MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

Determination 2014/045

Regarding the refusal to issue a code compliance certificate for a 7-year-old commercial building at 36 Munroe Street, Napier

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 and Assurance, Ministry of Business, Innovation and Employment ("the Ministry"), for and on behalf of the Chief Executive of the Ministry.

1.2 The parties

1.2.1 The parties to the determination are

- the owner of the building, the Thackeray Trust ("the applicant") acting through the builder
- Napier City Council ("the authority"), carrying out its duties as a territorial authority or building consent authority
- PricewaterhouseCoopers New Zealand ("the tenant"), who is a lessee and occupies the third floor of the building.

1.2.2 I consider that the builder ("the builder"), who is also acting as agent for the owner, 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 Ministry are all available at www.dbh.govt.nz or by contacting the Ministry on 0800 242 243.

1.3 This determination arises from the decision of the authority to refuse to issue a code compliance certificate for a 7-year-old commercial building because it is not satisfied that some elements of the building work comply with certain clauses[2] of the Building Code (First Schedule, Building Regulations 1992).

1.4 The matter to be determined[3] is whether the authority correctly exercised its powers of decision when it refused to issue a code compliance certificate. In deciding this, I must consider whether the particular building elements identified by the authority comply with the following relevant Building Code clauses:

- Clause B1 Structure
- Clause B2 Durability
- Clause E2 External Moisture
- Clause G4 Ventilation.

1.5 Matters outside this determination

1.5.1 This determination is limited to the authority's reasons for refusing to issue a code compliance certificate for the building, including concerns regarding ventilation of the third floor (see paragraph 3.9) which the authority added after the application was for a determination was made. Other clauses of the Building Code and other building elements are not considered within this determination.

1.5.2 It appears that other building consents were issued for fit-out work to this building in 2008 and 2009. I have received no information regarding those consents and this determination is limited to the original building consent (No. 051404) issued for the building on 20 February 2006 and the subsequent amendments to that consent.

1.6 The evidence

1.6.1 This determination refers to reports, correspondence, and statements from a variety of consultants, engineers and the like. Those entities are described herein as:

- the expert commissioned by the Ministry to advise on this dispute ("the expert")
- the engineer engaged on the Ministry's behalf to provide specialist technical advice to the expert in regard to the ventilation systems consented for the building and as installed in the third floor ("the mechanical engineer")
- the structural engineer who designed and inspected structural elements in the building ("the engineer")
- the designers of the building ("the architects")
- the consultants engaged by the tenant to investigate the performance of ventilation systems to the third floor ("the HVAC engineer")
- the engineering adviser engaged by the applicant to assess compliance of the ventilation systems ("the engineering adviser")
- the consulting engineer ("the consulting engineer") engaged by the tenant to review the engineering adviser's report.

[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

1.6.2 In making my decision I have considered the submissions of the parties, the expert's report and the other evidence in this matter.

2. The building work

2.1 The building work consists of a commercial building on a level corner site in an urban area. The building is four-storeys-high with a basement car park accessible by vehicle ramp and a service lane along the east boundary. The tenant occupies the third (top) floor of the building.

2.2 The structure is specifically designed, with reinforced concrete foundations, floor slabs, columns, and beams. Precast concrete panels form the basement walls, with timber framing to the remaining levels. Exterior walls are clad in a proprietary fibre-cement wall panel system, with profiled metal cladding to part of the north elevation.

2.3 The roof is timber-framed, with timber trusses and purlins supporting the profiled metal roofing. The 3^{o} pitch 'butterfly' roof drains into a 3m wide central membrane-lined box gutter ("the gutter"). The gutter has cross falls of 1:60 and falls of 1:100 toward concealed outlets and overflows at the east and west ends.

2.4 Stairs on the rear (north) elevation provide fire egress from upper level floors. Up to the second floor, the staircase is oriented with its width projecting out from the north wall. To give access to the third floor, the staircase is moved and rotated to project out by its length, with the roof level of the lower stairwell forming a deck from the tenant's staff room.

3. Background

3.1 The authority issued building consent No. 051404 under the Building Act 2004 on 20 February 2006, and construction commenced the following month. The consent included the condition that:

> All work subject to Engineers Design to be inspected by the Engineer and a Producer Statement issued before the issue of the Code Compliance certificate.

3.2 Construction

3.2.1 The engineer and the authority inspected structural concrete elements, with various 'deviations' to the building consent approved, which included:

- changes to the north stairwell, with the addition of a third floor deck on the roof of the lower stairwell
- the anchor tenant's third floor layout plan showing partitioning proposed to provide the open plan office area, enclosed offices, meeting rooms and the staffroom, which showed a recessed deck adjacent to the north stairs (I note that this layout was prepared prior to changes to the north stairwell)
- amendments to the above layout to suit the added roof deck, with the staff room expanded to include the previously recessed deck.

3.2.2 The main structural work appears to have been completed by October 2006 and the engineer issued a 'Producer Statement – Construction Review' dated 6 March 2007, which stated that all 'of the building work under the above building consent with respect to Clause B1 of the Building Regulations 1992 has been completed to the extent required by that building consent.'

3.2.3 The authority carried out inspections of the timber framing and claddings, with pre-line inspections carried out in December 2006/January 2007 and the building was substantially completed by March 2007 when final inspections were requested. The authority's computer summary history notes on 5 March 2007 'not ready for final – full reinspection required' and inspections were therefore limited to issues requiring attention before certificates for public use could be issued.

3.3 The certificates for public use

3.3.1 The authority issued the first certificate for public use on 9 March 2007 for the ground and first floors. The certificate stated that the authority was satisfied on reasonable grounds that 'the public can safely use' the part of the building described in the certificate.

3.3.2 A second certificate was issued on 19 April 2007, which stated that it was limited to the '4th floor public areas and 4th floor occupancy' by the tenant. (I note that the top floor of the building is actually the third floor and there is also no mention of the basement and second floor within either of the certificates.)

3.4 The 2007 final inspections

3.4.1 The authority carried out final inspections on 17 May 2007 which identified various incomplete work and documentation. The authority's letter to the builder, dated 18 May 2007, listed 17 items to be attended to, with item 1 referring to 'water seepage and salt deposits in basement carpark'.

3.4.2 In a facsimile to the authority dated 31 October 2007, the engineer noted that he had inspected the leaks to the basement walls and slab and understood that these were being attended to. The engineer stated that:

> ...on this basis and after the repair is complete that there will be no detrimental effect upon the structure due to this occurrence.

3.4.3 Various work and documentation was completed and the building was re-inspected on 21 December 2007. The inspections noted that leaks were continuing into the basement and also identified leaks through the roof. A notice to fix dated 21 December 2007 was issued, which stated that the authority

> ...[did] not believe on reasonable grounds that the building complies with Clauses B1 & B2 of the Building Regulations due to the water ingress into the basement carpark area & through the roof.

3.5 On-going leaks and repairs

3.5.1 Work to rectify the leaks continued during 2008. In a facsimile to the authority dated 17 December 2008, the engineer noted that he had inspected the basement leaks and 'it now appears that all the leaks have been stopped'. The engineer added that:

> ...it is our opinion that the durability of the foundations, columns, walls and slab has not been compromised over this period.

3.5.2 In a letter to the builder dated 23 December 2008, the authority noted items that were still outstanding and acknowledged the engineer's advice regarding the remedial work to the basement leaks. However the authority stated that it intended:

> ...to reserve judgement until autumn/winter next year when the ground water table will be at a more realistic level to assess the situation.

3.5.3 A 6 July 2009 entry in the authority's computer summary history noted that when inspecting work relating to other building consents issued for fit-out alterations in the building (see paragraph 1.5), the authority noted that the 'basement still has numerous leaks despite previous remedial works.' The authority also noted work to rectify leaks through claddings had apparently 'been ongoing for months.'

3.5.4 In response to the builder's request for a final inspection, the authority advised by telephone on 21 August 2009 that before any reinspection was undertaken it would require a 'detailed report' from the engineer in regard to 'remedial works to basement to rectify leaks & cladding repairs to east elevation to be completed.'

3.5.5 In a report dated 30 June 2010, the engineer reviewed 'some cracks that were allowing water to penetrate inside the rear stairwell', noting that the slab was continuous with the main concrete floor within the building. The engineer concluded:

> The concrete deck is safe to use, but if other cracks, height differences between slab and walls, tiles crack or come loose then we should be notified in order to make sure the situation has not changed.

3.6 The first refusal to issue a code compliance certificate

3.6.1 No further inspections were carried out during the next three years. In a series of emails to the authority in June 2012 the builder addressed the list of items identified in the final inspection on 17 May 2007, attaching photographs of the work undertaken.

3.6.2 The authority responded in a letter to the builder dated 25 June 2013, stating that after a review of the file it had to refuse to issue a code compliance certificate for the building due to the 'substantial history of water ingress through the basement, the walls and the roof' and also because it had

> ... very recently become aware that the basement walls may be approximately 50mm thinner than the approved Building Consent documentation due to the placement of the second set of shutters after our inspection of the reinforcing steel.

3.6.3 Because of the above concerns, the authority was

> ...therefore not satisfied that the building work complies with the following clauses of the New Zealand Building Code that applied at the time the Building Consent was granted:
>
> - B1 – Structure – specifically clause B1.3.1
> - B2 – Durability – specifically clause B2.3.1
> - E2 – External Moisture – specifically clauses E2.3.2 and E2.3.3.

3.6.4 The builder responded to the authority's refusal on 28 June 2013, stating that the reasons provided were not reasonable as all problems had 'been repaired properly and professionally' with engineering reports and producer statements submitted as necessary. The builder noted the following (in summary):

- Basement leaks have been repaired and there is no recent history of major water ingress. The leaks were due to shrinkage cracks and joints in the concrete floor and were of a 'seepage' nature not uncommon in underground basement carparks, with no puddles or flooding even in the heaviest of rain.
- The authority's reference to wall leaks applies only to the rear stairwell, due to a defective seal in the precast panels and tension cracks in the concrete roof deck; this was repaired in 2010 and a report submitted (see paragraph 3.5.5), with no further problems to the area.

- The roof leak was due to defective installation of the Butynol, with the underlying plywood joints lacking joint tape which resulted in the membrane perishing and eventually failing. The membrane has now been replaced and a warranty submitted by a 'fully accredited installer' for the new work.
- The authority's comment on the basement wall thickness questioned the professional integrity of the engineer, who confirms satisfactory inspections of panels prior to concrete pouring and following installation. The precast panels are poured onto a bedding slab, with shutters used only for in situ concrete.

3.7 The tenant's concerns

3.7.1 The tenant engaged a building services engineer ("the HVAC engineer") to investigate the poor performance of the heating, ventilation and air conditioning system to the top floor of the building. The HVAC engineer had observed additional defects that the tenant had not been aware of.

3.7.2 In the letter to the authority dated 26 August 2013 the HVAC engineer, on behalf of the tenant, enquired about the status of the code compliance certificate for the building; noting the continuing concern that the on-going issues had not been resolved and referring to 'the recent liquidation of the builders'.

3.7.3 The letter sought clarification on the following (in summary):

- The current status of the code compliance certificate for the building.
- Confirmation of expiry dates for the certificates of public use issued in 2007.
- The status of the notice to fix referring to leaks into the basement and roof, and confirmation of repairs undertaken and approved.
- The HVAC engineer's identification of insufficient roof insulation and the apparent contradiction within the drawings as to requirements.
- The HVAC engineer's identification of missing fire collars to penetrations through the fire rated wall surrounding the stair and toilet areas.

3.7.4 The authority responded on 11 September 2013, confirming (in summary):

- The authority has refused to issue a code compliance certificate.
- The certificates of public use were issued without expiry dates.
- There have been various attempts to repair the leaks, but none have been 'signed off as being approved'.
- The original drawing showing R2.2 insulation appears to have been superseded by the hand-drawn details showing insulation with an apparently lower value.
- Fire penetrations were inspected until early 2007 during construction of the building, so the location of the defects would need to be identified.

3.8 The Ministry received an application for a determination on 17 October 2013 and sought the property file for the original building consent, which was received the following month. Following the application, the authority requested the Ministry add the compliance of the original HVAC system to the determination.

3.9 The second refusal to issue a code compliance certificate

3.9.1 In a letter to the applicant dated 8 November 2013, the authority noted that it had received an application for a building consent to undertake alterations to the HVAC system installed as part of the original building consent. The application had not been accepted as it was not from or on behalf of the building owner.

3.9.2 The authority also noted that the proposed alterations were likely to impact on other elements in the building and could raise further compliance matters, concluding:

> [The authority] now refuses to issue a Code Compliance Certificate for Building Consent number 051404 as we are not satisfied that the building work complies with the New Zealand Building Code clauses B1 Structure, B2 Durability, E2 External Moisture and G4 Ventilation.

4. The submissions

4.1 The applicant's submission

4.1.1 In a letter to the Ministry dated 15 November 2013, the applicant commented on the authority's second refusal to issue a code compliance certificate (see paragraph 3.9) with the addition of Clause G4. The applicant noted the following (in summary):

- The building was originally intended to be a completely open plan office space as shown in the original plans.
- The tenant commissioned its fit out after handover of the leased area; the owner's responsibility is limited to an 'open shell' only to the third floor.
- The original HVAC system was designed for open spaces, with no allowance for individual offices and areas, and all fit-out works are carried out under separate consents for separate tenancies.

4.1.2 The applicant stated:

> In conclusion, the work in this tenancy was carried out under a separate consent and has absolutely nothing to do with the original building consent for which determination is sought.

4.1.3 The applicant forwarded copies of:

- some of the correspondence with the authority
- the engineer's report dated 30 June 2010
- various certificates, warranties, photographs and other information.

4.2 The authority's submission

4.2.1 The authority made no formal submission but forwarded a digital copy of its property file, which contained documents pertinent to this determination including:

- the building consent, with the consent drawings and specifications
- the amendments to the building consent
- the inspection records and the computer summary of the history
- the notice to fix dated 21 December 2007
- the structural engineer's producer statements and reports

- correspondence with the builder and the tenant
- various other certificates, producer statements, warranties and other information.

4.3 The tenant's submission

4.3.1 In a letter to the Ministry dated 19 February 2014, the tenant commented on the expert's first report dated 18 December 2013. Those comments have been taken into account within the expert's amended report dated 24 April 2014 and also within the determination.

4.3.2 In regard to compliance with the requirements for ventilation, the tenant noted the following (in summary):

- The fit-out of the third floor has not changed since commencement of the lease and there are well-documented concerns about the performance of the HVAC system over the past six years, with the landlord agreeing to undertake appropriate remedial works to the system.
- The landlord installed the system together with the fit-out works and invoiced the anchor tenant accordingly, confirming the landlord's responsibility. However, there is no documented evidence to demonstrate that the fresh air supply meets minimum compliance requirements.
- No commissioning results have been made available, although the annual building warrant of fitness also requires this documentation to ensure Building Code parameters are being maintained. Installation faults such as torn flexi-ducts have been identified, which indicate 'a general lack of good practice.'

4.3.3 In regard to water ingress, the tenant noted the following (in summary):

- The third floor is directly affected by roof leaks, with three current leaks. Leaking has continued for years, with new leaks appearing after any heavy rain and one new leak resulting in puddles on the floor.
- Water accumulating on the floor is totally unacceptable and shows systemic failures of the specification or application that has applied since 2007.
- Extracts provided from email correspondence offer two examples of recent leaks; the first resulting in water accumulating on a toilet floor in January and the second referring to two leaks in November 2013.

4.3.4 The tenant also noted that fire collars were discovered to be missing from service penetrations through fire rated stairwell walls, and considered that all levels of the building required a fire engineer's appraisal.

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

4.5 In an email dated 24 February 2014, the builder responded to the tenant's submission as follows (in summary):

- The landlord acknowledges past problems due to the failed Butynol lining to the gutter, which has been completed renewed with warranties submitted.
- The January leak occurred after 'exceptionally heavy rain' and was repaired immediately, with no notification that this is a recurring problem. The other leaks were 'relatively minor events due to small defects', which have been rectified immediately.

- There was only one fire collar missing from a pipe installed during HVAC work, which was noted and remedied with an intumescent sealer prior to the expert's inspection.

4.6 A draft determination was issued to the parties for comment on 26 May 2014.

4.7 Submissions in response to the draft determination.

4.7.1 The authority and the tenant both accepted the draft without further comment in responses received on 9 June 2014.

4.7.2 The applicant responded to the draft in a letter dated 19 June 2014. The applicant provided copies of a letter dated 23 May 2014 from a builder regarding leaks, and a report dated 10 June 2014 from an engineering adviser on the compliance of the fresh air ventilation systems.

4.7.3 The builder identified leaks as being caused by

- a loose collar on the inside of a downpipe at the east end of the building, and similarly recently the west end, which the builder repaired and resealed
- leaking of the glass cladding on the exterior, which the builder described as 'an ongoing problem that has been attributed to the membrane roof'.

4.7.4 The engineering adviser's report on the ventilations system was based on a visual inspection of the roof plant, the level 3 air distribution system, and part of the level 2 air distribution system, and noted that the airflow performance of the existing system had not been measured. The engineering adviser assessed compliance of the system with the Acceptable Solution G4/AS1 as follows:

Compliance with NZS 4303[4]

- NZS 4303 nominates an occupancy rate of 7 persons per 100m^2. The existing fresh air ventilation system is capable of compliance (based on assumed performance).

Compliance with AS 1668.2 (excluding Table A1 and sections 3 and 7)

- AS 1668.2 nominates an occupancy rate of 1 person per 10m^2. Based on a floor area of 766m^2 for mechanical ventilation as reported in the mechanical engineer's report (refer paragraph 5.7), the system in its current configuration cannot provide the ventilation rate required. Using a greater floor area (from the original architectural drawings) of 782.4m^2, a slightly worse outcome is calculated.

4.7.5 The engineering adviser also stated that there were deficiencies in the fresh air ventilation on level 3, in particular that the air distribution is 'sub-optimal and grossly insufficient in the central open plan office'. The report went on to note that the air distribution system does not deliver compliant air volumes to all occupied spaces, and in addition requires some remedial work to rectify ductwork that has become disconnected.

4.7.6 The report also commented on the effect that the fit-outs have had in respect of the fresh air requirements of the office spaces. The report concluded that the occupancy space of ground floor and levels 1 and 2 was much reduced as the net 'lettable areas'

[4] NZS 4303:1990 Ventilation for acceptable indoor air quality

were significantly less, but that as level 3 is an open plan space the result was unchanged from the findings in paragraph 4.7.4 above.

4.7.7 The tenant made a further submission on 20 August 2014 in response to the engineering adviser's report above. The submission included a review of the engineering adviser's report by a consulting engineer, dated 8 August 2014. The review raised the following (in summary):

- Unless a method of air relief from the floor is installed, the louvres cannot be counted on for providing passive outside air as the pressurised floor will cause air to leave the floor via these louvres.
- The report is based on the louvers providing passive outside air and so is currently incorrect.
- Text associated with Table 2 of NZS 4303 notes 'Where occupant density differs from that in Table 2, use the per occupant ventilation rate for the occupancy load.'
- The actual performance has not been measured and the report is based on assumed capacity of the fresh air system, assumed occupancy, and assumed fan performance; acceptance of the existing system operation should not be based on assumptions.

4.8 Taking account of the submissions received I have amended the determination as I consider appropriate.

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 Architects. The expert inspected the builder on 5 and 6 December 2013, providing a report on 18 December 2013 ("the first report"), which was forwarded to the parties via email on the same day.

5.2 Taking account of the addition of Clause G4 Ventilation to the matters, I asked the expert to seek specific technical advice on the building's compliance as consented and as built, with the work documented and approved under amendments. The expert revisited the building with the mechanical engineer on 2 April 2014, providing a second report on 30 April 2014 and updating the first report.

5.3 General

5.3.1 The expert noted that his investigations were limited to the authority's concerns in regard to Clauses B1, B2, E2 and G4 as follows:

- the thickness of precast panels in the basement walls (B1)
- the exposure of unsealed fibre-cement panels during repainting (B2)
- areas associated with historic or recent external moisture ingress (E2):
  - the membrane lined internal box gutter
  - basement leaks
  - the deck above the stairwell
- the ventilation provided by the as-built HVAC system (G4).

5.3.2 The expert noted his December visits included inspections of the basement, roof, and third floor deck above the stairs – with non-invasive moisture testing below the deck. At that time he also had discussion with the builder and the authority. The April visit included discussions with the tenant and a building services engineer.

5.3.3 The expert noted that air conditioning is installed to all occupied levels of the building, with ceiling mounted cassettes inside and the associated heat pump units mounted on the roof. The car park has a separate ventilation system. A report by the mechanical engineer was attached as an appendix (see paragraph 5.7).

5.4 Clause B1 Structure: the precast panels

5.4.1 The expert noted that the original consent drawings showed reinforced concrete block walls to the basement, which were amended with the authority's approval to 150mm thick precast concrete panels that required no shuttering during installation.

5.4.2 Although the engineer had provided producer statements for design and construction review, the authority was concerned that basement precast panels may not be 150mm thick. However, the expert was able to inspect a hole for a cable at the top of a precast panel and measured actual panel thickness as 155mm.

5.4.3 Taking account of the engineer's producer statements, the onsite measurement of panel thickness and the lack of other structural concerns raised by the authority, the expert considered that 'compliance with B1 has been met.'

5.5 Clause B2 Durability: the wall cladding panels

5.5.1 The expert noted that the subject wall cladding system consisted of 12mm compressed fibre-cement panels installed over a cavity. The manufacturer's technical information on the characteristics of the product states:

> It's immune to permanent water damage over long term exposure. It won't rot, burn or corrode and it's unaffected by termites, air salt and sunlight.

5.5.2 The panels had originally been painted in 'an enamel type' finish. In order to change the exterior colour scheme, this had been replaced some 3 to 4 years ago with an acrylic textured high-build coating system. The re-finishing work included sanding back the original finish to properly prepare the substrate; according to the builder this resulted in fibre-cement backing sheets being exposed for 4 to 6 weeks.

5.5.3 The expert visually examined accessible panels and noted that the finish appeared satisfactory, with 'no water damage detected or deterioration seen.' The expert concluded that the panels and associated textured coating appeared 'to be performing well and show no signs of any premature deterioration'.

5.6 Clause E2 Weathertightness: the leaks

5.6.1 During his visits in December 2013 and April 2014, the expert investigated and assessed the particular areas of the building associated with historic and recent external moisture ingress. The following paragraphs outline the expert's findings.

The internal roof gutter

5.6.2 The expert noted that butyl rubber membrane was used in lieu of the modified bituminous membrane shown in the original consent drawings, with leaking noted shortly after the third floor was occupied in 2007 (see paragraph 3.4.3).

5.6.3 Despite attempts to repair the membrane, leaking continued and a new butyl rubber membrane was installed in late 2012, with a 20-year materials warranty issued on 14 December 2012. However, leaks continued to be reported, with recent leaks in November 2013 and February 2014. The expert confirmed that the latter, resulting in water on toilet floors, occurred after 'significant stormy weather' in the region.

5.6.4 The expert noted the following evidence of past water damage:

- Water marks on ceiling panels at the eastern end of the gutter.
- Peeling paint to ceiling linings in toilets at the western end of the gutter.
- Water stains to the underside of the plywood substrate at the eastern end.

Although non-invasive moisture readings were not elevated in plywood or framing, the expert noted that readings were taken after a prolonged period of dry weather.

5.6.5 Commenting specifically on the gutter, the expert noted

- the gutter is 'a good width' and has sufficient falls towards recessed channels at each end, with double downpipes and double overflows
- there is significant patching at gutter ends, some of which appears 'crudely finished'
- the tenant reported further leaking below repaired areas since the inspection (I note this is corroborated by photographs taken in mid-April, which show obviously damp areas within or adjacent to past water marks).

The basement leaks

5.6.6 Leaking had occurred through precast panel joints and through shrinkage cracks in the concrete floor and repairs had been carried out during 2008. Some further repairs were carried in mid-2009 (see paragraph 3.5.3), but the engineer reported that no further problems had arisen since those repairs.

5.6.7 The expert noted that the basement car park floor is likely to be below the water table due to its proximity to the shore. The engineer confirmed that no corrosion would have resulted from the past leaking, because water beneath the slab is not saltwater due to a perched water table[5].

5.6.8 The expert noted that repairs used a proprietary product injected into drilled holes and forced into cracks, where the liquid forms a gel in the concrete to form a waterproof barrier. The expert also observed that the car park floor drains into a catchpit and the basement has a forced ventilation system; noting also that his December inspection took place during reasonably heavy rain and no moisture penetration was observed.

The third floor deck

5.6.9 The expert noted that the third floor tiled deck sits above the lower stairwell, which is constructed of full height precast panels with a precast concrete top. Leaks developed due to some cracking which was inspected by the engineer in June 2010 who reported that the deck was safe (see paragraph 3.5.5).

[5] A freshwater aquifer trapped above the denser seawater, which rises and falls with the tides.

5.6.10 In consultation with the engineer, a method was devised to repair the problem. Deck tiles were removed, the concrete top re-fixed, cracks repaired, waterproofing replaced and deck tiles reinstated; with no leaking reported following the remedial work.

5.6.11 The expert observed no evidence of moisture penetration and no elevated non-invasive moisture readings; concluding that the repairs to the deck appeared to have been successful with no further reports of leaking in that area.

5.7 Clause G4 Ventilation

5.7.1 The expert engaged an independent mechanical engineer to provide specific technical advice about compliance with Clause G4. The engineer provided his findings in a report dated 24 April 2014.

5.7.2 The engineer noted that the 'base build' ventilation provisions were part of the original building consent, with the fit-out to the tenant's third floor completed under an amendment to that consent (see paragraph 4.3.2). The scope of his report was therefore limited to 'the base build ventilation systems plus the Level 3 fit out ventilation system' and relied on the following information:

- Building consent drawings provided by the original architects.
- The third floor layout plan provided by the tenant.
- Existing services drawing provided by the tenant's HVAC engineer.

5.7.3 In regard to the 'base build' ventilation systems, the mechanical engineer noted the following:

- 300mm wide, variable-height manually-operated louvers are installed in external walls and provide about 84% free area when fully open – resulting in a total of 9.73m^2 for the third floor, with other floors likely to be similar.
- If natural ventilation alone is used, G4/AS1[6] requires a free air equivalent to a minimum of 5% of floor area[7] – indicating that the louvers can be deemed to provide sufficient fresh air to 194m^2 of each floor, which leaves 766m^2 of office space to be mechanically ventilated.
- Before occupancy levels are known, accepted practice is to assume 1 person per 10m^2 – which implies a mechanical system capable of supplying fresh air to about 76 occupants.
- The mechanical system in this building supplies ducted fresh air from a roof-mounted fan via the central services shaft and branch ducts for each floor level – estimated as capable of supplying sufficient fresh air for only 62 occupants.
- Although an exhaust fan extracts air from toilet areas, there is no fan to exhaust stale air from the mechanically ventilated office areas – and louver vents that provide limited fresh air cannot be assumed to have a dual function.
- The toilet ventilation relies on air drawn from office areas under doors, with no dedicated transfer air path.

[6] The acceptable solution is used as a basis for review in the absence of any information on an alternative solution.
[7] The third floor in this building has a net office area of about 960m^2.

5.7.4 In regard to the ventilation systems for the third floor as fitted out, the mechanical engineer noted that:

- Base build systems must be amended and added to as required to suit a tenant's requirements as part of the fit out – and a building services designer is expected to find out all relevant information, including occupant numbers for each area.
- The 100mm flexible ducts to four cassette air conditioning units serving the open plan area are expected to provide a combined total of 40 l/sec of fresh air to an office area of 255m^2 maximum. For the actual open plan area in the third floor, a fresh air rate of 360 l/sec would be required to comply with G4/AS1.
- Flexible ducts are undersized and run for up to 20m in the roof space, whereas best practice limits such ducts to 3m.

5.8 The expert's conclusions

5.8.1 In regard to matters raised by the authority, the expert considered that

- taking account of the engineer's producer statements, the onsite measurement of panel thickness and the lack of other structural concerns raised by the authority 'compliance with B1 has been met.' (Clause B1 Structure)
- in regard to Clause B2 Durability
  - wall cladding panels and associated textured coating appeared 'to be performing well and show no signs of any premature deterioration'
  - repairs and patching to the roof gutter indicate that the new membrane lining has not performed satisfactorily for the minimum 15 years required
  - taking account of the engineer's statements, moisture penetration through car park walls has not affected the durability of the precast concrete or reinforcing steel
- in regard to Clause E2 Weathertightness:
  - the engineer-designed repairs to the deck above the stairwell appear successful, with no evidence or further reports of leaking
  - ongoing leaking into third floor ceilings in the vicinity of the roof gutter shows that the roof is not durably weathertight
  - the lack of leaking for some time, the drainage systems in place to remove any water if necessary and the forced ventilation system to allow drying indicates that the basement is sufficiently weathertight
- taking account of the mechanical engineer's report, the third floor is not adequately ventilated (Clause G4 Ventilation).

5.9 The expert's second report was forwarded to the parties for comment on 1 May 2014.

6. Discussion

6.1 The matter in dispute is whether the authority was correct to refuse to issue a code compliance certificate for the reasons provided by the authority. In deciding the matters included in this determination, I must therefore consider

- whether certain as-built elements of the building work identified by the authority comply with the building consent
- whether certain completed elements of the building work described by the authority comply with the relevant clauses of the Building Code.

6.2 Compliance with the building consent

6.2.1 Section 94 of the Act requires an authority to issue a code compliance certificate only if it is satisfied on reasonable grounds that the building work complies with the building consent.

6.2.2 In providing reasons for refusing to issue the certificate for this particular building, I note that the thickness of the basement precast wall panels was the only question by the authority on lack of compliance with the building consent. Taking account of the expert's report and the other evidence, I am satisfied that the thickness of the precast panels to the basement wall comply with the building consent.

6.2.3 Taking account of the above, together with authority's inspections, the formal amendments to the consent made during construction and the other evidence, I have no reason to question the compliance of the building work with the building consent as amended.

6.3 Compliance with the relevant clauses of the Building Code

6.3.1 Section 17 of the Act also requires that all building work must comply with the Building Code to the extent required by the Act. In refusing to issue a code compliance certificate, the authority has noted a number of areas where it considers compliance with the Building Code has not been met. I address those areas below.

6.3.2 I accept that this building has a history of problems in regard to recurring leaks into various areas and I have taken that history into account in reaching my conclusions on the current weathertightness and durability of those areas.

6.3.3 The expert's report, the engineer's producer statements and the other evidence provides me with reasonable grounds to conclude that the following areas are adequate and compliance has been achieved for

- the structural building work (B1)
- the durability of reinforcing to the basement concrete (B2)
- the durability of the re-finished exterior wall panels (B2)
- the repairs to the third floor deck (E2 and B2)
- the weathertightness of the basement car park (E2 and B2).

6.3.4 However the expert's report and the mechanical engineer's report satisfy me that the following areas are not adequate and compliance has not been achieved in respect of

- the weathertightness of the roof in regard to the central gutter (E2 and B2)
- the ventilation of the third floor (G4).

6.4 The original 'base build' ventilation systems

6.4.1 The fresh air provisions of the Building Code[8] require that spaces 'shall be provided with adequate ventilation consistent with their maximum occupancy and their intended use', and fresh air ventilation that 'will provide an adequate number of air changes to maintain air purity.'

6.4.2 The mechanical engineer has commented, as outlined in paragraph 5.7.3, on the likely inadequacy of the originally consented ventilation systems for the level of fresh air supply to and the exhaust of stale air from the third floor occupied by the anchor tenant. The engineer also noted that 'base build' systems were likely to have been similar for all occupied floors in the building.

6.4.3 The engineer based his comments on an accepted practice for assuming design occupancy levels when these are not known; noting that base build systems must be amended and added to as required to suit tenants' requirements as part of fit-out work. The question of whether a building consent should have been issued for the original designed ventilation system is not addressed in this determination.

6.4.4 This determination is limited to the particular matters in dispute and I have therefore concluded only on the likely compliance of the third floor ventilation system.

6.5 Conclusion

6.5.1 I conclude that the authority had reasonable grounds to be satisfied that the building work had been completed in accordance with the building consent. However, the building work must also comply with the Building Code.

6.5.2 In regard to items identified by the authority and considered in this determination, I am satisfied that some of these are adequate and have achieved compliance. However, I am not satisfied that the areas outlined in paragraph 6.3.4 comply with the Building Code and I therefore conclude that the authority was correct to refuse to issue the code compliance certificate.

6.6 The notice to fix

6.6.1 The notice to fix issued on 21 December 2007 referred only to compliance with Clauses B2 and E2 and was limited to water ingress into the basement car park and through the roof. Although I am satisfied that the basement area now complies with Clauses E2 and B2 of the Building Code, I note that considerable remedial work to achieve compliance was carried out in response to the notice to fix. However, I am also of the view that that the roof has not achieved yet compliance despite significant repairs carried out since 2007.

6.6.2 I am therefore satisfied that the authority made an appropriate decision to issue the notice to fix at the time the notice was issued. However, one item identified in the notice is now adequate and I have also identified an additional item that needs to be addressed, so the notice should be modified accordingly.

[8] The functional and performance requirements of Clause G4.2 and G4.3.1 of the Building Code.

7. What happens next?

7.1 The notice to fix should be modified to take account of the findings of this determination, identifying the items listed in paragraph 6.3.4 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 stipulate directly how the defects are to be remedied and the building 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.

7.2 I suggest that the parties adopt the following process to meet the requirements of paragraph 7.1. Initially, the authority should issue the notice to fix. The applicant should then produce a response to this in the form of a detailed proposal, produced in conjunction with a competent person with suitable experience in weathertightness remediation and a suitably qualified and experienced HVAC engineer, as to the investigation and 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.

8. The decision

8.1 In accordance with section 188 of the Building Act 2004, I hereby determine that

- the roof does not comply with Clauses E2 and Clause B2 of the Building Code
- the ventilation systems provided for the third floor do not comply with Clause G4 of the Building Code

and accordingly, I confirm the authority's decision to refuse to issue a code compliance certificate.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 22 September 2014.

John Gardiner
Manager Determinations and Assurance

Appendix A

A.1 Relevant paragraph of Acceptable Solution G4/AS1

1.5 Mechanical ventilation

1.5.1 Mechanical ventilation systems must satisfy the following conditions:

a) outdoor air supply shall be designed and equipment installed to comply with NZS 4303, or AS 1668.2 (excluding Table A1 and Sections 3 and 7), and to provide outdoor air to *occupied spaces* at the flow rates given in NZS 4303 Table 2, …