

MEMORANDUM

Job No.:	70B-23-0225	Doc. No:	55700-1
Attention:	Darryl Baylosis	Author:	Henri Magisson
Company:	Admired Flooring	Reviewed by:	Jackson Yu
Email:	office@admiredflooring.com.au	Issued by:	Henri Magisson
Subject:	River Place Apartments - Floor Impact Test Results		

Dear Darryl,

Vipac Engineers and Scientists (Vipac) conducted a site visit to test the acoustic performance of four floor systems between units 46 and 38 within the River Place Apartments, located at 82 Boundary St, Brisbane City.

This memo contains the results of the floor tests conducted on 9th May 2023. Results of the tests have been compared against 'River Place Apartments – Renovation Guidelines' body corporate by-law, Building Code of Australia (BCA)/National Construction Code (NCC) 2019 and 1996 (Amendment 2) Section F5 requirements, and the Association of Australasian Acoustical Consultants 'Guideline for Apartment and Townhouse Acoustic Rating (Version 1.0)' rating chart. Additional predicted results comparing different slab thickness and ceiling scenarios have also been included as a guide.

Yours faithfully

Vipac Engineers & Scientists Ltd



Henri Magisson
Project Engineer

1. Introduction

Vipac was engaged by Admired Flooring to conduct field acoustic tests to test the acoustic performance of four floor systems (plus the bare slab by itself) between sole occupancy units 46 and 38 within the River Place Apartments, located at 82 Boundary St, Brisbane City.

1.1. Test Scenarios

The following flooring samples were tested in Unit 46 Living to Unit 38 Living (floor) as outlined in Table 1-1.

Table 1-1 - Test Scenarios

Test	Name	Plank size	Thickness	Wear layer	Notes
1	Resi-Commercial Luxury Vinyl Planks	1219 x 177.8 mm	2.5 mm	0.5 mm	Loosely laid
2	FC Hybrid Flooring Rigid Core SPC	1220 x 181 mm	6.5 mm	0.5 mm	Clipped laid (built-in underlay)
3	LVT Pro Flooring	1219 x 177.8 mm	4.5 mm	0.5 mm	Loosely laid
4	Grand Hybrid Flooring Rigid Core SPC	1530 x 228 mm	6.5 mm	0.5 mm	Clipped laid (built-in underlay)
5	Bare slab	n/a	n/a	n/a	180mm bare slab

Note that the slab thickness was confirmed to be 180mm with no ceiling cavity.

2. Test Methodology

2.1. Equipment List

The following equipment were used in the tests. Table 2-1 shows the equipment utilised throughout the test procedure on the day of testing.

Table 2-1: Equipment List

Item of Equipment	Model	Serial Number	Due for Calibration
Sound Level Meter	Brüel & Kjær Hand Held Analyzer Type 2250	3029997	14/07/2023
Calibrator	Pulsar Model 106 Acoustic Calibrator	96825	8/08/2023
Tapping Machine	Norsonic 211A	31127	23/08/2023

2.2. Methodology

2.2.1. Floor Impact Insulation Test

The floor impact tests were undertaken in conformance with the International Standard ISO 16283-2 "Field measurement of impact sound insulation of floors". The evaluation of the results, to derive the single figure $L_{nT,w}$ rating, was conducted to ISO 717-2 2013 "Rating of insulation in buildings and of building elements – Part 2 Impact Sound Insulation".

A Norsonic 211A tapping machine was used to generate impact noise on the floor. This machine consists of five hammers that continuously fall from a 40mm height. A B&K 2250 Sound Analyser was used to measure impact noise in the unit below using the microphone sweep method for approximately 25 seconds. The reverberation time and background noise level were also measured for the receiving space of the room downstairs.

2.3. Criteria

2.3.1. Floor Impact Insulation Criteria

Section 4 of the Body Corporate 'River Place Apartments – Renovation Guidelines' stipulates an $L_{nT,w} \leq 50$ for flooring installed in Living Rooms. The full requirements have been reproduced below in Figure 2-1.

The minimum standards using Weighted Standardised impact Sound Pressure Level (L_{nTw}) are listed below. These figures are based on the generic construction of River Place Apartments. Note the lower the figure the better the acoustic performance.

Source Room (Floor where hard treatment is proposed)	Receiving Room (Room below proposed hard floor treatment)				
	Bedroom	Living Room	Kitchen	Bathroom/Laundry	Entrance Foyer
Bedroom	≤ 45	≤ 50	≤ 50	≤ 50	≤ 50
Living Room	≤ 45	≤ 50	≤ 50	≤ 50	≤ 50
Kitchen	≤ 45	≤ 50	≤ 50	≤ 50	≤ 50
Bathroom/Laundry				≤ 50	
Entrance Foyer	≤ 45	≤ 50	≤ 50	≤ 50	≤ 50

Figure 2-1 - Body Corporate 'River Place Apartments - Renovation Guidelines' L_{nTw} Requirements

Furthermore, the NCC provides minimum acceptable construction standards for various aspects of a development including acoustic privacy. The BCA/NCC requirement is a weighted standardised impact sound pressure level of $\leq 62 L_{nTw}$. A lower L_{nTw} value represents better impact insulation performance.

For comparison with section 1.8 of the by-laws and the BCA/NCC requirements, the Association of Australasian Acoustical Consultants (AAAC) have published the 'Guideline for Apartment and Townhouse Acoustic Rating (Version 1.0)' which details a 'Star Rating' system to rank the acoustical quality of apartments to promote better standards of acoustical quality in dwellings. Figure 2-2 presents the star ratings chart for Intertenancy Activities on Impact Isolation of Floors between separate tenancies.

Intertenancy Activities	2 Star	3 Star	4 Star	5 Star	6 Star
(c) Impact Isolation of Floors					
Between Tenancies $L_{nT,W} \leq$	65	55	50	45	40
Between All Other Spaces & Tenancies $L_{nT,W} \leq$	65	55	50	45	40

Figure 2-2 - AAAC Ratings Chart for Intertenancy Activities

Results from testing conducted on the 9th May 2023 can be compared to this chart to produce a specific star rating for the floor systems separating Unit 46 and Unit 38, using the 'Between Tenancies' row.

3. Test Results

3.1. Floor Impact Test Results

A summary of the floor impact test results is shown in Table 3-1 where the measured impact noise level from the tests from Unit 46 Living to Unit 38 Living outlined in Table 1-1 is compared against the noise criteria.

As a reference, an extra column with a range of predicted L_{nTW} values with the installation of a suspended plasterboard ceiling under the concrete slab has also been included. Note that the thickness of the plasterboard ceiling would have an influence on the performance of the overall rating of the installed flooring.

Table 3-1 - Summary of Floor Impact Test Results

Test	Floor Tested	Field Measured L_{nTW} (Impact)	L_{nTW} (Impact) Criteria from Section 4 body corporate by-law	Compliance with Section 4 body corporate by-law	L_{nTW} (Impact) Criteria from BCA/NCC	Compliance with BCA/NCC	AAAC Star Rating	Approximate Predicted L_{nTW} with Ceiling
1	Resi-Commercial Luxury Vinyl Planks	62	≤ 50	No	≤ 62	Yes	2	53 to 57
2	FC Hybrid Flooring Rigid Core SPC	49	≤ 50	Yes	≤ 62	Yes	4	40 to 44
3	LVT Pro Flooring	58	≤ 50	No	≤ 62	Yes	2	49 to 53
4	Grand Hybrid Flooring Rigid Core SPC	48	≤ 50	Yes	≤ 62	Yes	4	39 to 43
5	Bare slab 180mm thick	66	≤ 50	No	≤ 62	No	1	57 to 61

3.2. Discussion of Results

The floor impact test results of tests 2 and 4 show compliance with Section 4 of the Body Corporate 'River Place Apartments – Renovation Guidelines'. However, tests 1 and 3 did not comply with the body-corporate criteria. The measured L_{nTW} values compared to the AAAC ratings chart show that the floor systems tested with built-in underlays (tests 2 and 4) had a 4 star rating, while the flooring systems with no built-in underlays (tests 1 and 3) received a two star rating. Furthermore, all flooring samples tested complied with the BCA/NCC criteria of $L_{nTW} \leq 62$. Additionally, the bare slab of 180mm thickness was tested without any flooring samples to have a L_{nTW} baseline value.

As a reference, Table 3-2 below illustrates approximate predicted range of L_{nTW} values with a 200mm slab scenario (instead of 180mm), with, and without a ceiling.

Table 3-2 - Approximate Predicted L_{nTW} with a 200mm Slab

Flooring system	Approximate predicted L_{nTW} with 200mm slab	
	Without Ceiling	With Ceiling
Resi-Commercial Luxury Vinyl Planks	60 to 64	53 to 57
FC Hybrid Flooring Rigid Core SPC	47 to 51	40 to 44
LVT Pro Flooring	56 to 60	49 to 53
Grand Hybrid Flooring Rigid Core SPC	46 to 50	39 to 43
Bare slab	64 to 69	57 to 62

4. Conclusion

A site inspection was conducted by Vipac on the 9th of May 2023. Floor tests were carried out in Unit 46 living area of the River Place Apartments for four different flooring samples (plus the bare slab by itself). All test results of the flooring samples (tests 1 to 4) indicate compliance with the BCA/NCC criteria, but exceeded the criteria from Section 4 of the Body Corporate 'River Place Apartments – Renovation Guidelines' for the flooring samples with no built-in underlays.