



Determination 2017/068

Regarding an amendment to a building consent for an apartment building with tiled decks at 7 Salisbury Avenue, Mount Maunganui, Tauranga

Summary

This determination considers the authority's refusal to grant an amendment to a building consent for remediation of tiled decks above habitable spaces. The matter turns on whether the acoustic mat that forms part of the proposed tiling system will comply with Clauses G6 and B2.

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1. The matter to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations 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 to the determination are:

- Body Corporate BC S90108 as owner of common areas and representing the owners of the apartments in the building (“the owners”). The Body Corporate is represented by a project management company (“the project manager”)
- Tauranga City Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.

1.3 This determination arises from the authority’s decision in regard to an application for an amendment to a building consent for reinstatement of the deck tiling system installed to an existing apartment building. The authority is not satisfied that the

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

repaired decks will comply with certain clauses² of the Building Code (Schedule 1, Building Regulations 1992).

- 1.4 The authority's concerns originally related to the weathertightness and durability of the decks over habitable spaces (refer paragraph 3.7.4). After a draft of this determination was issued to the parties for comment, the authority limited its concerns to compliance with Clause G6 Airborne and impact sound, and Clause B2 Durability insofar as it applies to Clause G6 (refer paragraph 4.4.5).
- 1.5 The matter to be determined³ is therefore the authority's exercise of its power of decision in refusing to issue an amended building consent for proposed alterations to decks above habitable spaces. In deciding this, I must consider whether the tiling system proposed complies with Clause G6 Airborne and impact sound and Clause B2 Durability insofar as it applies to Clause G6. The "tiling system", which is to be located on a previously installed membrane, includes an uncoupling mat, acoustic mat, and ceramic tiles, and other system components (e.g. perimeter sealant, movement joints mortars and adhesives).
- 1.6 The compliance of any other building element or other proposed building work is not considered in this determination.
- 1.7 The relevant clauses of the Building Code in this determination are set out in Appendix A.

1.8 The evidence

- 1.8.1 In making my decision, I have considered:
- the submissions of the parties
 - a number of reports prepared for the project manager, the supplier of the tiling system ("the system supplier"), the tiling installer, the main contractor for the remediation work ("the contractor"),
 - BRANZ appraisal No.792 for the installed membrane and BRANZ appraisal No. 950 for a similar membrane that has been appraised to include the tiling system, and
 - the report of the expert commissioned by the Ministry to advise on this dispute ("the expert") and the other evidence in this matter.

2. The building work

- 2.1 The subject decks are part of extensive remediation work carried out to a four-storey apartment block situated on a corner urban site in a high wind zone and corrosion zone. The building was originally completed in 2001 and has a reinforced concrete post and beam structure, with concrete floor slabs, masonry party walls and timber framed infill panels to exterior walls. The apartment block accommodates:
- Ground level: car parking and main entry to apartments
 - Level 1 and Level 2: six apartments on each floor, with four facing north ("the north apartments") and two facing the street to the south ("the south apartments")
 - Level 3: four apartments – two north-facing and two south-facing.

² In this determination, unless otherwise stated, references to sections are to sections of the Act and clauses are to Building Code clauses.

³ Under sections 177(1)(b) and 177(2)(a) of the Act

- 2.2 On Levels 1 and 2 the north apartments open onto large tiled decks that run the length of the building and step back from the boundary to meet daylight requirements for the site (see Figure 1 below). The Level 1 deck is located over car parking at Ground level and is not considered in this determination.

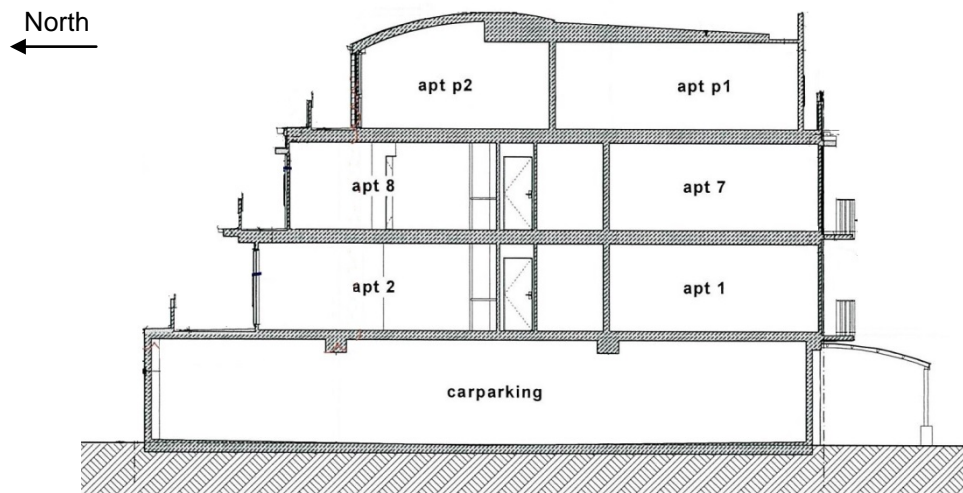


Figure 1: Cross section through the building (not to scale)

- 2.3 The Level 2 deck is partly cantilevers over open space and partly over living areas on Level 1. Level 3 includes a perimeter tiled deck with clad balustrades to the whole level. The deck is fully located over Level 2 living areas. The south apartments include recessed bedroom decks, with living room decks to the west and east.
- 2.4 The decks to Level 3 are situated above habitable spaces, and the decks to Level 2 are partially over habitable spaces.

3. Background

3.1 Remediation work

- 3.1.1 The original apartment block was completed in 2001 and subsequently developed moisture problems which were the subject of a WHS⁴ investigation, report and remediation process (I have not seen any WHS documentation). On 15 January 2015, the authority issued a building consent (No. BC 51090) for remediation work to the building; the remedial work included the installation of the TPO⁵ membrane PSA⁶ adhesive, acoustic mat, and tiling to the subject decks.
- 3.1.2 The construction programme was extended due to unexpected structural and fire protection issues revealed after the building work commenced, and the work including remediation of the decks was not substantially completed until March 2016.
- 3.1.3 Following removal of the original finishes from the concrete floors and precast concrete balustrades to the subject decks, the remediation work included:
- installation of waterproofing and soundproofing to deck floors
 - recladding of balustrades
 - recladding of walls

⁴ Weathertight Homes Service

⁵ Thermoplastic polyolefin membrane

⁶ Polymer modified pressure sensitive adhesive

- completion of deck tiling.
- 3.1.4 Construction drawings dated 30 April 2015 note that all the northern decks on levels 1 - 3 are to have:
- ...tiles, Sound Mat & uncoupling mat uplifted, existing TPO membrane cleaned with PSA [adhesive] remover ready for system to be re-instated...
- 3.1.5 When the tiling installation was nearing completion, concerns were raised about “numerous tiling installation defects” and tiling not being installed to the consented specifications using “good tiling practice”. At this point concerns were raised that layers under the tiles were detaching and that the installed system was “prone to failure due to moisture ingress”.
- 3.1.6 A meeting was held on 15 April 2016 to discuss the tiling, with the project manager, the contractor, and the system supplier in attendance. The meeting apparently agreed that two reports would be written to:
- Review [the system supplier’s] literature and site installation against the [manufacturer of the uncoupling and acoustic mat] parent company literature to determine if the applied system is suitable for exterior exposure.
- 3.1.7 According to the project manager the tiling system was left incomplete and the uncoupling mat left exposed to the weather from December 2015 to April 2016.

3.2 The reports

- 3.2.1 The contractor engaged a company of ‘consulting chemists’ (“the consultant”), while the system supplier engaged a ‘forensic building pathology’ company (“the building surveyor”).
- 3.2.2 The consultant’s report dated 10 May 2016 (in summary):
- included inspection of the tiling/waterproofing system and the suitability of the installed system
 - observed defects with the sealant separating and/or missing and re-emulsification of adhesive fixing the uncoupling mat to the TPO membrane
 - noted the visible parts of the TPO membrane showed it was “well installed and heat welded”
 - reviewed the technical literature and correspondence with the manufacturer of the uncoupling and acoustic mats, which revealed inconsistencies between the manufacturer’s installation requirements and the system supplier’s information
 - considered the delays in applying sealant allowed water to penetrate the gaps and the tiling system is unable to drain
 - noted some system components are not to be used in exterior situations.
- 3.2.3 The building surveyor’s report dated May 2016⁷ (in summary):
- assessed the deck tiling and outlined ‘any concerns and/or outline remedial work’
 - observed defects/flaws to the installed control joints, acoustic mat joining tape edge strips and sealant, and the installation of the acoustic mat

⁷ Provided under cover of a letter dated 20 May 2016

- noted the bond between acoustic and uncoupling mat had deteriorated due to water entering tile/wall junction
 - commented on the installation and adhesives used in the tiling system.
- 3.2.4 In the letter dated 20 May 2016 attached to the building surveyor's report, the building surveyor provided the system supplier with expanded comments and opinions on the consultant's report. The building surveyor noted he did not challenge the findings of the consultant's report but made further comment regarding good tiling practice, integrity of acoustic/uncoupling mats, and free-draining uncoupling systems are not available or locally appraised.
- 3.2.5 The tiling installer provided an undated report to the authority which commented that the system supplier's tiling system "will not work", and there is no BRANZ appraisal for the system. The report also commented on the scope of the building surveyor's report, and rebutted much of its content.
- 3.2.6 The building surveyor provided two "adhesive reports", with the first dated 4 January 2017, which further investigated the varying opinions on the adhesive used to secure the uncoupling mat to the TPO.
- 3.2.7 The system supplier then engaged the building surveyor to carry out a "document only evaluation of the proposed composite decoupling system". The second report, dated 8 February 2017, in which the building surveyor acknowledged his lack of expertise in chemistry, reviewed papers and technical literature regarding polymer modified adhesives. The building surveyor concluded that the polymer modified adhesive proposed to be used under the subject tiles and the uncoupling mat was acceptable to the manufacturers of the tiling system's components.

3.3 The authority's assessment

- 3.3.1 The project manager and designer met with the authority to discuss tiling problems and to resolve whether repairs could be carried out under maintenance or if building consent was required. The authority inspected the tiling and visited the site on 30 May 2016.
- 3.3.2 The authority received copies of the consultant's report and the building surveyor's report on the system and decided that an "amendment needed to be submitted as an alternative solution to remediate the existing consented design".
- 3.3.3 In a letter to the project manager dated 9 June 2016, the authority stated that it was unable to issue a code compliance certificate for the project because the installed tiling system did not comply with Building Code Clause B2, because (in summary):
- materials, components and construction methods must be sufficiently durable to ensure the building continues to satisfy code requirements for required periods
 - there is no recognised appraisal for the entire tiling system, which is currently failing due to moisture ingress, and the installed materials may not be fully compatible in their current situation
 - the building owner will need to "remove fully the current system, except for the BRANZ appraised waterproofing membrane" (the TPO membrane), then submit a proposal for "a fully appraised and certified" system for approval.

- 3.3.4 The authority added that any alternative solution would need to be supported by extensive evidence and testing in order to provide reasonable grounds for the authority to be satisfied on the code compliance of the proposal.

3.4 The tiling system as proposed

3.4.1 After seeking further product information and technical literature the system supplier provided a proposal for removing the existing tiling system and replacing it with a similar tiling system to that shown in Figure 2.

3.4.2 The tiling system is made up of the following primary layers:

Existing building elements to remain installed under the 2015 remedial consent

- Screed laid to 1:40 falls over the existing precast concrete decks.
- A moisture-cured polyurethane vapour block.
- 1.5mm thick TPO membrane.

Proposed building elements

- The PSA contact adhesive between the uncoupling mat and the TPO membrane.
- 3mm uncoupling mat.
- 3.5mm acoustic mat – not included on Level 1 deck.
- Water resistant cementitious adhesive (“the mortar”) between the acoustic mat and uncoupling mat, and between the acoustic mat and the tiles.
- The deck floor tiles.

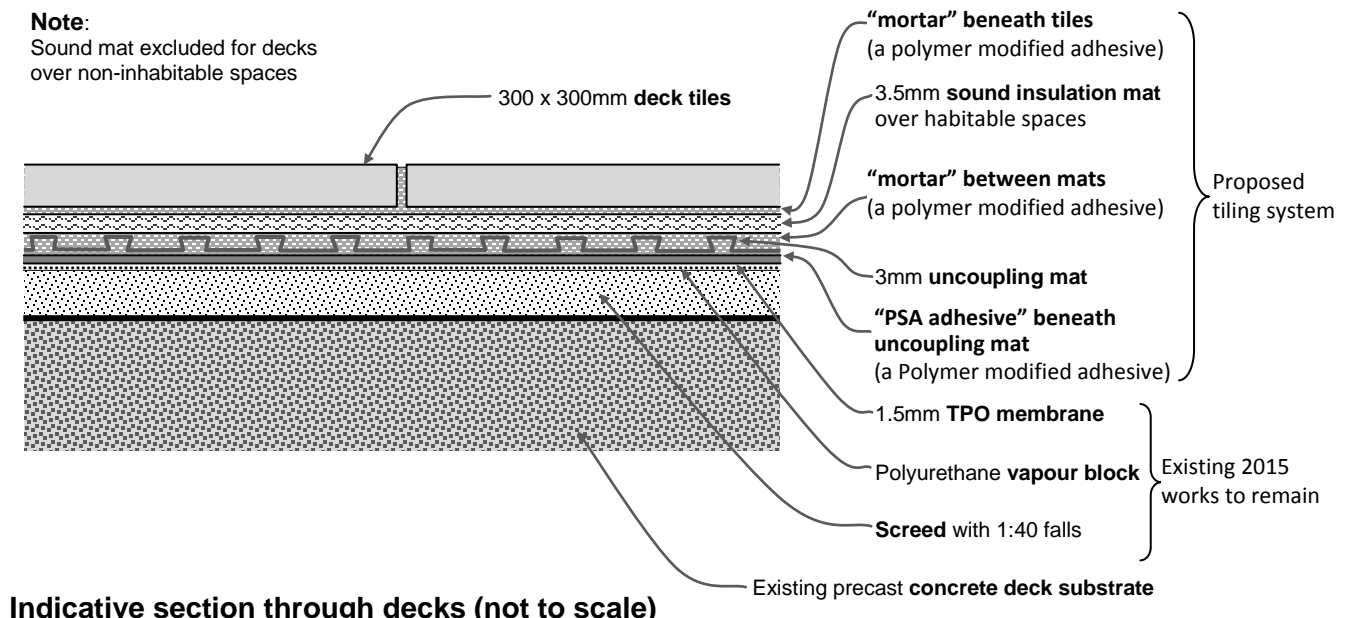


Figure 2: Deck construction over habitable spaces

3.5 The component products

- 3.5.1 The existing TPO membrane has a BRANZ Appraisal⁸ which describes the product as a “fully adhered polyester fabric reinforced, multilayer, synthetic roof waterproofing sheet based on thermoplastic polyolefin (TPO).” The system includes proprietary adhesives, sealants and membrane flashings to edges and other junctions. The appraisal concludes that, if installed in accordance with the conditions within the appraisal, the membrane system will comply with Clauses B2, E2 and F2.
- 3.5.2 The uncoupling mat is a polyethylene membrane with a grid structure of square cavities, each cut back in a dovetail configuration, with an anchoring fleece laminated to its underside. The uncoupling mat is bonded to the TPO with a PSA adhesive.
- 3.5.3 The acoustic mat is a polyethylene mat with a thickness of approximately 3.5 mm, which has an anchoring fleece laminated on both sides to bond with adhesive. Tiles are installed directly over the sound mat, with the thin-bed mortar bonded with the top fleece fabric – resulting in complete bonding of the system.
- 3.5.4 The proposed mortar is a polymer modified mortar, which is generally a cement-based mortar mix to which additional polymeric materials are added to provide “enhanced characteristics” to assist its application and its curing.

3.6 The peer review

- 3.6.1 The system supplier commissioned a peer review of the system by a second building surveyor, who reviewed the proposal and reported to the supplier on 3 July 2016. The surveyor noted that he had “fully reviewed” the supporting literature, specifications and Quality Assurance program. The peer review concluded:

Providing all phases of the work, ..., are fully overseen and completed strictly to the specification, by qualified practitioners – and signed off against the Q/A program, I am confident that the works will meet – and comfortably exceed the minimum durability performance requirements B2 of the NZ Building Code.

3.7 The amendment application and the authority’s refusal

- 3.7.1 As part of the amendment to the building consent to remediate the tile system, it was proposed that the existing tiles and acoustic mat system would be removed, and the TPO membrane would be cleaned, inspected and “certified ready” for the new tiling system to be installed. It was proposed that all decks were to have the uncoupling mat installed underneath the tiles, and where the decks were over habitable spaces, the acoustic mat was also to be installed – the decks with acoustic mats are the subject of this determination.
- 3.7.2 The relevant deck drawings were amended in accordance with the system supplier’s proposal, with details for expansion joints and deck/wall junctions provided by the system supplier. The proposal was submitted to the authority for approval in August 2016.

⁸ BRANZ Appraisal No.792 (2012)

3.7.3 The authority carried out a review of the proposal and an in-house report dated 25 August 2016 records comments and opinions on the documentation provided. The review included the following comments:

- Most authorities will not accept tiling on membranes because the mortar and the membrane are not compatible. The uncoupling mat is designed to be a slip layer to reduce the risk of incompatibility.
- There were “currently ... problems with” another uncoupling mat which has a BRANZ appraisal, and that company is using tile pedestals in place of a mat. (I note here that the uncoupling mat in that instance was a 0.4mm thick butyl rubber sheet for use on floors: it is not comparable with the uncoupling mat proposed.)
- In-service history shows “failures of the system” due to water entering under the tiles.

3.7.4 In a letter to the project manager dated 9 September 2016, the authority noted that it had reviewed and assessed the proposed amendment and had decided that the documentation provided:

...does not contain sufficient evidence to show all the identified performance criteria of all relevant clauses will be met especially B2 durability, and to a lesser degree B1 structure and for the large [decks] E2 external moisture.

3.7.5 The authority considered the evidence provided was not sufficient to allow it to conclude, on reasonable grounds, that:

- the entire system, including all the building materials, components, and the proposed construction method would satisfy the functional and performance requirements for the periods required by the Building Code
- damage to any elements in the proposed tiling system could be easily detected and repaired without damaging the integrity of the system, allowing elements of lesser durability to be replaced without removing others of greater durability
- the tiles of the ‘large [deck] areas using the ... sound mat’ will stay in place, with a ‘low probability of not causing loss of amenity’.

4. The submissions

4.1 The owner’s submission

4.1.1 On 7 December 2016 the Ministry received an application for determination regarding the authority’s refusal to approve the tiling system proposed for the decks described in paragraph 2.

4.1.2 The application, dated 1 November 2016, identified the matter for determination as the authority’s decision to refuse to issue an amendment to the building consent for the proposed tiling system, which applied to the large decks situated over habitable spaces. The applicant’s submission was prepared by the designer and forwarded under cover of a letter dated 7 December 2016. The application described the project and outlined the background to the dispute, which I have included in this determination as I consider appropriate.

4.1.3 The TPO membrane installed as part of the remediation work consented in 2015 had not been removed and “exhibits no sign of failure and the existing installation continues to perform.” The designer also stated that:

...Uncoupling System with the Acoustic System [the proposed tiling system⁹] is currently being assessed by BRANZ to be updated as an addition to the existing BRANZ Appraisals...The [system supplier’s] Uncoupling System will also be added to the existing [trademark named] TPO Appraisal.

4.1.4 The application described the proposed tiling system and the products used, noting the following (in summary):

- The uncoupling mat system is “approved” for use in Auckland and other regions¹⁰, and the in-service history records show no instances where the system supplier has needed to up-lift tiles installed over an uncoupling mat.
- The adhesive manufacturer has stated the PSA adhesive will adhere to the uncoupling mat.
- The uncoupling mat provides uncoupling from the substrate through its profile, which allows for in plane movement to neutralise differential movement stresses and eliminates major causes for cracking and delamination of tiling.
- The grout and adhesive are water-resistant and the tile also protects the system from damage while allowing simple tile replacement without damaging the underlying membrane.
- The perimeter seal and expansion joints control thermal movement.
- In the unlikely event of moisture ingress, the profile of the uncoupling mat allows moisture to drain down the deck slope to the open edge.

4.1.5 The applicant provided copies of:

- the consent amendment drawings
- correspondence with the system supplier and the authority
- the building surveyor’s reports
- the BRANZ appraisal for a different TPO membrane supplied by the system supplier
- various other warranties, technical product information, and other correspondence.

4.1.6 The designer also stated that a ‘further peer review’ of the proposed tiling system was being conducted by building surveyor – this report, dated 8 February 2017, was submitted on the same day (refer paragraph 3.2.7).

4.2 The authority’s submission

4.2.1 The authority explained the background to its decision regarding the consent amendment. The authority noted that the consultant’s report and the building surveyor’s report on the tiled decks had ‘basically came to the same conclusion that it was a “cobbled” system’ which had not been appraised by BRANZ.

4.2.2 In regard to the decks over enclosed spaces, the authority had concluded that there was insufficient evidence to approve the amendment as proposed.

⁹ Refer Figure 2

¹⁰ I note that the “approval” has subsequently been withdrawn by the authority

4.2.3 The authority provided copies of:

- the authority's review of the proposed amendment dated 25 August 2016
- correspondence from the contractor and the project manager
- the building surveyor's report and covering letter dated 20 May 2016
- the tiling installer's response to the building surveyor's report
- correspondence between the system supplier and the manufacturer of the uncoupling and acoustic mats
- various other reports and email correspondence.

4.3 The preliminary draft determination and responses received

4.3.1 A preliminary draft determination was issued to the parties for comment on 15 March 2017. The draft was limited to the matter to be determined, the background, and the submissions; and was issued in this form in order to confirm the matter(s) to be determined. The draft included some compliance matters that the applicant did not want the determination to consider, which were subsequently removed.

4.3.2 In a letter dated 22 March 2017, the authority:

- queried how the acoustic and uncoupling mats effected the performance requirements of the TPO membrane and how the membrane will be maintained
- stated that the alternative solution proposal was "assessed as near as practical against the Acceptable Solution" and in the authority's view the evidence provided does not establish compliance with the Building Code
- noted there has been no assessment in the preliminary draft of the decks in regard to Clause G6 Airborne and impact sound
- provided photographs of the tiles in situ, showing the tile "grout was not waterproof"

4.3.3 In a letter dated 7 April 2017 the project manager responded to the preliminary draft as follows (in summary):

- Any report or submission supplied by entities not directly involved in the determination should be removed (I note that under section 186 the Ministry must receive any relevant evidence, whether or not it would be admissible in a court of law.)
- The tile size was clarified and an incorrect reference to the specifier and installer of the tile system noted.
- The building surveyor had undertaken further research on the adhesive used to fix the uncoupling mat, noting the adhesive can be removed using solvent without damaging the membrane.
- Events and parties involved at various stages were clarified.

4.3.4 On 3 May 2017 the project manager provided photographs of some areas of the decks where the system had been uplifted, acoustic tests carried out at the site (and another in Auckland using the same system), a brochure on the uncoupling mat, and a report of the performance of the TPO membrane. The project manager made a further submission in response to the authority. The submission is summarised as follows:

- A recent BRANZ appraisal¹¹ included the uncoupling mat as part of the system.
- Photographs provided showed the “relative ease of uplift tiles and [the] corresponding ease of cleaning” the TPO membrane.
- A test had been conducted where the TPO membrane was “soaked” with adhesive solvent for an “extended period with no discernible damage”.
- The uncoupling mat allows the system above the membrane to be removed in order to maintain the TPO membrane.
- It was noted that the photos provided by the authority are to areas where the tiles are proposed to be removed as part of the building consent amendment.

4.3.5 The project manager provided a report dated 30 January 2016 on acoustic testing of the apartment complex. The report stated that it carried out acoustic tests on the floor and ceiling assembly on 28 January 2016, noting that the minimum requirement for on-site installations is FIIC¹² 50dB. The test results showed that there was a range of FIIC results from 51 to 62dB¹³ for tile systems with the acoustic mat.

4.3.6 Also submitted were acoustic tests carried out to another apartment complex in Auckland by a different acoustic engineering company. The report tested the FIIC results for a system similar to that used in this case (tiles, over acoustic and uncoupling mats): that report gave FIIC results of 56 and 57dB.

4.4 The draft determination and submissions in response

4.4.1 On 4 July 2017 a draft determination was issued to the parties for comment. The draft considered the compliance of the TPO membrane with the proposed tiling system would comply with Clause B2 insofar as it applies to Clause E2, and there was insufficient information on which to form a view regarding Clause G6.

4.4.2 On 21 July 2017 the project manager responded to the draft determination, requesting further information be considered (some of which concerned matters in relation to Clause E2). The project manager advised that the acoustic mat fixed with PSA adhesive in the ‘as-built’ installing under building consent no. 51090 (refer paragraph 3.1) ‘exhibited no sign of deterioration of the acoustic mat material’, and the recent BRANZ appraisal (refer paragraph 3.5.1) includes the tiling system with the PSA adhesive and the acoustic mat as part of the tiling system. The project manager also noted that the tiles can be lifted without damaging the acoustic mat, and submitted that ‘the existing tile adhesive is protected from water ingress by the tile which is 99.5% waterproof and the [trademark named] exterior epoxy tile grout...’

¹¹ BRANZ appraisal No. 950 (2017)

¹² Field Impact Insulation Class

¹³ The results show the construction performs better than the minimum requirement

- 4.4.3 On 24 July 2017 the authority responded to the draft determination, advising that it had no concerns regarding ongoing maintenance or performance of the TPO membrane, but only with regard to compliance with Clause B2, and seeking clarification of the durability periods that applied to the tiling system. The authority noted its concern regarding durability of the tiling system was because of the scale of the decks and costs that would be involved in any replacement, and that the manufacturer has advised the acoustic mat is not suitable for external applications and the uncoupling mat should not be installed beneath the acoustic mat and is not recommended for over membranes.
- 4.4.4 On 25 July I sought clarification from the authority in regards to its previous correspondence regarding compliance with Clause B1 and E2 (refer paragraph 3.7.4).
- 4.4.5 On 25 July 2017 the authority clarified its position and confirmed that the only matter in dispute was in relation to the tiling system over habitable spaces with respect to Clauses G6 and B2. The authority no longer has concerns regarding compliance with Clause E2, or with tiling systems on Level 1 decks over non-habitable spaces. The authority provided a copy of the approved plans for the tiling over the habitable spaces.
- 4.4.6 The project manager provided a further submission regarding the acoustic performance, enclosing a copy of the acoustic test report. The project manager noted that this matter had not been raised by the authority during construction, and only the results of testing had been requested. The project manager advised that the pre-existing tiling system prior to remediation did not include any acoustic measures for apartments below and that the new acoustic mat has improved the sound transmission class and exceeded the performance requirements of the Building Code.
- 4.4.7 I have taken into account the submissions of the parties and amended the determination as I consider appropriate.

5. The expert's report

5.1 General

- 5.1.1 As mentioned in paragraph 1.8.1, I engaged an independent expert, who is a materials engineer, to assist me. The expert conducted a document review and analysis of the uncoupling system. The expert's report was received on 18 May 2017, and was sent to the parties on the same day. I note here that although the full expert's report was summarised in the draft of this determination, much of that content has been removed due to the authority's concerns now being limited to Clauses G6 and B2 (refer paragraph 4.4.5).
- 5.1.2 The expert carried out a review of the documents provided to the Ministry to provide an opinion about the compliance of the membrane and tiling system. The expert considered the various reports, correspondence between the manufacturers and the parties, and product sheets of the various components for the tiling system.
- 5.1.3 The expert described the proposed system as identified in Figure 2 and included a description of the materials used in the decks as installed under the 2015 building consent, as well as those specified for the proposed system.

5.1.4 The report was framed in terms of the reasons given for the authority's refusal (refer paragraph 3.7.4) and considered matters such as the failure of the as-built decks, the uncoupling mat, the TPO membrane, the PSA adhesive, and tile mortar. In regard to the tiling system generally, the expert concluded that:

- there was no apparent failure of the existing TPO membrane, and no failure with respect to Clause E2 External Moisture
- provided adequate adhesion is achieved between the TPO membrane and the uncoupling mat, the performance of the tiling system is immaterial to the performance of the TPO membrane; neither the weathertightness of the TPO membrane nor physical integrity of the tiles relies on the adhesion between the uncoupling mat and the TPO membrane
- adhesion of the mortar to the uncoupling mat is unlikely to be problematic as long as the mortar is suitable for exterior use, and the proposed mortar "would seem to be appropriate"
- any water that moved through the system would not affect the surrounding construction, provided water resistant adhesives are used; the ingress of water into the proposed tiling system would not constitute a failure of the Building Code
- the proposed tiling system will not affect the ability of the TPO membrane to comply with Clause E2.

5.2 External use of the proposed system

5.2.1 The expert considered the proposed mortar, the use of the uncoupling mat and acoustic mat, the PSA adhesive, and considered whether the uncoupling system can be used externally for the proposed construction.

5.2.2 Correspondence from the manufacturer of the acoustic mat established that the acoustic mat was being used outside of the manufacturer's scope; the expert noted that the acoustic mat and the existing mortar are specified for internal use only. The acoustic mat is described as "waterproof", however this simply means it is unaffected by water itself. The expert stated that water could be retained within the porous structure of the acoustic mat and would be damaging to other materials, such as adhesives; meaning that the acoustic mat should be protected from water to avoid damage to other materials.

5.2.3 The expert stated that it is not possible to keep the system components dry in service. Water is likely to move into the tile bed through the grouted joints between the tiles. The ability of the mortar to tolerate water is a critical aspect of the system. Failure of the mortar would manifest as "drumminess" in localised areas with tiles detaching from the bed. However, the TPO membrane is unlikely likely to be affected "in any way" by failure of the rest of the system to tolerate or prevent the ingress of water.

6. Discussion

6.1 General

- 6.1.1 While the principle matters in dispute previously centred on the ongoing maintenance of the TPO membrane and the likely impact the proposed tiling system will have on the ability of the TPO membrane to satisfy Clause E2 for the minimum periods prescribed in Clause B2 (15 years), the authority has now limited its concerns to Clauses G6 and Clause B2 insofar as it applies to Clause G6.
- 6.1.2 The performance requirements of the Building Code that apply to the tiling system in relation to the acoustic performance are as follows:

Component	Performance requirement
Acoustic mat	<p>G6.3.1 The Sound Transmission Class of walls, floors and ceilings, shall be no less than 55.</p> <p>G6.3.2 The Impact Insulation Class of floors shall be no less than 55.</p> <p>B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:</p> <p>(b) 15 years if:</p> <p>(i) those building elements ... are moderately difficult to access or replace, ...</p>
Ceramic tiles	<p>Has a role to play in regard to Clause B2 insofar as it relates to the acoustic mat: protects the acoustic mat from UV and physical damage:</p> <p>B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:</p> <p>(c) 5 years if:</p> <p>(i) the building elements (including services, linings, renewable protective coatings, and fixtures) are easy to access and replace, and</p> <p>(ii) failure of those building elements to comply with the building code would be easily detected during normal use of the building.</p>

- 6.1.3 I must consider the information before me and whether there are reasonable grounds to form the view that the proposed tiling system complies with Clause G6 and Clause B2 insofar as it applies to Clause G6. In making an assessment of the tiling system I have taken into account the trade literature available on the component products along with the acoustic testing already carried out.

6.2 Clause G6 Airborne and impact sound

- 6.2.1 The project manager has provided results of acoustic tests of the subject decks and for tests carried out in a building located in Auckland using the same or similar materials.
- 6.2.2 I am of the view that the acoustic performance of the acoustic mat is unlikely to be significantly affected by moisture as it would continue to act as a non-rigid interlayer that does not transmit impact noise to the extent a rigid path would. I note the use of the uncoupling mat of itself may also assist in lessening impact noise from the deck

areas into habitable spaces below. I consider there are reasonable grounds to be satisfied that the tiling system as proposed complies with Clause G6.

- 6.2.3 It is emphasised that each determination is conducted on a case-by-case basis. The fact that a particular system has been established as being code-compliant in relation to a particular building does not necessarily mean that the same system will be code compliant in another situation.

6.3 Clause B2 Durability as it applies to Clause G6

- 6.3.1 The project manager has noted that the tiles can be lifted without damaging the acoustic mat, and submitted that ‘the existing tile adhesive is protected from water ingress by the tile which is 99.5% waterproof and the [trademark named] exterior epoxy tile grout...’
- 6.3.2 In regards to the acoustic mat, I am of the view that failure of the tiling system with respect to Clause G6 would be easily detected during normal use of the building by those in the habitable spaces below. While some components of the tiling system, such as the tiles, may be easily accessed and replaced and have a required minimum durability period of 5 years, I am of the view that other components of the tiling system would be moderately difficult to access and replace. I consider the durability period for the acoustic mat is 15 years.
- 6.3.3 In regards to the use of the acoustic mat externally, I note that the acoustic mat is constructed of the same material as the uncoupling mat, which can be used externally; both the uncoupling and acoustic mats are water-resistant and should not be affected by the effects of water ingress in terms of being degraded by the presence of moisture. I am of the view that there are reasonable grounds to be satisfied that the tiling system will comply with Clause B2 insofar as it applies to Clause G6.

7. The decision

- 7.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the proposed deck tiling system complies with Clauses G6 Airborne and impact sound and Clause B2 Durability insofar as it applies to Clause G6 and accordingly I reverse the authority’s decision to refuse to grant the amended building consent in this respect.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 28 August 2017.

John Gardiner
Manager Determinations and Assurance

Appendix A

A.1 The relevant clauses of the Building Code referred to in this determination

Clause B2—Durability

B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

...

(b) 15 years if:

(i) those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or

(ii) failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

(c) 5 years if:

(i) the building elements (including services, linings, renewable protective coatings, and fixtures) are easy to access and replace, and

(ii) failure of those building elements to comply with the building code would be easily detected during normal use of the building.

Clause G6—Airborne and impact sound

G6.3.1 The Sound Transmission Class of walls, floors and ceilings, shall be no less than 55.

G6.3.2 The Impact Insulation Class of floors shall be no less than 55.