BUILDING PERFORMANCE

Determination 2026/014

An authority's proposed decision to refuse a building consent with the reasons relating to the compliance of the bracing design with B1/AS1

124 Spencer Road, Tarawera, Rotorua

Summary

The determination considers the authority's proposed decision to refuse a building consent in relation to the bracing design in a proposed new dwelling. In making the determination, it will consider the reasons for the refusal in relation to whether the compliance pathway for the design of the bracing system is Acceptable Solution B1/AS1.

In this determination, unless otherwise stated, references to "sections" are to sections of the Building Act 2004 ("the Act") and references to "clauses" are to clauses in Schedule 1 ("the Building Code") of the Building Regulations 1992.

The Act and the Building Code are available at www.legislation.govt.nz. Information about the legislation, as well as past determinations, compliance documents (eg, Acceptable Solutions) and guidance issued by the Ministry, is available at www.building.govt.nz.

1. The matter to be determined

1.1. This is a determination made under due authorisation by me, Andrew Eames, Principal Advisor Determinations, for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment ("the Ministry").[1]

1.2. The parties to the determination are:

1.2.1. O Frost, the structural engineer who is the licensed building practitioner concerned with the relevant building work, and who applied for this determination ("the applicant"),

1.2.2. Rotorua Lakes Council, carrying out its duties as a territorial authority or building consent authority ("the authority"),

1.2.3. L-A Buxton and T Bowron, the owners of the property ("the owners").

1.3. This determination arises from the authority's proposed decision to refuse a building consent for a new dwelling, providing reasons for this proposed decision that related to the compliance pathway for the design of the bracing system. The applicant carried out this design work and considers it complies with B1 *Structure* by way of the Acceptable Solution B1/AS1 ("B1/AS1").[2]

1.4. Therefore, the matter to be determined, under section 177(1)(b) and (2)(a), is the authority's proposed decision to refuse to grant building consent BC24-011449. In deciding this matter, I will consider the reasons provided in relation to the compliance of the design of the bracing with B1/AS1.

1.5. Outside the scope of this determination is the subsequent decision by the authority to grant the building consent.

2. The building work & background

2.1. In 2024, building consent BC24-011449 for the new dwelling was lodged with the authority. The proposed building work is a dwelling in a horseshoe shape containing the living facilities all on one level, centred around a central courtyard. Beneath the

[1] The Building Act 2004, section 185(1)(a) provides the Chief Executive of the Ministry with the power to make determinations.

[2] Acceptable Solution B1/AS1 (first edition, amendment 21, effective 2 November 2023 until 31 July 2026).

centre of the dwelling there is an 80m^2 lower level forming a basement garage on a concrete slab, with 3 concrete masonry walls providing retaining to the surrounding soils. The structure between the lower-level basement and dwelling is a suspended concrete slab and timber sub-floor, including steel beams, supporting a cantilever of the dwelling to the west.

2.2. The applicant designed parts of the structure including the bracing systems for the roof, walls and floors, the basement masonry walls (on 3 sides), a suspended concrete slab, the foundations to both levels, being a mix of on-grade slab and timber sub-floor, alongside load paths and connections. This determination considers the design of the bracing system only.

2.3. The bracing system consists of roof plane braces, wall linings of plasterboard with specific screw patterns, floor diaphragms, timber piles in the subfloor and masonry block walls in the basement.

2.4. In the building consent application, the applicant provided a Producer Statement with a supporting 'scope of design' document. This scope of design indicated the compliance pathways used for the design of each element, in particular:

- House bracing – design using [proprietary bracing design] software + SED[3]
- Roof plane bracing – SED / select from NZS 3604[:2011[4]]
- Check wall bracing demand on [bracing line] 4.4a/b – SED

2.5. During the processing of the building consent, on 12 February 2025 the authority requested further information ("RFI") on the structural design from the architectural designer[5] who consulted with the applicant. The RFI letter to the designer requested:

> 1.8 – No ground floor and subfloor bracing design – please provide.
> 1.9 – Lack of load path and detailing to transfer the first floor lateral load to the ground floor bracing elements – Please review and design accordingly.

2.6. On 12 May 2025, the designer responded to the authority, incorporating the applicant's responses. The responses to the two RFIs included reference to structural calculations provided with the building consent application, stating that these calculations cover the "timber floor bracing and bracing provided by the cantilevered block basement retaining walls" and that, in relation to point 1.9 of the quote text above, the "timber floor is braced by deep-embedded 150mm diameter cantilevered timber piles. [The suspended] concrete floor is braced by the block basement retaining walls…". These calculations referred to by the applicant indicate a combination of B1/AS1 and SED solutions were used in the design, which included the roof and wall bracing design.

[3] Specific Engineer Design.
[4] New Zealand Standard 3604:2011 *Timber-framed buildings*.
[5] Acting as the agent for the owners in respect of the building consent application.

2.7. Following this response, correspondence continued between the applicant and authority over the preceding months in relation to the design of the bracing system. The authority did not consider the design met the requirements of B1/AS1 using NZS 3604 and NZS 4229:2013[6] ("NZS 4229"), highlighting items such as bracing lines being at a greater separation than allowed for in these standards, with some separations creating a torsion risk, the masonry block walls to the basement being outside the scope of NZS 4229, and a lack of detailing of the load paths. The applicant in their responses disagreed with the authority's views and provided additional evidence to support their view the design was within the scope of B1/AS1.

2.8. On 8 August 2025, the authority proposed to refuse the building consent, stating it considered "…that the building cannot fully be addressed under NZS 3604 and NZS 4229" and that it did not accept "…that you can have SED braced items that are reliant on structures that are designed for non SED bracing".

2.9. The applicant disagreed with the authority and applied for this determination. Subsequent to the application for determination being made, on receiving further information, the authority granted the building consent.

3. Submissions

The applicant

3.1. The applicant believes their design of the bracing system complies with B1 by way of the acceptable solution, using cited standards NZS 3604 and NZS 4229. They submitted (in summary):

3.1.1. "I consider the building is [B1/AS1] bracing compliant and that as such I should have been able to employ the provisions of NZS 3604 and/or NZS 4229 to derive bracing demands, generally demonstrate transmission paths (with the exception of the SED roof cross-bracing) and bracing resistance (via NZS 4229 block walls + hybrid anchor/cantilever timber piled footings) all expressed in '[Bracing Units]'".

3.1.2. They consider "… it is common practice… to 'mix and match' solutions with varying compliance pathways", and providing examples of an SED lintel with fixings and load paths as per NZS 3604, or using "…proprietary software packages to demonstrate the demand and supply of adequate bracing, with additional SED design to pick up on areas not adequately covered by that package".

3.1.3. The applicant has provided specific details about how they believe the design is demonstrating compliance using various methods, types of building elements and load paths. As an example, regarding the relationship

[6] New Zealand Standard 4229:2013 *Concrete masonry buildings not requiring specific engineering design*

between the timber subfloor, the suspended concrete slab and cantilevered timber floor, they have submitted that in the east-west direction "…lateral forces would be transferred through bracing lines…either directly into substantial block foundation walls, or into those walls via the suspended concrete floor". Additionally in the north-south direction, they have stated "…that transmission of lateral forces could occur in two ways…", which are then discussed in reference to both NZS 3604 requirements and SED calculations to demonstrate and/or confirm compliance.

3.1.4. The applicant does not agree with the authority's proposed decision to refuse the consent for the bracing design and in summary, considers the "…bracing design as being extremely robust".

The authority

3.2. The authority considers the design of the bracing system did not demonstrate compliance by way of B1/AS1 and that it therefore required specific engineer design. It submitted (in summary):

3.2.1. "Although certain components of this structure adhere to NZS 3604 and NZS 4229, these standards alone are insufficient to demonstrate full compliance in this instance. It is our opinion that the current specific design documentation provided by [the applicant] does not satisfactorily establish compliance with Clause B1…".

3.2.2. It has provided examples of where it believes SED is required, such as for the design of the suspended concrete slab above the basement, which has a different level from the dwelling's timber floor. The authority has stated:

> Horizontal restraint for the concrete floor, as well as face loading from the supporting block walls, is provided on three sides. Gridline D features only a 0.6m section of block wall. No specific design has been supplied for either the floor diaphragm or its edges.
>
> According to NZS 4229, a compliant diaphragm must be fully supported on all four sides. Clause 8.8.4 stipulates that no less than 30% of the total bracing units must be provided by the walls, and panels shorter than 0.8m are not considered as bracing elements. As there is no specific design for the 0.6m wall lengths, NZS 4229 alone cannot be relied upon from compliance without an accompanying appropriate specific design.

3.2.3. Regarding the cantilevered timber floor diaphragm, the authority has stated that bracing elements that the diaphragm connects back into do not provide sufficient bracing capacity to comply with the requirements of NZS 3604 or NZS 4229, and "no specific design has been provided that demonstrates how horizontal loads are transferred to the bracing walls or confirms that the bracing walls and footings can support these demands".

The owners

3.3. The owners are represented by the applicant as their agent and did not provide a separate submission on the matter being determined.

4. Discussion

4.1. The provisions in the Act relating to building consents can be found in sections 40 to 52. Section 49 concerns granting a building consent and states:

> A building consent authority must grant a building consent if it is satisfied on reasonable grounds that the provisions of the building code would be met if the building work were properly completed in accordance with the plans and specifications that accompanied the application.

4.2. Sections 45 and 48 relate to applying for and processing an application for a building consent, respectively, and establish the expected level of documentation to be provided with an application. Section 48(2) allows an authority to require "further reasonable information" while a consent application is being processed to enable it to be satisfied that the consent will adequately demonstrate compliance with the Building Code.

4.3. Where there is inadequate documentation for an authority to be satisfied that compliance will be achieved, it is entitled to refuse to grant the building consent with reasons. Section 50 states that an authority must give an applicant written notice of both the refusal and the reasons for the refusal.

4.4. Establishing compliance with the Building Code is set out in Section 19, and states that an authority must accept building work's conformance with certain solutions, being considered as 'deemed to comply' solutions, such as Acceptable Solutions, Verification Methods, and current registered product certificates (known as CodeMark certificates). In deemed to comply solutions, standards can be cited as a means of complying with the relevant solution.

4.5. Specific to this matter, B1/AS1 includes cited standards NZS 3604 and NZS 4229 and Verification Method B1/VM1 ("B1/VM1")[7] utilises the AS/NZS 1170:2002[8] ("AS/NZS 1170") suite of standards for structural design actions. The applicant considers their design of the bracing systems complies with the relevant performance criteria of B1 *Structure* by way of B1/AS1, using NZS 3604 and NZS 4229.

4.6. While NZS 3604 and NZS 4229 are standards that have been written to allow for non-engineers to design simple structures and minimise the need for engineering input, both standards have their basis in structural engineering principles.[9]

[7] Verification method B1/VM1 (first edition, amendment 21, effective 2 November 2023 until 31 July 2026).
[8] Australian/New Zealand Standard 1170:2002 *Structural Design Actions*
[9] The purpose of these documents does not restrict structural engineers from also utilising them where applicable.

4.7. As such, *Engineering Basis of NZS 3604* is a "source document for those who need to know the basis for the engineering decisions underpinning NZS 3604", that has been adapted and revised from a BRANZ study report.[10] This document can assist engineers in incorporating SED elements in buildings with simple structural layout, such as by assisting with conversions of terms from standards utilised in NZS 3604, i.e., converting the 'bracing units' as described by NZS 3604 into kilo-Newtons (kN) used in AS/NZS 1170.

4.8. There is nothing in the Act or 'deemed to comply' methods that restrict the use of both B1/AS1 and B1/VM1 in the same building. Rather, I consider it is a common industry practice to employ B1/VM1, utilising AS/NZS 1170, to design certain structural elements where they are beyond the simple scope of B1/AS1. This approach requires additional considerations of load paths and transmission of forces, as it will take into account the performance thresholds of those elements designed via the Acceptable Solution.

4.9. However, where a portion of the design does employ the Verification Method B1/VM1 alongside the Acceptable Solution B1/AS1, the overall compliance pathway cannot be characterised as relying solely on the Acceptable Solution B1/AS1.

4.10. Both NZS 3604, at 1.1.4, and NZS 4229, at 1.2.2, include comments about scenarios where structural elements are outside the design tables and requirements of the standards, SED is required for those elements. Therefore, this will employ the verification method or an alternative solution for those specific elements to demonstrate compliance with the relevant performance criteria of B1.

> **NZS 3604 – 1.1.4 Structural elements not covered by this Standard**
> Structural elements outside the generic prescriptions and design tables of this Standard including their durability shall be the subject of SED taking into account the element as well as the impact of resulting load paths on the structure.
>
> **NZS 4229 – 1.2.2**
> …
> Where this Standard requires specific engineering design (SED) then this is outside the scope of the Standard as an Acceptable Solution to the [NZ Building Code] and shall be to the satisfaction of the building consent authority.
> …

4.11. Within the documents supplied with the building consent and the applicant's submissions for this determination, I have seen evidence of building elements for the bracing system that are outside the scope of B1/AS1 and the cited standards, particularly NZS 3604. As examples:

4.11.1. The 'scope of design' document from the applicant that accompanied the building consent application states a combination of SED and NZS 3604 or NZS 4229 for building elements relating to the bracing of the dwelling.

[10] *The engineering basis of NZS 3604,* BRANZ (Building Research Institute of NZ) Study Report 168 (2007)

4.11.2. In their submission, the applicant commented on the design of the timber sub-floor piles. I understand their comment to confirm the piles do not meet the requirements of NZS 3604 for a specific pile type, rather it is an SED solution that uses the engineering basis of NZS 3604.

> I provided a veritable forest of concrete encased … timber poles … to provided bracing for every pile at a value established by interpolation between NZS 3604 values provided for anchor and cantilevered piles. I settled on an interpolated value half-way but consider that I could have used higher because these piles are closer to anchor piles than cantilever piles.

4.11.3. The bracing lines in some areas are greater than the maximum allowable separations of NZS 3604 and NZS 4229.

4.12. Based on this evidence, I consider the applicant's bracing design is not fully within the scope of B1/AS1, as it utilises elements calculated using B1/VM1 via AS/NZS 1170. Turning to the authority's reasons for refusal, section 49 for granting a consent places the test on whether compliance with the Building Code would be met, and in turn, the same consideration should be made when refusing a building consent under section 50.

4.13. In this case, the authority made no specific reference to a non-compliance with any of the performance criteria in the Building Code. The description in the authority's proposed refusal email and the background information demonstrates an apparent concern about compliance with Clause B1 Structure. However as discussed above, it is common practice to utilise the Verification Method alongside the Acceptable Solution and therefore is not an adequate reason to propose to refuse the consent.

5. Decision

5.1. In accordance with section 188 of the Building Act 2004, I determine that the authority's reasons for the proposed refusal of building consent BC24-011449 were insufficient and did not meet the requirements of section 50.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 22 April 2026.

Andrew Eames

Principal Advisor Determinations