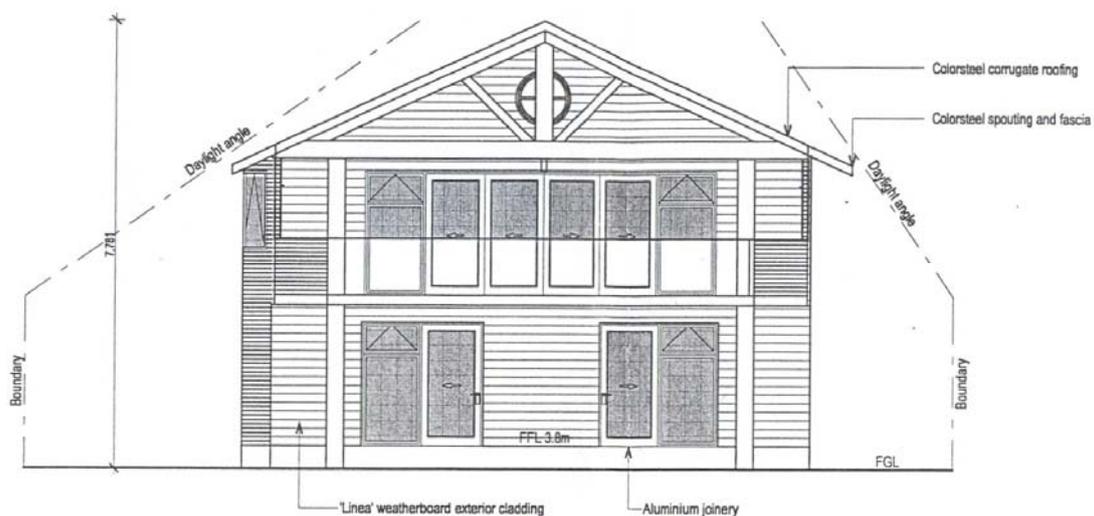


# Determination 2007/97

27 August 2007

## Determination regarding exposed heart macrocarpa posts and beams to a house at 231 Oakura Road, Hikurangi



### 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 (“the Department”), for and on behalf of the Chief Executive of that Department. The applicant is Whangarei District Council (“the territorial authority”), and other parties are the owners, GL and VE Currie and JS and SP Gathercole (“the owners”). The territorial authority has identified the builder of the house, Ryan Builders Ltd (“the builder”) as an interested party to the matter.
- 1.2 This determination arises from the decision of the territorial authority to refuse to issue a code compliance certificate for a 1-year old house because it is not satisfied that the exterior posts and beams comply with clause B2 of the Building Code<sup>2</sup> (First Schedule, Building Regulations 1992).

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

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

- 1.3 The matter for determination is whether the exposed timber structural elements as installed to this house (“the portals”) comply with clause B2 “Durability” of the Building Code. By “the structural elements” I mean the components of the portals (such as the posts, the beams, the struts and the fixings) as well the type of timber used and the location of the portals in the case of this house.
- 1.4 I note that there is no dispute as to whether the portals comply with clause B1 “Structure” of the Building Code, and this determination is therefore limited to the matter outlined in paragraph 1.3.
- 1.5 As outlined in paragraph 4.1 the territorial authority has referred to Determination 2004/71, and I accept that the circumstances are similar to those now under consideration. I have therefore consulted the specialist advice received for Determination 2004/71 (“the 2004 report”), which was supplied by an expert in the preservative treatment of timber. The 2004 report therefore forms part of the evidence in this matter.
- 1.6 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”), the 2004 report and the other evidence in this matter. I have evaluated this information using a framework that I describe more fully in paragraph 6.1.
- 1.7 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 work consists of a 2-storey house situated on a flat site, which is in a very high wind zone for the purposes of NZS 3604<sup>3</sup>. The construction of the house includes specifically engineered timber portal frames, with conventional light timber frame elsewhere, a concrete slab and foundations and aluminium joinery. The wall claddings are generally fibre cement weatherboard, with several areas of corrugated steel. The house is simple in plan and form, and has a 25° pitch profile metal gable roof with 600mm eaves and verge projections.
- 2.2 The roof projects beyond both gable end walls to provide canopies above the two upper level decks. The roof projections are supported by timber portals, with the verges extending a further 600mm beyond the portals. Additional heavy timber posts provide extra supports to the upper decks.
- 2.3 The exposed timber of the deck posts and the gable end portals is heart macrocarpa, with clear preservative applied to the surfaces and purpose-made stainless steel connection brackets and plates. The primary portal timbers are 300mm x 200mm, and the diagonal struts and protruding verge beams are 200mm x 150mm, with the members structurally over-sized for decorative purposes. The extended portal rafters and verge beams include metal cappings that cover the end grain of the timber.

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

- 2.4 The builder has provided a letter dated 27 April 2007 (refer paragraph 3.5) stating that the exposed timber was treated with clear “Holdfast Metalex Timber Preservative” applied in 2 coats to the surface of the timber. The builder also noted that the owners have been supplied with maintenance information stating that the preservative is to be reapplied every 5 years. The timber supplier has provided a producer statement dated 24 April 2007, confirming that the timber supplied was “Heart Grade” macrocarpa and stating that:

Heart Macrocarpa is suitable for beams, weatherboards etc where specified in the building code.

### 3. Background

- 3.1 The applicants applied for a building consent for the building which the territorial authority responded to in a letter dated 13 December 2005, which amongst other matters, said:

Show Macrocarpa framing exposed to weather as heart timber and specify protection being used on the timber.

- 3.2 The territorial authority issued the building consent (No. 85014) on 29 December 2005.

- 3.3 It appears the applicants had specifically addressed the matter raised by the territorial authority in paragraph 3.1 because the relevant consented plans are amended to include the annotation:

Note: All Macrocarpa to be heart timber with Clear Metalex treatment. Rev B2

- 3.4 The territorial authority carried out various inspections during construction, including a pre-cladding inspection on 14 June 2006. The pre-cladding inspection record (Field Advice Notice No. 7884BB) included a requirement to:

Provide producer statement for compliance with durability of Macrocarpa beams in compliance with NZS 3602.

- 3.5 On 19 April 2007, following a final inspection of the house, the territorial authority wrote to the builder noting that the requirement as outlined in paragraph 3.4 was still outstanding and this information:

...will need to be assessed and approved before a Code Compliance Certificate can be issued...

The builder responded by providing the information as outlined in paragraph 2.4.

- 3.6 In a letter to the builder dated 1 May 2007, the territorial authority stated that the timber supplier’s producer statement did not adequately cover the compliance of the portals as:

...NZS: 3602 (2003) Table 1B only allows for Radiata Pine to a minimum of H3.2 treated can be used for a structural member exposed to weather and dampness, but not in ground contact, and therefore suggest the Producer Statement does not cover the post and beam structure on site which requires a 50 year durability performance.

3.7 The territorial authority applied to the Department for a determination. The application was received on 8 June 2007, with further information sought and received on 14 June 2007.

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

4.1 The territorial authority noted in the application that the matter for determination was “use of macrocarpa for structural posts and beams in exterior weather conditions and dampness”. In the letter dated 5 June accompanying the application, the territorial authority described the structural timber components, and noted:

We are seeking a favourable outcome with this determination based on previous determination No. 2004/71 which appears to have similar components.

4.2 The territorial authority supplied copies of:

- the consent drawings and structural details
- the building consent
- the pre-cladding inspection record
- the correspondence with the builder.

4.3 No other party made a submission.

4.4 Copies of the submission and other evidence were provided to the other parties, who made no submissions in response.

4.5 A copy of the draft determination was sent to the parties for comment on 14 August 2007. Both parties accepted the draft without comment.

#### **5. The expert’s report**

5.1 As discussed 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.

5.2 The expert inspected the exposed portals on 4 July 2007, and furnished a report that was completed on 9 July 2007. The expert noted that the exposed timbers are used for the portals and deck posts at the east and west gable ends, and that the connectors and fixings to the large timber members are “substantial and professionally finished”. The expert noted that most of the timber is sheltered beneath eaves, verges or decks; and there was no sign of any deterioration in the timber.

5.3 The expert took invasive moisture readings within the exposed timber at the most risky locations. Readings were taken at the surface and then at depths of 10mm and 25mm to observe the drop in moisture with increasing depth, and the maximum moisture content at 25mm depth was recorded as 19%.

5.4 The expert noted that, although flashing over or sloping the tops of horizontal timbers would shed water, the timbers are open to ventilation and fairly sheltered

beneath the roof. The expert concluded that “these are substantial timbers and if properly maintained and treated should satisfy the requirements under the Code”.

5.5 A copy of the expert’s report was provided to each of the parties on 12 July 2007.

## 6. Evaluation for code compliance

### 6.1 Evaluation framework: durability of exposed timbers

6.1.1 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” (clause B2.3.1).

6.1.2 In the case of the timber portals and posts, this durability period is:

- the life of the building, being not less than 50 years, if the building elements provide structural stability to the building, or are difficult to access or replace, or failure of those elements would go undetected during both normal use and maintenance.

6.1.3 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solution<sup>4</sup>, in this case B2/AS1, which provides NZS 3602<sup>5</sup> as an acceptable solution for meeting the durability requirements of timber used in the building. NZS 3602 specifies H3.2 treated radiata pine for posts and beams exposed to exterior weather conditions and dampness but not in ground contact. The exposed heart macrocarpa timber portals and posts in this house must therefore be assessed as an alternative solution.

6.1.4 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.

6.1.5 The approach in determining whether the timber posts and portals 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 portals. 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.

<sup>4</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>5</sup> New Zealand Standard NZS 3602:2003 Timber and wood-based products for use in building

## 6.2 Durability risk

6.2.1 In relation to these characteristics I find that the exposed timbers to this house:

- are installed in a very high wind zone
- are a combination of exposed vertical, horizontal and sloping timber members
- are situated beneath decks or roof projections more than 600mm deep
- are of dimensions that are structurally over-sized
- are visible and accessible
- use heart macrocarpa timber that is treated with a surface preservative to provide resistance to the onset of decay if the timber absorbs and retains moisture
- are specified to be retreated with the surface preservative at minimum intervals of 5 years.

6.2.2 When assessed according to the weathertightness features listed in paragraph 6.2.1, I consider that the exposed timbers demonstrate a low durability risk.

## 6.3 Durability performance

6.3.1 With regard to the particular exposed timber portals and posts in this house, I consider that the following factors compensate for the lack of treatment as specified in NZS 3602:

- While encouraging wind-blown moisture, the exposure of the timber to high winds will assist in removing debris that can trap moisture at junctions and in drying the timbers.
- The end grain of the members is protected from moisture absorption by metal caps.
- The horizontal and sloping timber members are sheltered beneath roof projections more than 600mm deep.
- The structure of the house has been engineered to allow for the use of exposed heart macrocarpa timber at the gable ends.
- The timber members are sufficiently over-sized to prevent risking the structural integrity of the posts and portals, should any surface deterioration occur.
- The posts and portals are of heart macrocarpa timber that is treated with a surface preservative to provide resistance to the onset of decay from surface moisture and reduce moisture absorption to some degree.
- The posts and portals are clearly visible and easily accessible for regular inspections and recoating with preservative.

## 7. Discussion

- 7.1 Under the Act, if a territorial authority is satisfied on reasonable grounds that building work complies with the building consent, it must under section 94(1)(a) issue a code compliance certificate, unless certain other conditions, which do not apply in this case, are not met. A territorial authority therefore is required to assess whether the work as described in the building consent application will comply with the building code.
- 7.2 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 6.3.1, have established that the exposed timber portals and posts in this house meet the durability requirements of clause B2 of the Building Code.
- 7.3 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.
- 7.4 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.
- 7.5 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 portals and posts used in this house, normal maintenance tasks should include but not be limited to:
- regular inspection of the exposed timber
  - regular cleaning and removal of any debris trapped at the portal junctions
  - re-coating with the protective preservative treatment in accordance with the manufacturer's instructions.

## 8. The decision

- 8.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the exposed posts and portals to this building comply with clause B2 of the Building Code. Accordingly, I reverse the territorial 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 27 August 2007.

John Gardiner  
**Manager Determinations**