MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

Determination 2014/022

Regarding the refusal to issue a code compliance certificate for 16 to 18-year-old alterations to a house at 60 Nevay Road, Wellington

1. The matters to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004[1] ("the current Act") made under due authorisation by me, Tony Marshall, Manager Determinations and Assurance (Acting), Ministry of Business, Innovation and Employment ("the Ministry"), for and on behalf of the Chief Executive of the Ministry.

1.2 The parties to the determination are

- the owners of the house, T and C Hughes ("the applicants")
- Wellington City Council ("the authority"), carrying out its duties as a territorial authority or building consent authority.

1.3 This determination arises from the decision of the authority to refuse to issue code compliance certificate for 16 to 18-year-old alterations to a house because it was not satisfied that the building work complied with certain clauses[2] of the Building Code (First Schedule, Building Regulations 1992).

1.4 The matter to be determined[3] is therefore whether the authority was correct to refuse to issue a code compliance certificate. In deciding this, I must consider whether the external building envelope of the alterations complies with Clause B2 Durability and Clause E2 External Moisture of the Building Code, and whether the remaining unresolved items which relate to other clauses of the Building Code also comply.

[1] The Building Act, Building Code, compliance documents, past determinations and guidance documents issued by the Ministry are all available at www.dbh.govt.nz or by contacting the Ministry 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.
[3] Under sections 177(1)(b) and 177(2)(d) of the Act

The building envelope includes the components of the systems (such as the wall claddings, the windows, the roof cladding, the decks and the flashings), as well as the way the components have been installed and work together.

1.5 The authority has stated that the applicants may apply to the authority for a modification of the requirements of Clause B2.3.1 to allow durability periods to commence from the date of substantial completion of the alterations. I leave this matter to the parties to resolve in due course.

1.6 In making my decision, I have considered:

- the submission of the applicant, including reports provided by:
  - the building surveyor engaged by the applicant ("the building surveyor")
  - the structural engineer engaged by the applicant ("the engineer")
- the report of a consultant commissioned by the Ministry to carry out a visual inspection ("the consultant")
- the other evidence in this matter.

2. The building work

2.1 The building work considered in this determination consists of additions and alterations to an existing house on a steep east-sloping site in a wind zone requiring specific design for the purposes of NZS 3604[4]. However, there is little exposure to wind and rain from the south and west as shelter is provided by the steep easterly slope and neighbouring houses.

2.2 The original two-bedroom house was a single-storey 1940s bungalow, which had a simple plan, timber-framed walls and subfloor, timber weatherboard claddings, timber windows and a corrugated steel hipped roof. The current house is more than twice the size of the original and is assessed as having a high weathertightness risk.

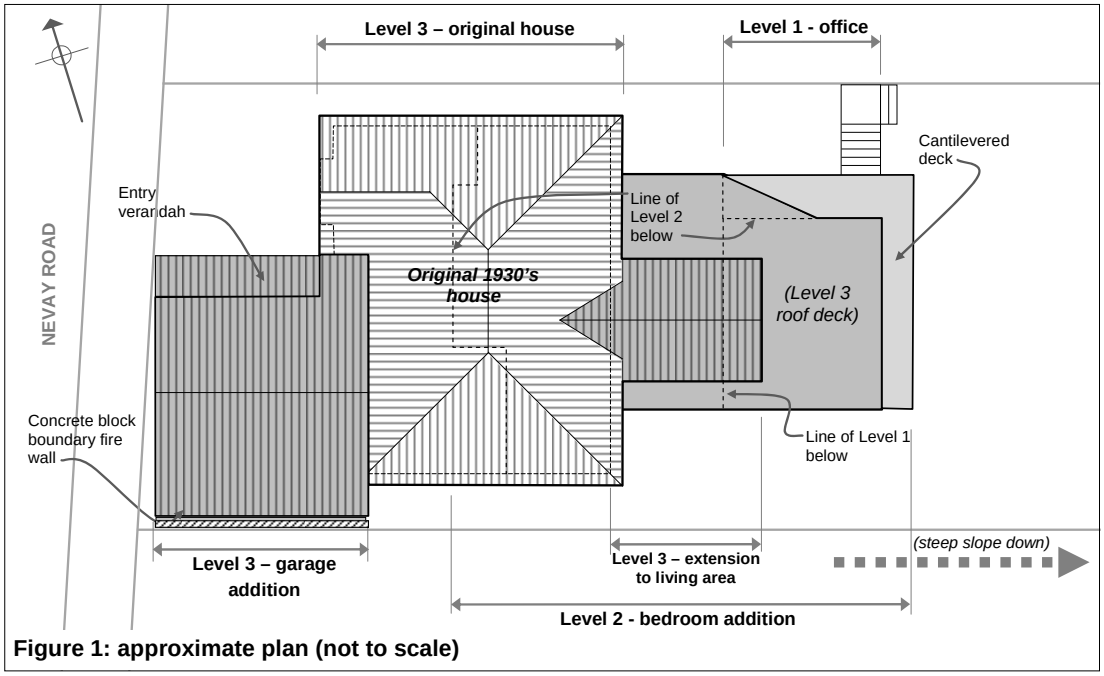

Figure 1: approximate plan (not to scale)

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

2.3 The alterations and additions

2.3.1 The subject alterations include the addition of a single-storey garage to the west and a three-level addition stepping down the contours of the site to the east of the house as follows:

- street level: garage addition, original house with east extension ("Level 3")
- middle level: bedrooms ("Level 2")
- lower level: basement office with external access ("Level 1")

2.3.2 The resulting house is shown in the site plan sketch in Figure 1 above:

2.3.3 Level 3 alterations and additions included:

- the addition of a double garage to the west
- a new entry veranda and foyer in a lean-to against the garage north wall
- conversion of former bedrooms and bathroom into living areas
- conversion of laundry and rear porch into a bathroom and kitchen pantry
- the addition of stairs down to the new Level 2
- an extension to the dining area opening onto a roof deck

2.3.4 Level 2 additions extend about half way under the original house to provide:

- master bedroom and ensuite bathroom opening onto a cantilevered timber deck
- two additional bedrooms and a bathroom
- laundry and back door.

2.3.5 The Level 1 addition extends beneath the master bedroom to provide an office with external access and timber steps providing access to the lower garden.

2.3.6 Construction is generally conventional light timber frame, with specifically engineered bracing, foundations, retaining walls and some other elements. The garage has a concrete slab and foundations, with a masonry fire wall to the south boundary. The east addition has reinforced concrete perimeter foundations, and timber-framed floors.

2.3.7 The additions have textured fibre-cement wall claddings and aluminium windows, while the original house has timber weatherboards with aluminium window sashes installed into existing timber joinery. The new roofs have eaves of about 250mm overall and no verge projections; the original house roof has eaves of about 600mm.

2.3.8 The walls to the original house are clad in horizontal timber bevel-backed weatherboards. The wall cladding to the additions is a form of monolithic cladding, which consists of 7.5mm thick fibre-cement sheets fixed through the building wrap to the framing, and finished with an applied textured coating system.

2.3.9 Given its age, the original house is likely to have Rimu wall framing. The building surveyor removed two timber samples from exterior walls to Level 2 and Level 1 additions, and three samples of deck framing to Level 3 roof deck (see paragraph 3.8.2). Laboratory tests confirmed that all timber samples were CCA-treated to the equivalent of H3.2. I therefore accept that the alteration's exterior wall and deck framing is treated to a level that provides considerable resistance to decay.

2.4 The decks

2.4.1 The floor to the roof deck on Level 3 is liquid-applied membrane applied over 18mm treated plywood substrate. Balustrades are timber framed, with fully clad balustrades to the north and south, and glazed panels to the east. The deck floor slopes to the east to drain through a gap of about 70mm below the bottom rail into an external gutter. The membrane is dressed up against the bottom of the balustrade posts.

2.4.2 The deck to Level 2 is supported by a timber post and beam on the north side, with the east side cantilevered from the wall. Following a recent engineering report (see paragraph 3.7.4), the cantilever was reduced to about 800mm. The deck floor is membrane applied to 12mm plywood, which forms a strip of about 600mm with an apron flashing at the wall junction and spaced timber decking to the outer edge.

2.4.3 The membrane used on both decks is a liquid-applied fibreglass mat reinforced membrane applied in three coats. Though different to the membrane product that was originally specified, the product used was provided by same manufacturer as the textured coating system to the wall cladding ("the coating manufacturer") and is included in the coatings appraisal (refer paragraph 3.4).

3. Background

3.1 The consent for the alterations

3.1.1 The authority issued building consent No. SR 3893 for the alterations on 17 February 1994 under the Building Act 1991. The consent conditions included the following:

> All structural work is to be supervised by the Engineer responsible for design who shall furnish a certificate to the Manager on completion of the structural work verifying that the work has been completed in accordance with his plans and specifications as approved in the building consent and that the workmanship is of satisfactory quality.

3.1.2 The applicant was also the builder of the alterations and is currently a licensed building practitioner. I have not seen records of inspections undertaken by the authority during construction except for an incomplete handwritten summary sheet listing one inspection of foundations on 20 October 1994. However, the applicant maintains that the authority carried out at least six inspections during construction, three of foundations and three during the framing and cladding installation.

3.1.3 Construction was protracted, with the three-storey addition largely completed by the beginning of 1996. In a letter to the authority dated 28 February 1996, the applicant explained that '90% of the construction' had been completed and had 'been inspected and passed' by the authority's inspector. The applicant stated that he had not yet completed the garage and requested 'an extension to the building consent'. Further extensions were requested and granted and the electrical certificate of compliance indicates that work was substantially completed by early 1998.

3.1.4 Finishing work was gradually carried out as time permitted and final inspections were carried out on 1 September 2000, which identified some minor outstanding items, incomplete work, and the need for an amended drawing of the west elevation. The authority's records note that the applicant advised that the work was 'not quite finished' on 30 August 2001, 28 November 2001 and 22 February 2002. There are no records of further communication until 2012.

3.2 The request for a code compliance certificate and the authority's response

3.2.1 The applicant sought a code compliance certificate in October 2012 and the authority responded on 9 November 2012. The authority noted that final inspections would be carried out if requested and any items identified would need to be addressed to the authority's satisfaction. The authority would also need to be satisfied as to the building work's compliance with the durability requirements, which:

> ...includes, but is not limited to, consideration of profiled roof claddings, roof and deck membranes, exterior wall claddings, external joinery elements, floor coverings in wet areas and maintenance requirements for the products used.

3.2.2 The authority carried out a final plumbing inspection on 22 November 2012, which identified four items requiring attention. The authority also met with the applicant on the same day to discuss the inspection process. The authority's site report notes that photographs were taken of various construction details for review by a panel of the authority's officers, who would determine the property owners 'options towards Code Compliance for the building work.'

3.2.3 It appears that the authority carried out a further inspection on 5 December 2012, though I have seen no record of that inspection. In a letter to the applicant dated 11 December 2012, the authority noted that its inspection had identified various matters that needed to be addressed before a code compliance certificate could be considered.

3.2.4 In regard to the exterior building envelope, the authority noted that a report from a 'registered building surveyor' should be submitted which covered 'all exterior work carried out under this consent', including (in summary):

- membrane to garage concrete block wall
- lack of vertical control joints
- cladding clearances
- weatherboard/fascia junction at front door
- apron flashing above entry and
- west gable end and bay window
- roof junctions
- membrane to wall junctions
- cladding to foundation junctions.

3.2.5 Other items identified by the authority included (in summary):

- applicator's appraisals for membrane and texture coating
- engineer's report on structural compliance, including for lower deck
- the basement office and external stairs constructed without a consent
- various other minor items.

3.2.6 The authority concluded that a 'site meeting is advisable to clarify the content of this letter before any remedial work commences'. The applicant subsequently engaged a building surveyor and a further site meeting was held on 21 December 2012.

3.3 The building surveyor's first report

3.3.1 The building surveyor submitted a report dated 21 January 2013, which considered the authority's requirements. The building surveyor carried out non-invasive moisture readings internally, noting that these showed no sign of moisture penetration.

3.3.2 The building surveyor's responses to the items identified by the authority are summarised in Table 1:

Table 1: response to authority's letter dated 11 December 2012

Item	Authority's concerns as at 11 Dec 2012	Building surveyor's comments	Clause
1	As built drawings	Provided by applicant	
2	Modification to durability provisions	To be submitted by applicant	B2
3	Exterior cladding not per manufacturer's instructions	Installed to BRANZ practice guide No signs of any cracking No signs of any moisture penetration	E2
	Exposed membrane to garage block wall	Applied recently – no implication on weathertightness	
	Lack of vertical control joints	Installed to BRANZ practice guide No signs of any cracking	
	Cladding clearance at driveway	Now remedied	
	Cladding clearance to flashings	-	
	Weatherboard/fascia junction at entry	Now remedied	
	Stepped apron flashing above entry	Now remedied	
	Front bay window	New sill flashing installed	
	Roof junctions	-	
	Deck membrane to cladding junctions	Specific design is performing	
	Cladding junctions with foundations	To have surface fixed flashing applied	
4	Appraisals for membrane and texture coating	To be provided	
5	Height of staircase	-	D1
6	Compliance with H1	Roofs and walls insulated	H1
	Compliance with B1	To be attended to	B1
7	B1 compliance of cantilevered deck	To be attended to	
8	Safety of upper deck balustrade	To be attended to	F4
9	Handrails to external stairs	Now remedied	D1
	Barrier to concrete stairs	-	F4
10	Overflow outlet to garage rain water head	Now remedied	E1
11	Head flashings to entry door and meter box	Beneath deep veranda	E2
12	Downpipes to be secured	Now remedied	E1
13	Incomplete plumbing items	Now complete	
14	Gas certificate incomplete	-	G11
	No plumber's registration number	-	G12,G13

3.3.3 The building surveyor concluded that the alterations as constructed met the performance requirements of the Building Code. The applicant subsequently carried out remedial work identified by the building surveyor and provided additional information to the authority.

3.4 The coating's appraisal

3.4.1 The coating manufacturer inspected the installation of the deck membrane and the wall texture coating on 20 March 2013 and provided an appraisal dated 16 April 2013, which included photographs of the installed products.

3.4.2 The manufacturer stated that the deck membrane was in good condition, with 'no issues with watertightness'. The manufacturer commented that the membrane had been well maintained, noting that 'regular recoats have maintained the film build and provided good protection of the membrane.'

3.4.3 The manufacturer also confirmed that the textured coating to the fibre-cement cladding had 'been applied by an approved applicator in accordance with the manufacturer's specifications and instructions'; adding that the cladding had been well maintained, with regular washing and repainting with a 'high build acrylic coating'.

3.5 The authority's refusal

3.5.1 Following a further inspection and a site meeting on 2 May 2013 some items were resolved. The authority wrote to the applicant on 7 May 2013, noting it had sighted the remedial work undertaken since its previous letter and acknowledging the provision of the building surveyor's report.

3.5.2 Taking account of the remedial work undertaken and the additional documentation provided, the authority commented on the items listed in its letter of 11 December 2012 as summarised in Table 2 (with resolved items shown shaded):

Table 2: Authority's response of 7 May 2013

Item	Authority's concerns as at 11 Dec 2012	Authority's response following work	Clause
1	As built drawings	East elevation and roof plan provided Structural outline of basement office provided	
		Require elevations of office and deck/stair	
2	Modification to durability provisions	Prepared but not yet submitted by applicant	B2
3	Exterior cladding not per manufacturer's instructions	Building surveyor's report provided	E2
	Exposed membrane to garage block wall	Report states no evidence of moisture ingress	
	Lack of vertical control joints	Report states no evidence of moisture ingress	
	Cladding clearance at driveway	Now rectified	
	Cladding clearance to flashings	Gap to head flashings not yet rectified	
	Weatherboard/fascia junction at entry	Now rectified	
	Stepped apron flashing above entry	Now rectified	
	Front bay window	Now rectified	
	Roof junctions	Now rectified	
	Deck membrane to cladding junctions	Report states specific design is performing	
	Cladding junctions with foundations	Now rectified	
4	Appraisals for membrane and texture coating	Statement for texture coating now provided	
		Statement required for deck membrane	

Item	Authority's concerns as at 11 Dec 2012	Authority's response following work	Clause
5	Height of staircase	Bulkhead altered to increase height but still does not meet 2m height of D1/AS1	D1
6	Compliance with H1	Accept that roofs and walls insulated	H1
	Compliance with B1	No structural engineer's report yet provided	B1
7	B1 compliance of cantilevered deck	No structural engineer's report yet provided	
8	Safety of upper deck balustrade	Height raised and toe space eliminated	F4
		Gap and toe space still at west end	
9	Handrails to external stairs	Now rectified	D1
	Barrier to concrete stairs	Now rectified	F4
10	Overflow outlet to garage rain water head	Now rectified	E1
11	Head flashings to entry door and meter box	Flashing installed to meter box	E2
		No flashing to entry door but under veranda	
12	Downpipes to be secured	Some remedied, but some still missing screws	E1
13	Incomplete plumbing items	Now rectified	
14	Gas certificate incomplete	Reviewed and certificate acceptable	G11
	No plumber's registration number	Plumbing systems show satisfactory in service history – no further information required	G12 G13

3.5.3 The authority also accepted that the structural drawings stamped 13 December 1994 showed the footprint of the lower level basement office, but as-built drawings were needed to show elevations and the deck/stair to the office door. (I note that the construction photographs show the basement wall and floor framing, indicating that the office was built concurrently with the remaining construction.)

3.5.4 The authority concluded that it could not issue a code compliance certificate for the following reasons (in summary):

- minimal site inspections recorded during construction
- no evidence of supervision by structural engineer
- lack of detail analysis and evidence in building surveyor's report to show the building is meeting performance requirements, including lack of:
  - details of moisture readings and locations
  - details and evidence of performance of alternative solutions
  - evidence of timber treatment
  - evidence of invasive investigation below deck membrane, balustrades and post penetrations
- some details are not in accordance with Acceptable Solutions, manufacturers' specifications, standards and recognised weathertightness details, such as:
  - lack of head flashing to some windows
  - head flashings not extended past joinery jambs
  - unsealed, uncoated harditex in some areas
  - balustrade posts penetrating membrane deck
  - deck membrane dressed over external cladding at deck/wall junctions

- internal stairs do not meet minimum 2m height of Acceptable Solution.

3.6 The Ministry received an application for a determination on 2 September 2013.

3.7 The engineer's report

3.7.1 Following the application for determination, the applicant engaged the original engineering consultancy ("the engineer") to comment on its involvement with the construction and to review the structure of the cantilevered deck.

3.7.2 In a report dated 3 December 2013, the engineer advised that he believed the consultancy 'did undertake inspections of the dwelling during construction, however the records in respect of this property have been destroyed given the time since the work was carried out.' The engineer also stated:

> We have inspected the completed building and are satisfied that there is no evidence of substandard construction or structural movements which would indicate that the work has been done other than in accordance with the Building Consent and/or the requirements of the relevant New Zealand Standard in respect [of] B1.

3.7.3 The engineer confirmed that the cantilevered deck was not originally constructed in accordance with NZS 3604 as the cantilever exceeded 900mm. On reviewing the structure, the engineer found that 'the deck as constructed does not meet the strength requirements of NZS 3603[5].'

3.7.4 At the engineer's request, the applicant altered the deck to reduce the cantilever to 800mm. Photographs of the reduced deck had been reviewed, and based on these the engineer was satisfied that the construction is now compliant.

3.7.5 The engineer concluded that the authority had reasonable grounds to conclude that the subject building work complies with Clause B1 Structure of the Building Code.

3.8 The building surveyor's second report

3.8.1 Under cover of a letter to the Ministry dated 10 December 2013, the building surveyor provided a second report in response to the authority's letter of 7 May 2013. The second report was intended as a 'follow up' to his first report and included additional investigations and information. The report attached copies of various documents as outlined in 4.3.

3.8.2 The building surveyor had carried out invasive sampling and moisture testing of the framing by using long probes or by removing small sections of lining at locations considered to be 'at risk' of moisture penetration, such as:

- below membrane deck areas and balustrade post penetrations
- below ends of exposed head flashings
- where no flashing installed to sheltered basement window heads
- behind areas where deck membrane was dressed over wall cladding.

3.8.3 All invasive moisture readings in the following locations were below 15%, with five timber samples taken for analysis of the timber treatment:

- north and east walls of the basement office (sample taken from east wall)
- through skirting and at cut-out to master bedroom south wall (sample taken)
- through the skirting adjacent to the master bedroom deck doors

[5] NZS 3603:1993 Timber Structures Standard

- through skirtings under the living extension north and south windows
- through cut-outs into the master bedroom lining into perimeter framing to east, south and north sides of upper deck under balustrade posts (3 samples taken)
- into framing above the north garage door.

3.8.4 The building surveyor forwarded the timber samples for analysis and the laboratory report confirmed that all samples were CCA treated to the equivalent of H3.2, which was 'considerably more durable' than other framing used in buildings.

3.8.5 Taking account of the remedial work undertaken and documentation subsequently provided, together with his investigations, the building surveyor responded to the remaining unresolved items identified by the authority in its letter of 7 May 2013 as summarised in Table 3:

Table 3: response to authority's letter dated 7 May 2013

Item	Authority's concerns	Building surveyor's response	Clause
Authority letter of 11 December 2012			
1	As built drawings	Drawings of office and deck/stair provided	
2	Modification to durability provisions	Prepared but not yet submitted by applicant	B2
3	Exterior cladding not per manufacturer's instructions	Additional invasive investigation undertaken at all areas considered at risk. Confirms no evidence of moisture ingress and high level of timber treatment.	E2
	Exposed membrane to garage block wall		
	Lack of vertical control joints		
	Cladding clearance to flashings		
	Deck membrane to cladding junctions		
4	Appraisals for membrane and texture coating	Statement for texture coating already provided and this also covers deck membrane. (see paragraph 2.4.3)	
5	Height of staircase	Bulkhead altered to increase height to only 35mm below 2m height of D1/AS1, which has proved satisfactory for past 18 years.	D1
6	Compliance with B1	Structural engineer's report now provided	B1
7	B1 compliance of cantilevered deck	Structural engineer's report now provided	
8	Safety of upper deck balustrade	Gap and toe space now eliminated	F4
12	Downpipes to be secured	Now secured with clips	E1
Additional concerns per authority letter of 7 May 2013			
1	Lack of recorded site inspections	Owner/builder is LBP and maintains that at least 6 inspections were carried out.	
2	Lack of engineering inspections	Engineer's report now provided	B1
3	Lack of detailed analysis and evidence in building surveyor's report		E2
a	Moisture readings and locations	Now provided	
b	Evidence of performance of alternative solutions	Additional invasive investigation undertaken at all areas considered at risk	
c	Evidence of timber treatment	Now provided	
d	Evidence of invasive investigation below upper deck	Additional invasive investigation undertaken below upper deck	
4	Other details		
a	Some head flashings missing	Window heads to basement office are sheltered below cantilevered deck. Additional invasive investigation confirms performance over past 18 years.	
b	Ends of head flashings	Additional invasive investigation confirms performance.	

Item	Authority's concerns	Building surveyor's response	Clause
Additional concerns per authority letter of 7 May 2013			
c	Unsealed uncoated fibre-cement	Fibre-cement now sealed	E2
d	Timber posts penetrating membrane	Additional invasive investigation confirms performance.	
e	Internal stairs less than 2m high	Bulkhead altered to increase height to only 35mm below 2m height of D1/AS1, which has proved satisfactory for past 18 years.	D1

4. The submissions

4.1 The applicant's submission was made prior to the additional information and work outlined in paragraph 3.7 and paragraph 3.8. Some comments in the submission are now superseded and are therefore not included in the following summary:

- The anti-capillary gap above the garage head flashing was inadvertently filled with coating and later recoats of paint.
- The appraisal of the texture coating system also covered the liquid-applied deck membrane, which has been recoated as part of ongoing maintenance.
- The staircase was a compromise that balanced the minimum safe landing and width stair treads and risers with the height – which resulted in clearance close to that of a 1980mm high standard door.
- The authority's inspector visited the site at least six times – three during foundation work and three during framing/cladding installation.

4.2 The applicant forwarded copies of:

- some of the consent drawings and specification
- construction photographs
- various as-built details
- the membrane and coating supplier's statement dated 16 April 2013
- the building surveyors first report dated 21 January 2013
- correspondence from the authority
- various other photographs and information.

4.3 Following the application for determination, the building surveyor's second report (dated 15 November 2013) was received on 23 December 2013. The report included:

- as-built drawings and photographs of the office and decks
- moisture testing locations and results
- timber sample locations and the laboratory report dated 8 June 2013
- the engineer's report dated 3 December 2013
- various other photographs and information.

4.4 The authority made no submission but forwarded a CD-Rom which contained some additional documents pertinent to this determination, including

- the original consent drawings and specifications
- the building consent
- the available inspection records
- various certificates, producer statements, warranties and other information.

4.5 A draft determination was issued to the parties for comment on 17 March 2014.

4.6 In a response received on 24 March 2014, the applicants accepted the draft without further comment.

4.7 The authority responded by email on 22 April 2014, noting that it accepted the draft but that it disagreed that 'reasonable grounds to show compliance of the building work can be established due to the additions experiencing severe storm forces and earthquakes'.

5. Grounds for the establishment of code compliance

5.1 In order for me to form a view as to the compliance of the building work, I established what evidence was available and what could be obtained considering that some elements are not able to be cost-effectively inspected. In the case of the alterations to this house, I observe that:

- the records and correspondence indicate
  - the engineer has confirmed that, despite the lack of records, inspections of specific engineering elements are likely to have been carried out
  - the membrane and coating manufacturer has inspected the products and confirmed that the standard of installation was satisfactory and the products have been well maintained
  - the applicants have attended to outstanding items identified by the authority and have provided all documentation required
  - significant investigation has been carried out by the building surveyor which showed no evidence of raised moisture levels and the framing is confirmed as treated to provide a high level of resistance to decay
- over the past 16 to 18 years the additions will have experienced and withstood severe storm events, and since the last inspection on 2 May 2013 the location has also experienced a severe earthquake event. The Building Code is performance based, and these events have tested the building's weathertightness and structural performance
- the incomplete handwritten inspection summary indicates that authority may not have maintained full and accurate inspection records during construction. I also note that most work was carried out some 16 to 18 years ago when standards of record keeping were not consistent with current expectations

5.2 The applicant is an experienced certified builder and licensed building practitioner who constructed the additions over a prolonged period. Despite the lack of inspection records the applicant states that regular inspections were carried out by the authority during construction.

5.3 Taking account of the above and in the absence of any evidence to the contrary, I take the view that I am entitled to rely on the applicant's statements that the authority carried out sufficient satisfactory inspections during the construction of elements that

are now hidden. However, that reliance rests on corroboration of the building's performance by inspection of the accessible building elements.

6. The site inspection

6.1 In order verify the impression given by the evidence, the consultant visited the house on 7 March 2013 to carry out a visual inspection, reporting that the additions appeared to have been 'built to a good standard and have been well maintained'.

6.2 General

6.2.1 The consultant inspected the interior of the house, noting:

- the interior appeared to be dry on all levels, including linings and trim directly below the upper roof deck
- there was no 'cracking, creasing, bulging, mould growth or other signs of moisture' observed to plasterboard linings and trim, and no bulging or cracking of window architraves and reveals was observed.

6.2.2 The consultant also inspected exterior wall claddings, noting:

- the flush-finished fibre-cement walls appear to be 'straight and fair, with the new textured coating evenly applied and no signs of cracking, bulging or movement to underlying backing sheets'
- windows are face-fixed over the backing sheets, with metal head flashings, sealed jamb flanges and drainage gaps above head flashings
- the roof deck membrane appeared in good condition, with no signs of ponding or moisture penetration.

6.3 Items remaining from authority's letter of 11 December 2012

The consultant also observed and commented on the remaining unresolved matters listed by the authority in its letter of 11 December 2012 and responded to in the building surveyor's second report (see Table 3). The following uses the authority's reference numbers.

Table 4: the consultant's observations

Item	Authority's concerns	Consultant's observations
Authority letter of 11 December 2012		
1	As built drawings	The basement office and adjoining exterior deck/staircase appears to reflect the as-built construction.
2	Modification to durability provisions	The applicant has completed a standard form requesting a modification 'to the effect that Clause B2.3.1 applies from March 1996', but this will not be submitted until remaining outstanding matters are resolved (see Table 2). Discussions with the applicant and the records indicate that, although the exterior of the 3-storey addition was complete by March 1996, the interior and the garage addition were not substantially completed until early 1998.
3	Exterior cladding not per manufacturer's instructions.	
	Exposed membrane to garage block wall	<u>The exposed membrane to the garage firewall</u> • the applicant explained that the membrane was a patch repair to the exterior of the block wall, following work carried out on the neighbour's property • the inside of the wall is very dry, with paint and building materials stored in the garage against the wall and showing no sign of dampness

Item	Authority's concerns	Consultant's observations
		• the patch appears to have no effect on the weathertightness of the wall, taking into account the function of the garage.
	Lack of vertical control joints	<u>Lack of vertical control joints</u> • vertical control joints are recommended to be installed at 5.4m centres, so would be expected on the 7.4m long south wall of the east addition • the applicant explained that he had misunderstood the requirement and had actually allowed for movement between each backing sheet of the long wall • in 18 years since completion of the exterior walls, all shrinkage in timber framing will have occurred, and performance is now governed by environmental factors • the perimeter concrete foundation wall appears rigid, with specifically designed bracing and signs of movement cracks to interior linings • the region has experienced severe earthquakes and storms over the past year, with no signs of cladding movement or cracks resulting from these forces • taking into account the above circumstances, the lack of specific evidence as to the incorporation of control joints is likely to be acceptable.
	Cladding clearance to flashings	<u>Cladding clearance above head flashing</u> Windows generally include an anti-capillary gap above metal head flashings and the lack of a gap applies to the garage door The owner explained that the original gap had been inadvertently filled with the texture coating and subsequent repainting The interior of the garage appears very dry, with the unpainted lining showing no moisture marks after some 16 years The framing above the door head was exposed during the building surveyor's investigations and invasive moisture readings were low Taking into account the above, the garage door flashing appears to be performing satisfactorily.
	Deck membrane to cladding junctions	<u>Lower deck membrane to cladding junction</u> The membrane to the cantilevered deck is dressed up over the wall cladding, but: • the H4 treated deck framing is open below and the membrane floor has a fall away from the wall from to prevent moisture accumulating at the junction • the as-built detail shows an apron flashing underlying the membrane to direct any moisture penetrating the membrane to escape to the outside • the H3.2 framing in the basement office walls below the junction was invasively moisture tested and readings were low • the lack of moisture penetration after some 18 years indicates that the deck to wall junction as constructed is performing satisfactorily.
8	Safety of upper deck balustrade	The authority had originally identified toe-holds and insufficient height of the roof deck balustrades. Although the height had been increased and the toe-hold in the east glazed balustrade eliminated, a gap and toe-hold remained between the wall and the end of the north balustrade. The consultant observed that: • a timber infill has been added to reduce the gap • a slanted stainless steel cover has been installed to prevent the timber sill of the original house being used as a toe-hold • the cover is fixed into the timber sash and does not appear to compromise the weathertightness of the original window

Item	Authority's concerns	Consultant's observations
		• there appears to be no danger of falling from the roof deck balustrade.
12	Downpipes to be secured	The downpipe at the entry is now fixed with a bracket
Additional concerns per authority letter of 7 May 2013		
4	Other details	
a	Some head flashings missing	The basement office windows lack conventional metal head flashings. The consultant noted that: • the window heads are about 150mm beneath the deck ribbon plate with a 600mm deep membrane strip to the deck above • the windows face east, and easterly wind/rain is rare • the building surveyor's invasive moisture readings were low and • the wall framing is H3.2 treated • the lack of moisture penetration after some 18 years indicates that the office window heads as constructed are performing satisfactorily.
b	Ends of head flashings	• the joinery is face-fixed against the backing sheets with the textured coating applied after installation, but no signs of cracks at the jamb junctions • the ends of the head flashings do not project beyond the jamb flanges, but the ends are turned down and appeared to be well-sealed • there is no evidence of moisture penetration on inside reveals and trim • the lack of moisture penetration after some 18 years indicate that the window heads flashings as installed are performing satisfactorily.
c	Unsealed uncoated fibre-cement	The fibre-cement sheet behind the gutter to the upper roof deck is now painted and the building surveyor's low invasive moisture readings in walls below the deck perimeter indicate that weathertightness had not been compromised by the lack of sealing in the past.
d	Timber posts penetrating membrane	At the Level 3 roof deck, balustrade posts are fixed to deck framing and the deck membrane is dressed up against the bottom of the balustrade posts. The consultant noted that: • the membrane is in good condition and post/deck junctions appear sound • the membrane manufacturer has inspected and confirmed its good condition • the deck membrane is well maintained, with the owner recoating it regularly • the deck appears to have a satisfactory slope, with no sign of ponding • the building surveyor removed linings in the master bedroom below the post penetrations and invasive moisture readings were low • the wall framing below the deck is H3.2 treated. • the lack of moisture penetration after some 18 years indicate that the balustrade post penetrations as installed are performing satisfactorily.
e	Internal stairs less than 2m high	In response to the authority's concern, the owner altered the bulkhead above the stairs to increase the height as much as possible, but the height remains just below 2000m with the building surveyor measuring the height at 1965mm. The consultant noted that: • there were apparently no mishaps for some 16 to 18 years prior to the owner altering the bulkhead, when the height was less than 1900mm • the stair height is now very close to the height of a standard 1980mm high door and no further adjustments are practically possible • in other respects the stairs are satisfactory, with generous

Item	Authority's concerns	Consultant's observations
		landings, comfortable slope, even treads and risers and a satisfactory handrail

6.4 The consultant concluded that:

> The remaining unresolved items identified by the authority appear to have been satisfactorily attended to or are satisfactory in the circumstances and there is no evidence to suggest that the as-built work does not comply with the performance requirements of the Building Code.

7. Weathertightness matters

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 its weathertightness risk profile:

Increasing risk

- the house is in a wind zone requiring specific design
- the altered house is 3-storeys high and is fairly complex in form
- some walls have monolithic cladding fixed directly to the framing
- there are limited roof overhangs above most of the monolithic wall cladding
- there is an enclosed roof deck to the upper level and a partly enclosed cantilevered deck to the middle level

Decreasing risk

- despite the wind zone, the house is sheltered from the south and west
- some of the monolithic cladding is sheltered by roof or deck overhangs
- the external wall framing is treated to provide considerable resistance to decay if it absorbs and retains moisture.

7.2.2 Using the E2/AS1 risk matrix to evaluate these features, the elevations are assessed as having a high weathertightness risk rating. If details shown in the current E2/AS1 were adopted to show code compliance, a drained cavity would be required for the textured fibre-cement cladding. However, this was not a requirement at the time of construction.

7.3 Weathertightness performance

7.3.1 I note that an application will be made to the authority for a modification of the durability requirements to allow durability periods to commence from the date of substantial completion, which I take as being in early 1998. Although not part of this determination (see paragraph 1.3), I have taken the upcoming modification into account when considering the weathertightness performance of the claddings.

7.3.2 Taking account of the consultant's report and the other evidence, the claddings generally appear to have been installed in accordance with good trade practice and

the manufacturer's instructions at the time, with no evidence of moisture penetration into the walls, decks and roofs.

7.3.3 With regard to the lack of evidence that control joints have been installed in the textured fibre-cement to the single wall that is two-storeys high and also beyond 5.4m long, I note the following:

- the cladding appears to have been installed according to good trade practice onto framing with specifically engineered bracing and is supported on a rigid structure of concrete perimeter foundations
- interior linings show no signs of cracking after at least 16 years, indicating the structure's rigidity and lack of movement experienced over that time
- all drying shrinkage in supporting framing would have occurred during the early part of the period since construction and some minor cracking is expected in response to seasonal movements along with wind and earthquake forces
- significant wind and earthquake forces have been experienced since cladding installation with no signs of cracking; which indicates that the cladding is adequate despite their omission.

7.3.4 I also note the consultant's conclusions in regard to the other items identified by the authority (see paragraph 6.3) and accept that these areas are adequate in the particular circumstances described.

7.3.5 Notwithstanding that the wall cladding is fixed directly to timber framing, thus inhibiting drainage and ventilation behind the cladding, I note certain factors that assist the performance in this case:

- The cladding is generally installed according to good trade practice and has been well maintained.
- After 16 to 18 years, there is no evidence of moisture penetration into framing.

7.4 Conclusion

7.4.1 The consultant's report together with the building surveyor's report provide me with reasonable grounds to conclude that the current performance of the claddings is adequate because they are preventing water penetration at present. I also consider that building surveyor's invasive investigations indicate that there is no evidence of moisture penetration over the past 16 to 18 years. Consequently, I am satisfied that the alterations comply with Clause E2 of the Building Code.

8. Remaining matters of compliance

8.1 Taking account of the consultant's report, the building surveyor's reports and the engineer's report, I am satisfied that other items identified by the authority are satisfactory in the circumstances and comply with the performance requirements of the Building Code. In particular:

- the alterations, including the altered cantilevered deck comply with Clause B1 (see paragraph 3.7)
- the internal stairs comply with Clause D (see paragraph 6.3, Table 4 item 4e)
- the balustrades to the roof deck comply with Clause F4 (see paragraph 6.3, Table 4 item 8).

9. The decision

9.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the alterations comply with the Building Code that was current at the time the consent was issued, and accordingly I reverse the authority's refusal to issue a code compliance certificate for building consent No. SR 3893.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 30 April 2014.

Tony Marshall
Manager Determinations and Assurance (Acting)