Item No **5.2 (a)**

RMP

acoustics energy vibration

42 Colinton Road
Edinburgh
EH10 5BT

T: 0845 062 0000
F: 0131 455 5121
E: rmp@napier.ac.uk
www.rmp.biz
www.soundtest.co.uk
www.airtest.org.uk

BRIEF FOR CONSULTANCY:

To carry out a noise impact assessment and give advice in order to improve the acoustic separation between residential property and an existing bakery/cafe.

NOISE IMPACT ASSESSMENT
ARCHIPELAGO BAKERY
39 DUNDAS STREET
EDINBURGH
EH3 6QQ

Technical Report No. R-7406-GH-MI
2nd March 2016

PREPARED FOR:

Caroline Walsh
Archipelago Bakery
39 Dundas Street
Edinburgh
EH3 6QQ

The Queen's Anniversary Prizes
For Higher and Further Education
2015

Edinburgh Napier University

RMP is a consulting division of Edinburgh Napier University.

Contents

1.0 Introduction

1.1 We were instructed by Caroline Walsh of Archipelago Bakery to undertake a noise impact assessment in relation to a noise complaint for the property situated at 39 Dundas Street, Edinburgh and to offer any acoustical advice necessary to facilitate compliance with the acoustic planning guidelines.

1.2 It is understood that the layout of the bakery has the service counter and seating in the front section of the shop and a kitchen area located at the rear of the property. The whole space is open plan and the only entrance is to the front. A residential flat is located above the bakery.

1.3 It is understood that the bakery operates from early in the morning until late afternoon preparing varied items throughout the day.

1.4 The present assessment has considered sound insulation between the existing bakery/café and first floor residential flat and recommends appropriate mitigation measures.

2.0 Relevant planning guidance

2.1 The following section outlines the design criteria used in the report to ensure there is no loss of amenity for residents due to excess noise from the development.

2.2 Environmental Assessment, Services for Communities of The City of Edinburgh Council have advised that the any operational noise from the property should be inaudible within the vertically adjacent residential property.

2.3 From previous experience, we would propose that noise from the development could be considered inaudible if controlled so as not to exceed NR15 inside the neighbouring residence.

2.4 The NR 15 criteria is a spectrum based criteria which requires that the maximum noise level at a range of frequencies should not be exceeded as indicated in Table 1.

Table 1: Proposed inaudibility criteria - NR15

	Octave Band Centre Frequency						
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz
NR 15	47	35	26	19	15	12	9

3.0 Measurement methodology and sound insulation results

3.1 In order to predict the level of noise break out from the bakery to the bedroom of the vertically adjacent apartment, it was necessary to undertake a sound insulation assessment of the party floor construction.

3.2 The original party floor construction was unknown, but it is assumed to be a traditional timber floor with ash deafening. The ceiling in the commercial property on the ground floor is understood to be a new plasterboard ceiling.

3.3 Measurements were carried out on 25th February 2016, by Gareth Henderson, BEng (Hons).

3.4 The airborne sound insulation results ($D_{nT,w}$ weighted standardized level difference) of the tested separating floor constructions are presented in Table 2.

Table 2. Sound insulation measurements of existing floor construction (dB).

Frequency (Hz)	63	125	250	500	1000	2000	4000
Archipelago Bakery to Bedroom ($D_{nT,w}$ *61)*	30	43	50	57	64	67	73
Archipelago Bakery to Kitchen ($D_{nT,w}$ *67)*	34	49	57	64	70	68	74

3.5 During the measurements, the background noise comprised road traffic noise from Dundas Street transmitted through the single-glazed sash and case windows and secondary glazing in the first floor flat.

3.6 The background noise did affect the measurement results at some frequency bands, which will therefore present an underestimate of the actual performance. However the single figure result was unaffected.

3.7 Measurements were taken of the bakery operating to establish typical maximum noise levels. This included a twenty minute measurement in the kitchen area that involved various tasks being carried out such as bread and

cakes being prepared, use of the two ovens, washing dishes and the operation of the dough mixing machines. A shorter eight minute reading was taken in the service area. This included the use of a coffee machine, voices from customers and the door to the bakery opening and closing. The results from these measurements are presented in Table 3.

Table 3. Measured Bakery Maximum Noise Levels, L_{AFMax}(dB)							
Frequency (Hz)	63	125	250	500	1000	2000	4000
Kitchen Area (20 minutes)	79	81	90	89	85	86	84
Service Area (8 minutes)	86	80	79	83	77	77	80

4.0 Equipment

The equipment used conformed to the requirements of BS EN ISO 140 *Measurement of sound insulation in buildings and of building elements Part 4: Field measurements of airborne sound insulation between rooms* (1998).

4.1 The following items of equipment were used during the measurement:

Equipment	Serial No.	Calibration expiry	Calibration certificate
Brüel & Kjær Modular Precision Sound Level Meter Type 2260 running Brüel & Kjær Building Acoustics Software BZ7204 Version 2.7	1772256	22/07/2016	16645
Brüel & Kjær Prepolarised Condenser Microphone Cartridge Type 4189	2502954	22/07/2016	16644
Brüel & Kjær Sound Level Calibrator Type 4231	1807698	22/07/2016	16643
JBL EON 510 Active Sound Source	74327	-	-
Creative MP3 Player	C6PF0863633R04848C	-	-

5.0 Noise impact assessment

5.1 It is expected that the main airborne noise sources would be associated with the kitchen section of the bakery where ovens and food mixers are used. Also voices, coffee machine/grinder within the café area are expected. Noise levels measured in the bakery are presented in Table 4 & 5 to assess the noise level in the first floor apartment due to airborne sound transmission via the separating floor.

5.2 Achieving compliance with the nominated NR 15 criterion for the L_{AFmax} noise levels should ensure that normal operation would result in inaudibility in the residential apartment above.

Table 4. Maximum bakery noise level through bedroom floor section (dB).

Frequency (Hz)	63	125	250	500	1000	2000	4000
Typical maximum kitchen noise levels (L_{AFmax})	86	80	79	83	77	77	80
Floor attenuation ($D_{nT,w}$)	30	43	50	57	64	67	73
Receiver noise level (L_{AFmax})	56	37	29	26	13	10	7
Inaudibility Level (NR 15)	47	35	26	19	15	12	9
Exceedance	9	2	3	7	-	-	-

Table 5. Maximum bakery noise level through kitchen floor section (dB).							
Frequency (Hz)	63	125	250	500	1000	2000	4000
Typical maximum service area noise levels (L_{AFmax})	79	81	90	89	85	86	84
Floor attenuation ($D_{nT,w}$)	34	49	57	64	70	68	74
Receiver noise level (L_{AFmax})	45	32	33	25	15	18	10
Inaudibility Level (NR 15)	47	35	26	19	15	12	9
Exceedance	-	-	7	6	-	6	1

5.3 The calculations in Table 4 & 5 show that noise levels due to typical bakery/café operations exceed the inaudibility criterion of NR15 in the bedroom and the kitchen of the adjacent residential apartment at certain frequency bands. The exceedances require further mitigation measures to be implemented.

5.4 Recommendations are provided in Section 5 for suitable acoustic treatment to ensure inaudibility may be achieved in the residential apartment during normal bakery activity.

6.0 Recommendations

6.1 Sound insulation of floor/ceiling

6.2 An additional acoustic ceiling should be installed within the perimeter of the walls. The ceiling should be a suspended, metal or timber frame ceiling approximately 150mm below the underside of the existing plasterboard ceiling and incorporate a 50mm layer of acoustic quilt (such as *Isover APR1200* or equivalent with density 10-36 kg/m^3). It should be finished with 1no. layer of 15mm high density plasterboard (e.g. *Gyproc Soundbloc)*.

6.3 Service penetrations through the new ceiling are to be minimised and well sealed.

6.4 General

6.5 When carrying out the assessment it was noted that the main door could be heard in the flat above. To reduce the noise a door closer could be used.

6.6 It is recommended that tables and chairs are fitted with rubber feet to reduce any noise from movement.

Prepared by:	Approved by:
Gareth Henderson	Mark Irish
B.Eng (Hons)	B.Eng, M.DesSc, MIOA

Comprising several of Scotland's leading built environment applied research centres, the Institute works with key organisations across the construction industry. ISC has specialist expertise in developing and supporting innovative Building Technologies & Product Innovation and is the lead partner in the Low Carbon Building Technologies Gateway.

Our primary research and innovation support centres include:

Building Performance Centre
Centre for Geotechnics
Centre for Offsite Construction and Innovative Structures
Robin Mackenzie Partnership
Scottish Energy Centre
Centre for Sustainable Communities

Institute for Sustainable Construction

Construction technologies for tommorow's communities

OFFICES

Head Office Edinburgh
42 Colinton Road
Edinburgh
EH10 5BT

Merseyside
Riverside Place
4 Oakland Vale
Wirral
CH45 1LQ

South West
17 Bishops Close
Torquay
Devon
TQ1 2PL

Wales
Plas Y Dderwen
Waunfarlais Road
Ammanford
Carmarthenshire
SA18 3NG

Lyon
Bureau d'études
BPC
19 rue Saunière
26000 VALENCE

0845 062 0000

rmp@napier.ac.uk

www.rmp.biz
www.soundtest.co.uk
www.airtest.org.uk

INVESTORS IN PEOPLE

CHECKED 2015

ANC ACOUSTICS & NOISE CONSULTANTS

Independent Airtightness IAS Testing Scheme