

## Determination 2007/129

### Determination regarding the durability of Lawson Cypress posts and beams to a cottage at 1700 Russell Road, Hikorangi



#### 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, A and L Fleming (“the owners”). I note that the designer of the cottage (“the designer”) is an interested party to the matter.
- 1.2 This determination arises from the concerns of the territorial authority that the exterior posts, rafters and verge beams installed in a partly constructed building may not comply with clause B2 of the Building Code<sup>2</sup> (First Schedule, Building Regulations 1992).
- 1.3 The matter for determination is whether the exposed timbers of the posts, rafters and verge beams (“the exposed timber”) comply with clause B2 “Durability” of the Building Code. By “the exposed timber” I mean the components (such as the posts,

<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).

the rafters, the verge beams, the cappings, the junctions and the fixings) as well the type of timber used and the location of the exposed timbers in the case of this house.

- 1.4 I note that there is no dispute as to whether the exposed timbers 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 I also note that the circumstances now under consideration are similar to those considered in Determination 2004/71, which related to the use of Macrocarpa posts in a similar application. I have therefore consulted the specialist advice received for that determination (“the 2004 expert’s report”), which was supplied by an expert in the preservative treatment of timber. The 2004 expert’s 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 2004 expert’s report, the additional information provided by the owner and the designer (refer paragraphs 3.4 and 3.5), and the other evidence in this matter. I have evaluated this information using a framework that I describe more fully in paragraph 5.1.
- 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 small cottage situated on a sloping site, which is in a very high wind zone for the purposes of NZS 3604<sup>3</sup>. The construction of the house is conventional light timber frame, with a concrete slab to the garage, driven timber piles elsewhere, plywood cladding and aluminium joinery. The house is simple in plan and form, with a 7° pitch profile metal gable roof over the house area and a lean-to monopitched roof over the garage. Eaves and verge projections have exposed timber beams and rafters; and are a minimum of 900mm, with deeper overhangs provided to around three walls (above a verandah, adjoining patio and the garage doors).
- 2.2 A verandah extends around the north corner, with the posts supported on timber bearers and piles. Timber posts also support the roof overhang around two walls of the garage, with these posts supported on metal brackets set into concrete pads.
- 2.3 The exposed timber is heart Lawson Cypress, with stainless steel connection brackets and plates. I note that Lawson Cypress and Macrocarpa are both members of the Cypress family of timbers, and have very similar properties. The post timbers are 100 mm x 100 mm, and the exposed rafters and verge beams include copper cappings to cover the end grain.
- 2.4 The specification calls for the Lawson Cypress to be heart timber, and this has been confirmed by the timber supplier (refer paragraph 4.5). I also note that the specification does not call for any preservative treatment to be applied to the exposed timbers.

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

### **3. Background**

- 3.1 On 24 July 2006, the territorial authority issued a building consent (No. 92348) for a “studio/barn (minor dwelling)”. I note that the specification is stamped as approved on 11 August 2006 and includes the requirement that “the exposed timbers used on this project shall be well seasoned and rough sawn dry heart Lawson Cypress”.
- 3.2 The territorial authority has carried out various inspections during construction to date. The most recent inspection record I have received records a preline inspection on 17 May 2007.
- 3.3 The territorial authority applied to the Department for a determination. The application was received on 4 July 2007.
- 3.4 The Department sought further information from the designer and the owner, who forwarded photographs of the construction via an email dated 3 September 2007. The photographs show the exposed timbers, including the junction of the verandah posts with the deck bearers.
- 3.5 On 7 September 2007, following further correspondence, the designer forwarded the Department an amendment proposed for the bottom of the verandah posts. This detail shows the verandah post fixed to the bearer with bolted stainless steel brackets, and a gap of 50 mm provided between the post and bearer (refer paragraph 5.7).

### **4. The submissions**

- 4.1 The territorial authority noted in the application that the matter for determination was “B2 Durability for Lawson Cypress rafters and posts exposed to weather”. In the letter dated 8 June 2007 accompanying the application, the territorial authority described the exposed timber components, and stated:
- These members contravene Table 1 B3 of NZS 3602:2003 i.e. “Members exposed to exterior weather conditions and dampness but not in ground contact” and would therefore not comply with B2 Durability for 50 years.
- 4.2 The territorial authority supplied copies of:
- the consent drawings and specification
  - the building consent
  - the records of inspections undertaken to date
  - various other structural calculations and information.
- 4.3 The owner and designer supplied photographs and further information.
- 4.4 Copies of the submission and other evidence were provided to the other parties, who made no submissions in response.

- 4.5 The draft determination was sent to the parties for comment on 21 September 2007. The owners accepted the draft (received by the Department on 10 October) and attached a statement from the timber supplier, dated 16 July 2007, to the effect that the timber supplied was “heartwood Lawson Cypress”. I have amended the determination accordingly.
- 4.6 The territorial authority accepted the draft without comment (received by the Department on 5 November 2007).

## **5. Evaluation for code compliance**

### **5.1 Evaluation framework: durability of exposed timbers**

- 5.1.1 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).
- 5.1.2 In the case of the exposed timbers, 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.
- 5.1.3 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 Lawson Cypress timber post, rafters and verge beams in this house must therefore be assessed as an alternative solution.
- 5.1.4 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.

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<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

- 5.1.5 The approach in determining whether the exposed timbers are durable involves an examination of their position 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 exposed to exterior weather but demonstrating low risks and consequences of failure is that solutions that comply with the Building Code may be less robust than for elements exposed to average or higher risk.

## 5.2 Durability risk

- 5.2.1 In relation to the risk characteristics, I note the following:

- (a) With respect to the construction features:

- The house is located in a high wind zone
- The exposed timbers are visible and accessible
- The roof timbers are protected by the overhang of the roof
- The posts have a high level of exposure to the weather but are able to be removed if necessary
- The verandah posts are fixed directly to the bearer with no allowance for ventilation to the end of the post that is in direct contact with the bearer (however, it is proposed that this detail be changed, refer paragraph 5.6

- (b) With respect to the use of the timber in this instance:

- With the exception of the verandah posts and their connection to the bearer, the timber is well ventilated and is therefore able to dry out if it becomes wet.
- copper caps are used to protect the end grain of the roof timbers

- (c) With respect to the durability of this timber species:

- Heart Lawson Cypress is a moderately durable timber and is the equivalent of Pinus Radiata treated to H3.1, according to table 1 of NZS 3602.

- 5.2.2 When assessed according to the weathertightness features listed in paragraph 5.2.1, I consider that the exposed timbers demonstrate a low to moderate durability risk (depending on the particular location beneath the roof projections).

## 5.3 Durability performance

- 5.3.1 With regard to the particular exposed timbers in this house, I consider that the following factors compensate in part for the lack of treatment as specified in NZS 3602:

- The exposure of the timber to high winds will assist in their drying.
- The end grain of the roof members is protected from moisture absorption by copper caps.
- The horizontal and sloping timber members are sheltered beneath roof projections.
- The timbers are clearly visible and easily accessible for regular inspections and maintenance.

5.4 I note that the 2004 expert's report concluded that, for a similar situation considered by Determination 2004/71, 200 mm x 200 mm Macrocarpa verandah posts with the cut ends of the posts painted with a copper naphthenate preservative have "equivalent durability to that conferred to radiata pine by preservative treatment to Hazard Class H3". I also note that in Determination 2004/71, the posts were sized with a significant reserve on their structural capacity.

5.5 In the case of the exposed timbers to this house, I accept that Lawson Cypress timber has similar qualities to that of heart Macrocarpa timber (refer paragraph 2.3), and may therefore be expected to have similar durability when used in comparable circumstances.

5.6 I consider the durability of the heart Lawson Cypress used in this situation is insufficient to achieve the durability required by NZS 3602. I therefore consider that the exposed heart Lawson Cypress is to be treated with a surface preservative to provide the necessary level of resistance to the onset of decay if the timber absorbs and retains moisture.

5.7 I note that the designer has proposed an amendment to the junction between the verandah posts and the bearer (refer paragraph 3.5). I accept this change will provide sufficient clearance to allow for adequate drainage and drying at the bottom of the verandah posts.

5.8 I therefore consider that, based on the available information, remedial work is necessary in respect of the following:

- the provision of a ventilation gap between the verandah posts and the bearer
- the provision of an appropriate applied surface preservative to timber end grains and surfaces exposed to rainwater, in order to reduce the absorption of surface moisture and to provide some resistance to the onset of decay

## 6. Discussion

6.1 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.

- 6.2 The building consent documentation details the use of heart Lawson Cypress. In my view the territorial authority should have addressed the durability of this timber before the building consent was issued.
- 6.3 I take the view that the evidence, when considered together with the particular risks and circumstances as outlined in paragraph 5.3.1, has established that the exposed timbers in this house do not currently meet the durability requirements of clause B2 of the Building Code.
- 6.4 However, I am able to conclude that satisfactory completion of the items outlined in paragraph 5.7, to the satisfaction of the territorial authority, will result in the exposed timbers complying with clause B2.
- 6.5 I emphasise 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.
- 6.6 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.
- 6.7 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 junctions
  - re-coating with a protective preservative treatment in accordance with the manufacturer’s instructions.

## **7. The decision**

- 7.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the exposed posts and portals to this building do not currently comply with clause B2 of the Building Code.
- 7.2 I note that that the territorial authority has not issued a notice to fix. The territorial authority should now issue a notice to fix that requires the owners to bring the exposed timbers up to compliance with the Building Code, incorporating the items listed in paragraphs 5.8 but not specifying how those specified issues are to be resolved. That is a matter for the owner to propose and for the territorial authority to accept or reject.

7.3 I would suggest that the parties adopt the following process to meet the requirements of paragraph 7.2. Initially, the territorial authority should issue the notice to fix. The owner should then produce a response to this in the form of a detailed proposal, produced in conjunction with a competent and suitably qualified person, as to the rectification or otherwise of the specified issues. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 14 November 2007.

John Gardiner  
**Manager Determinations**