



READING GATEWAY - UNIT F

Noise Impact Assessment



READING GATEWAY - UNIT F

Noise Impact Assessment

Kier Construction

Revision	Description	Author	Checked by	Issued by	Issue Date
00	First Issue	SD	ZV	ZV	04/04/2018

MACH Acoustics Ltd
3rd Floor 4 York Court
Upper York Street
Bristol
BS2 8QF

t: 0117 944 1388
e: info@machacoustics.com
w: www.machacoustics.com

Eagle House
163 City Road
London
EC1V 1NR

Consultants

AR	Andrew Rickard
CB	Claire Bye
CJ	Chris Jones
JC	Josh Childs
MR	Max Reynolds
OP	Oscar Pope
PJ	Phil Jordan
RP	Rory Peliza
SH	Stefan Hannan
SD	Steffan Davies
YW	Hsuan-Yang Wang
ZN	Ze Nunes
ZV	Zoe Vernon
TT	Tracy Toal
ZG	Zheng Ge

Finance

andrew@machacoustics.com
claire@machacoustics.com
chris@machacoustics.com
josh@machacoustics.com
max@machacoustics.com
oscar@machacoustics.com
phil@machacoustics.com
rory@machacoustics.com
stefan@machacoustics.com
steffan.d@machacoustics.com
yang@machacoustics.com
ze@machacoustics.com
zoe@machacoustics.com
tracy@machacoustics.com
zheng@machacoustics.com

1.0	INTRODUCTION	1
2.0	SITE DESCRIPTION	2
2.1	Environmental Noise Sources	2
2.2	Noise Sensitive Receptors	2
2.3	Noise Source Locations	3
3.0	ENVIRONMENTAL NOISE SURVEY	4
3.1	Peter Brett Associates' Survey	4
3.2	Responsibilities	4
4.0	PLANT NOISE ASSESSMENT	6
4.1	Planning Conditions	6
4.2	Background Noise	6
4.3	Noise Sources	7
4.4	Assessment – BS 4142: 1997	9
5.0	CONCLUSION	10
	APPENDIX A – BS4142 CRITERIA	11

1.0 INTRODUCTION

MACH Residential has been appointed by Kier Construction to undertake an environmental noise assessment for the proposed Reading Gateway Unit F development. Proposals are for an hotel, a restaurant/pub, and a coffee shop, each with associated external plant.

The purpose of the assessment is to determine the existing ambient background noise level representative of the worst affected dwellings to the proposed development. Based on this level, the likelihood of complaints as a result of the proposed development can be assessed. Where non-compliance is indicated, appropriate noise mitigation can be specified.

In order to assess noise emissions from the proposed Mechanical Extract Fan, an assessment has been carried out to BS 4142:1997 *"Methods for rating and assessing industrial and commercial sound"*, as required for discharge of the planning conditions. This assessment has been benchmarked against a noise survey carried out by Peter Brett Associates between 21/01/15 and 28/01/15.

2.0 SITE DESCRIPTION

The location of the proposed development, and associated plant, is as indicated in Figure 2.1, along with the nearest residential receptors.

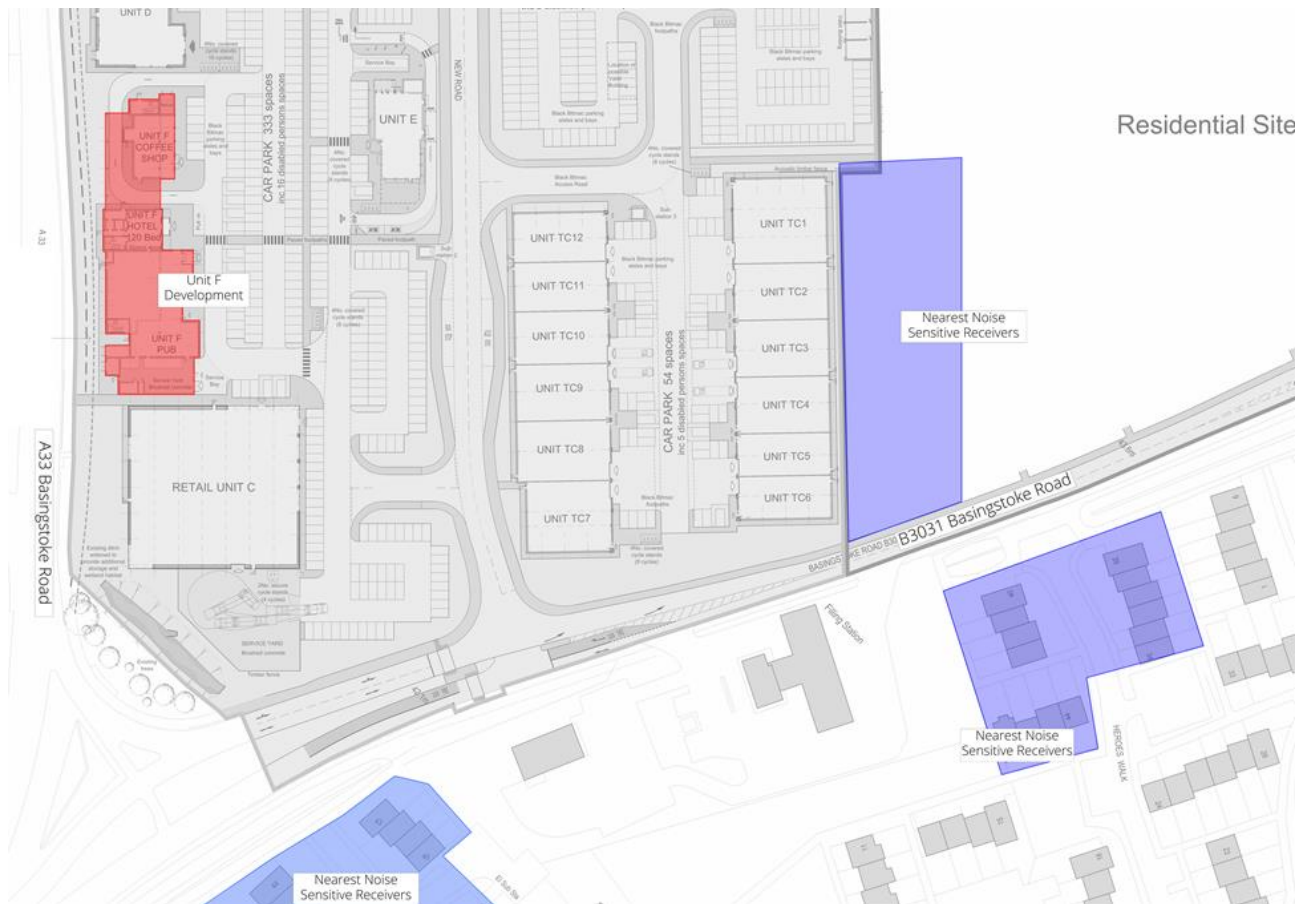


Figure 2.1: Site Location

2.1 Environmental Noise Sources

Road traffic in the surrounding area is seen to constitute the primary contributor to background noise levels on site, with the most dominant sources the traffic along the A33 Basingstoke Road and the M4.

2.2 Noise Sensitive Receptors

The nearest noise sensitive receptors are indicated in Figure 2.1, and are as follows;

- Residential dwellings on Kingsley Close, approximately 120 m to the south east.
- Residential, along B3031 Basingstoke Road, approximately 175 m to the east (the new Worton Grange development);
- Residential dwellings along Heroes Walk, approximately 210 m to the south east

2.3 Noise Source Locations

The proposed plant locations are presented in the following figure, with locations relating to the Hotel marked in red, the Coffee Shop in blue, and the restaurant/pub in purple. It is understood that all open external plant areas will have louvred enclosures.



Figure 2.2: Plant Locations

3.0 ENVIRONMENTAL NOISE SURVEY

Peter Brett Associates LLP (PBA) previously carried out an environmental sound survey for the Reading Gateway Unit F development between Thursday 21 January 2015 and Tuesday 28 January 2015. MACH has used raw survey data, courtesy of PBA, alongside the 'Preliminary Acoustic Design Report', to inform the acoustic design.

3.1 Peter Brett Associates' Survey

PBA notes that the dominant noise sources in the area are vehicles along the A33, Basingstoke Road, Imperial Way, and the M4. It is therefore considered that measurement position 1, as chosen by PBA, is a comparable, worst case, for the ambient day time noise climate at the proposed location of the Trade City development.

Further details of the environmental noise levels and assessment can be found within PBA's report; "32618_PADR_20102016_MLB_LWT_DW_rev1".

3.2 Responsibilities

MACH Residential does not accept any responsibility for the contents within the report by Peter Brett Associates. The methodology of the noise survey has been assumed to be conducted in accordance with BS 4142:1997.

It is also worth noting that there appear to be inconsistencies between the reports and raw data provided by PBA.

For example, the below table from the report by PBA, is the only summary given as to the results of the environmental sound survey, and presents the incident noise levels used by PBA for noise break-in assessments.

Table 2.3: Incident Noise Levels

Façade	Period		Incident Noise Levels (dB) at Octave Band Centre Frequency (Hz)								
			63	125	250	500	1k	2k	4k	8k	dBA
South West A33 Position 1	Daytime (07:00 – 23:00 hours)	dB Leq,1hr	72	66	63	62	67	66	60	57	71
	Night-time (23:00 – 07:00 hours)	dB Leq,1hr	71	64	61	61	65	62	57	53	68
		dB L _F Max	86	89	80	73	71	68	73	79	82
North-East Position 2	Daytime (07:00 – 23:00 hours)	dB Leq,1hr	73	66	61	60	65	62	56	54	68
	Night-time (23:00 – 07:00 hours)	dB Leq,1hr	70	63	59	59	62	59	54	51	66
		dB L _F Max	86	88	83	74	70	66	64	68	79
Roof Corrected Position 1	Daytime (07:00 – 23:00 hours)	dB Leq,1hr	67	61	58	57	62	61	55	52	66
	Night-time (23:00 – 07:00 hours)	dB Leq,1hr	66	59	56	56	60	57	52	48	63
		dB L _F Max	81	84	77	70	70	67	71	75	79

Figure 3.1: Incident Noise Levels by PBA

However, PBA also sets the below plant noise rating limits, with no indication as to where these have been derived from, as the measured background noise levels are not presented within the report.

6.1.2 Table 6.1: Plant Noise Emission Criteria

Location	Assessment Location	Plant Noise Emission Criteria Combined Plant	
		Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Residential	1m outside any openable, noise sensitive window	31	23
Premier Inn Facade	1m outside hotel room window	46	38
Office	1m outside any openable, noise sensitive window	31	-

Figure 3.2: Summary of Plant Noise Emission Criteria by PBA

Analysis of the raw data, as provided to MACH by PBA, indicates the following levels to be the lowest measured background noise levels, suggesting that corrections have been added to these to calculate the noise emission criteria given above. However, as mentioned previously, the calculation methodology is unknown.

		Position 1	Position 2
Daytime (07:00 – 23:00)	Lowest LA90,1hr	56 dB	53 dB
Night time (23:00 – 07:00)	Lowest LA90,1hr	49 dB	47 dB

Table 3.1: Summary of PBA Fixed Position Measurements

4.0 PLANT NOISE ASSESSMENT

4.1 Planning Conditions

The Local Planning Authority have not stipulated a numerical maximum rating level for the development, however, condition 62 states the following.

'62. Air conditioning or refrigeration plant shall not be installed on any unit within the Detailed Element until an acoustic assessment for the plant for that unit has been submitted to and approved in writing by the local planning authority. The assessment shall demonstrate that the plant noise rating level will not cause an increase in the existing background noise level measured / predicted in accordance with BS4142:1997 methodology. The noise levels shall be installed and maintained thereafter in accordance with the approved assessment.

Reason: to protect the amenity of neighbouring residents of the proposed development. LDF SDPD Policy DM4 – Safeguarding Amenity.'

Note, the above applies to the sum of ALL items of plant associated with the development. If individual noise sources are assessed separately, the overall plant noise contribution at the nearest residences from the development will increase, causing noise creep to the surrounding area. For example, two identical noise sources running together give a cumulative noise level of 3dB greater than a single unit.

For the purposes of assessment MACH has interpreted the above to mean the existing background noise levels at the nearest existing noise sensitive receptor.

4.2 Background Noise

BS4142: 1997 states that '*in using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.*' BS4142 further states that '*a representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either minimum or modal value*'. Hence BS4142 does not provide a black and white method of obtaining the assessment level for background noise.

For the purposes of assessment, MACH has derived the minimum L_{A90} occurring during the operational hours of the noise source, using the noise survey data provided by PBA. The table below provides the background noise levels which will form the basis of assessment.

Assessment Period	Assessed Background Noise Level (dB, L_{A90})
Daytime 07:00 – 23:00	53
Night time 23:00 – 07:00	47

Table 4.1: Assessment Background Noise Levels

4.3 Noise Sources

It is understood that all plant is to run during the day, with plant associated with the hotel only running at night. Noise data has been collected from Manufacturer's data, with details of the proposed plant provided in the table below.

Plant Location		Equipment	Sound Power Level dB(A)	Day Time (07:00 – 23:00)	Night Time (23:00 – 07:00)
Hotel	GF Open Plant Enclosure	S12 – Casing Breakout	71	Operational	Operational
	Rooftop Open Plant Enclosure	S1 – Casing Breakout	67	Operational	Operational
		S2 – Casing Breakout	67	Operational	Operational
		S3 – Casing Breakout	67	Operational	Operational
		S4 – Casing Breakout	67	Operational	Operational
		S5 – Casing Breakout	67	Operational	Operational
		S6 – Casing Breakout	67	Operational	Operational
		S7 – Casing Breakout	67	Operational	Operational
		S8 – Casing Breakout	67	Operational	Operational
		S9 – Casing Breakout	71	Operational	Operational
		S10 – Casing Breakout	54	Operational	Operational
		S11 – Casing Breakout	59	Operational	Operational
		S13 – Casing Breakout	54	Operational	Operational
Coffee Shop	GF Open Plant Enclosure / Bin Store	A/C 1	60	Operational	-
		A/C 2	60	Operational	-
		A/C 3	60	Operational	-
		A/C 4	60	Operational	-
Restaurant / Pub *	1F Open Plant Enclosure	Kitchen Supply AHU	- *	Operational	-
		Condenser 1	- *	Operational	-
		Condenser 2	- *	Operational	-
		Condenser 3	- *	Operational	-
		Condenser 4	- *	Operational	-
		Condenser 5	- *	Operational	-
		Condenser 6	- *	Operational	-
		Cellar Condenser	- *	Operational	-
		Cold Room Condenser	- *	Operational	-
		Freezer Condenser	- *	Operational	-
		Restaurant Supply & Extract Heat Recovery AHU	- *	Operational	-
		Air Conditioning Unit	- *	Operational	-
	5F Open Plant Enclosure	Kitchen Extract AHU	- *	Operational	-

Table 4.2: Proposed Plant

*Note: at time of writing, plant selections for the restaurant/pub are yet to be confirmed, see Section 4.3.1.

4.3.1 Noise Rating Limits for Restaurant/Pub Plant

At time of writing, the final plant selections for the restaurant/pub are yet to be confirmed. As noise emissions from plant associated with the restaurant/pub must be assessed as part of the wider development, MACH has set plant noise rating limits for each unit, such that these can be included within the assessment.

The plant noise rating limits for plant associated with the restaurant/pub, as used within the assessment, are as follows. It is understood that these will only be in operation during the operating hours of the restaurant/pub. Note, these limits are based upon the understanding that plant is to be located within the first-floor plant enclosure, except for the kitchen extract unit which is to be located above the stairs, at the fifth-floor level.

Plant Location		Equipment	Noise Rating Limit (SWL / SPL @ 1m)	
			Day Time (07:00 – 23:00)	Night Time (23:00 – 07:00)
Restaurant / Pub *	1F Open Plant Enclosure	Kitchen Supply AHU*	67 / 59	64 / 56
		Condenser 1	67 / 59	64 / 56
		Condenser 2	67 / 59	64 / 56
		Condenser 3	67 / 59	64 / 56
		Condenser 4	67 / 59	64 / 56
		Condenser 5	67 / 59	64 / 56
		Condenser 6	67 / 59	64 / 56
		Cellar Condenser	67 / 59	64 / 56
		Cold Room Condenser	67 / 59	64 / 56
		Freezer Condenser	67 / 59	64 / 56
		Restaurant Supply & Extract Heat Recovery AHU*	67 / 59	64 / 56
		Air Conditioning Unit	67 / 59	64 / 56
	5F Open Plant Enclosure	Kitchen Extract AHU*	78 / 70	70 / 62

*Note, the above limits are the combined noise rating limits, including casing radiated noise, and noise from duct terminations

Table 4.3: Noise Rating Limits for Restaurant/Pub Plant

It is considered the responsibility of the M&E Engineer(s) to ensure that plant selections are in line with these limits and, therefore, the planning conditions, and further assessment in accordance with BS 4142:1997 may be required at a later stage.

Noise break-in to the proposed development has also been considered in relation with the predicted façade noise levels. It is understood that the development is to be mechanically ventilated, therefore, the above limits have been set such that combined noise contributions from plant at the nearest windows of the development are in the region of, or below, 50 dB $L_{Aeq,T}$ during the day, and 48 dB $L_{Aeq,T}$ at night. Which, when compared to the lowest average noise levels incident on the façades, 57 dB $L_{Aeq,16hr}$ during the day, and 55 dB $L_{Aeq,8hr}$ at night, is considered suitably low such that risk of complaints from occupants of the proposed development is low.

4.4 Assessment – BS 4142: 1997

The table below provides the calculated rating levels at the nearest noise sensitive receptor, with the specific noise level for each unit established through calculation, which can be provided upon request, and the nearest noise sensitive receptors as indicated in Figure 2.1. To avoid adverse effect on the end users of the development, plant noise rating levels at the nearest noise sensitive window of the development have also been considered.

Note; at this stage, no acoustic feature corrections under BS4142:1997 have been included within calculations as it is unknown whether any units have tonal / impulsive features. Manufacturers and suppliers are therefore to confirm, and guarantee, there are no such characteristics as described in BS 4142:1997, e.g. tonality, impulsivity etc.

Period	Assessed Background Noise Level dB L_{A90} ,	Predicted Plant Noise Level dB $L_{Aeq,T}$ *	Assessment Outcome
Daytime (07:00 – 23:00)	53	35	-18
Night-time (23:00 – 07:00)	47	30	-17

Table 4.4: BS4142: Assessment Outcome – Nearest Noise Sensitive Receptor

*Note; the predicted noise levels are dependent upon the final selection of plant for the restaurant/pub, see Section 4.3.1.

As can be seen in the above table, the rating levels of the proposed noise sources are more than 10 dB below the measured background noise levels at the nearest receptors, which is a positive indication that complaints are unlikely.

5.0 CONCLUSION

MACH Residential has been appointed by Kier Construction to undertake an environmental noise assessment for the proposed Unit F development at Reading Gateway. Proposals are for an hotel, a restaurant/pub, and a coffee shop, each with associated external plant.

At time of writing, the final plant selections for the restaurant/pub are yet to be confirmed. As noise emissions from plant associated with the restaurant/pub must be assessed as part of the wider development, MACH has set plant noise rating limits for each unit, such that these can be included within the assessment, see Section 4.3.1.

The assessment has indicated that the rating level of the proposed plant will be compliant with the provisions of BS 4142:1997, with the calculated rating levels more than 10 dB below the measured background noise levels, a positive indication that complaints are unlikely. As such the assessment indicates that there will be no adverse noise impact at the worst affected noise sensitive receptors, and the proposed development will not result in an increase in the existing background noise levels.

APPENDIX A – BS4142 CRITERIA

BS 4142: 1997 “Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas” describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions.

The likelihood of complaints in response to a noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level. This standard also allows for an appropriate correction for the acoustic features present in the noise, see below.

In accordance to BS 4142, the likelihood of noise complaints for plant noise break out is a function of the difference between plant noise levels and existing background noise levels at the nearest sensitive location. BS 4142 states that

- A difference of around +10 dB or more indicates that complaints are likely.
- A difference of around + 5 dB is of marginal significance.
- If the rating level is more than 10 dB below the measured background noise level, then this is a positive indication that complaints are unlikely.

A 5 dB correction should be added if one or more of the following features (see the list below), are present within the noise sources in question.

- The noise contains a distinguishable, discreet, continuous note (whine, hiss, screech, hum);
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps);
- The noise is irregular enough to attract attention.