



Determination 2017/022

Regarding the refusal to grant a waiver of Clause C3.4(b) of the Building Code in respect of the use of an artificial turf floor surface lining at 14 Newton Street, Mount Maunganui

Summary

This determination considers the compliance of the artificial turf flooring with Clause C3.4(b) of the Building Code. The determination discusses the allowances within the Acceptable Solutions for non-compliant surface finishes, and whether there are reasonable grounds to issue a waiver of the building consent in respect of the artificial turf.

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:
 - Tauranga City Council, the applicant, carrying out its duties as a territorial authority and building consent authority (“the authority”).
 - the owners of the centre, S, R, L and S Smyth, P O’Brien, M and J Young (“the owners”) acting through S Baldry (“the agent”)
- 1.3 I have provided the New Zealand Fire Service Commission (“the NZFS”) with the determination documentation for comment by way of consultation under section 170 of the Act.
- 1.4 This determination arises from the decision of the authority to refuse to issue a code compliance certificate for the sports centre. The refusal arose because the authority was not satisfied that the building work complies with certain clauses² of the Building Code (First Schedule, Building Regulations 1992); specifically with regard to the artificial turf flooring satisfying Clause C3.4(b).
- 1.5 The matter to be determined³ is the authority’s exercise of its powers of decision in refusing to issue a waiver for the artificial turf. In deciding this matter, I must consider if the artificial turf meets the requirements of Clause C3.4 and whether there were sufficient reasonable grounds for the authority to issue a waiver to the Building Code.

¹ The Building Act, Building Code, compliance documents, 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.

² In this determination, 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)(a) and 177(2)(d) of the current Act

- 1.6 In making my decision, I have considered the submissions of the parties, the report of the independent expert commissioned by the Ministry to advise on this dispute (“the expert”) and the other evidence in this matter.

2. The building work and background

- 2.1 The building work considered in this determination is the conversion⁴ of an existing single storey warehouse to a sports centre. The building work is designed to C/AS4 with a risk group of CA⁵. The floor plan (Fig 1) shows the sports centre consists of four offices/storage rooms, an office, kitchen, toilets and changing rooms, bar, four cricket lanes and three netball/football courts.
- 2.2 The building has concrete foundations and the walls are constructed with timber framing, but with existing steel portal frames and concrete panels retained in the courts area. The building is clad with direct fixed fibre-cement sheet and profiled metal cladding. There are no alterations proposed to the existing roof.
- 2.3 Artificial turf is a surface of synthetic grass designed to resemble real grass. The synthetic grass is made from either polypropylene or polyethylene yarn and it is tufted into a polypropylene backing cloth and rubber back.

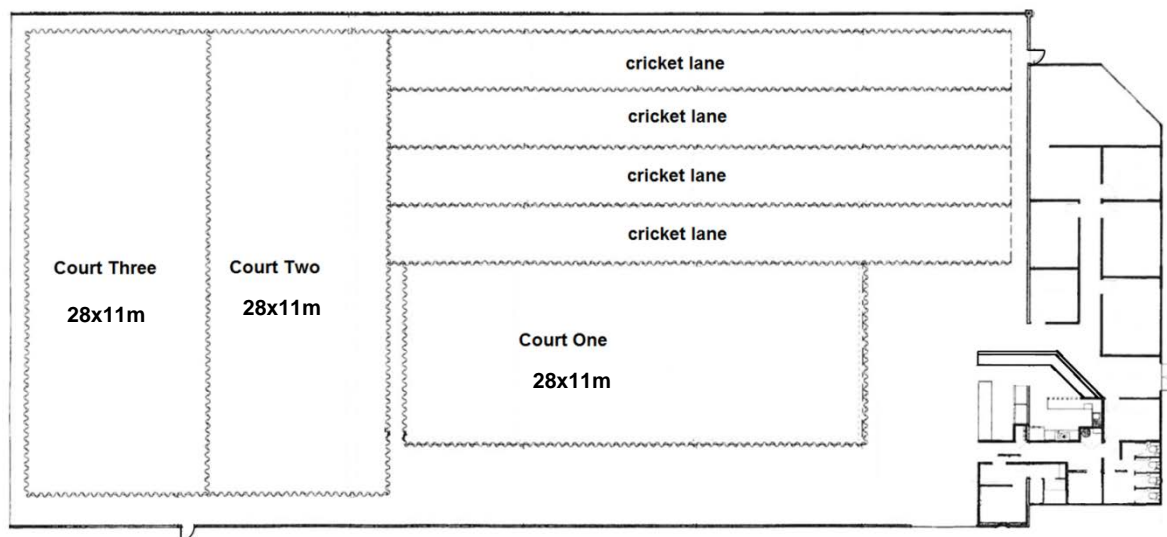


Figure 1: Floor plan

- 2.4 The authority received the application for a building consent to change the use of the warehouse to a sports centre on 24 September 2015. The building consent application was supported by the fire report provided by the designer (“the designer’s fire report”).
- 2.5 During the processing of the building consent, further information was requested by the authority on 6 November 2015 to clarify how the artificial turf would comply with the requirements of C3.4(b) where a critical radiant flux⁶ of not less than 2.2 kW/m² is required.

⁴ The building work is a change of use from a work, business or storage activity to a use related to crowd activities. Categories of use are defined in the Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005, Schedule 2 *Uses of all or parts of buildings*

⁵ Risk group CA is a classification under the Acceptable Solutions for public access and educational facilities, e.g. cinemas, shops, restaurant etc.

⁶ Critical radiant flux is the minimum radiant energy a fire requires to sustain flame spread on the material.

- 2.6 The designer responded to the authority in a letter dated 2 December 2015 stating that the artificial turf would be removed from the consent application. Testing was being sought by the owners, and if appropriate an amendment to the building consent would be applied for at a later date to include the artificial turf into the building.
- 2.7 On 16 December 2015 the authority received the 'Fire Safety Regulatory Review Acceptance Letter' from the engineering firm ("the authority's fire engineer") that peer reviewed the designer's fire report. The letter confirmed that if the building was constructed as in accordance with the plans and specifications (the artificial turf having been removed from the consent application) it would comply with the requirements of the Building Code to the extent required by the Act for the change of use.
- 2.8 The authority issued building consent No. 53536 on 22 January 2016.
- 2.9 The final inspection was undertaken by the authority on 6 May 2016. The inspection failed on various grounds including that the unconsented artificial turf had been installed.
- 2.10 On 13 May 2016 the authority issued a notice to fix. This was issued by the authority for various reasons including:
- Public occupation of the building in the absence of a certificate of public use or a code compliance certificate.
 - Installation of the artificial turf, which it stated did not comply with the Building Code and was not part of the consent.
- 2.11 On 24 June 2016 the authority issued a certificate of public use for eight weeks to provide a period in which to resolve the installation of the artificial turf.
- 2.12 The authority received a request to waive⁷ the Building Code requirement for C3.4 in respect of the artificial turf on 5 July 2016 from a fire engineer ("the first fire engineer") on behalf of the agent. The fire engineer set out their justification for a waiver as follows:
- A similar artificial turf with a critical radiant flux value of 1.1kW/m², which did not comply with the Building Code, had been used in another indoor sports centre. The building had an automatic sprinkler system installed, which lowered the requirement for the critical radiant flux value to a minimum 1.2 kW/m². The building consent authority granted the building consent, although the product did not comply with C3.4(b). This set a precedent for authorities to approve artificial turf products where the critical radiant flux did not comply with the Building Code.
 - It is not possible to source a suitable artificial turf that meets the Building Code requirements. The proposed artificial turf at 1.6 kW/m² does not meet the 2.2 kW/m², but it has the highest critical radiant flux of the available turfs that can be sourced.
 - Under Clause C3.4(b) different areas of the building require varying minimum critical radiant flux values. The playing surfaces are used by less than 50 people, and they consider the cricket lanes to be 'an area of the building'. Therefore, the floor surface should require a minimum critical radiant flux of 1.2kW/m² meaning that the artificial turf at 1.6 kW/m² complies with the Building Code.

⁷ Under section 67 of the Act a territorial authority may grant a building consent subject to waivers or modifications of the Building Code.

- There are a number of existing indoor playing surfaces that will no longer meet the minimum critical radiant flux value. When building consent applications are made for these buildings, an ‘as near as reasonably practicable approach’ will have to be adopted for these flooring surfaces to remain.
- 2.13 The authority requested further information to support the application for a waiver. I have not seen this request.
- 2.14 On 12 August 2016 the authority received another request to waive the requirements of C3.4(b) from another fire engineer (“the second fire engineer”). This fire engineer set out their justification for a waiver as follows:
- Lateral flame spread across horizontal surfaces is less significant than the spread across a vertical wall, and therefore the flooring is not considered a factor in the early stages of a fire.
 - Results from one sample of the artificial turf that tested the flame spread velocity vs distance, and the time to burn. They stated the indicative results provide an example of the ‘likely flame spread rate and small area affected in the initial stages of the fire’.
 - Flashover⁸ will occur faster due to the lower critical radiant flux than a compliant flooring. To meet the Building Code the building must be vacated before the flooring ignites as that will lead very rapidly to ‘untenable conditions’. They modelled the fire growth rate and radiation to the floor, and compared it to the required evacuation time, to establish whether the flooring is likely to be involved in the fire before the building can be cleared and untenable conditions reached. The results showed that the radiation at the floor exceeds 1.6kW/m² after 440 seconds, at which time the building is expected to be vacated.
 - The second fire engineer concluded that while the non-compliant critical radiant flux will lead to untenable conditions faster than compliant flooring, the large volume and high ceiling will enable tenable conditions for the time required to evacuate the building.
- 2.15 The authority’s fire engineer reviewed the waiver and stated:
- The fire growth rate used in the modelling is based on typical office furniture burning and not artificial turf burning.
 - The inputs to the fire modelling have not been agreed to, and the file that recorded the modelling has not been reviewed for accuracy.
 - The calculations submitted by the second fire engineer compares Clause C4.3 to Clause C3.4(b), but there is no ‘linkage’ between the Clauses and it does not address the non-compliant artificial turf.
 - That sprinklers could be installed to lower the minimum critical radiant flux value to 1.2 kW/m² so that the artificial turf will comply, or it could be replaced with a compliant turf.
- 2.16 The authority informed the owners that it did not believe there were grounds to support a waiver on 23 August 2016. It provided the option to extend the certificate of public use while the owners applied for a determination.

⁸ Flashover is the near simultaneous ignition of all combustible materials due to intense heat temperature.

- 2.17 The certificate of public use was extended to 28 February 2017 by the authority on 31 August 2016.
- 2.18 On 1 September 2016 the request for waiver was declined by the authority.
- 2.19 The Ministry received an application for a determination from the authority on 8 November 2016.

3. The submissions

3.1 With its application the authority provided copies of:

- building consent No. 53536
- the designer's fire report
- fire regulatory review and associated correspondence by the authority's fire engineer
- correspondence between the designer and the authority
- artificial turf specification sheet
- inspection report
- notice to fix dated 13 May 2016
- certificates of public use
- the requests for waivers for the artificial turf
- the letter from the authority declining the request for a waiver

3.2 The agent acknowledged the determination application on 10 February 2017. The agent submitted a fire report from the second fire engineer dated 16 December 2016 that stated the following:

- The artificial turf has a non-compliant critical radiant flux but is not a significant hazard. Flooring is not considered a significant hazard in the early stages of a fire because the flame spread rate is slower over horizontal surfaces.
- There are two fire spread scenarios that affect flame spread over the artificial turf. Analysis of the large area scenario indicated that 'ignition over a larger area is unlikely', and the lateral flame spread scenario indicated the flame spread rate 'does not necessarily equate to the critical radiant flux'.
- The testing to determine critical radiant flux assesses the hazard in a 'small' area and a larger space may still satisfy the life safety objectives of the Building Code, while not meeting the minimum critical radiant flux value.
- There was 'little published data on sports turf fire tests', but quoted a study that showed there 'is no tendency for spread of fire' to artificial turfs.
- Non-compliant wall linings were permitted in a crowd use building, under strict limitations to the escape distance, in two determinations⁹ regarding wall linings. They believed that if a 'flap' was installed to the netting around the

⁹ Determination 2015/010 *Regarding the authority's refusal to grant a modification of Clause C3.4(a) of the Building Code in respect of materials used for internal surface linings at a new school hall at 90-98 Blake Street, Greymouth* (MBIE) 31 March 2015
Determination 2015/022 *Regarding the authority's refusal to grant a modification of Clause 3.4(a) of the Building Code in respect of materials used for internal surface linings at a function centre at 75-79 Parker Avenue, New Lyn, Auckland* (MBIE) 14 May 2015

courts, this would reduce the escape path to under 50m and ‘given that flooring is less hazardous than combustible wall linings’ it would be appropriate to use non-compliant flooring.

3.3 The report also provided the test results from modelling of a fire in the sports centre

3.4 On 17 February 2017 the agent submitted another letter from the second fire engineer, dated 12 December 2016, which mostly reiterated their earlier submission but included additional comments regarding:

- How the non-compliant artificial turf meets the life safety objective of Clause C3.1 in the same manner that wall finishes do as determined by the Ministry in several previous determinations (see paragraph 5.2.5)
- The heat release rate and flame spread with a discussion of a test¹⁰ on two carpet samples with a critical radiant flux of 1.4 kW/m² and 2.3 kW/m². The two samples had similar flame spread results, and the second fire engineer argued the critical radiant flux was not ‘critical to final spread’.

3.5 A draft determination was issued to the parties for comment on 7 March 2017.

3.6 Responses to the draft determination

3.6.1 On 14 March 2017, the second fire engineer on behalf of the agent stated they did not accept the draft determination. The second fire engineer commented as follows (in summary):

- The cost to install a sprinkler system to the building, which was estimated as ranging from \$222,000 to \$297,000, is ‘not justified’. The second fire engineer stated that the system would not activate in time due to the high ceiling space to ‘provide any benefit to life safety or address the concerns about the impact of the flooring...’
- A compliant artificial turf for cricket could not be sourced.
- The ongoing maintenance of some of the suggestions by the expert would be too onerous (see paragraph 4.4.7). Also, the use of sand could be a health and safety hazard.
- Applying the limitations contained within the Acceptable Solutions for non-compliant linings in Marae buildings is not applicable to this building (see Appendix A). Noted that BRANZ report SR128¹¹ was carried out after the escape distance allowances for Maraes were included in the Acceptable Solutions.
- Further technical information was supplied regarding the rate of burning. The available information indicates that the difference between a compliant flooring and a non-compliant flooring does not lead to untenable conditions.
- The expert report and draft determination did not take into account the information provided on 12 December 2016, which demonstrated that the difference between the artificial turf and a compliant flooring ‘does not lead to untenable conditions’.
- The time limit provided by the Ministry to respond to the draft determination is not sufficient for ‘any laboratory or full scale testing’ of the artificial turf. (I

¹⁰ *Flame spread of carpet systems involved in room fires* (1976), K-M Tu, Washington: US Department of Commerce

¹¹ Study Report No. SR 128 *Fire Protection of New Zealand’s Traditional Māori Buildings* (2004) BRANZ

note that the designer stated on 2 December 2015 that ‘testing [was] being sought’. I consider that a sufficient extent of time has passed in which the artificial turf could have been tested).

- Disagreed with the expert regarding her comment that the modelling being based on typical office furniture burning, rather than artificial turf burning. The second fire engineer stated that full scale fire tests of similar flooring demonstrated that ‘flooring is not significant until flashover’. BRANZ report SR128 does not cover the floors and floor coverings as the report considered that they are unlikely to become ‘significantly involved’ in a fire until after flashover. Therefore, as previous determinations ‘relied entirely on this report, then this flooring must be deemed to have been included’.
- Stated that their inputs and records of the fire modelling carried out to the sports centre can be provided on request.
- The functional requirement of Clause C1 is to protect life safety. The surface finishes are part of the ‘restrictions to achieve the life safety objective’. The building complies with the functional requirements of the Building Code.

3.6.2 In response to Table 1 (see paragraph 5.2.4) in the draft determination, the second fire engineer submitted the following:

- There is no difference between a compliant flooring and the artificial turf, as the building ‘maintains tenability to well after the RSET¹² time’. (Item 1)
- Sprinklers would not activate before RSET time due to the building height, and their cost is prohibitive. (Item 2)
- There is no suitable compliant turf. (Item 3)
- The waiver is consistent with the purposes and principals of the Act. To say otherwise is contrary to the BRANZ report that MBIE ‘relied upon’ for the previous determinations on wall linings to justify the exemption, ‘where it was stated that flooring was not material to the outcome’. The modelling conducted shows that tenable conditions are maintained with a ‘good margin of safety’. (Item 4)
- Tenable conditions are maintained for the duration of RSET, and the objectives of the Building Code are met. (Item 5)

3.6.3 On the 24 March 2017, the second fire engineer provided a further submission which documented the burning of two pallets on a piece of the artificial turf with the aim of measuring the flame spread. The second fire engineer pointed out that the fire spread in the areas where the flames did not touch the turf were ‘minor’ and it had ‘barely spread beyond the perimeter of the pallets’.

3.6.4 The authority accepted the draft with no additional comments on 16 March 2017.

3.6.5 The NZFS advised on 29 March 2017 that it agreed with the decision.

3.6.6 I have taken the parties’ submissions on the draft determination into account and amended the final determination as appropriate.

¹² Required Safe Egress Time

4. The expert's report

- 4.1 As mentioned in paragraph 1.6, I engaged an independent expert to assist me. The expert is a Chartered Professional Engineer with specific expertise in fire matters. The expert's report was received on 16 February 2017, and was sent to the parties on 17 February 2017.
- 4.2 The expert noted that the artificial turf did not satisfy the critical radiant flux value in C/AS4¹³ and did not meet the requirements of Building Code Clause C3.4(b), because the manufacturer's test results at 1.6 kW/m² were below the minimum 2.2 kW/m² value.
- 4.3 The expert noted that the submission provided by the second fire engineer did not state how the artificial turf would comply with the Building Code, or how life safety requirements would be met in the building should the non-compliant surface be retained if a waiver was issued.

4.4 Assessment of the grounds for a proposed waiver of the Building Code

- 4.4.1 The expert commented on the waiver proposal of the second fire engineer that the non-compliant floor was allowed for within a Marae because the escape distances provided in that situation were adequate as described in the Ministry FAQ (see Appendix B).

Marae exception

- 4.4.2 The second fire engineer stated that it could use escape distances allowances as grounds for a waiver for non-compliant artificial turf, because the escape distance length was 31m. The Marae exception is permitted when the open path length is halved. Using the Acceptable Solution C/AS4¹⁴ with a Type 4 alarm system installed and applying the Marae escape distance allowances (see Appendix A):

- Total open path must be 50m or less
- Dead end open path must be 20m or less

- 4.4.3 However, the expert noted that 50m or less travel distance is for the total open path only, and the proposal did not consider the dead end open path. The dead end open path from the cricket lanes appeared to be approximately 40m. The expert stated that given the number of nets that restrict egress and that the dead end open path is over 20m, the building does not satisfy the open path length requirements.

Means of escape

- 4.4.4 The expert analysed the building in terms of means of escape where it is relevant to the issuing of a waiver by the authority. The expert noted that as the building is an 'indoor cricket facility' there are a number of nets separating cricket lanes. The expert identified the following three issues:

The means of escape from the netted areas are obscured as a gap in the net must be found by the occupants in order to exit.

Signage does not appear to be required by the fire report at the end of each cricket lane.

The dead end escape route is noted as 'N/A' in the [designer's] fire report. However, it is entirely applicable given that there is only one escape route from each netted

¹³ C/AS4 Acceptable Solution for Buildings with Public Access and Educational Facilities (Risk Group CA)

¹⁴ C/AS4 Table 3.2 Travel distances on escape routes for risk group CA

cricket lane. It appears that the dead end path lengths are quite close to the 40m limit.

- 4.4.5 These issues could result in a slower escape time than what could normally be expected for compliant escape routes with appropriately sized doors and adequate signage.
- 4.4.6 The expert also noted that, while not related to the means of escape, the hose run distance is relevant to the ability of the NZFS to fight a fire in the building. The expert observed that the hose run distance, calculated in the drawings attached to the designer's fire report, has been measured diagonally through the nets. The expert is of the view that this is not practical as it would be 'too difficult for NZFS personnel to get through the nets with their hoses and apparatus.'
- 4.4.7 The expert provided several possible solutions that the owners could use to achieve compliance with the Building Code in respect of the flooring:
- Sprinklers could be installed that would make the artificial turf compliant as the critical radiant flux value in the Building Code requires 1.2 kW/m^2 for buildings protected by an automatic sprinkler system.
 - The expert has experience with adding sand to non-compliant artificial turf which increased its critical radiant flux value. However, this would require re-application of sand and this may not provide a suitable playing surface.
 - An alternative solution design in support of a waiver application could be proposed using similar concessions allowed for Marae buildings (see Appendix A). If exit widths are doubled and the open path lengths are halved, non-compliant surface finishes could be allowed. Although, the expert notes that it is likely that additional exits would be required from the netted areas.

4.5 Expert's conclusion

- 4.5.1 The expert concluded that the installation of the artificial turf does not comply with Clause C3.4(b), because the critical radiant flux at 1.6 kW/m^2 is lower than the minimum 2.2 kW/m^2 . The expert agreed with the authority that a waiver should not be granted for the non-compliant artificial turf. However, the expert provided several options that could be used to achieve compliance or justify a waiver.

5. Discussion

5.1 Compliance with the Building Code

- 5.1.1 Under section 115 of the Act a building owner cannot change the use of the building unless the territorial authority is satisfied on reasonable grounds that the building, in its new use:

(i) will comply, as nearly as is reasonably practicable, with every provision of the building code that relates to the following:

(A) means of escape from fire, protection of other property...

- 5.1.2 Section 17 of the Act requires all 'new building work must comply with the building code'.

- 5.1.3 The relevant Building Code Clause is functional requirement C3.1, which states that:

Buildings must be designed and constructed so that there is a low probability of injury or illness to persons not in close proximity to a fire source

Performance Requirement Clause C3.4(b) for floor surfaces are:

Area of building	Minimum critical radiant flux when tested to ISO 9239-1: 2010	
	Buildings not protected with an automatic fire sprinkler system	Buildings protected with an automatic fire sprinkler system
Sleeping areas and exitways in <i>buildings</i> where care or detention is provided	4.5 kW/m ²	2.2 kW/m ²
Exitways in all other <i>buildings</i>	2.2 kW/m ²	2.2 kW/m ²
<i>Firecells</i> accommodating more than 50 persons	2.2 kW/m ²	1.2 kW/m ²
All other occupied spaces except <i>household units</i>	1.2 kW/m ²	1.2 kW/m ²

- 5.1.4 The Building Code seeks to balance fire dynamics, human behaviour and risk assessment. The performance criteria for internal floor finishes assess the contribution that surface finishes make to the rapid spread of fire, and the degree it may hinder the occupants' means of escape. A burning floor is a hazard given that this is the surface for escaping the building, and could induce panic in occupants, regardless of tenable conditions.
- 5.1.5 Critical radiant flux is defined as 'the minimum radiant energy a fire needs to sustain flame propagation on the material'¹⁵. The lower the critical radiant flux value, the greater the tendency for the material to ignite, and increase the growth of the fire and smoke spread, which will prevent the occupants from safely evacuating the building.
- 5.1.6 The designer's fire report notes that the design occupancy is 203 people, so it falls under 'firecells accommodating more than 50 persons', placing the minimum critical radiant flux of the floor surface at the 2.2 kW/m².
- 5.1.7 I consider the installation of the artificial turf to be new building work which must fully comply with the Building Code. The artificial turf has a critical radiant flux of 1.6 kW/m² and the building is not protected by an automatic fire sprinkler system, so it does not meet the requirements of Clause C3.4(b). I note that if an automatic fire sprinkler system was installed to the building, the installation of the artificial turf would comply with the Building Code.
- 5.1.8 The artificial turf was removed from the building consent application when this failure to comply with the Building Code was identified by the authority. The authority was correct to deem the artificial turf non-compliant, and approve the building consent once it had been removed.

5.2 Waiver of the Building Code

- 5.2.1 A territorial authority may grant an application for a building consent subject to a waiver (or modification) of the Building Code. However, the granting of a waiver must be reasonable¹⁶ in taking into account the circumstances of the particular situation.

¹⁵ BRANZ Study Report No. 181 *Fire properties of Floor Coverings: New Fire Test Methods and Acceptable Solutions* (BRANZ) 2007

¹⁶ Determination 2006/085 *Refusal of a code compliance certificate for a building with a plywood cladding system at a house* (Department of Building and Housing) 4 October 2006

- 5.2.2 I note that the Act does not establish what the authority must consider when issuing a waiver or modification. However, in previous determinations I have established that compelling reasons must exist that support the view that a waiver is appropriate¹⁷, and when ‘explicitly or implied necessary for the granting of a building consent in respect of the building work concerned’¹⁸.
- 5.2.3 The issue of whether an authority can retrospectively issue a waiver has been discussed in *Morresy V Palmerston North City Council*¹⁹, where it has been established that an amendment to the building consent must be ‘able to incorporate a waiver or modification of the Building Code.’ A waiver where the building consent has been issued must take the form of an amendment to the original consent.
- 5.2.4 In Determination 2015/010 I noted the factors that an authority should consider and balance regarding whether it is reasonable to grant the waiver. I have used the methodology established in this determination to assess whether it is ‘reasonable’ to grant a waiver for this building:

Table 1

Factors	Comment
The extent and possible consequence of the non-compliance with the specific performance clause.	Untenable conditions reached faster than a compliant flooring.
The availability of other reasonably practicable solutions that would result in the building work fully complying with the Building Code and associated costs.	Installing sprinklers would result in the flooring comply with the Building Code. The cost is unknown. A compliant artificial turf is difficult to source.
Any special and unique circumstances of the building work subject to the waiver.	The availability of compliant artificial turf.
The extent to which the waiver will still be consistent with the purposes and principles of the Act	The waiver would not be consistent with the purposes of the Act, as people using this building have an increased risk from the non-compliant artificial turf and there are no proposed steps to increase fire safety. The principle of the Act is to limit the spread of fire. Flashover will be reached sooner with a non-compliant artificial turf, because less energy is required to ignite the floor covering.
The extent that the waiver complies with the relevant objective and functional requirement of the specific clause of the Building Code.	The waiver would not comply with the relevant objective and functional requirement of Clause C3.1. The artificial turf increases the probability or injury or illness to people who are not in close proximity, because it would lead to untenable conditions faster than compliant flooring, and no other actions have been proposed to mitigate this.

- 5.2.5 I consider that this methodology has established that the waiver could not reasonably be granted as currently proposed. While both the first and second fire engineers acknowledged that the artificial turf was non-compliant, there were no actions proposed to mitigate the increased risk to occupant safety.

¹⁷ Determination 2012/049 *Regarding the refusal to issue a code compliance certificate for a 16-year-old house with monolithic cladding at 33 Bishopsworth Street, Hillsborough, Christchurch* (Ministry of Business, Innovation and Employment) 12 July 2012

¹⁸ Determination 2007/110 *Building consent for a house on land subject to coastal hazards at 35 Clifton Road, Haumoana, Hawkes Bay* (Department of Building and Housing) 17 September 2007

¹⁹ CIV-2007-454-000463

5.3 Marae exception for non-compliant linings

5.3.1 The second fire engineer stated that the Marae exception features of doubling escape widths and halving escape distances is not applicable to the sports centre:

- Halving the escape distances is ‘not relevant to the evacuation time’ and the exits in this building are ‘widely spaced’.
- Doubling the exit width would not be necessary for the sports centre because it is ‘significantly larger’ in the height and floor area without a larger increase in occupancy, with a longer ASET²⁰, than the buildings in the previous determinations regarding surface linings.

5.3.2 The Marae exception in the Acceptable Solutions balances the risk from the non-compliant linings and the availability of exits and escape routes. Applying this exception to the sports centre can show a consideration of balancing the increased risk to occupants and mitigating this by allowing for faster evacuation times. Previous determinations have considered the Marae building exception on non-Marae buildings where non-compliant surface linings have been proposed (see paragraph 3.2). Therefore, I have considered this example against the constructed building:

Table 2

Features of the Marae exception that would allow the use of non-compliant linings	Evaluation of the features in the constructed building
Escape route widths need to be double that required by paragraph 3.3.2 of the relevant Acceptable Solution	<p>The width of all available escape routes as calculated using C/AS4 is required to be 1421mm. This is calculated by multiplying the occupancy number by 7mm, so 203 persons x 7mm = 1421mm.</p> <p>There are four escape routes that are 810mm wide. The total of all available escape routes is calculated by multiplying the width of the escape routes by the number, e.g. 4 x 810mm = 3240mm.</p> <p>Discounting the widest escape route as per paragraph 3.3.2(d), the designer’s fire report calculates the width of the escape routes from the courts area (because it will have the highest amount of occupants) is reduced to 1620mm.</p> <p>The escape route width needs to be double what C/AS4 requires, so 1421mm x 2 = 2842mm to satisfy the use of non-compliant linings.</p>
Open paths travel distances need to be half that specified in Table 3.2 of the relevant Acceptable Solution	<p>A Type 4 system is proposed and the dead end open path is 40m and total open path is 100m. When halved, a dead end open path needs to be 20m which is not achieved:</p> <ul style="list-style-type: none"> • Cricket lanes – approximately 40m • Courts – 35m
Finished floor to ceiling height needs to be more than 3m	Yes
The occupancy of the building is under 250	Yes – at 203 people
The fire cells are at ground level and need to be served by at least two exitways or final exits.	Yes

²⁰ Available Safe Egress Time

5.4 Means of escape

- 5.4.1 I consider that the means of escape routes are relevant to this discussion as they will have an impact upon a future waiver application. The fire report, as observed by the expert, has incorrectly considered the escape routes out of the courts and cricket lanes to be 'not applicable'. The consented fire drawing shows the escape routes drawn diagonally through the courts and through the middle of the cricket lanes. This is incorrect, as the escape distance is calculated following the walls (nets) with a 1.0m separation²¹. The escape path must follow the wall to accommodate the likelihood that there could be objects placed within the area that would obstruct direct passage to the exit.
- 5.4.2 In the designer's fire report I note that the escape route from the cricket lanes are approximately 40m, as the Fire Plan (sheet 10 of the consented plans) shows the first 20m of the escape routes to indicate the emergency lighting. The centre advertises 'Slam Jump Inflatable Fun' every weekend where inflatables are set up on the courts and in the cricket lanes. I consider that calculating the correct escape distance is important because these inflatables are a potential fire risk that will hinder the escape time, as they are obstructions, their height could block any emergency signage, and there are an increased number of children playing in the courts and cricket lanes.

5.5 Conclusion

- 5.5.1 The performance requirement of Clause C3.4(b) clearly states the minimum critical radiant flux of 2.2kW/m^2 is required. A non-compliant product has been installed without building consent, and this non-compliance has not been mitigated by way of improving fire safety features. I do not accept that the non-compliant flooring is acceptable because of the existing features of the buildings and the calculations provided. When designing the building, the designer should have noted that the artificial turf did not comply with the Building Code and adjusted the design or the cost of the project accordingly.
- 5.5.2 I consider that using the established waiver methodology and non-compliant lining example that currently the building does not meet the criteria to justify a waiver. In my view, while compliant artificial turf is difficult to source, there are possible solutions that could be applied to reduce the critical radiant flux level required by the Building Code or mitigate the risks associated with the non-compliant flooring. I have set out this analysis in Table 2.
- 5.5.3 Therefore, I consider that there is insufficient reasonable grounds for the authority to grant a building consent subject to a waiver for Clause C3.4(b).

6. The decision

- 6.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the artificial turf installed in this building without the protection of an automatic fire sprinkler system does not meet the requirements of Clause C3.4(b).
- 6.2 In regard to granting a waiver to the Building Code for Clause C3.4(b) I determine that the authority was correct to refuse to issue a waiver for building consent No. 53536.

²¹ Commentary for Acceptable Solutions C/AS1 to C/AS7 (Ministry of Business, Innovation and Employment) December 2013

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 10 April 2017.

John Gardiner
Manager Determinations and Assurance

Appendix A

A.1 Sections of the Acceptable Solution C/AS4 discussed in this determination

Width

3.3.2 Width requirements within *escape routes* shall be as follows:

a) **Width of all available escape routes:** the total combined width of all available *escape routes* shall allow 7 mm/person for horizontal travel and 9 mm/person for vertical travel.

²
³ b) **Not an accessible route or accessible stair:** if the *escape route* is not an *accessible route* or *accessible stair*, it shall have a minimum width of 850 mm for horizontal travel and 1000 mm for vertical travel, except in the following cases:

i) if an *escape route* is within an *exitway*, its width shall be no less than 1000 mm, and

ii) if there is no requirement for *people with disabilities*, the *occupant load* is less than 50 and the *escape route* is within an *open path*, its width may be reduced to 700 mm for horizontal travel and 850 mm for vertical travel.

²
³ c) **Accessible routes and accessible stairs:** if the *escape route* is an *accessible route* or *accessible stair*, it shall have a minimum width of 1200 mm for horizontal travel and 1100 mm for vertical travel.

Comment:

See Paragraph 3.15.5 for allowable widths of doors.

d) **Provision for unusable escape routes:** except where *dead ends* and single *escape routes* are permitted, the total required width in unsprinklered *firecells* shall still be available should the widest of the *escape routes* be unusable due to the location of the *fire* or any other reason (see Figure 3.3).

Comment:

Requirement d) may be achieved either by providing additional *escape routes* or by making the minimum required number wider.

e) **Sprinkler concession:** if the *fire cell* is sprinklered, requirement d) does not apply (ie, it is not necessary to provide extra width to allow for the possibility that one *escape route* may be unusable).

f) **Horizontal escape route with a single direction of escape:** this shall be wide enough at any point to take the full *occupant load* from all contributing *occupied spaces*. However, the *escape route* may have its width increased progressively as it passes the exit from each *occupied space* (see Figure 3.4).

j) **Marae buildings using traditional Māori construction materials:** where applying the exception permitted in Paragraph 4.17.6 i), the *escape route* widths required by Paragraph 3.3.2 b) shall be doubled.

3.4 Length of escape routes

3.4.1 An *escape route* may be any length, but:

a) The lengths of *dead ends* and *total open paths* shall not exceed the distances given in Table 3.2, adjusted as necessary for:

- i) reductions on *intermediate floors* (see Paragraph 3.4.3), and
- ii) reductions on stairs and ladders (see Paragraph 3.4.4), and

e) **Marae buildings using traditional Māori construction materials:** when applying the exception permitted in Paragraph 4.17.6 i), the permitted length of the *open path* specified in Table 3.2 shall be halved, and

Table 3.2 Travel distances on escape routes for risk group CA				
	No system and Type 2 system	Type 4 system	Type 6 system	Type 7 system
<i>Dead end open path</i>	20 m	40 m	40 m	50 m
<i>Total open path</i>	50 m	100 m	100 m	120 m
<p>If <i>open path</i> length increases for smoke detectors are being applied, where Acceptable Solution F7/AS1 allows heat detectors to be substituted for smoke detectors, not less than 70% of the <i>firecell</i> shall be protected with smoke detectors. Heat detectors cannot be substituted for smoke detectors in <i>exitways</i>.</p> <p>If smoke and heat detection systems are installed in order to extend permissible travel distance in accordance with this table and are not a requirement of Paragraph 2.2.1 then Fire Service connection is not required.</p>				

Appendix B

B.1 Relevant section of the Ministry Guidelines regarding timber linings:

3.5 How timber linings can be used in certain crowd uses

The content below provides guidance for designers enabling them to submit for building consent based on a modification of Building Code Clause C3.4 (a) where Group Number 3 timber is proposed in crowd occupancy areas requiring Group Number 2. Material Group numbers are described in the Building Code and the requirements are repeated within Acceptable Solutions C/AS1-7 relevant to each risk group. Group numbers are aligned with general building uses and can be broadly summarised as follows:

Group number	Building use
Group number 1	Exitways, Importance level 4, Sleeping Use with Care or Detention
Group number 2	Crowd & Sleeping Use except within household units
Group number 3	All other uses

It is important to ensure that materials used as internal surface linings do not unreasonably contribute to the fire risk including in crowd areas. These areas generally contain people who are unfamiliar with the building and its escape routes.

Crowd use is any of the uses within CS (Crowd Small), CL (Crowd Large), CO (Crowd Open) or CM (Crowd Medium) as defined in Schedule 2 of the Building (Specified Systems, Change of Use, and Earthquake-Prone Buildings) Regulations 2005.

It is however acknowledged that smaller premises used for crowd activities may by their nature have a low occupancy and efficient escape route features. Escape time in the event of a fire is therefore shorter and the probability of Group 3 internal surface finishes adversely affecting the ability to escape may be low. These can be used to justify applying for building consent based on a modification to Clause C3.4(a) to the effect that a material with Group Number 3 can be used.

Criteria to be included in justifying that the proposed modification is reasonable in a particular instance include:

- escape route widths are double that required by Paragraph 3.3.2 of the relevant Acceptable Solution
- open paths travel distances are half that specified in Table 3.2 of the relevant Acceptable Solution
- finished floor to ceiling height is more than 3m
- the occupancy of the space is less than 250 people
- the firecell is at ground level and served by at least two exitways or final exits.

The above consideration does not extend to exitways within crowd uses.

Where the above criteria are met Council, after taking advice from the Fire Service as required by Gazette Notice 49, may well consider it appropriate to issue a modification to Building Code Clause C3.4 (a) under Section 67 of the Building Act for crowd uses. This would permit use of solid timber surface linings in buildings such as community halls, cafes, schools, recreation halls, small shops and restaurants.

There are likely to be circumstances where these criteria are not met in full. If so, designers need to look at the facts in each instance and put their arguments forward to Council justifying why they believe the modification is nevertheless reasonable.