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55 Carefree Road, Narrabeen

Alternative (Building) Solution Report – Ceiling Heights

Prepared for: Peter Princi Architects

Project No: P490/Rev 1

26 November 2020

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REPORT REVISION STATUS		
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Signature

Graham Scheffers
GRS Building Reports Pty Ltd
BPB Grade A1 (unrestricted) Registered Certifier No. 0364
Date: 26 November 2020

Executive Summary

This document details the Alternative (Building) Solution Report (ABSR) prepared by GRS Building Reports Pty Ltd for the reduced ceiling heights for the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) as shown in Figures 1 and 2 below for the Upper Floor of the Dwelling located at 55 Carefree Road, Narrabeen. These rooms had been identified as having reduced ceiling heights which are impacted by a proposed Development Application being lodged with the Northern Beaches Council.

The ABSR incorporates the following Building Code of Australia 2019 Volume 2 (BCA) Deemed-to-Satisfy (DtS) departure that has been reviewed to ensure that the building solution meets the Performance Requirements of the BCA.

- (a) Ceiling height reduced from 2.4m, to ranging from approximately 2.338m to 2.365m, for the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) on the Upper Floor of the Dwelling to the approximate ceiling heights as detailed in Table 1 below.

The ABSR is to demonstrate compliance with the following relevant BCA Performance Requirements. All other Performance Requirements are to be met by adopting a DtS Solution or as accepted by the Building Certifier and other Regulatory Authorities.

- P2.4.2

Reduced ceiling height less than 2.4m to the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) as shown in Figures 1 and 2 of this Report.

Alternative (Building) Solution Outcomes

The assessment is to be based on the following outcomes/requirements as described below. Note that all other items where not specifically addressed or reviewed as part of this assessment or mentioned below (refer Table 4.1) are to be in accordance with the DtS provisions of the BCA or as accepted by the Building Certifier and other Regulatory Authorities.

Health and Amenity

- a) That the reduced ceiling height of the existing Bedroom 1 as shown in Figure 1 on the Upper Floor of the Dwelling measured on site as ranging from approximately 2.338m to 2.365m, along with the proposed addition and alternation as shown in Figure 2 to include; part of Bedroom 1 is to become Bedroom 4 and Bedroom 1 is to be extended with the same reduced ceiling height be accepted.

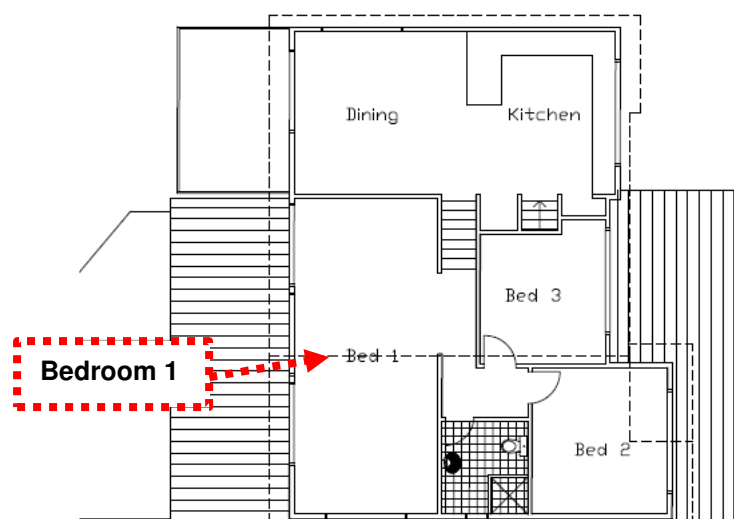


Figure 1 – Existing Upper Floor Plan

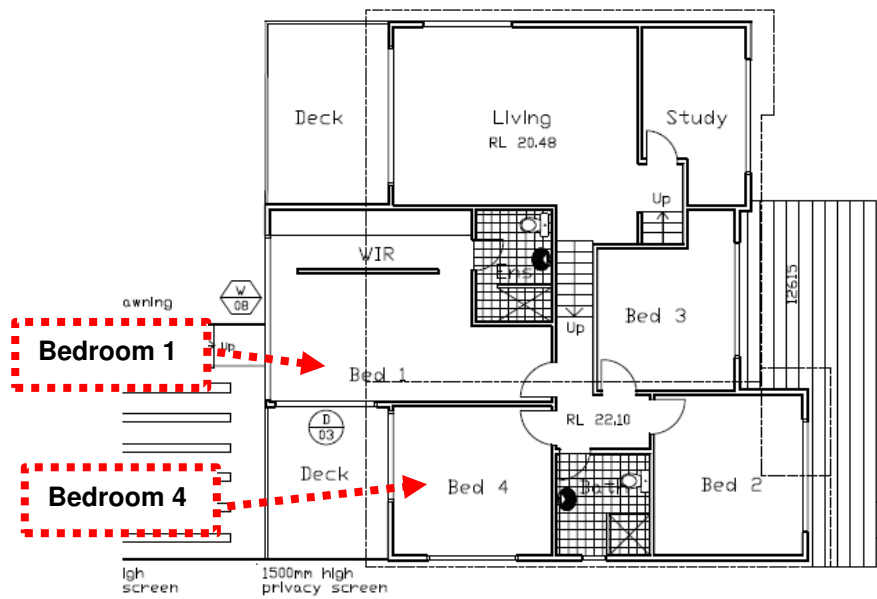


Figure 2 – Proposed Upper Floor Plan

Room	Ceiling Height (Approximate Range in mm)
Bedroom 1	2338mm to 2365mm
Bedroom 4	2349mm to 2362mm

Table 1 – Reduced Ceiling Heights Assessed

General

- b) No changes to the aforementioned requirements without further assessment. All Alternative (Building) Solutions to the BCA described herein are to be incorporated into the building design.

1. Introduction

1.1 General

GRS Building Reports Pty Ltd has been engaged by the property owner, Peter Princi Architects to undertake a performance-based assessment for the reduced ceiling heights to the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) on the Upper Floor of the Dwelling located at 55 Carefree Road, Narrabeen.

1.2 Stakeholders

The Stakeholders for this project comprises of the following parties:

Name	Company	Role
Mr & Mrs Williams	-	Owner
Peter Princi	Peter Princi Architects	Registered Architect
-	Northern Beaches Council	Regulatory Authority (DA)
Graham Scheffers	GRS Building Reports Pty Ltd	BCA Alternative Solution Consultant

Table 1.1 –Stakeholders

1.3 Sources of Information

This document is based on the following sources of information:

- a) Architectural plans prepared by Peter Princi Architects refer to Table 1.2.

Drawing No.	Revision	Title
E02	A	Existing Plans
DA03	A	Upper Floor Plan

Table 1.2 – Architectural Plans

- b) These rooms addressed in this ABSR have been identified as having existing reduced ceiling heights that impact the proposed design and ceiling height of the Bedroom 1 addition requiring consideration as they are part of a proposed Development Application being lodged with the Northern Beaches Council.

1.4 Assumptions and Limitations

The following assumptions and limitations apply to the Alternative (Building) Solution contained in the document.

- This Report relates solely to the reduced ceiling height issues listed in Table 4.1. Where not specifically mentioned, the design is expected to meet the DtS requirements or is as accepted by the Building Certifier and other Regulatory Authorities.
- Review or assessment of any other parts of the building or other issues relating to the BCA has not been undertaken.
- Assessment of any other provisions of the BCA, except as noted in this Report has not been undertaken.
- All essential services equipment services and strategies will be maintained to the operational capacity to which they were designed and correctly functioning.

2. Building Characteristics

2.1 General

The building comprises a multi-level single occupancy Dwelling with rooms on the Upper Floor subject of the assessment.

2.1.1 Classification

For the purposes of the BCA, the building is classified as follows:

- Classification - Class 1a building (Dwelling).
- Rise in storeys - N/A
- Type of Construction - N/A

2.2 Building Configuration & Location

2.2.1 Building Size

The building is a single Dwelling with Ground and Upper Floor levels.

2.2.2 Building Floor Areas/Ceiling Heights

The Upper Floor of the building is understood to be approximately 117m² and the ceiling heights to the habitable rooms assessed in this report is as detailed in Table 2.1 below.

Room	Ceiling Height (Approximate Range in mm)
Bedroom 1	2338mm to 2365mm
Bedroom 4	2349mm to 2362mm

Table 2.1 – Reduced Ceiling Heights Assessed

2.3 Occupant Characteristics

2.3.1 Population

The population is based on the use of the building as a single dwelling with individual bedrooms.

2.3.2 State of Occupants

Based on the inherent function and use of the building, occupants using the various spaces or rooms are likely to be visitors or residents. Visitors are generally likely to be transient and alert. Residents may be asleep or alert and in various physical or health related conditions.

2.3.3 Familiarity with the Building

The residents are likely to be familiar with the layout of the building.

3. Acceptance Criteria

3.1 Legislative

The Building (Alternative) Solution will need to demonstrate the proposed complies with the BCA.

3.1.1 Relevant Legislation

Compliance with the BCA can be demonstrated by either complying with the DtS provisions or by formulating a Building (Alternative) Solution based on equivalency to the DtS provisions or compliance with the Performance Requirements.

3.1.2 BCA Performance Solutions (Compliance)

Clause 1.0.2 Meeting the Performance Requirements

Compliance with the Performance Requirements can only be satisfied by a:-

- (a) Performance Solution; or
- (b) Deemed-to-Satisfy Solution; or
- (c) A combination of (a) and (b).

3.1.3 Performance Solutions

Clause 1.0.3 Performance Solutions

(a) A Performance Solution must-

- (i) comply with the Performance Requirements; or
- (ii) be at least equivalent to the Deemed-to-Satisfy Provisions,

and be assessed according to one or more of the Assessment Methods.

(b) A Performance Solution will only comply with the BCA when the Assessment Methods used satisfactorily demonstrate compliance with the Performance Requirements.

3.1.4 Building Solutions (Assessment Methods)

The various Assessment Methods that can be specified in Clause 1.0.5 of the BCA are as follows:

Clause 1.0.5: Assessment Methods

The following Assessment Methods, or any combination of them, can be used to determine that a Building Solution (Performance Solution of a Deemed-to-Satisfy Solution) complies with the Performance Requirements:

- (a) Evidence to support that the use of a material, form of construction or design meets a *performance Requirement* or a *Deemed-to-Satisfy Provision* as described in 1.2.2
- (b) Verification Methods such as :-
 - (i) The Verification methods in the BCA; or
 - (ii) Such other Verification Methods as the appropriate authority accepts for determining compliance with the Performance Requirements.
- (c) Comparison with the *Deemed-to-Satisfy Provisions*.
- (d) Expert Judgement.

3.1.5 Performance Provisions

Clause 1.0.7: Relevant Performance Requirements

In order to comply with the provisions of 1.1.5 (to comply with BCA Sections 1 and 2), the following method must be used to determine the Performance Requirement or Performance Requirements relevant to the Performance Solution:

- (a) Where a Performance Requirement is satisfied entirely by a Performance Solution;
 - (i) Identify the *Performance Requirements* from the Section or Part to which the Performance Solution applies.
 - (ii) Identify the *Performance Requirements* from other Sections or Parts that are relevant to any aspects of the Performance Solution proposed or that are affected by the application of the Performance Solution proposed.
- (b) Where a Performance Requirement is satisfied entirely by a Performance Solution in combination with a Deemed-to-Satisfy Solution;
 - (i) Identify the relevant Deemed-to-Satisfy Provisions of each Section or Part that is to be the subject of the Performance Solution.
 - (ii) Identify the *Performance Requirements* from the same Sections or Parts that are relevant to the identified Deemed-to-Satisfy Provisions.
 - (iii) Identify Performance Requirements from other Sections or Parts that are relevant to any aspects of the *Performance Solution* proposed or that are affected by the application of the Deemed-to-Satisfy Provisions that are the subject of the *Performance Solution*.

The relevant Deemed-To-Satisfy Provisions and Performance Requirements applicable to this Building Solution are detailed in Table 4.1 of this report.

4. Performance Assessment

4.1 BCA DtS Departures and Relevant Performance Requirements

This Alternative (Building) Solution Report incorporates departures from the DtS Solution intended to meet the requirements and Objectives set out in Section 3. This Report considers the following building Solutions:

- (a) Ceiling height reduced from 2.4m, to ranging from approximately 2.338m to 2.365m, for the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) on the Upper Floor of the Dwelling, as detailed in Table 1 below.

Refer to the Recommendations for a detailed list of all design requirements.

Table 4.1 details the various aspects of the proposed Alternative (Building) Solution that do not comply with the BCA DtS Provisions and the relevant BCA Performance Requirements for each departure. Details of the Performance Requirement are shown in Section 4.3 below.

DtS Clause	DtS Provision Departure	Performance Requirements	Method of Meeting Performance Requirements (CI 1.0.3)	Assessment Method (CI 1.0.5)
3.8.2.2 (a)	Reduced ceiling height less than 2.4m to the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) as shown in Figures 1 and 2 of this Report.	P2.4.2	1.0.3 (b) (i).	1.0.5 (b) (ii).

Table 4.1 – DtS BCA Provision Departures

4.2 Ceiling Heights

4.2.1 Deemed-to-Satisfy Provisions

The DtS Provisions of BCA Clause 3.8.2.2 (a) necessitates that

“The ceiling height must be not less than be –

(a) A habitable room excluding a kitchen – 2.4m; and

(b) in a kitchen – 2.1m; and

(c) in a corridor ... - 2.1m; and

(d) in a bathroom; and

(e) in a room or space with a sloping ceiling or projections below the ceiling line within –

(i) a habitable room

(A) in an attic – a height of not less than 2.2m over two-thirds of the floor area of the room or space

(B) in other rooms – a height of not less than 2.4m over two-thirds of the floor area of the room or space.

(ii) a non-habitable room – a height of not less than 2.1m

And when calculating the floor area of the room or space, any part that has a ceiling height of less than 1.5m is not included; and

(f) in a stairway ... - 2.0m”.

4.2.2 Methodology

The proposal is to address the reduced ceiling heights for the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) on the Upper Floor of the Dwelling as shown in Figure 2 below to satisfy the Performance Requirements of the BCA as required by Clause 1.0.3 (a) (i). The Assessment method is Clause 1.0.5 (b) (ii).

Performance Requirement P2.4.2 relates to provision of ceiling heights that states: -

"A room or space must be of a height that does not unduly interfere with its intended function."

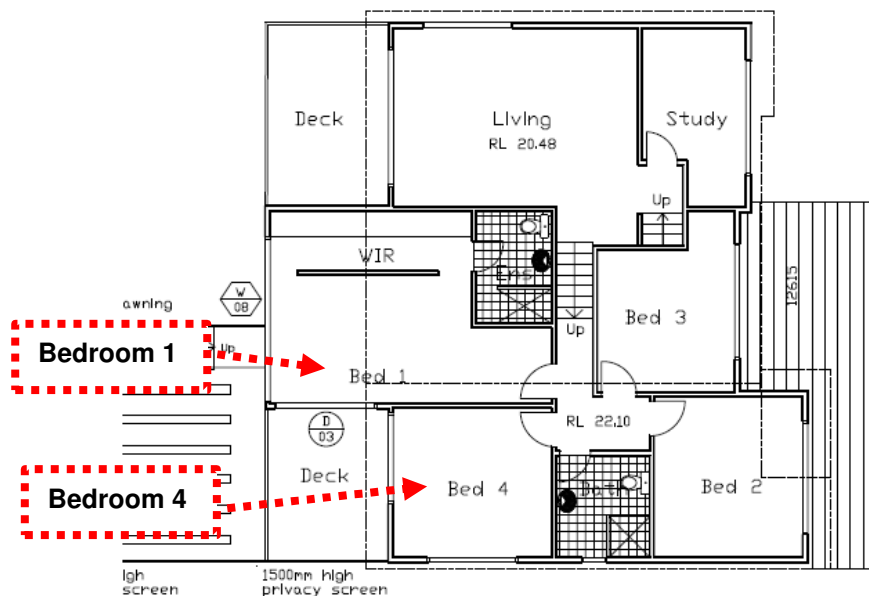


Figure 2 – Proposed Upper Floor Plan

4.2.3 Discussion

The ceiling height of the portions of the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) on the Upper Floor have been measured on site as ranging from approximately 2.338m to 2.365m as detailed in Table 1 below.

Room	Ceiling Height (Approximate Range in mm)
Bedroom 1	2338mm to 2365mm
Bedroom 4	2349mm to 2362mm

Table 1 – Reduced Ceiling Heights Assessed

This results in a deficiency varying from 62mm (Bedroom 1) and 51mm (Bedroom 4) from the required minimum ceiling height of 2.4m.

The subject reduced ceiling heights has been assessed as follows: -

- a) The deficiency represents a reduced height of;
 - (i) 2.58% (2.338m) for Bedroom 1,
 - (ii) 2.13% (2.349m) for Bedroom 4,
 below the required ceiling height of 2.4m.

- b) To offset any perceived loss in amenity for the bedrooms, each of the rooms are to be provided with natural light and ventilation that exceeds the minimum BCA requirements of BCA Part 3.8.4 (light) and 3.8.5 (ventilation). This is assessed as follows: -
- Bedroom 1 – Floor area of approximately 17.83m² requires natural light with windows having a light transmitting area of 1.78m² and openable windows / doors with area of 0.89m². The calculated proposed light transmitting area is approximately 11.5m² and the openable sliding window / doors have an area of approximately 4.5m². That is, the available natural light and natural ventilation is at least five (5) times the minimum requirements, therefore significantly more than the minimum BCA Deemed-to-Satisfy provisions.
 - Bedroom 4 - Floor area of approximately 12.89m² requires natural light with windows having a light transmitting area of 1.29m² and openable windows / doors with area of 0.64m². The existing calculated light transmitting area is approximately 3.59m² and the openable sliding windows have an area of approximately 1.64m². That is, the available natural light and natural ventilation is more than the double the minimum BCA Deemed-to-Satisfy provisions.
- c) The use of the building as a dwelling with the reduced ceiling height in Bedrooms 1 and 4 assessed would result in occupants generally being familiar with the layout and configuration of the spaces.
- d) The reduced ceiling heights generally range from 2.13% to 2.58% below the minimum required ceiling height of 2.4m. This is considered a minor variation from the BCA Deemed-to-Satisfy Provisions.
- e) The proposed design has incorporated an ensuite to the existing portion of Bedroom 1 that contains the lowest ceiling height. As this ensuite is required to achieve a minimum ceiling height of 2.1m this has resulted in the design partially rectifying the ceiling height to this area to achieve compliance with the BCA. Other design aspects also improve the existing circumstances, such as;
- (i) Part of the existing area in Bedroom 1 at the entry from the hallway is a walkway area that would not be impacted by the reduced ceiling height as this is a transient area.
 - (ii) Part of the existing area in Bedroom 1 adjacent to the Living Room is to be used as a Walk-In Robe that could be considered to only require a 2.1m ceiling height.
- f) On the basis of the increased amenity provided by minimum requirements for natural light and ventilation being exceeded, the minor deficiency in ceiling heights to the bedrooms assessed, is not considered to interfere with the intended function of each space, therefore is recommended to be accepted.

On the basis of this, the existing ceiling height to the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) assessed, it is considered that due to the design and configuration of each room, this will not interfere with the intended function of these rooms.

4.3 Performance Requirements

Further to the analysis contained in Section 4.2, the following additional comments are made:

In respect of Performance Requirement P2.4.2: -	
<i>"A room or space must be of a height that does not unduly interfere with its intended function."</i>	Comment: - The assessed ceiling heights has been shown above that the height will not unduly impact on the function as intended.

4.4 Conclusion

It is concluded that subject to the implementation of the Alternative (Building) Solution Outcomes as recommended in this Report, it is considered that the reduced ceiling heights, is shown to be provided to the degree necessary. Therefore, the existing ceiling heights to the proposed Bedroom 1 and Bedroom 4 (Note: Bedroom 4 and part of Bedroom 1 are existing) on the Upper Floor of the Dwelling have been assessed and it is considered that the provisions of Performance Requirement P2.4.2 have been satisfied.

5. Recommendations

It is recommended that the performance-based design include the following outcomes / requirements as a result of the assessment of the item as detailed in Table 4.1:

- a) That the reduced ceiling height of the existing Bedroom 1 as shown in Figure 1 on the Upper Floor of the Dwelling measured on site as ranging from approximately 2.338m to 2.365m, along with the proposed addition and alternation as shown in Figure 2 to include; part of Bedroom 1 is to become Bedroom 4 and Bedroom 1 is to be extended with the same reduced ceiling height be accepted.

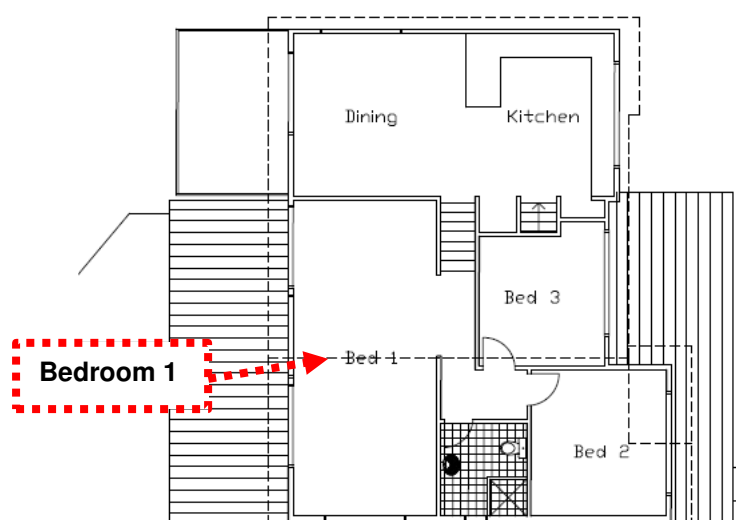


Figure 1 – Existing Upper Floor Plan

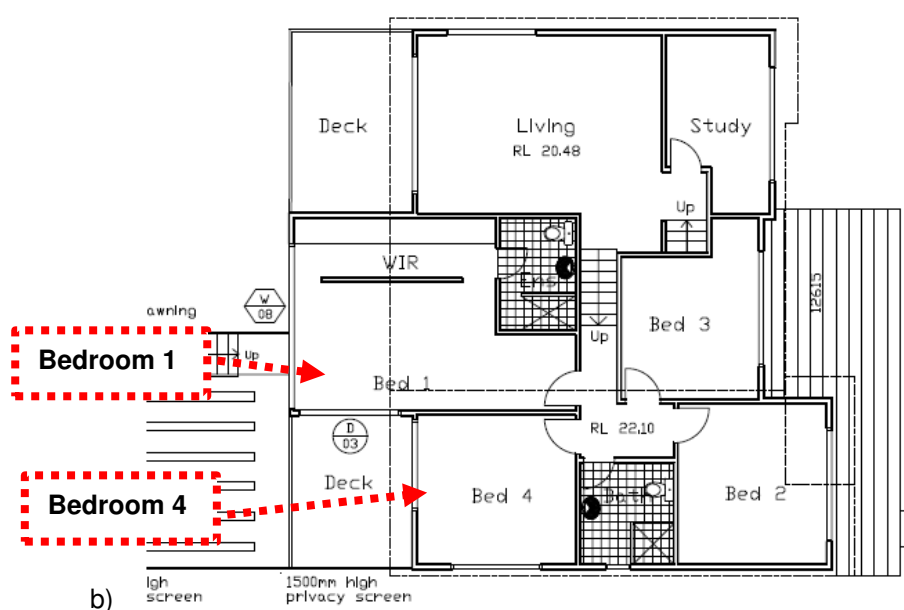


Figure 2 – Proposed Upper Floor Plan

Room	Ceiling Height (Approximate Range in mm)
Bedroom 1	2338mm to 2365mm
Bedroom 4	2349mm to 2362mm

Table 1 – Reduced Ceiling Heights Assessed

- c) No changes to the aforementioned requirements without further assessment. All Alternative (Building) Solutions to the BCA described herein are to be incorporated into the building design.

6. References

1. Australian Building Codes Board, 'Building Code of Australia 2019 – Volume 2 Class 1 and Class 10 Buildings'.