

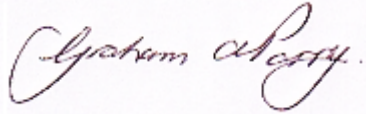
Report for:

Macniven Quays Ltd

The Maltings, Fobney Street, Reading
Noise Impact Assessment

Status: Final

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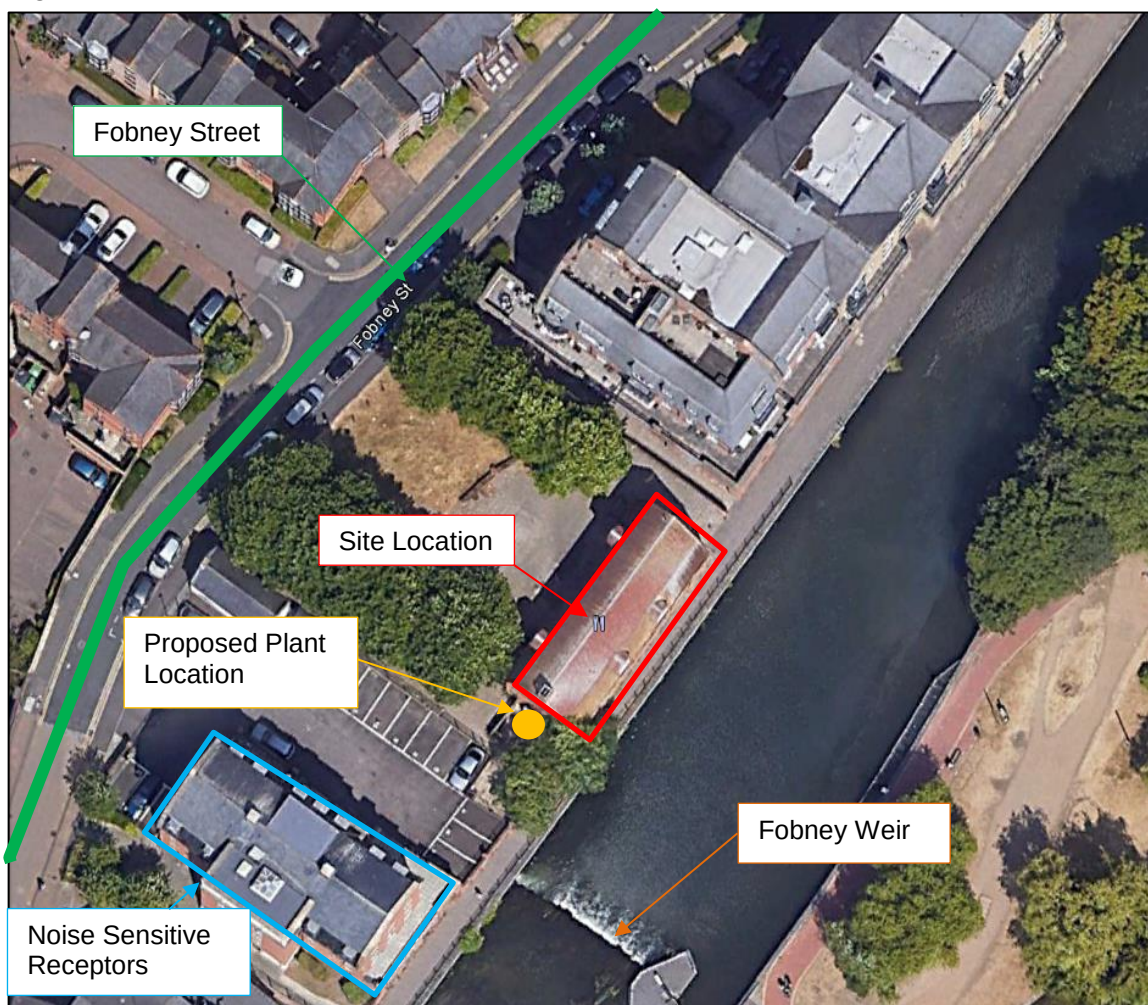
1. INTRODUCTION

ACCON UK Limited (ACCON) has been commissioned by Macniven Quays Ltd to carry out a noise assessment in order to determine the impact of noise on nearby residential receptors from the proposed offices at The Maltings, Fobney Street, Reading.

The assessment is required in order to quantify the impact of noise from the proposed air handling system associated with the proposed change of use development in line with the requirements of Reading Borough Council (RBC) as detailed in a Memorandum from James Crosbie (Head of Planning, Development & Regulatory Services at RBC) dated 16th July 2018, reference 182233/PREAPP.

A noise measurement survey has been carried out in order to determine the background noise climate in the vicinity of the nearest noise sensitive receptors. A site location plan is shown in **Figure 1.1**.

Figure 1.1: Location Plan



The specific type of plant has yet to be determined, therefore this assessment will identify the maximum allowable sound power level of the proposed plant in order to meet the criteria of RBC.

2. THE NATURE, MEASUREMENT AND EFFECT OF NOISE

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to characterise the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB(A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels, for example from 60 dB(A) to 70 dB(A), would represent a doubling in 'loudness'. Similarly, a 10 dB(A) decrease in noise, for example from 70 dB(A) to 60 dB(A), would represent a halving in 'loudness'. A change of 3 dB(A) is generally considered to be just perceptible¹. **Table 2.1** provides typical noise levels of common sources.

Table 2.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In car noise without radio
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

A Glossary of Acoustic Terminology is provided in **Appendix 1**.

¹ Institute of Environmental Management and Assessment (2014). Guidelines for environmental noise impact assessment.

3. NOISE ASSESSMENT CRITERIA

3.1. National Planning Policy Framework

The revised National Planning Policy Framework (NPPF, February 2019) supersedes the 2012 and 2018 versions of the NPPF. The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The environmental role is to contribute to protecting and enhancing our natural, built and historic environment; and as part of this, make effective use of land, help to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate to adapt to climate change including moving to a low carbon economy.

One of the core planning principles is to contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser value, where consistent with other policies in the Framework. The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

Paragraph 180 of the NPPF states:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life (see Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food and Rural Affairs, 2010));*
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

Additionally, Paragraph 182 states:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

3.2. Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010. The vision of the NPSE is to *'Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development'*.

The Noise Policy Statement for England (NPSE) aims to *'through the effective management and control of environmental neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life.'*

Based on concepts from toxicology, it introduces three 'Effect Levels' relevant to the assessment of noise. These are:

- NOEL: No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
- LOAEL: Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected; and
- SOAEL: Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur.

3.3. Planning Practice Guidance

The Planning Practice Guidance for Noise (PPG-N) was published in March 2014 and updated in December 2014. The PPG-N provides the following advice on how to determine the noise impact on development:

'Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- *Whether or not a significant adverse effect is occurring or likely to occur;*
- *Whether or not an adverse effect is occurring or likely to occur; and*
- *Whether or not a good standard of amenity can be achieved.*

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.'

The document goes on to acknowledge the levels of noise exposure at which an effect may occur as provided in the NPSE and introduces a fourth level:

- UOAEL: Unacceptable Observed Adverse Effect Level: This is the level above which extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise lead to psychological stress or physical effects.

It is important to understand that as the PPG-N does not provide any advice with respect to specific noise levels/limits for different sources of noise, it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment.

3.4. Reading Borough Council

Reading Borough Council (RBC) have issued the following advice in pre application advice (Reference: 182233/PREAPP):

“Applications which include noise generating plant when there are nearby noise sensitive receptors should be accompanied by an acoustic assessment carried out in accordance with BS4142:2014 methodology. If air conditioning or other air handling plant is proposed as part of the application then a noise assessment will be required. The noise assessment needs to establish the predicted noise rating level taking account of any characteristic factors like tonality or impulsiveness of the noise. The rating level should be compared with the background noise level.

Within Reading there is strong justification for requiring the plant specific sound level to be at least -10dB below the measured background level and for the plant noise rating level to not exceed the measured background level. Specifically to prevent cumulative impact from addition of plant over time which could result in background creeping up to levels which might cause adverse health impact, which is more likely in a densely occupied town such as Reading. Levels of -10dB ensure that the background level is not increased and nuisance is unlikely.

However, there may be some situations where this cannot be achieved there may be some flexibility where this is justifiable for example where there are very low background noise levels, etc. Reasons should be clearly stated within the assessment conclusion.

Obviously should externally located plant be proposed as part of your future application this will need to be very carefully considered, especially in the context of the listed building too.”

3.5. British Standard 4142:2014

BS 4142 *Methods for rating and assessing industrial and commercial sound* provides a method for the measurement and rating of industrial type noise sources and background noise levels outside dwellings. The rating level (defined in the BS) is used to rate the noise level of the source (this is defined as the ‘specific sound level’) outside residential dwellings.

The rating level is determined by assessing the character of the noise and applying an acoustic feature correction, if appropriate, to the specific sound level. Corrections are applied for the tonality, impulsivity and intermittency of the noise source which can all increase the impact of noise.

The initial assessment described in BS 4142 to determine whether an adverse impact is likely is based on establishing the difference between the rating level and the background noise

level outside the residential property of interest. The British Standard states that the following points should be considered:

- *“Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”*

Where it is considered that the initial assessment of the impact needs to be modified due to the context in which the noise is occurring, BS 4142 suggests that all pertinent factors are taken into consideration, including:

- 1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound² levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

- 2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*

² The residual sound is defined as the ambient sound level at the assessment location in the absence of the specific sound source

- 3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*
- i. facade insulation treatment;
 - ii. ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 - iii. acoustic screening.

There is also a requirement within BS 4142:2014 to consider the uncertainty in the measurement and assessment procedure and it is stated that *“The level of uncertainty associated with a measurement of sound level depends upon a number of factors, including:*

- a. the complexity of the sound source and the level of variability in sound emission from the source;*
- b. the complexity and level of variability of the residual acoustic environment;*
- c. the level of residual sound in the presence of the specific sound at the measurement location;*
- d. the location(s) selected for taking the measurements;*
- e. the distance between sources of sound and the measurement location and intervening ground conditions;*
- f. the number of measurements taken;*
- g. the measurement time intervals;*
- h. the range of times when the measurements have been taken;*
- i. the range of suitable weather conditions during which measurements have been taken;*
- j. the measurement method and variability between different practitioners in the way the method is applied;*
- k. the level of rounding of each measurement recorded; and*
- l. the instrumentation used.”*

4. NOISE MEASUREMENT SURVEY

A noise measurement survey has been carried out at the site in order to determine the typical background sound levels ($L_{A90,T}$) at the nearest residential receptors to the proposed location of the air conditioning plant.

Noise Monitoring Position 1 (MP1) was located on the grass area between the proposed development and Fobney Street. The noise measurements were carried out between 1000 hrs and 1100 hrs and between 1700 hrs and 1800 hrs on Tuesday 19th March 2018 in order to capture those periods when the proposed plant is likely to be operational. The microphone was mounted on a tripod at a height of approximately 1.5 m above the ground level. This position is considered to be representative of the nearest noise sensitive receptors to the site.

The noise climate at MP1 was dominated by road traffic on Fobney Street with distant road traffic on other local roads such as the elevated Inner Distribution Road to the south east were also audible. Noise from the Fobney Weir was occasionally audible when road traffic sources were reduced.

The measurement position is identified in **Figure 4.1**.

Figure 4.1: Noise Measurement Position



The noise measurements utilised a Norsonic 118 Class 1 Sound Level Meter which has a current certificate of calibration. Before and after the measurement period, the equipment was calibrated in order to ensure that the equipment had remained within reasonable calibration limits (± 0.5 dB).

The weather conditions recorded during the noise measurements on Tuesday 19th March were dry with 100% cloud cover, and a temperature of approximately 10°C. There was a wind speed of less than 1 m/s.

The noise levels measured at MP1 are summarised in **Table 4.1**. Detailed noise measurement results are identified in **Appendix 2**.

Table 4.1: Summary of Free-Field Noise Levels at MP1

Period (Hours)	L _{Aeq, T} (dB)	Average L _{A90, 5min} (dB)	Typical L _{A90, 5min} (dB)
1000 – 1100	57	51	51
1700 – 1800	55	51	51

Note: The noise measurements were carried out over consecutive five minute periods. The L_{Aeq, T} was subsequently logarithmically averaged over the time periods indicated in **Table 4.1**, the Average L_{A90, T} were arithmetically averaged. The Typical L_{A90, T} is the most commonly occurring L_{A90, 5min} during the specific period.

5. BS 4142 ASSESSMENT

5.1. Initial Assessment

Table 5.1 identifies the BS 4142 assessment that has been carried out in order to determine the maximum noise level that the proposed plant can generate in order to have a low impact on the nearest noise sensitive receptor. This assessment assumes a very worst case in which the plant is running constantly for the identified operational hours and that the plant is approximately 20 m from the nearest noise sensitive receptor. It is also assumed that any intervening structures do not provide shielding of noise from the proposed air conditioning plant. The location of the nearest noise sensitive receptor is identified in **Figure 1.1**. The maximum sound power level (L_{WA}) has been derived using a standard point source attenuation formula.

Table 5.1: BS 4142 Assessment

Results	Noise Level at the Nearest Noise Sensitive Receptor (dB)	Relevant Clauses of BS 4142:2014	Commentary
Typical Background Sound Level $L_{A90,T}$ (dB)	51	8.1, 8.2	A typical background sound level during the specific periods.
Maximum Rating Sound Level $L_{Aeq,1hr}$ (dB)	51	9.1	The rating sound level as identified in order to achieve RBC's requirement that the rating sound level does not exceed the background sound level
Maximum Specific Sound Level $L_{Aeq,1hr}$ (dB)	41	7.3	The specific sound level as identified in order to achieve RBC's requirement that the specific sound level should be at least 10 dB below the existing background sound level ($L_{A90,T}$)
Maximum Acoustic Feature Correction (dB)	+10	9.1, 9.2, 9.3	The maximum total acoustic feature correction such that plant with the identified maximum specific sound level will not exceed the maximum rating sound level.
Maximum Sound Power Level (dB)	75	9.1, 9.2	The maximum possible sound power level in order to meet the requirements of RBC

The assessment of the existing noise levels at the proposed development in **Table 5.1**, identifies that in order for the assessment to give an indication of a low impact when assessed in line with the methodologies in BS 4142, the proposed plant must have a sound power level not exceeding 75 dB.

5.2. Acoustic Feature Correction

The assessment in **Table 5.1** has identified that the maximum acoustic feature correction should not exceed +10 dB should the maximum specific sound level be achieved. The maximum feature correction has been determined such that both the rating sound level and specific sound level will not exceed the criteria of RBC. This should be readily achievable for any new air handling plant however a more detailed assessment will be required once the final plant selection has been made.

5.3. Potential Noise Mitigation Measures

Should a suitable item of plant with a sound power level of 75 dB or lower not be available, mitigation measures will need to be incorporated into the design of the air handling unit such that the specific sound level of the proposed air handling plant is reduced to be 10 dB below the background sound level at the nearest sensitive receptor.

Such mitigation measures may include the following:

- An enclosure for the air handling plant incorporating an acoustic louvre;
- Attenuator

If mitigation measures are necessary, a further assessment will be undertaken to assess the most suitable option for the selected plant.

6. CONCLUSION

A noise assessment has been carried out to assess noise from the air conditioning plant of the proposed offices at The Maltings, Fobney Street, Reading.

An assessment of the sound from the proposed plant has been undertaken with regard to the methodology in BS 4142 and measured background sound levels. The assessment has identified the maximum sound power level (75 dB L_{WA}) and acoustic feature correction (+10 dB) that the plant can produce in order to have a low impact on residents of the nearest noise sensitive receptor, based on Reading Borough Council's pre-application advice.

Subject to the installation of air handling plant where the sound power level when also taking into account any acoustic feature corrections does not exceed 75 L_{WA} then there are no noise reasons for refusal of the change of use application. Should a suitable item of plant with the appropriate sound power level not be available, the identified mitigation measures should be investigated further.

APPENDICES

Appendix 1

Glossary of Acoustic Terminology

Term	Description
'A'-Weighting	This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.
Decibel (dB)	This is a tenth (deci) of a bel. A decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of ratio between two quantities expressed in logarithmic form.
$L_{Aeq,T}$ (Ambient /Period Sound Level)	The equivalent steady sound level in dB containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as 1 second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specified location. $L_{Aeq,T}$ can be measured directly with an integrating sound level meter.
$L_{A90,T}$ (Background Sound Level)	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 per cent of a given time. The $L_{A90,T}$ is used to describe the background noise levels at a particular location.
L_{Amax}	The 'A'-weighted maximum sound pressure level measured over a measurement period.
Rating Level, $L_{Ar,Tr}$	The specific sound level plus any adjustment for the characteristic features of the sound.
Residual Sound Level, $L_r = L_{Aeq,T}$	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Specific Sound Level, $L_s = L_{Aeq,Tr}$	The equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr .
Sound Power Level	The total sound energy radiated by a sound source in all directions. In decibels with a reference level of 1×10^{-12} Watts

Appendix 2

Summary of Noise Measurements

Time	L _{Aeq}	L _{AF(max)}	L _{A10}	L _{A90}
1000 – 1005	58	71	61	52
1005 – 1010	59	72	62	51
1010 – 1015	58	72	60	52
1015 – 1020	58	70	60	53
1020 – 1025	60	78	62	52
1025 – 1030	55	67	57	51
1030 – 1035	55	70	57	50
1035 – 1040	55	64	58	51
1040 – 1045	56	73	57	50
1045 – 1050	57	72	58	50
1050 – 1055	55	67	58	50
1055 – 1100	56	65	58	51
1000 – 1100	57	78	59	51
1705 – 1710	57	73	58	52
1710 – 1715	56	67	58	51
1715 – 1720	55	66	57	52
1720 – 1725	55	63	57	51
1725 – 1730	54	62	56	51
1730 – 1735	56	71	56	51
1735 – 1740	55	71	56	51
1740 – 1745	57	71	58	51
1745 – 1750	54	67	56	51
1750 – 1755	56	70	58	51
1755 – 1800	57	76	58	50
1800 – 1805	55	61	57	50
1705 – 1805	55	76	57	51



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