



Determination 2011/028

Regarding a notice to fix for a partly completed house at 362 Hillsborough Road, Hillsborough, Auckland



1. The matters 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.

1.2 The parties to the determination are:

- the applicant, Auckland Council (including in its previous capacity as Auckland City Council) (“the authority”), carrying out its duties as a territorial authority or building consent authority
- the owner, J Wu (“the owner”).

I consider that B Jacobson (“the consultant”), as an advisor to the former and current owners is a person with an interest in this determination.

¹ The Building Act, Building Code, compliance documents, past determinations and guidance documents issued by the Department are all available at www.dbh.govt.nz or by contacting the Department on 0800 242 243.

1.3 The reason for the application

1.3.1 This determination arises from the decisions of the authority:

- to issue a notice to fix for the partly completed house because it was not satisfied that the building work complied with certain clauses² of the Building Code (First Schedule, Building Regulations 1992)
- to refuse to accept that the consultant's proposals for addressing items identified in the notice ("the proposed repairs") will be sufficient to achieve compliance with the Building Code.

1.4 The matters to be determined³ are therefore:

1.4.1 Matter 1: the notice to fix

Whether the authority was correct in its decision to issue the notice to fix. In deciding that matter, I must consider the compliance of:

- the existing building envelope with Clauses B2 Durability and E2 External Moisture; taking into account the work completed to date such as the wall cladding and the roof cladding, as well as the way these components have been installed and work together (I consider this in paragraph 6)
- the existing timber framing with Clause B1 Structure, taking into account the damage to the framing that has resulted from the lack of weathertightness of the incomplete building envelope (I consider this in paragraph 7.1)
- the compliance of various other structural components with Clause B1 Structure, taking into account the lack of inspections and the changes to the building consent (I consider this in paragraph 7.2.1)
- the timber retaining walls on the property with Clause B1 Structure, taking into account the lack of inspections and the changes to the retaining walls (I consider this in paragraph 7.2.2).

1.4.2 Matter 2: The proposed repairs

Whether the proposed repairs and completion of the building work will result in the building work complying with Clauses B1, B2, and E2 of the Building Code. (I consider this matter in paragraph 9).

1.5 Matters outside this determination

1.5.1 This determination does not consider the following matters and contraventions of other clauses cited in the notice to fix:

- Clause F4 Safety From Falling, which relates to temporary access steps
- Clause G9 Electricity, which relates to temporary construction power supply
- Clauses G10 Piped services and G12 Water Supplies, which appear to relate to the lack of plumbing and drainage inspections rather than specific defects

² 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.

³ Under sections 177(1)(b), 177(2)(d) and 177(2)(f) of the Act

- and G13 Foul Water, which relates to the position of a main sewer drain.

1.5.2 The notice to fix also outlined requirements for durability of building elements. The owner may apply to the authority for a modification in respect of the provisions of Clause B2 if the building work is able to be completed in accordance with the Building Code; and I therefore leave this to the parties to resolve in due course.

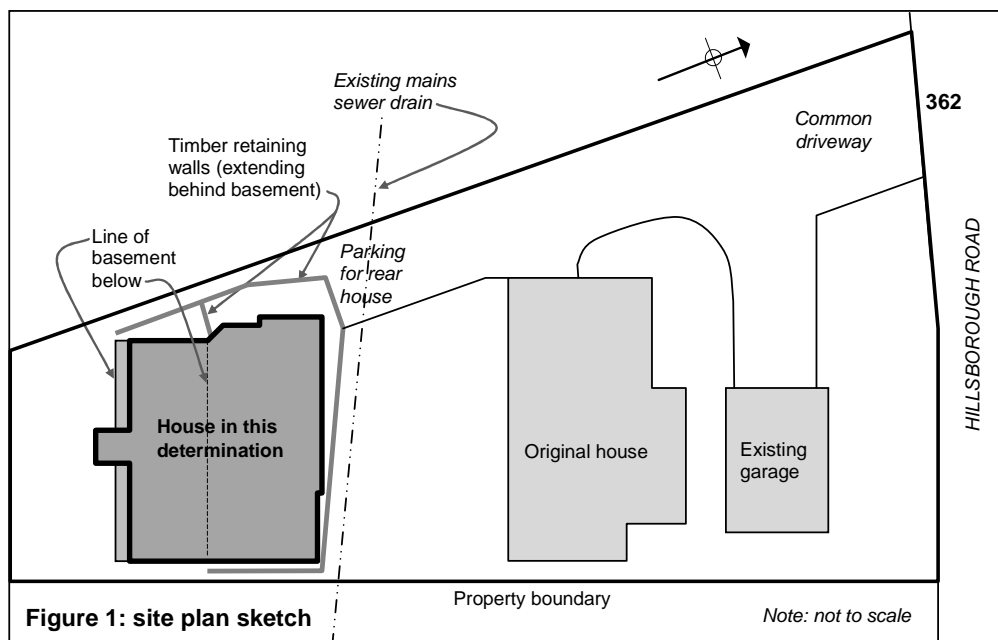
1.6 In making my decision, I have considered:

- the authority's submission
- various reports and correspondence from the consultant
- the report of the expert commissioned by the Department to advise on this dispute ("the expert")
- the other evidence in this matter.

2. The building work

2.1 The building site

2.1.1 The subject house is to the rear of a large undivided section, with an older 1940's house and garage situated to the north. A shared driveway from the street provides access to the older house and extends to provide car parking for the rear house as shown in Figure 1, with timber steps leading down to lower level paving.



2.1.2 The un-subdivided south-sloping section narrows towards the rear where it is 'benched' with timber retaining walls to provide two building platforms. One of these walls extends through the subfloor of the house, while the other borders the west, north and east sides of the building platform. An existing mains sewer drain crosses the section; and is shown on the site plan as 1 metre north of the upper retaining wall.

2.2 The house

- 2.2.1 The building work considered in this determination consists of a detached house with a part basement level situated in a high to very high wind zone for the purposes of NZS 3604⁴. The house design is assessed as having a low weathertightness risk.
- 2.2.2 The 2004 amended consent plans show living areas and three bedrooms in the upper level of the house, with a spiral staircase to the south providing access to the basement. The basement plan shows a central 'studio' with bathroom facilities along the north wall and two additional bedrooms to either side. The exterior basement walls are proud of the upper walls, with lean-to glazed roofs.
- 2.2.3 Construction is generally conventional light timber frame, with a concrete floor slab to the basement and timber pole foundations elsewhere. The 5° pitched profiled metal roof has eaves projections of about 200mm and no verge projections.

2.3 The unfinished work

- 2.3.1 The house has been completed to a semi-enclosed stage, with most internal framing and the roof complete. The unfinished work includes:
- all plumbing and wiring
 - the windows and doors except for two installed windows
 - the lean-to glazed roofs to the south basement walls
 - the spiral stairway, together with the cladding around the stairwell projection
 - some other areas of the wall cladding.
- 2.4 The wall cladding installed to date is horizontally fixed interlocking uPVC weatherboards fixed over 40mm polystyrene sheet and the building wrap to the framing. The weatherboard manufacturer provides purpose-made uPVC flashings, trims and accessories, which include head, sill and jamb flashings for windows and doors. However, few flashings have been installed as the cladding is unfinished.
- 2.5 The expert removed nine timber samples and forwarded them to a testing laboratory for analysis. The biodeterioration consultant's analysis confirmed that five of the samples were boron treated to H1.2 while the remaining four were either untreated or the boron had leached from prolonged exposure to moisture. Given the potential framing exposure from 2000 to 2009, I consider the latter to be more likely. I therefore accept that the original framing was likely to have been treated to H1.2.

3. Background

3.1 The building consents

- 3.1.1 In the past 10 years, the following building consents or consent applications relate to the building work for this house:
- the original consent B/1999/3603229/01 issued on 19 May 1999

⁴ New Zealand Standard NZS 3604:1999 Timber Framed Buildings

- the amended consent B/1999/3603229/02 issued on 4 May 2004
- application for amendment B/1999/3603229/03 refused on 7 August 2007.

3.2 The original building consent

3.2.1 The authority issued a building consent (No. B/1999/3603229/01) for the house to the former owner on 19 May 1999 under the Building Act 1991. The former owner apparently carried out most of the building work.

3.2.2 The original consent drawings included:

- a 4.2m deep ‘rumpus’ room basement, limited to one side of a staircase
- a timber deck to the other (east) side of the staircase
- a part-height concrete block retaining wall to the basement/subfloor wall
- aluminium ‘conservatory windows and roof light’ to the south basement wall
- a 3.6m high exterior wall to the north ground floor wall
- fibre-cement weatherboard wall claddings.

3.3 Construction until 2004

3.3.1 The timber pole foundations and retaining walls were completed first, with the retaining walls inspected by an engineer on 20 September 1999 and 7 March 2000. In a letter to the authority dated 7 March 2000, the engineer stated that the retaining walls had been inspected and complied with the requirements of the Building Code. A handwritten postscript by the engineer on the letter noted that the former owner ‘has advised that Building Pole Foundations have been inspected by [another firm of engineers]’; however, I have seen no record of such an inspection.

3.3.2 Construction of the basement foundations and floor slab followed, with the authority recording a satisfactory ‘slab floor’ and foundations inspection on 28 October 2000. At that time the floor slab accorded with the original drawings and the subfloor retaining wall would not yet have been constructed. The engineer’s inspections (see paragraph 3.3.1) therefore could not have included the subfloor retaining wall.

3.3.3 As the former owner continued to work on the house, significant changes from the consent drawings were made during the next three years although no amendments were applied for. The consultant apparently became informally involved with the project from late 2001, subsequently assisting with amended drawings.

3.3.4 Apart from a letter from the authority on 5 November 2003, noting the lack of inspections and asking the former owner to request an inspection, there is no record of any correspondence between the parties until 2004.

3.3.5 From the sequence of events outlined in paragraph 3.4, it is apparent that all of the wall, floor and roof framing was completed by about 2004, along with the roof cladding (see paragraph 3.4.3). Some of the timber framing must therefore have been exposed to the weather from its erection between 2000 and 2004.

3.4 The 2004 amended consent

3.4.1 According to the consultant, he assisted the former owner with drawings for the changes to the building work, providing ‘some 24 or more A3 sheets’ to support an application for an amended building consent, which sought retrospective approval for changes already carried out (see paragraph 3.4.3). In May 2004, the former owner applied to amend the original building consent for:

Revised layout of basement and extend. Change stairs to spiral. Close in deck.
Separate wc and shower.

3.4.2 The authority issued the amended consent (No. B/1999/3603229/02) on 4 May 2004, based on a set of four rudimentary drawings. The consent drawings showed:

- no change to the fibre-cement weatherboard cladding
- basement depth increased from 4.2m to 6.8m
- timber deck deleted, with the basement extended full width of the house
- two bedrooms, a studio and shower/toilet facilities replacing the rumpus room
- basement concrete slab extended and noted as ‘non structural’
- deletion of the concrete block retaining wall to the north basement wall
- second timber retaining wall constructed behind the north basement wall
- conservatory glazing replaced with conventional windows and wired glass to the lean-to roofs of the south basement wall
- spiral staircase in lieu of the conventional stairs
- north ground floor wall height reduced to 3m, so reducing the roof pitch.

3.4.3 On 5 May 2004 (the following day) the authority carried out a pre-line inspection of the work carried out. The inspection record ‘passed’ the framing, bracing and fixings and noted that a producer statement was required for the driven piles. Although the record ticked ‘building weathertight’, it is apparent that only the roofing was installed, as the record also noted:

insulation to be installed, windows to be fitted, exterior cladding to be in place.

3.5 Work carried out from 2004 to 2007

3.5.1 There are no records of what work, if any, was carried out during 2004 and 2005 and no inspections were requested or carried out. By March 2006 the former owner had started to install uPVC weatherboards over polystyrene (“EPS”) backing sheets in lieu of the fibre-cement weatherboards shown in the original consent drawings.

3.5.2 In a letter to the authority dated 24 March 2006, ‘tendered to keep the file current on progress of this project’, the consultant described the ‘cladding that has been applied’ and concluded:

Window installation is shortly to be undertaken, to be followed by electrical and plumbing services and pre-lining inspection.

I submit that Council has the authority to accept [the proprietary cladding] as a cladding in this project without the substrate of EPS, which substrate increases the

degree to which the combination complies and resists the ingress of external moisture.

3.6 The consultant's 2007 report to the authority

3.6.1 The consultant again wrote to the authority on 10 July 2007, noting that the former owner had asked him 'to review and resolve final issues culminating in a certificate of compliance'; and that the owner was committed to completing the work with contractors and the house was likely to be completed by the end of the year. The consultant also noted that 'workmanship is excellent' and generally exceeded code requirements. He described the installed cladding in some detail, noting that the uPVC weatherboards had been fixed through the EPS using 90mm nails.

3.6.2 The consultant also stated that the intention was to use uPVC windows and attached a window detail showing uPVC head flashings 'fused' with adhesive to the outside face of the uPVC weatherboards. The consultant also proposed using 2mm thick foil-faced self-adhesive flashing tape for sill flashings.

3.6.3 The consultant noted that, subject to the authority's comments:

...we anticipate undertaking joinery installation, services installation, and interior lining promptly – the pre-lining inspection having been undertaken 5 May 2004.

(I take this to mean that a further pre-lining inspection would not be requested, despite the earlier pre-line inspection being incomplete.)

3.7 The authority's response

3.7.1 The authority wrote to the consultant on 18 July 2007, noting that any changes to wall cladding and windows required an amendment to be issued prior to work commencing. The authority noted that the consultant's proposals would need to be considered as alternative solutions, and:

As such, full and careful consideration by Council must be undertaken when considering your product as an alternative method of construction prior to approval being given. Unfortunately, with the information that has been provided, Council are unable to be satisfied that compliance with the code can be achieved.

3.7.2 The authority outlined the level of additional evidence and independent verification required to demonstrate code compliance for alternative solutions, noting that a determination could be applied for in regard to its refusal of the proposals.

3.7.3 Despite the authority's response, a consent application (No. B/1999/3603229/03) was made by the consultant on 26 July 2007 and the form was stamped as rejected on 7 August 2007. The consultant continued to correspond with the authority, and in a letter dated 26 November 2007 the authority confirmed that its position remained as previously stated.

3.8 There was no further communication until the sale of the house in March 2009. The new owner subsequently engaged the consultant to assist in resolving the situation of the partly finished house.

3.9 The consultant wrote to the authority again on 27 December 2009. As inspections by the authority had been carried out, the consultant considered the only issue requiring 'endorsement or acceptance to progress the work' was the cladding. The consultant therefore asked the authority to reconsider the use of uPVC weatherboards fixed over EPS.

3.10 The notice to fix

3.10.1 The authority inspected the house on 2 March 2010 and wrote to the owner on 17 May 2010, stating that it was not satisfied that the building work complied with the Building Code in 'a number of respects'.

3.10.2 The authority attached a 'photo file' of defects and a notice to fix listing defects identified during its inspection. In summary, these included:

- the timber retaining walls across the property:
 - the lack of drainage inspections
 - the position of the upper wall relative to the mains sewer pipe
 - excavations below upper wall larger than originally approved
- lack of confirmation of boundaries in regard to building height
- plumbing and drainage:
 - lack of inspections
 - drainage tank installed without approval
- lack of hardfill and DPM to slab of habitable basement area
- the timber framing:
 - some framing is second-hand or demolition timber
 - varieties of timber species and grades are used
 - timber was exposed to moisture during construction
- lack of sub-floor insulation
- inadequate structural bracing
- inadequate roof fixings
- inadequate discharge of stormwater
- inadequate exterior stairs to main entry
- inadequate electrical wiring.

Changes from consented work

- unauthorised work carried out prior to 4 May 2004 amended consent
- the substitution of a 'hybrid' wall cladding system, which had
 - been installed prior to notifying the authority
 - been installed without applying for an amendment to the consent
 - insufficient evidence in support to determine compliance
- changes to window and door opening sizes without approval
- windows changed from aluminium to uPVC without approval.

3.10.3 The authority required the owner to provide a proposed 'scope of works' outlining how each area of non-compliance is to be addressed and rectified.

3.11 The consultant's response to the notice to fix

3.11.1 The consultant responded to the notice to fix on 31 May 2010, describing the background to the situation and explaining that the former owner would have exceeded any code requirements. He noted that the re-used framing was boron-treated timber from demolished school buildings built about 1978; and had been used as new boron treated timber was not available at the time.

3.11.2 The consultant stated that any problems in the building's construction were 'all documentary in nature' and considered that 'no risk of rotting applies in the case of this project'.

3.11.3 The consultant advised that he had been informally involved with the project since late 2001 and had assisted with drawings for the amended building consent in 2004; providing the former owner with 'some 24 or more A3 sheets' although the authority appeared to hold an incomplete set. In the consultant's opinion, the original building consent documents had no standing and therefore the building work should not be compared with them.

3.11.4 The consultant explained his engagement by the new owner in December 2009 to 'check the status of the project with the objective of completion'. The objective of the inspection that followed should therefore have been 'to establish what is needed to be done to make the building habitable, and complete the project.'

3.11.5 The consultant considered that the notice to fix was 'defective' as:

- it related to original consent drawings, now superseded by amended drawings
- the built work cannot be compared to the amended consent, as the amended drawings should consist of 24 drawings (not four) plus a specification
- it attempts to place blame and does not lead to a solution; instead ensuring that the project is left unfinished
- 'blind compliance with rules that do not exist' could lead to cladding removal
- it refers to many irrelevant items relating to the building being unfinished.

3.11.6 The consultant considered that 'little is needed to complete' the building and commented in detail on the items identified in the notice to fix, providing a limited 'scope of works' refer paragraph 3.11.6).

3.11.7 The consultant proposed that the following work be completed:

- | | |
|---------------------------------------|------------------------------|
| 1. Completion of [external] flashings | 10. Fix and stop linings |
| 2. Install stairs | 11. Paint / decorate |
| 3. Fit electric wiring | 12. Finish electrics |
| 4. Install plumbing & drainage | 13. Fit plumbing appliances |
| 5. Install joinery | 14. Fit hardware |
| 6. Install balustrades | 15. Fit kitchen units |
| 7. Install under-floor insulation | 16. Fit lighting & electrics |
| 8. Install [internal] doors | 17. Fit gas [hot] water |
| 9. Connect services | 18. Fit floor coverings |

3.11.8 In a follow-up letter dated 14 June 2010, the consultant notified the authority that the work proposed in his report would proceed by 21 June 2010 unless the authority advised otherwise.

3.12 Further correspondence and meetings continued without resolution and the Department received an application from the authority for a determination on 28 September 2010. The Department sought additional information, which was received on 15 October 2010.

4. The submissions

4.1 The authority provided copies of:

- the original drawings and building consent issued on 19 May 1999
- the amended drawings and amended building consent issued on 4 May 2004
- the inspection summary and computer record
- the correspondence with the former owner, current owner and the consultant
- the authority's letter and notice to fix dated 17 May 2010
- various statements, photographs and other information.

4.2 Copies of the authority's submission and other evidence were provided to the owner. The owner made no submission in response to the application.

4.3 A draft determination was issued to the parties for comment on 16 December 2010. The authority accepted the draft without comment in a response received on 18 January 2011.

4.4 The Department repeatedly sought a response from the owner and a final request for submissions was made on 16 March 2011. No response was received from the owner or the consultant.

5. The expert's report

5.1 As mentioned in paragraph 1.6, I engaged an independent expert to assist me. The expert is a member of the New Zealand Institute of Building Surveyors and inspected the house on 8 November 2010, providing a report dated 11 November 2010.

5.2 General

5.2.1 Apart from items outlined below, the expert considered that the general overall construction quality of the partly completed house was 'average'. The expert noted that, while the roof cladding itself was 'done very well', barge flashings were unfinished.

5.2.2 The house poles and suspended timber floor structure also appeared to be of a 'reasonable standard', with the second-hand Oregon/Douglas fir floor joists 'especially good'.

5.2.3 The expert's general impression of the work completed to date was:

...of conscientious work by someone who was not fully familiar with, for example, NZS 3604:1999. This explains some of the anomalies such as the framing under the ends of the steel beams, some of the angle brace installations and many of the lintels not being checked in or supported by under-studs.

5.3 Moisture levels

5.3.1 The expert inspected the framing in the uncompleted building, noting soaked timber and other obvious signs of past and current water penetration in:

- bottom plates and lower studs to basement south walls and adjacent partitions
- bottom plates and plywood to basement/subfloor dividing wall
- bottom plates to west and east side walls
- some bottom plates to internal basement partitions, including wardrobes
- exposed framing at some door openings
- exposed kitchen window sill framing, beneath deteriorated building wrap
- soffit framing, where flashings missing.

5.3.2 The expert took invasive moisture readings into bottom plates of basement walls, noting that these varied from about 25% to 'soaking wet'. In the upper level, moisture levels were lower and varied between 15% and 17%. However, as the framing is exposed, I consider these to be of limited comfort due to the drying of exposed framing expected during spring allowing moisture to dissipate.

5.4 Decay analysis

5.4.1 The expert removed nine timber samples and forwarded them to a biodeterioration consultant for analysis. The samples were taken from the following areas:

- nog to interior wall (sample 1)
- nog to upper level ceiling framing (sample 2)

- trim stud to north door opening (sample 3)
- bottom plates to basement south walls and partition (samples 4, 5, 6 and 7)
- bottom plate to the basement/subfloor wall (sample 8)
- boundary joist to stairwell south wall (sample 9).

5.4.2 The report of the biodeterioration consultant, dated 10 November 2010, found that:

- samples 4 to 8 contained ‘well established decay, typically deep advanced decay that had caused loss of the bulk of the original structural integrity in affected areas (high risk of structural failure)’ and replacement is needed
- sample 9 contained ‘pockets of early soft rot in the outer 1-2mm’ and dense fungal growths indicating prolonged exposure to the weather, with nearby decay possible and future serious decay likely.

5.4.3 The tests also found that all samples except sample 9 showed a ‘substantial loss of boron due to leaching’. Samples 4 to 7 were ‘either untreated or more likely had lost boron due to prolonged leaching conditions’, while the remaining samples retained sufficient boron to be equivalent to H1.2.

5.5 The windows

5.5.1 The expert noted that only two windows had been installed to the upper south wall, with uPVC head flashings glued onto the face of the uPVC weatherboard. At some north door and window openings, more appropriate two-part head flashings had been installed.

5.5.2 The expert observed flashing tape installed over timber to many windows and doors and was told that this had been applied ‘relatively recently’. Until then the openings would have been similar to the northwest kitchen corner window, where sills were covered with deteriorated building wrap.

5.6 The wall cladding

5.6.1 The expert was able to observe the wall construction at the top of the open basement walls and at the sides of various door and window openings. The expert noted that the uPVC weatherboards had been fixed through 40mm EPS using 85mm zinc plated gun nails, which penetrated the timber framing by no more than 25mm.

5.6.2 The expert noted that the manufacturer’s recommendations at the time for directly fixing uPVC weatherboards called for 40mm flat head galvanised clouts that provided about 30mm penetration into the timber. However, the expert also noted that the EPS substrate is soft in comparison to timber, which makes it difficult to fit softer/more flexible components such as proprietary flashings.

5.6.3 The expert also noted that, although ground levels cannot be seen or accessed on the west and east walls, the wet bottom plates indicate that water is soaking in from outside. The paving to the north side butts against the cladding and the cladding does not cover the boundary joists on the west side.

5.7 The roof

- 5.7.1 The skillion roof ceiling is intended to be fixed to the underside of the joists, leaving little allowance for air circulation beneath the low-pitched roof.
- 5.7.2 The expert also noted that only one barge flashing is installed, and this does not overlap two ridges of the roofing as needed for a high wind zone. The 'fascia' is 4.5mm fibre-cement with no drip edge and water has entered the soffit framing.

5.8 The subfloor and the basement floor slab

- 5.8.1 The expert observed conventional 'black plastic' at the rear of the slab. As the adjacent clay in the sub-floor was very wet and the concrete surface appeared dry, the expert considered the membrane could be 'more or less continuous'. (I note that the original slab was smaller and later extended).
- 5.8.2 Given the high moisture reading of 62% in the nearby wardrobe bottom plate (an internal wall); the expert considered that further investigation was required to establish the cause(s) of the high moisture level.
- 5.8.3 The subfloor timber retaining wall is very close to the basement north wall and the exposed subfloor clay is 'soaking wet'. The adjacent bottom plate is wet and decaying indicating a drainage problem relating to the retaining wall.
- 5.8.4 The expert also noted that there is no insulation to the suspended timber floor and access to the sub-floor area is 'quite difficult'. (I also note that sub-floor ventilation appears to be limited.)

5.9 The structure

- 5.9.1 The expert considered that a registered structural engineer should inspect work undertaken to date as he had observed some questionable elements, including:
- incorrect positioning of metal angle bracing
 - plywood flooring not laid with staggered joints
 - ends of some steel beams supported from single studs, with adjacent vertical nogs cut between the horizontal nogs, with loads transferred down to the mid-span of single floor joists
 - lack of structural connections between rafters and beams
 - some of the second-hand timber and the mix of timber species
 - rafters connected to steel beams with a single zinc plated screw
 - lintels neither checked in nor otherwise supported at the ends
 - a continuous ceiling rafter nailed in place while apparently supposed to support rafters over window openings
 - walls and roof structure above the northwest kitchen corner window supposed to be supported via cantilevers from each end

- the subfloor retaining wall not appearing to be drained to the outside, as the exposed clay is 'soaking wet' (I also note that this wall was not inspected by an engineer during construction – see paragraph 3.3.2).

5.10 Commenting on the code compliance of other items identified in the notice to fix, the expert noted that he was not in a position to comment on:

- the retaining walls
- the location of the sewer
- the 'storage tank' buried in the backyard
- the height in relation to the boundaries
- the lack or otherwise of inspections.

5.11 The expert's conclusions

5.11.1 In addition to the need for a structural inspection of the work, the expert concluded that, in his opinion, a scope of works should be developed that addresses each code clause individually to demonstrate compliance and to address the other issues raised in the notice to fix.

5.11.2 The expert considered that a scope of works should include removal of the cladding, EPS backing sheets and building wrap, with all timber framing exposed, inspected and replaced as necessary, with retained timber treated with site-applied preservative.

5.12 A copy of the expert's report was provided to the parties on 12 November 2010.

6. Weathertightness

6.1 The evaluation of building work for compliance with the Building Code and the risk factors considered in regards to weathertightness have been described in numerous previous determinations (for example, Determination 2004/1). When evaluated using the E2/AS1 risk matrix, the environmental and design features of this house show that, if the house were to be completed, all elevations would demonstrate a low weathertightness risk rating.

6.2 I note that direct-fixed uPVC weatherboards are an alternative solution to E2/AS1 which have been appraised by BRANZ⁵ as compliant with Clauses E2 and B2 for buildings of low to moderate weathertight risk providing the cladding is installed in accordance with the manufacturer's instructions.

6.3 However, in the case of this uncompleted house, the uPVC weatherboards are not installed in accordance with the manufacturer's instructions, in that:

- the uPVC weatherboards are fixed through 40mm EPS backing sheets, with consequential changes to fixings

⁵ BRANZ Appraisal Certificate No. 490 (2005)

- the expert has shown the penetration of the fixing nails through the uPVC weatherboards and polystyrene to be 25mm. (I note however, this could be considered adequate for that diameter of nail)
- with the cladding already in place:
 - the window openings cannot be adequately protected
 - purpose-made uPVC flashings, trims and accessories, including head, sill and jamb flashings for windows and doors, are not able to be installed
- the cladding is fixed to framing that has decayed in a number of areas.

6.4 Taking account of the expert's report and the above observations, I consider that the wall cladding has not been installed in accordance with good trade practice and to the manufacturers' instructions at the time of construction.

6.5 Conclusion

6.5.1 It is clear from the expert's report that the unfinished exterior envelope of this house is unsatisfactory in terms of its weathertightness performance, which has resulted in moisture penetration to many areas and decay to some of the framing. Considerable work is required to complete a weathertight and durable exterior envelope, which is likely to include the removal of wall cladding to fully investigate and repair the underlying damaged timber framing.

6.5.2 Further investigation is necessary, including the systematic survey of all risk locations, to determine causes and the full extent of moisture penetration, timber damage and the work that would be required to complete the exterior envelope.

7. The structure

7.1 The timber wall framing

7.1.1 The expert's report and the biodeterioration consultant's report satisfy me that significant damage to the timber framing has resulted in a risk of structural failure of the affected areas, which include load-bearing walls for the upper level and roof of the house. I therefore consider that the timber wall framing does not comply with Clauses B1 and B2 of the Building Code.

7.1.2 As outlined in paragraph 2.5, I accept that the timber framing was likely to have been originally treated to an equivalent of H1.2 and the lack of treatment in timber samples containing advanced decay has resulted from boron leaching due to prolonged exposure to moisture.

7.1.3 The expert's evidence of significant past and current moisture penetration into the framing, taken together with the history of exposure during the protracted construction of the house to date, lead me to suspect that similar boron leaching may have occurred elsewhere in the house; thereby reducing the resistance of the framing to future moisture damage.

7.2 Other structural components

- 7.2.1 The expert's report, in particular his comments outlined in paragraph 5.9.1, satisfies me that various other aspects of the building work completed to date do not comply with Clause B1 of the Building Code and require further investigation and remedial work. I also note that the amended consent documents did not include structural bracing calculations or a producer statement for the amended design.
- 7.2.2 In regard to the subfloor retaining wall, the sequence of events outlined in paragraph 3.3.2 satisfies me that that this wall was not inspected by an engineer or the authority during its construction. The expert's report (see paragraph 5.8.3) and the biodeterioration consultant's report (see paragraph 5.4) also satisfies me that the management of water associated with the timber retaining wall in the subfloor of the house is inadequate, and is adding to the accumulation of external moisture that is penetrating the timber framing of the basement/subfloor wall.

7.3 Conclusion

- 7.3.1 Based on the above, I am able to conclude that the unfinished house does not comply with Clauses B1, B2, and E2 of the Building Code and that further investigation is required. I consider that a registered structural engineer should inspect and report on the adequacy of the work undertaken to date and on any remedial work needed.

Matter 1: The notice to fix

8. The notice to fix

- 8.1 Taking into account the expert's comments, the following table summarises my conclusions on items listed in the notice to fix dated 17 May 2010; referring also to the relevant code clauses and related paragraphs within this determination.

Notice to fix		My conclusions	Code Clauses	Paragraph references
Item	Summarised requirement			
2.1	Issues related to changed cladding			
a) b)	Hybrid cladding not in approved consents	Agreed	E2, B2	3.2.2 and 3.4.2
c) d)	Cladding installed with no amendment.	Agreed	E2, B2	3.6.1 and 3.7.3
e)	Insufficient evidence submitted to show compliance.	Agreed	E2, B2	3.6.1 and 3.7.1
2.1	Not to relevant acceptable solutions at the time			
a)	Confirmation required of drainage and discharge from behind retaining walls	Agreed (for sub-floor retaining wall)	B1, B2, E2	5.8.3 and 5.9.1
b)	Confirmation required of position of mains sewer drain relative to upper retaining wall	Not in determination	G13	1.5.1 and 5.10
c)	Confirmation required of boundaries	Not in determination		5.10
d)	Upper excavation changed without approval	Agreed (for sub-floor retaining wall)		3.3.2 and 3.4.2
e)	No plumbing and drainage inspections	Agreed (in regard to 'drainage tank')	G12	1.5.1 and 5.10
f)	A 'drainage tank' installed without approval	Agreed	E2	1.5.1 and 5.10

g)	No DPM/hardfill shown in amended drawings	Agreed (in regard to amended section - needs further investigation)	E2, B2	5.8.1 and 5.8.2
h)	Changes made prior to amended consent	Agreed		3.3.3 and 3.4.2
i)	Second-hand timber framing used	Agreed (requires engineering review)	B1	5.2.1 and 5.9.1
j)	No sub-floor insulation installed	Agreed	H1	5.8.4
k)	Variety of timber species and grades used	Agreed (engineer to review)	B1	5.2.1 and 5.9.1
l)	Timber exposed to moisture	Agreed	B1	3.3.5, 5.3, 5.4
m)	Some structural bracing elements inadequate	Agreed (engineer to review)	B1	5.9.1
n)	Structural changes not approved – to lintels, beams, bracing etc	Agreed (engineer to review)	B1, E2, B2	3.3.5 and 3.4.1
o)	Windows changed to uPVC without approval	Agreed		3.6.2 and 5.5.1
p)	Roof fixings inadequate	Adequate for roof itself (but perimeter flashings require completion/amendment)	E2, B2	5.2.1 and 5.7.2
2.3	Drainage and ventilation			
	Lack of cladding drainage & ventilation	Likely, due to hybrid nature of cladding	E2, B2	
3.0	Changes to building consent			
a) to f)	Various changes to approved documents	Agreed		3.3.5 and 3.4.2
4.0	Other building related issues			
a)	Discharge of surface water not confirmed	Agreed (for sub-floor retaining wall)	B1, B2, E2	5.8.3 and 5.9.1
b)	Access stairs to dwelling non-complying	Not in determination	D1, F4	1.5.1
c)	Unsafe electrical wiring installed	Not in determination	G9	1.5.1

8.2 I am satisfied that the uncompleted house does not comply with the Building Code and that the authority made an appropriate decision to issue the notice to fix. However, I am also of the view that one item identified in the notice, at least in part, is likely to be adequate and the expert also identified additional items that need to be addressed, so the notice should be modified accordingly (refer to paragraph 10.1).

8.3 In addition I note also that the 1.8m high timber retaining wall requires a barrier to comply with Building Code Clause F4.

Matter 2: The proposed repairs

9. Discussion

9.1 It is apparent that the severe decay to the basement walls will require the removal of at least some areas of wall cladding to the affected walls in order to allow appropriate repair of the damaged timber, which should include a full investigation of the causes, extent, level and significance of the timber decay to framing.

9.2 For the remaining wall areas, I consider that final decisions on the future of the house may depend on whether code compliance can be achieved by either remediation or removal of the wall cladding, or a combination of both, and can only be made after a more thorough investigation of the wall cladding and of the condition of the

underlying timber framing, which will require a careful analysis by an appropriately qualified expert. Once that decision is made, the chosen remedial option must be submitted to the authority for its approval.

- 9.3 Taking account of the expert's report and his conclusions as outlined in paragraph 5.11, I am satisfied that the limited repairs proposed by the consultant do not adequately address the significant problems apparent in this partly completed house. I am satisfied that the house would not comply with Clauses B1, B2, and E2 of the Building Code if completed in accordance with the consultant's proposals.

10. What is to be done now?

- 10.1 The notice to fix should be modified to take account the findings of this determination, referring to the additional investigations required and to any further defects that might be discovered in the course of investigation and rectification, but not specifying how those defects are to be fixed. It is not for the notice to stipulate directly how defects are to be remedied and the building work brought to compliance with the Building Code. That is a matter for the owner to propose and for the authority to accept or reject. It is important to note that the Building Code allows for more than one means of achieving code compliance.
- 10.2 I suggest that the parties adopt the following process to meet the requirements of paragraph 10.1. Initially, the authority should revise and reissue the notice to fix. The applicants should then produce a response to this in the form of a detailed proposal (refer also paragraph 5.11) for the uncompleted house as a whole, produced in conjunction with a competent and suitably qualified person, as to the rectification or otherwise of the specified matters. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

11. The decision

- 11.1 In accordance with section 188 of the Act, I hereby determine that:
- the uncompleted external envelope of the building work does not comply with Building Code Clauses B2 and E2
 - the building work does not comply with Building Code Clauses B1 and B2
 - the subfloor retaining wall adjacent the internal basement wall does not comply with Building Code Clause E2
 - the 1.8m high timber retaining wall does not comply with Building Code Clause F4

and accordingly I confirm the authority's decision to issue a notice to fix; however the authority is to modify the notice to fix, dated 17 May 2010, to take account of the findings of this determination.

11.2 I also determine that the completion of the building work with the proposed repairs will not result in the building work complying with Building Code Clauses B1, B2, and E2.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 6 April 2011.

John Gardiner
Manager Determinations