 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.

7.1.4 The approach in determining whether the timber lintels are durable involves an examination of their positions within the building, the surrounding environment, the design features likely to limit water penetration into the timber, and the moisture tolerance of the timber used in the lintels. The consequences of an element demonstrating low risks and consequences of moisture penetration and damage is that solutions that comply with the Building Code may be less robust.

7.2 Durability risk

7.2.1 In relation to these characteristics I find that the exposed timber lintels to this house:

- are installed in a high wind zone
- are exposed on one side only
- are situated directly beneath roof projections more than 600mm deep
- are visible and accessible on the exposed face of the timber

⁵ 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.

⁶ New Zealand Standard NZS 3602:2003 Timber and wood-based products for use in building

- use heart macrocarpa timber
- are coated with a clear coating system to resist the absorption of moisture.

7.2.2 When assessed according to the weathertightness features listed in paragraph 7.2.1, I consider that the exposed timber of the lintels demonstrate a low durability risk.

8. Discussion

8.1 The applicant has submitted that, because they are constructed from heart macrocarpa timber and are sheltered from the weather by the soffits, the lintels have sufficient durability to meet or exceed the 50 year requirement of the code.

8.2 In the case of the macrocarpa lintels installed to this house, I make the following observations:

The legislation and the Compliance Documents	The macrocarpa lintels
Clause B2.3.1 The lintels shall be sufficiently durable for a minimum of 50 years.	The lintels provide structural stability to the building.
NZS 3602 Table 1B Members exposed to exterior weather but not in ground contact require H3.2 treated radiata pine.	Table 1B does not apply as the lintels are: <ul style="list-style-type: none"> • directly below deep roof overhangs • sealed with a water repellent coating • are easily assessable for recoating.
NZS 3602 Section 109.2 (c) Table 1D applies to members exposed to exterior weather on one face, where moisture penetration is likely and detection is difficult.	Table 1D applies as the lintels are: <ul style="list-style-type: none"> • directly below deep roof overhangs • exposed on one face only • sealed with a water repellent coating • are easily accessible for recoating.
NZS 3602 Table 1D Members not directly exposed to exterior weather but with a risk of raised moisture content.	Heart macrocarpa requires no treatment for timbers falling within this category.

8.2.1 Taking into account the above observations, I consider that the following factors influence the durability of the timber lintels in this building:

- The end grain of the lintel members is protected from moisture absorption by the adjacent support walls.
- The timber lintels are sheltered directly beneath deep roof projections.
- The expert's moisture testing during rainy winter weather establishes that the timber is not currently absorbing moisture.
- The lintels are of heart macrocarpa timber that is coated with a clear coating system to resist the absorption of moisture.
- Heart macrocarpa requires no treatment for members not directly exposed to exterior weather.

- The timber is exposed only on the vertical face of the lintel, which is clearly visible and easily accessible for regular inspections and recoating as necessary.

8.3 I take the view that the expert's report and the other evidence, when considered together with the particular risks and circumstances as outlined in paragraph 7.2.1, have established that the exposed timber lintels in this house meet the durability requirements of clause B2 of the Building Code.

8.4 I emphasize that each determination is conducted on a case-by-case basis. Accordingly, the fact that particular timber elements have been established as being code compliant in relation to a particular building does not necessarily mean that the same timber elements will be code compliant in another situation.

8.5 Effective maintenance is important to ensure ongoing compliance with clause B2 of the Building Code and is the responsibility of the building owner. Clause B2.3.1 of the Building Code requires that the element be subject to "normal maintenance", however that term is not defined in the Act.

8.6 I take the view that normal maintenance is that work generally recognised as necessary to achieve the expected durability for a given building element. With respect to the exposed timber lintels used in this house, normal maintenance tasks should include but not be limited to:

- regular inspection of the exposed timber
- regular re-coating with the water repellent sealer in accordance with the manufacturer's instructions.

9. The decision

9.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the exposed lintels to this building comply with Clause B2 of the Building Code. Accordingly, I reverse 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 5 August 2008.

John Gardiner
Manager Determinations