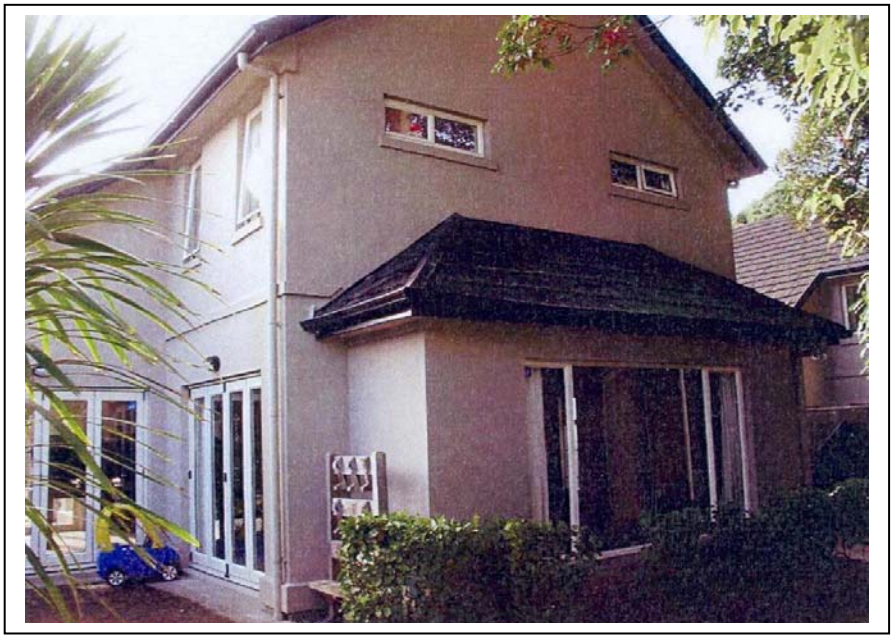
Determination 2010/081

Refusal to issue a code compliance certificate for a 7-year-old house with a solid wall system at 1/28 Ireland Road, Panmure, Auckland



1. The matters to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004[1] ("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 the owner and builder of the house; A Prince ("the applicant") acting through an independent building company ("the agent") and the other party is the Auckland City Council ("the authority"), carrying out its duties as a territorial authority or building consent authority.

1.2 This determination arises from the decisions of the authority to refuse to issue a code compliance certificate and to issue a notice to fix for a 7-year-old house because it was not satisfied that the building work complied with certain clauses[2] of the Building Code (First Schedule, Building Regulations 1992). The authority's concerns about the compliance of the building work relate primarily to the weathertightness of the exterior building envelope.

[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.

[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.

1.3 The matter to be determined[3] is therefore whether the authority was correct in its decisions to refuse to issue a code compliance certificate and to issue a notice to fix for the house. In deciding this matter, I must consider whether the external building envelope of the house complies with Clause B2 Durability and Clause E2 External Moisture of the Building Code. The external building envelope includes the components of the systems (such as the solid wall system, the other wall claddings, the windows, the roof claddings and the flashings), as well as the way the components have been installed and work together.

1.4 The notice to fix cited a contravention of Clauses B1 Structure and required the provision of additional engineering documentation on the construction of the solid wall system. I have addressed the authority's documentation requirements in paragraph 8.2, as part of my conclusions on the notice to fix.

1.5 Matters outside this determination

1.5.1 The notice to fix cited contraventions of Clauses E1 Surface Water and H1 Energy Efficiency of the Building Code, although there are no specific identified defects identified in the notice that relate to these clauses. I therefore do not consider these clauses further in this determination.

1.5.2 The notice to fix also identified several defects related to compliance with Building Code Clauses E3 Internal Moisture and G13 Foul Water. As the applicant has agreed to remedy those defects, I do not consider these clauses further in this determination.

1.5.3 The notice to fix also outlined requirements for durability of building elements and stated that the applicant may apply to the authority for a modification of the requirements to allow durability periods to commence from the date of substantial completion in 2003. I therefore leave this matter to the parties to resolve once the house has been made code compliant.

1.6 The evidence

1.6.1 In making my decision, I have considered the submissions of the parties, the report of the expert commissioned by the Department to advise on this dispute ("the expert") and the other evidence in this matter.

1.6.2 The house considered in this determination ("House 1") is one of three neighbouring houses developed and constructed by the applicant under separate building consents from 2002 to 2004. The adjacent house ("House 2") was the subject of Determination 2005/114, which was referred to in the applicant's submission. I have therefore included information collected for that determination as part of the evidence in this matter. I have received no information about the construction of the third house in the group ("House 3").

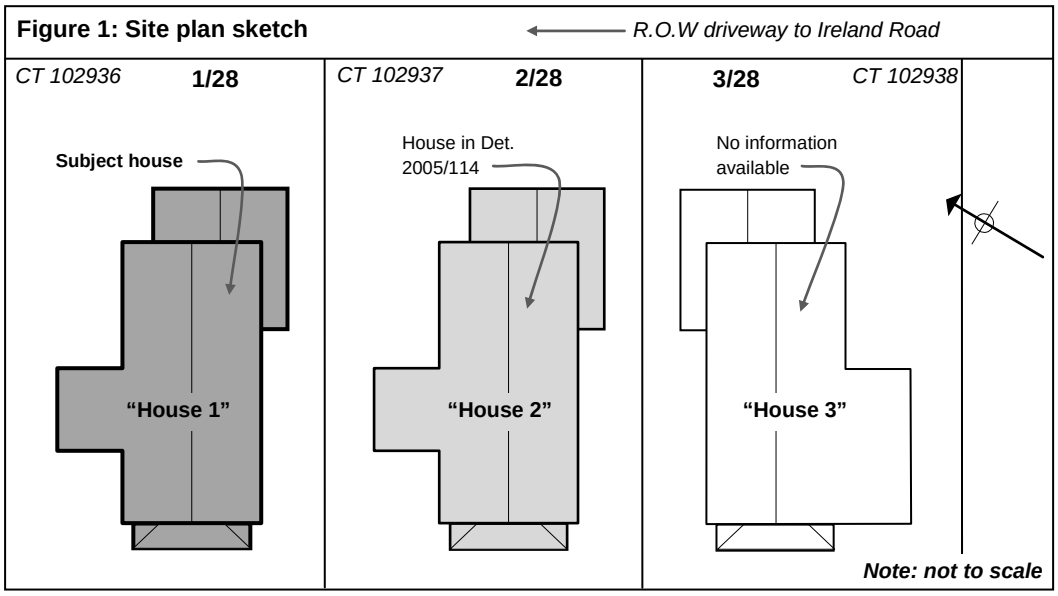
[3] Under sections 177(b)(i) and 177(b)(iii) of the Act (prior to 7 July 2010)

2. The development

2.1 The original property was a large rear section with a right-of-way driveway providing access from Ireland Road. The original house was removed and the property was sub-divided in 2003 by the applicant to provide three separate sections with separate land and building titles defining the legal boundaries to each property.

2.2 House 1 was completed in 2002, House 2 in 2003 and it appears that House 3 was constructed in 2004. House 2 and House 1 are of very similar size, design, construction and materials. The site plan is shown in Figure 1.

Figure 1: Site plan sketch



3. The building work

3.1 The building work for House 1 consists of a two-storey detached house, with an attached single-storey garage, situated on a level site in a low wind zone for the purposes of NZS 3604[4]. The construction is a specifically engineered proprietary solid wall system, with concrete foundations, a concrete waffle floor slab, aluminium windows and pressed metal tile roofing. The house is assessed as having a moderate to high weathertightness risk (see paragraph 7.2).

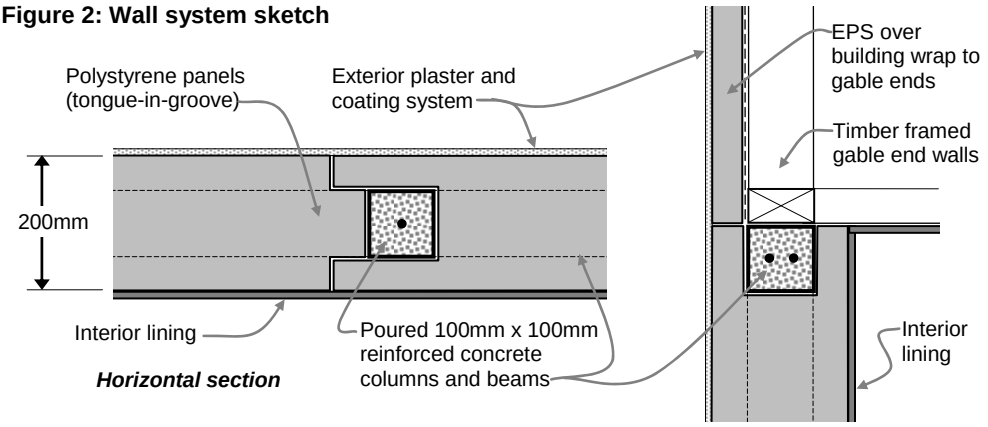
3.2 The house is fairly simple in plan and form, with 35^{o} pitch gabled roofs at two main levels and eaves and verges of about 350mm. A hipped roof projection forms a bay from the living area on the west elevation. A small deck, with open metal balustrades is partly recessed and partly cantilevered from an upper floor bedroom.

[4] New Zealand Standard NZS 3604:1999 Timber Framed Buildings

3.3 The wall system

3.3.1 The exterior walls are a proprietary solid wall system, as shown in Figure 2.

Figure 2: Wall system sketch



3.3.2 The main walls of the house are constructed from 200mm thick interlocking polystyrene ("EPS") panels, which provide formwork for a reinforced concrete post and beam structure. Steel reinforcing rods connect the poured columns and beams to the foundations, the first floor framing and the roof framing. At joinery openings, timber sub-frames fit within the panel grooves, with planted solid timber packers against which the windows and door are face-fixed.

3.3.3 The gable ends are relatively small areas, timber-framed and clad in a form of monolithic cladding system known as EIFS[5]. In these areas, the proprietary cladding system consists of 90mm polystyrene backing sheets fixed directly to the framing over the building wrap. The recessed timber-framed walls to the small upper deck are clad in fibre-cement sheet fixed directly to the framing over the building wrap.

3.3.4 At the base of the solid walls, a plastered polystyrene band with a sloped top is installed over the junction with the foundation wall. A similar band covers the inter-storey junction. A 3mm mesh-reinforced plaster system is applied as a continuous coating to the exterior of the solid walls, the polystyrene bands, the EIFS backing sheets and the fibre-cement backing sheets.

3.3.5 The expert took two timber samples from the bottom locating plate and forwarded them to a testing laboratory for analysis, and the biodeterioration consultant's analysis confirmed that the samples were CCA treated to an equivalent of H3.2. The specification calls for the same level of treatment for timber frames and packers to joinery openings, the first floor boundary joists and cantilevered deck joists. Given this evidence, I consider that timber members within solid walls are treated.

4. Background

4.1 The authority issued a building consent (No. B/2002/3604733) to the applicant for House 1 on 30 July 2002 under the Building Act 1991. The consent documentation included engineering calculations and a producer statement to cover the structural

[5] Exterior Insulation and Finish System

design of the solid wall system and its application to the house. The consent conditions did not include requiring the provision of a producer statement to cover specific engineering review of the solid wall system (see paragraph 8.2).

4.2 The authority carried out inspections during construction, including pre-pour inspections of the ground floor walls on 10 September 2002 and of the first floor walls on 19 September 2002. These passed the reinforcing and connections and noted '[named proprietary] system (polystyrene reinforced panels)'. The pre-line building inspection was passed on 23 October 2002 and the house was apparently completed during 2002, with a final drainage inspection passed on 5 December 2002.

4.3 House 2 was then constructed; and the authority carried out final inspections for both houses on 21 October 2003. House 1 was re-inspected and passed on 30 October 2003, with the inspection record noting 'all outstanding issues resolved'.

4.4 New certificates of title were issued for the three subdivided sections on 1 December 2003. The applicant retained ownership of House 1; House 2 was sold, and House 3 was constructed in 2004 then sold.

4.5 The applicant sought a code compliance certificate in. A final inspection was carried out on 8 June 2009, with the inspection record noting:

- Peer review required & further research needed due to the exterior cladding system selected.
- A letter will be sent to the owners once the council's position is decided.

4.6 The notice to fix

4.6.1 The authority wrote to the applicants on 13 August 2009, stating that it was not satisfied that the building work complied with the Building Code in 'a number of respects'.

4.6.2 The authority attached a 'photo file' of defects and a notice to fix dated 13 August 2009, listing defects identified during its inspection. These included in summary (with associated code clauses shown in brackets):

- lack of a spreader onto a lower roof (E2)
- cracking to the EIFS cladding at gable ends (E2)
- lack of or inadequate apron flashings, saddle flashings and back flashings (E2)
- lack of flashings between EIFS and solid walls and at the foundation wall (E2)
- lack of flashings at the inter-storey junction (E2)
- lack of flashings to window and doors (E2)
- lack of clearance of fibre-cement cladding above deck membrane (E2)
- insufficient step down from the interior floor level to the deck (E2)
- insufficient step between interior floors and exterior ground or paving (E2)
- lack of clearance of walls above ground or paving (E2)

- lack of sealing of the laundry bench to walls (E3)
- vent pipe terminations too close to building elements (G13)
- lack of assurance of condition of deck membrane (E2)
- unflashed and/or unsealed penetrations (E2)
- lack of drip edges (E2).

4.6.3 The authority also identified documentation required 'to assist with confirmation of compliance', which included an application for a 'waiver' of the durability provisions and an engineer's producer statement and inspection report on the solid wall system (see paragraph 8.2).

4.6.4 The agent responded to the notice to fix on behalf of the applicant in a letter to the Department dated 25 January 2010. The letter attached some of the required documentation and noted that the applicant would 'be happy with the CCC back-dated to the day the final inspection was passed'. A number of items identified in the notice to fix were accepted as requiring rectification, while other items were disputed. The agent also noted that at the time of construction, engineering inspections were not required and the authority inspections were sufficient to confirm satisfactory construction of the wall system.

4.6.5 In its response on 19 March 2010, the authority accepted some of the agent's proposals but required further documentation, investigation or remedial work for other areas. The authority noted that it:

> ...strongly urges you to employ the services of a suitably qualified building expert familiar with the [named proprietary] type of construction to help you address the complex issues raised in the Notice to Fix (in particular issues relating to Structure, Durability and Weathertightness/external moisture.

4.6.6 The Department received an application for a determination on 15 June 2010.

5. The submissions

5.1 On behalf of the applicant, the agent described the background to the situation and disputed many items identified in the notice to fix. The agent noted that the construction had been satisfactorily inspected; the work accorded with the code requirements at the time of construction and was built in accordance with the building consent.

The agent disputed the authority's judgement of some areas identified in the notice to fix, referring also to the expert's report completed for the determination issued for House 2. The agent considered that the authority did not appreciate the type of construction and expressed concern that the level of investigation required could create 'problems and potential points of moisture ingress that don't currently exist by pulling parts of the house to pieces', concluding:

> In the eight years since this building was completed there has been no evidence of moisture ingress as a result of failure in the cladding or construction system. there is little or no structural framing to be affected by moisture ingress; and at the time of completion the council was satisfied that it had been done in accordance with the plans consented and approved under the Building Act 1991.

5.2 The applicants forwarded copies of:

- the building consent, consent drawings and specification
- the authority's inspection records
- the notice to fix dated 13 August 2009
- the correspondence with the authority.

5.3 The authority forwarded a CD-Rom, entitled 'Property File', which contained some additional documents pertinent to this determination including:

- engineering design calculations and producer statement
- some additional inspection records.

5.4 Copies of the submissions and other evidence were provided to each of the parties.

5.5 A draft determination was issued to the parties for comment on 24 August 2010. Both parties accepted the draft subject to comment, which I have noted and addressed accordingly.

6. The expert's report

6.1 As mentioned in paragraph 1.6.1, I engaged an independent expert to assist me. The expert is a member of the New Zealand Institute of Architects. The expert inspected the house on 26 July 2010 and provided a report dated 4 August 2010.

6.2 General

6.2.1 Apart from items outlined in paragraph 6.6, the expert considered that the general construction quality was good, with the plaster finish 'smooth, uniform and free from obvious workmanship defects'. The expert noted that kickouts had been retro-fitted to the bottom of apron flashings. He also noted that the house was due for maintenance to some areas; in particular for some cladding damage and cracks, and soil accumulation in gutters.

6.2.2 The expert noted the following variations from the consent drawings:

- The east and west elevations in the drawings are mislabelled.
- The small recesses to the east elevation were not constructed.
- The window sills project from the face of the solid wall
- A band has been installed over the wall to foundation junction.

6.3 The windows

6.3.1 The expert noted that windows and doors are recessed back from the wall by about 100mm, with metal head flashings and sloped reveals to the heads and sills. Timber packers form rebates against which the windows and doors are face-fitted. The installation appeared satisfactory, with the jambs well-sealed and the sloped head reveal preventing water from tracking back to the window junction.

6.3.2 The expert removed a small area of plaster at the sill to jamb junction of a garage window and noted that the underlying timber jamb packer sloped sill was flashed with a liquid-applied glass fibre membrane (LAM). The expert measured the moisture content in timber packers at various windows; concluding that the 9% to 14% moisture content demonstrated that the window details were weathertight.

6.4 Moisture levels

6.4.1 The expert inspected the interior of the house, taking non-invasive moisture readings; noting one elevated reading at the bottom of the north garage wall, which was confirmed by invasive testing.

6.4.2 The expert also took invasive moisture readings through exterior claddings and from the inside using long probes to measure the moisture levels in:

- the timber locating plates in the centre bottom of the solid walls
- the timber packers around the joinery openings
- the timber-framed walls at the deck recess
- the framing of the cantilevered deck.

6.4.3 Moisture levels were between 9% and 14%, except for the bottom locating plate to the north garage wall, where 18% and 30% were recorded. The expert took a timber sample from the latter plate; and considered that the 30% reading could be due to one or a combination of:

- moisture penetrating from the inside of the garage where water was apparent from bottle-washing for the re-cycling bin
- high paving levels along the north garage wall
- the bottom of the apron flashing above, although a kickout was recently fitted.

6.4.4 The expert noted that moisture readings were taken during wet winter weather, so would likely represent peak seasonal variation. Moisture levels above 18% generally indicate that external moisture is entering the structure and further investigation is required.

6.5 Cut-outs and sample analysis

6.5.1 The expert made cut-outs to take timber samples and to observe the underlying construction at:

- the bottom of the two-storey south wall (sample 1)
- the bottom of the north garage wall, with the 30% moisture reading (sample 2).

6.5.2 At the bottom band, the expert exposed the underlying wall to foundation junction and noted that the band had been retro-fitted over the original plaster coating. Self-adhesive foil-faced tape was installed up against the bottom plate and extended as a flashing beneath the EPS and down the face of the concrete foundation wall.

6.5.3 Laboratory analysis of the samples showed that the timber was structurally sound and CCA-treated to the equivalent of H3.2. However there were signs of past fungal

growth over 'a prolonged period most likely of several years, although very recent activity was not detected.' For Sample 1, I note that the recent remedial work to ground/paving levels and the retro-fitted bands over foundation junctions may explain the lack of recent fungal activity, despite evidence of past growth.

6.5.4 I note that the lack of recent fungal activity applied to both samples, despite a 30% moisture level being recorded in Sample 2. This high level of moisture seems to be an isolated instance, this tends to support the likelihood that the moisture resulted from washing activities inside the garage (see paragraph 6.4.3). I also note that the recent retro-fitted kick-out to the apron flashing above this area may explain the lack of recent fungal activity, despite evidence of past growth.

6.6 Expert's comments

6.6.1 Commenting specifically on the external building envelope, the expert noted that:

- the cause(s) of the high moisture levels to the bottom of the north garage wall require further investigation and rectification
- there is insufficient clearance to the paving along the north wall of the garage, which the owner has agreed to rectify (I also note that the foundation band has not been installed along this wall)
- there are some hairline cracks and damage in the plaster coating
- the soffit lining and fascia to a gable verge is damaged.

6.6.2 The expert also noted that the fibre-cement cladding to the recessed walls of the upper deck butted against the deck floor, with little threshold clearance at the door sill. However, moisture levels were low (at 8% to 9%); with the junctions well-sheltered beneath the roof overhang. The expert therefore considered that, providing the painted sealant joints are maintained, the junctions are likely to remain weathertight.

6.6.3 The expert also commented on some other items identified in the notice to fix. I have taken the following comments into account in paragraph 8.1:

- The applicant has agreed to install a spreader from the upper downpipe.
- The cracks to the gable end EIFS were repaired and no cracks were visible.
- The mid-floor boundary joist is located at the inside face of the concrete beams and there were low non-invasive readings below the joists.
- The applicant has agreed to rectify ground clearances.
- The wall junction at the laundry bench has now apparently been sealed.
- The deck joists are likely to be H3 treated and low moisture levels in the joists indicate adequate performance of the deck membrane to date.
- Penetrations are satisfactorily sealed with flexible sealant, which will require regular maintenance.
- Drip edges appear to have been provided where required.

(I also note that the applicant agreed to rectify the position of vent pipe outlets.)

6.7 Response to expert's report

6.7.1 A copy of the expert's report was provided to the parties on 9 August 2010.

6.7.2 The agent responded to the experts report in letter to the Department dated 18 August 2010. The agent notes some anomalies in the expert's report which I have taken account of.

Matter 1: The external envelope

7. Weathertightness

7.1 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).

7.2 Weathertightness risk

7.2.1 This house has the following environmental and design features, which influence the weathertightness risk profile of the house:

Increasing risk

- the house is two-storeys high in part with some complex roof junctions
- there are two types of wall claddings, with inter-cladding junctions
- a partly cantilevered deck extends from the upper level
- some walls have monolithic cladding fixed directly to the framing
- the framing to the timber-framed gable ends and deck walls may not be treated to a level that provides resistance to decay if it absorbs and retains moisture

Decreasing risk

- the monolithic-clad walls are partly sheltered by eaves and verges
- the area clad with EIFS is small and contains no joinery openings
- most of the walls are solid, with a concrete beam and column structure
- the house is in a low wind zone
- the timber incorporated into the main solid walls is treated to a level that provides resistance to decay if it absorbs and retains moisture.

7.2.2 The area of EIFS is small and protected by the verges. If details shown in the current E2/AS1 were adopted to show code compliance, a drained cavity would not be required.

7.3 Weathertightness performance

7.3.1 Generally the solid walls and the monolithic claddings appear to have been installed to good trade practice and in accordance with the manufacturers' recommendations at the time of construction. However, taking into account the expert's report, I conclude that the areas outlined in paragraph 6.6.1 require investigation and rectification.

7.3.2 I also note the expert's comment in regard to the recessed walls to the deck, and accept that the deck junctions are adequate in these particular circumstances.

7.3.3 Notwithstanding that the EIFS and fibre-cement backing sheets fixed to the sheltered balcony side walls are fixed directly to timber framing, I note the following that regarding performance:

- The claddings are generally installed according to good trade practice.
- After almost eight years, there is no evidence of moisture penetration associated with the lack of a drained cavity behind these claddings.

7.4 Weathertightness conclusion

7.4.1 I consider the expert's report establishes that the current performance of the building envelope is not adequate because there is evidence of moisture penetration in one area at present. Consequently, I am satisfied that some work is required to for the house to comply with Clause E2 of the Building Code.

7.4.2 In addition, the building work is required to comply with the durability requirements of Clause B2. Clause B2 requires that a building continue to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement for the house to remain weathertight. Because faults in the exterior building envelope are likely to allow the ingress of moisture in the future, the house does not comply with the durability requirements of Clause B2.

7.4.3 Because the faults identified with the building envelope occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.6.1 will result in the house being brought into compliance with Clauses B2 and E2 of the Building Code.

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

8. The notice to fix

8.1 Taking into account the expert's comments, the agent's correspondence with the authority and the other evidence, the following table summarises my conclusions on items listed in the notice to fix dated 13 August 2009; referring also to the relevant code clauses and paragraphs in this determination:

Notice to fix		My conclusions	Code Clauses	Paragraph references
Item	**Summarised requirement**			
2.1	**Not to relevant code requirements at the time**			
a)	Lack of spreaders to downpipes	No conclusion, as agreed by applicant		4.6.4 and 6.6.3
b)	Cracks to EIFS at gable ends	Adequate (but maintenance required)	**E2, B2**	4.6.4 and 6.6.3
c)	Lack of or no evidence of flashings	Adequate	**E2, B2**	6.2.1 and 6.5.2
d)	Lack of inter-cladding flashings	Adequate	**E2, B2**	6.5.2
e)	Protection of mid floor boundary joist	Adequate	**E2, B2**	6.5.2
f)	Inadequate window flashings	Adequate	**E2, B2**	6.5 and 7.3.1
g)	Lack of clearance to deck wall cladding	Adequate	**E2, B2**	6.6.2 and 7.3.2
h)	Lack of step down to deck	Adequate	**E2, B2**	6.6.2 and 7.3.2
i)	Lack of clearances to interior floor level	No conclusion, as agreed by applicant	**E2, B2**	6.5 and 7.3.1
j)	Lack of clearances below exterior plaster	No conclusion, as agreed by applicant	**E2, B2**	6.5 and 7.3.1
k)	Wall junction at laundry bench top	No conclusion, as agreed by applicant and apparently rectified	**E3**	6.6.3
l)	Vent pipes too close to eaves, windows etc	No conclusion, as agreed by applicant	**G13**	6.6.3
2.2	**Not to accepted trade practice**			
a)	The condition of the deck membrane	Adequate	**E2, B2**	6.6.2 and 6.6.3
b)	Penetrations not sealed	Adequate	**E2, B2**	6.6.3
c)	Lack of drip edges	Adequate	**E2, B2**	6.3.1 and 6.6.3
2.4	**Drainage and ventilation**			
	Lack of cladding drainage & ventilation	Adequate	**E2, B2**	7.3.3 and 9.1

8.2 Structural documentation

8.2.1 Within the notice to fix and in subsequent correspondence to the agent, the authority also required an engineer's producer statement and inspection report on the solid wall system. The authority did not accept the agent's explanation that engineering inspections were not required at the time of construction and that the authority inspections were sufficient to confirm satisfactory construction of the wall system.

8.2.2 I note the following in regard to this matter:

- The building consent conditions included no requirement for engineering oversight of construction of the solid wall system (see paragraph 4.1).
- The pre-pour inspections of the wall system were inspected and passed by the authority (see paragraph 4.2).
- The notice to fix identifies no defects that would suggest any structural problems associated with the solid wall system.
- The expert's report also identifies no evidence of movement that would suggest any structural problems associated with the solid wall system.

8.2.3 I therefore conclude that the authority's requirement for a producer statement and inspection report for engineering construction review of this house is unreasonable in these circumstances and should be withdrawn.

8.3 I am satisfied that the house does not comply with the Building Code and that the authority made an appropriate decision to issue a notice to fix. However, I am also of the view that most items identified in the notice are likely to be adequate, although I have identified some additional items that need to be addressed, so the notice should be modified accordingly (refer to paragraph 9.3).

9. What is to be done now?

9.1 I note that the notice to fix required provision for adequate ventilation and drainage. I note that there was no requirement under E2/AS1 to provide a ventilated cavity when this consent was issued in July 2002.

9.2 Under the Act, a notice to fix can require the owner to bring the house into compliance with the Building Code, but as noted in previous determinations a notice to fix cannot specify how that compliance can be achieved. I concur with that view.

9.3 The notice to fix should be modified to take account the findings of this determination, identifying the items listed in paragraph 6.6.1 and referring 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 fix to stipulate directly how the defects are to be remedied and the house 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. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

10. The decision

10.1 In accordance with section 188 of the Act, I hereby determine that the external envelope does not comply with Building Code Clauses B2 and E2, and accordingly I confirm the decisions of the authority not to issue a code compliance certificate and to issue a notice to fix; however the authority is to modify the notice to fix to take account of the findings of this determination.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 15 October 2010.

John Gardiner
Manager Determinations