

BCA Sound Transmission and Insulation Assessment

Alterations and Additions
at 13 Cumberland Avenue,
Collaroy, NSW2097.

February 2021

Report No. nss23363 – Final

Prepared at the Request of: -

Corona Projects.
Suite 106/35, Spring Street,
Bondi Junction, NSW 2022

Prepared by: -

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1. INTRODUCTION

Noise and Sound Services was requested by Corona Projects of Suite 106/35, Spring Street, Bondi Junction, NSW 2022, on behalf of Stephanie Graham, to carry out a sound transmission and insulation assessment. This is for proposed alterations and additions at 13 Cumberland Avenue, Collaroy, NSW 2097.

The purpose of the assessment is to provide independent and accurate advice on the sound transmission and insulation between rooms of the development, in line with the current Building Code of Australia (BCA), Part F5. In particular, treatment of party floor.

2. SITE AND BUILDING DESCRIPTION

The project proposed is for alterations and change of building classification within the existing building. The building is a three-storey masonry structure with concrete floors and a tile roof. The building was originally approved as a Class 1A dwelling but contains a separate kitchen within the lower ground floor. The owners wish to retain the current kitchen facility and in this regard are seeking approval from Council for the premises to be considered as a class 2 structure comprising of a dwelling within the ground floor and the first floor and an additional dwelling within the lower ground floor. A full description is given in the architectural drawings by 'Drafts by Gibson', Job reference A02, Revision A, dated 27 November 2019.

3. BUILDING CODE OF AUSTRALIA (2019)

The National Construction Code (NCC) is an initiative of the Council of Australian Governments developed to incorporate all on-site construction requirements into a single code. The Building Code of Australia (BCA) is Volume One and Volume Two of the NCC. With the lower floor occupancy, the proposed dwelling will be classified as Class 2 as defined in the Australian Building Codes Board for the BCA 2019.

3.1 Walls

Under Section F, Health and Amenity, of the BCA, is Part F5 Sound Transmission and Insulation. Walls separating sole-occupancy units or a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or parts of a different classification, must provide insulation against the transmission of-

- a) airborne sound; and
- b) impact sound, if the wall is separating a bathroom, sanitary compartment, laundry, or kitchen in one sole-occupancy unit from a habitable room other than a kitchen in an adjoining unit sufficient to prevent illness or loss of amenity to the occupants.
- c) A sole-occupancy unit from a plant room or lift shaft.

TABLE 1. A SUMMARY OF THE REQUIREMENTS OF THE BCA, SOUND INSULATION RATING FOR WALLS AND DOORS.

PARTITION TYPE	Weighted Sound Reduction Index with Spectrum Adaptation Term $R_w + C_{tr}$	Weighted Sound Reduction Index R_w
Separating Sole-Occupancy Units	Not less than 50 dB	-
Sole-Occupancy Unit from a Stairway, Public Corridor Public Lobby, or the like, or Parts of a Different Classification.	-	Not less than 50 dB
Sole-Occupancy Unit from a Plant Room, Lift Shaft		Not less than 50 dB And with a discontinuous construction
A Door Incorporated in a Wall that Separates a Stairway, Public Corridor, Public Lobby or the like	-	Not less than 30 dB

A wall in a building required to have an impact sound insulation rating must be of a **discontinuous construction** and, for other than masonry, be two or more separate leaves without rigid mechanical connection except at the periphery. A discontinuous construction means a wall having a minimum 20 mm cavity between two separate leaves, and

- a) For masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and
- b) For other than masonry, there is no mechanical linkage between leaves except at the periphery.

3.2 Door Assembly

A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby, or the like provided the door assembly has a R_w not less than 30 dB.

3.3 Floors

Sound Transmission and Insulation for floors are covered under Section F of the Health and Amenity of the BCA in Part F5. Section 5.4 provides the sound insulation requirements for floors if they separate sole-occupancy units, a sole-occupancy unit from a lift shaft, stairway, public corridor public lobby, or the like, or parts of a different classification. Class 2 or 3 buildings must have a weighted sound reduction index (R_w) with spectrum adaption term (C_{tr}) for airborne sound and a weighted normalised impact sound pressure level for impact sound ($L_{n,w}$) as shown in Table 2 below.

TABLE 2. A SUMMARY OF THE REQUIREMENTS OF THE BCA, SOUND INSULATION RATING FOR FLOORS.

A PARTITION SEPARATING SOLE-OCCUPANCY UNITS.	Value
Weighted Sound Reduction Index with Spectrum Adaptation Term ($R_w + C_{tr}$)	Not less than 50 dB
AND A	
Weighted Normalised Impact Sound Pressure Level ($L_{n,w}$)	Not more than 62 dB

3.4 Sound Insulation Rating of Internal Services

Section 5.6 of the BCA provides requirements for sound insulation of internal services (plumbing). These are: -

- a) If a duct, soil, waste or water supply pipe, including a duct or pipe that is located in a wall or floor cavity, serves or passes through more than one sole-occupancy unit, the duct or pipe must be separated from the rooms of any sole-occupancy unit by construction with an $R_w + C_{tr}$ (airborne) not less than –
 - a. 40 dB if the adjacent room is a habitable room (other than a kitchen); or
 - b. 25 dB if the adjacent room is a kitchen or non-habitable room.
- b) If a storm water pipe passes through a sole-occupancy unit it must be separated in accordance with (a)(i) and (ii).

3.5 Sound Isolation of Pumps

Section 5.7 of the BCA requires that a flexible coupling must be used at the point of connection between the service pipes in a building and any circulating or other pump.

4. SITE SPECIFIC RECOMMENDATIONS

4.1 Walls

There is no specific requirement for sound insulation of the walls for this project as there are no walls proposed between sole occupancy units.

4.2 Door Assembly

The entry door to the lower ground level must be at least 35 mm thick and of solid-core construction (or with 6.38 mm thick laminated glass panel). The door must be fitted with acoustic seals (e.g., 'Lorient' IS7025 and IS8011si www.kilargo.com.au or 'Raven' RP47 frame and RP38 bottom seals www.raven.com.au) to give a certified R_w rating of at least 30 dB.

4.3 Floors

The concrete floor slab is reported by the property owners to be 190 mm thick. The floor covering is not indicated on the architectural drawings, but it is understood that currently the majority of the floor level above lower ground area comprises of hardwood floors and the kitchen floor is fitted with tiles. There is no ceiling below.

4.3.1 Airborne Sound Insulation

The floor needs to meet a Weighted Sound Reduction Index with Spectrum Adaptation Term ($R_w + C_{tr}$) of not less than 50 dB. The floor concrete slab will provide an R_w of 58 dB and an C_{tr} of -5 dB, giving a $R_w + C_{tr}$ of 53 dB (+/- 3 dB) and hence meets the airborne requirements of the BCA regardless of the floor covering.

4.3.2 Impact Sound Insulation

The floor needs to meet a Weighted Normalised Impact Sound Pressure Level ($L_{n,w}$) of not more than 62 dB. With carpet the predicted $L_{n,w}$ is 40 dB (+/- 3 dB) and meets the requirements of the BCA. With a standard timber floor above the slab the predicted $L_{n,w}$ is 66 dB (+/- 3 dB) and hence will not meet the requirements of the BCA. A tiled or vinyl floor covering above the slab the predicted $L_{n,w}$ is 72 dB (+/- 3 dB) and hence will also not meet the requirements of the BCA.

Here, the floor construction will require a layer of resilient underlay between the timber, tiles or the vinyl and the concrete slab. If the floor does not currently have a layer of suitable resilient underlay the floor needs to be fitted with a suitable carpet. Alternatively, the timber, tiles and/or vinyl will need to be removed and fitted with a resilient layer at least 3 mm thick between the new floor and the concrete slab. One suitable example is 3 mm thick AcoustaMat™. This product uses specially engineered recycled rubber underlays to meet the acoustical requirements of all common construction and installation methods. It can be used as underlay to timbers, ceramic tiles, vinyl flooring, carpets or floor lamination. (see: <https://a1rubber.com/our-products/acoustic-flooring/acoustamat/>). Alternatives underlays may be suitable, and we will be able to confirm upon request.

4.4 Sound Insulation Ratings of Internal Services

Where a stormwater or downpipe passes through a ceiling/roof cavity over a sole-occupancy unit habitable room it must be lagged with two layers of ‘Soundlag 4525C’ (or equivalent) See <https://www.pyroteknc.com/products/soundlag/soundlag-4525c/> and within a fully enclosed 13 mm thick plasterboard bulkhead. The bulkhead should be large enough to avoid any physical contact with the lagging. The foam or mineral wool side of the lagging is to be installed facing the service pipe or duct. Lagging is to completely cover the service duct or pipe by remove an approximate 50 mm wide strip of foam or mineral wool and overlapping at the joints. Then tape up with a quality aluminium tape.

Note: Sound isolation of pumps. A flexible coupling must be used at the point of connection between the service pipes in a building and any circulating or other pump.

5. SUMMARY AND CONCLUSIONS

A Building Code of Australia sound transmission and insulation assessment for the proposed alterations and additions at 13 Cumberland Avenue, Collaroy, NSW 2097 has been carried out. It is concluded that the Building Code of Australia (BCA) will be met for the proposed development. This is providing that the recommendations given in Section 4 above are fully complied with.

Design Statement. We confirm that the proposed design details of materials and forms of construction as given in this report will comply with the sound insulation requirements of BCA 2019, Part F5.

Status	Date	Prepared by:	
Draft	16 th February 2021	Ken Scannell MSc., MAAS	Acoustician
Status	Date	Checked by:	
Draft	16 th February 2021	Mark Scannell B.A. MAAS	Acoustician
Status	Date	Checked by:	
Final	19 th February 2021	Ken Scannell MSc., MAAS	Acoustician

Important Note. All products and materials suggested by 'Noise and Sound Services' are selected for their acoustical properties only. All other properties such as airflow, aesthetics, chemical, corrosion, combustion, construction details, decomposition, expansion, fire rating, grout or tile cracking, loading, shrinkage, ventilation, etc are outside of 'Noise and Sound Services' field of expertise and **must be** checked with the supplier or suitably qualified specialist before purchase.