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Environmental Noise Survey & Assessment

Prepared: 15th September 2016

Report No	17262-1
Client	Greggs Plc
Site	10 Oxford Road Manchester

1. Executive Summary

1.1.1. An environmental noise assessment has been carried out to assess the noise impact of proposed new fixed plant at a Greggs bakery at 10 Oxford Road, Manchester.

1.1.2. The impact has been assessed using the guidance and procedures contained in BS4142:2014[1] (BS4142).

1.2. Measurement, assessment and evaluation

1.2.1. The survey was conducted to BS7445-1:2003[2] and BS7445-1:1991[3] which are covered under our UKAS Accreditation.

1.2.2. The interpretation of the data and the specification of suitable mitigation or treatment is outside the scope of our UKAS accreditation but is covered in our 17025 Quality Management System and reporting procedure.

[1] BS4142:2014 "Methods for rating and assessing industrial and commercial sound"
[2] BS7445-1:2003 "Description and measurement of environmental noise – Part 1: "Description of quantities and procedures"
[3] BS7445-1:1991 "Guide to the acquisition of data pertinent to land use"

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4. Scope

4.1.1. This report covers all aspects of the measurement, evaluation and assessment procedure, including:

- The measurement of the existing sound pressure levels at the site of the proposed development
- The evaluation of the background sound level
- The assessment of the fixed plant using the assessment procedure from BS4142

5. Introduction

5.1.1. New fixed plant is proposed at a Greggs bakery at 10 Oxford Road, Manchester. The plant is to be located externally at the rear of the existing building. The opening hours of the bakery are as follows:

- 06:00 to 19:00 Monday – Friday
- 08:00 to 17:00 Saturday
- Closed Sunday

5.1.2. The nearby residential receivers have been identified as the residential accommodation on the opposite side of Measham Mews at the rear of the bakery. An aerial view of the site and immediate surroundings is given in Figure 1 with the location of the nearby residential receivers identified.

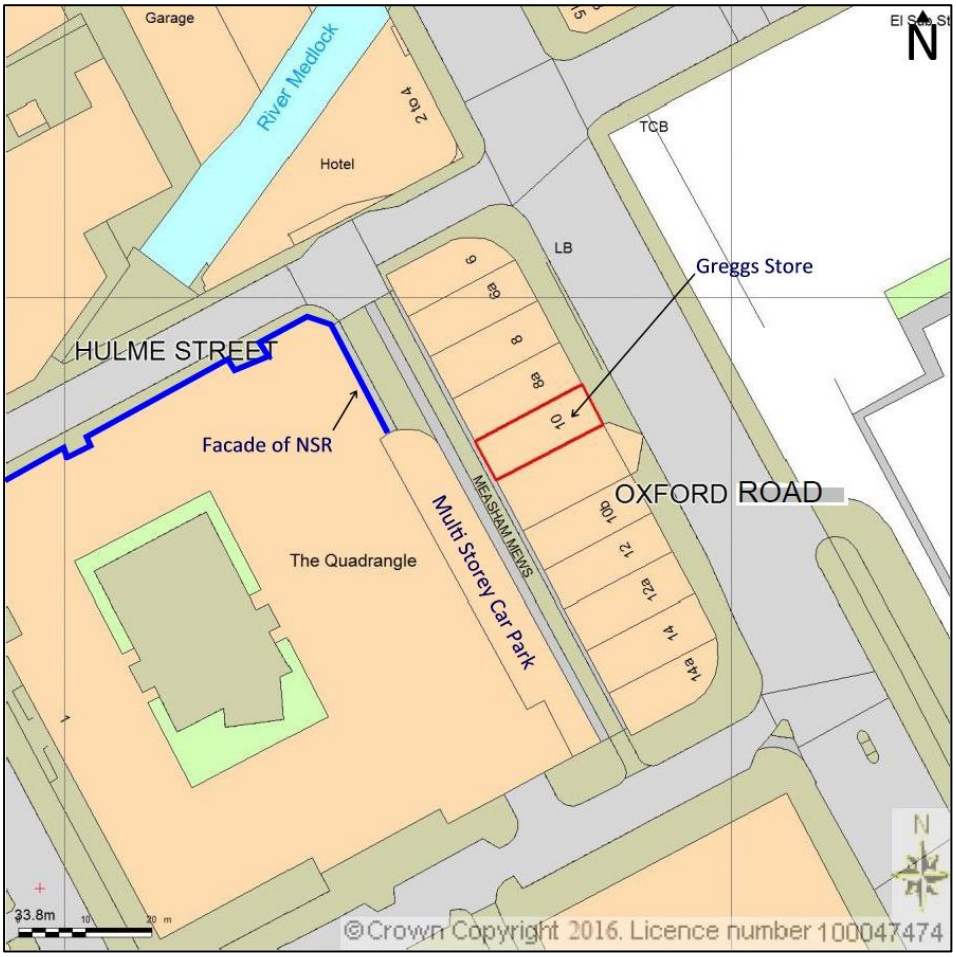


Figure 1 - Aerial view showing the location of the proposed development (red) and the nearby residential receivers (blue)

5.2. New specific sound sources

5.2.1. New fixed plant is proposed at the rear of the bakery. The items of plant and their locations are illustrated in Figure 2 and described in Table 1. The equipment has been assumed to operate in its loudest mode.

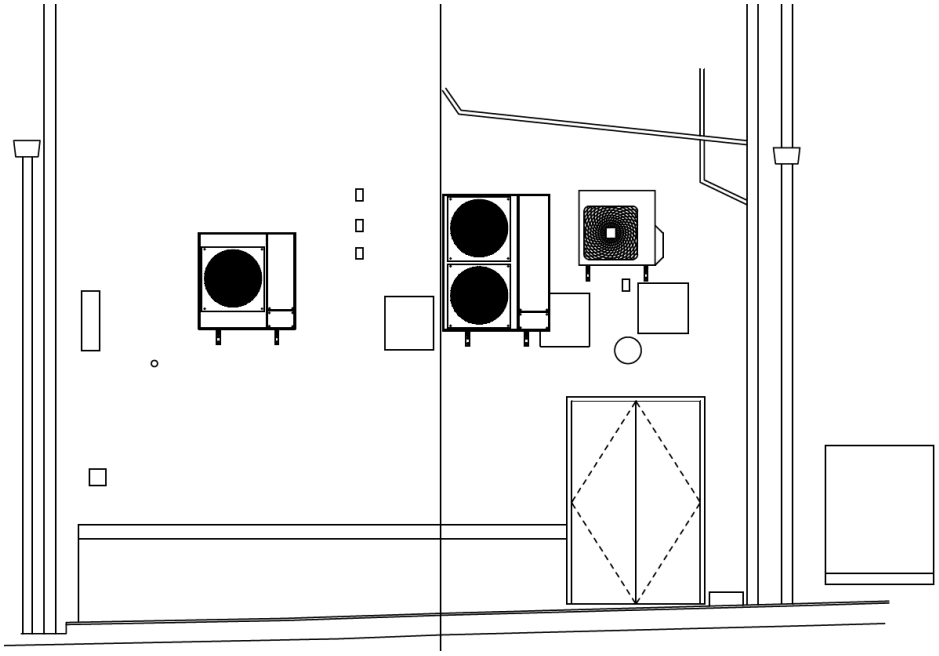


Figure 2 – Location of new fixed plan. Note: condenser unit shown on left of image is existing and to be retained

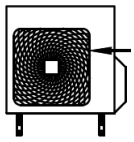
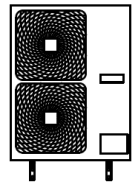
Plant Item	Illustration	Description
Condenser Unit Mitsubishi PUHZ - RP71VHA4 x1		Air conditioner/heating condenser unit. Manufacturer's data supplied. Assumed to operate 100% of the reference period.
Mitsubishi PUHZ - RP140VKA x1		Air conditioner/heating condenser unit. Manufacturer's data supplied. Assumed to operate 100% of the reference period.
Extract Fans Vent Axia x1	Not shown in Figure 2	Extraction fans. Specific model not specified Generic Vent-Axia product data used. Assumed to operate 100% of the reference period.
Extract Fan Ruck EL 315 E2 01 x1	Figure 2	Assumed to operate for 100% of the reference period. Specific product sound power level data provided with octave band spectrum.

Table 1 – Proposed new fixed plant

6. Assessment criteria

6.1. Local planning authority (LPA) criteria

6.1.1. The LPA (Manchester City Council) provides generic advice on carrying out noise assessments of fixed mechanical plant.[4] This has been reproduced in Figure 3 below:

> 'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

Figure 3 – Generic LPA guidance on the noise requirements for new fixed plant
The LPA has also provided specific guidance on the assessment of the sound from the new fixed from the new fixed plant. This has been reproduced in

6.1.2. Figure 4.

> *"Details regarding the noise output from the units, including the cumulative noise impact of all the units (existing and proposed) operating simultaneously, and any acoustic attenuation measures you are proposing to install to limit the breakout of noise from the units. You should also provide details of the ambient noise levels during the daytime, night and weekends and assess how noise from the units will impact on ambient noise levels. This is particularly important here given the large number of residential properties to the rear."*

Figure 4 – LPA guidance on assessing the noise from the new fixed plant

6.1.3. The LPA wishes the client to take account of the cumulative noise from all the plant, including that which is existing. For the purposes of this assessment it has been assumed that this is separate from the typical BS4142 type assessment.

6.2. National Planning Policy Framework

6.2.1. The National Planning Policy Framework (NPPF) was published in March 2012 and sets out the Government's planning policies for England and how these are expected to be applied. The framework states that 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".

[4] Manchester City Council, Planning and Noise: Technical Guidance, December 2015

6.2.2. The express inclusion of noise in the NPPF means that it is a material planning consideration for local planning decisions. It replaces the now revoked Planning Policy Guidance (PPG) Note 24. Paragraph 123 of the NPPF document states that planning policies and decisions should aim to:

A. Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;

B. Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;

C. Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and

D. Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

6.3. Noise Policy Statement for England

6.3.1. The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to *"promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"*.

6.3.2. This long-term vision is supported by the following aims; 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;
- Where possible, contribute to the improvement of health and quality of life.

6.3.3. The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise).

6.4. National Planning Practice Guidance

6.4.1. The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) in March 2014 to support the NPPF and make it more accessible.[5]

6.4.2. It advises on how planning can manage potential noise impacts in new development. The guidance is regularly reviewed and updated and noise is listed as a specific category. The guidance is for ad hoc developments, as major infrastructure is covered by overarching National Policy Statements.

[5] http://www.planningguidance.planningportal.gov.uk

6.4.3. A summary of the effects of noise exposure (in terms of health and quality of life) associated with both noise generating developments and noise sensitive developments is presented within the PPG and reproduced in Table 2.

Perception	Examples of outcomes	Effect level	Action
Not noticeable	No effect	No observed effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect (NOAEL)	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very intrusive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 2 – Noise exposure hierarchy

6.5. BS4142:2014

6.5.1. BS4142 provides methods for rating and assessing sound of an industrial and/or commercial nature, which includes sound from industrial and manufacturing processes, fixed services plant, sound generated by the loading/unloading of goods and sound from mobile plant/vehicles associated with industrial/commercial premises (e.g. fork-lift trucks).

6.5.2. The standard utilises various descriptors to assess complaints, the impact of sound associated with proposed industrial/commercial activities on existing noise-sensitive receivers, or the impact and likely suitability of siting new noise-sensitive receivers in the vicinity of existing industrial/commercial noise sources.

6.5.3. The standard is specifically precluded from being used to determine likely internal sound levels arising from external noise, or from the assessment of various sound sources for which other (more relevant) guidance exists, including music/entertainment noise, person noise and construction noise.

6.5.4. The magnitude of impact is assessed by subtracting the measured background sound level at a location representative of the nearest noise-sensitive receiver, from the 'rating level' (the specific sound source to be introduced into the locality, corrected for acoustically distinguishing characteristics which may make it more subjectively prominent).

6.5.5. Typically, the greater the difference between the background and rating level, the greater the magnitude of impact, although BS 4142 emphasises that this is highly context-specific.

6.5.6. As a guideline, BS4142 states that:

- A difference (between the background and rating level) of around +10 dB or more is likely to be indicative of significant adverse impact, depending on context
- A difference (between the background and rating level) of around +5 dB or more is likely to be indicative of adverse impact, depending on context
- The lower the rating level relative to the background level, the less likely it is that the specific sound will have an adverse impact
- Where the rating level does not exceed the background level, this is an indication that the specific sound will have a low impact, depending on context

6.5.7. It should be noted that BS 4142:2014 draws a clear distinction between the detailed and flexible assessment methods contained within, and the more limited versions contained in the previous (1997) edition.

Definitions

6.5.8. BS 4142 uses several specific terms to define the various levels used in assessments, as follows:

- Specific sound – the commercial/industrial noise source under consideration
- Residual sound – the sound level at the noise-sensitive receivers in the absence of the specific sound
- Ambient sound – the sound level at the noise-sensitive receivers in the presence of the specific sound (i.e. ambient = residual + specific)
- Background level - the sound pressure level which is exceeded by the residual sound for 90% of the measurement period
- Rating level – the specific sound, corrected for acoustically distinguishing characteristics

Background sound level

6.5.9. BS4142 emphasises that the background level ($L_{A90,T}$) is in fact a range of levels, not one absolute value. Whilst stating that the measurements of background sound should be normally not less than 15 minutes, the focus is on obtaining a level for use in assessment that is representative of typical conditions at the noise-sensitive receivers.

6.5.10. An example methodology by which this typical value may be obtained is given in the document. In this example, monitoring of $L_{A90,15mins}$ is undertaken during periods which represent when the specific noise will be operational. After obtaining a sequence of representative contiguous or disaggregated results, it is then proposed that the modal value is representative of the 'typical' background level.

Specific sound

6.5.11. BS 4142 requires that the specific sound ($L_{Aeq,Tr}$) is obtained over a reference period of 1 hour (daytime) and 15 mins (at night). Ideally, measurements would be taken of the ambient sound and residual sound at the assessment location, with these measurements used to accurately calculate the specific sound (ambient – residual = specific).

6.5.12. Where the source (specific sound) is not yet operational, it is permissible to measure the specific sound elsewhere (or to use known manufacturers' or library data) and then model the impact of this against the known background level.

Rating level

6.5.13. Once the specific sound level has been determined, this must be corrected in terms of the need to consider the subjective prominence of the impact of the sound at noise-sensitive receivers, and the extent to which acoustically distinctive characteristics will attract attention.

6.5.14. BS4142 states that this is normally possible to carry out a subjective assessment of characteristics, based on the following correction guidelines:

- Tonality: +2dB for a 'just perceptible' tone, +4dB for 'clearly perceptible', and rising to +6dB for 'highly perceptible' tones.
- Impulsivity (rapidity of change and overall chance in level): +3 dB for 'just perceptible' impulsivity, +6dB for 'clearly perceptible', rising to +9 dB for 'highly perceptible' impulsivity.
- Intermittency: if the on/off-time of the specific sound is readily distinctive at the noise- sensitive receivers, +3dB.

6.5.15. It should be noted that where one feature is clearly perceived as dominant, it may be applicable to correct for that feature only. Where multiple features are likely to affect perception and response, each should be added arithmetically.

7. Survey

7.1. Measurement instrumentation

7.1.1. The measurement instrumentation used during the survey is detailed in the appendix.

7.1.2. The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003 before and after the surveys. The calibration details can also be found in the appendix.

7.2. Monitoring locations

7.2.1. The aim was to locate the monitoring equipment adjacent to nearby residential receivers to record a representative background sound level. However, this was not possible due to the arrangement of the building facade.

7.2.2. An alternative monitoring location was selected to be representative of the noise climate at the nearest residential receiver. This was chosen to be adjacent to the existing plant at the rear of the Greggs Store. Care has been taken to determine a background sound level using data obtained when the existing plant was not operating.

7.2.3. The location of the monitoring equipment is illustrated in Figure 5. The equipment was mounted on the building facade, adjacent to the existing fixed plant.

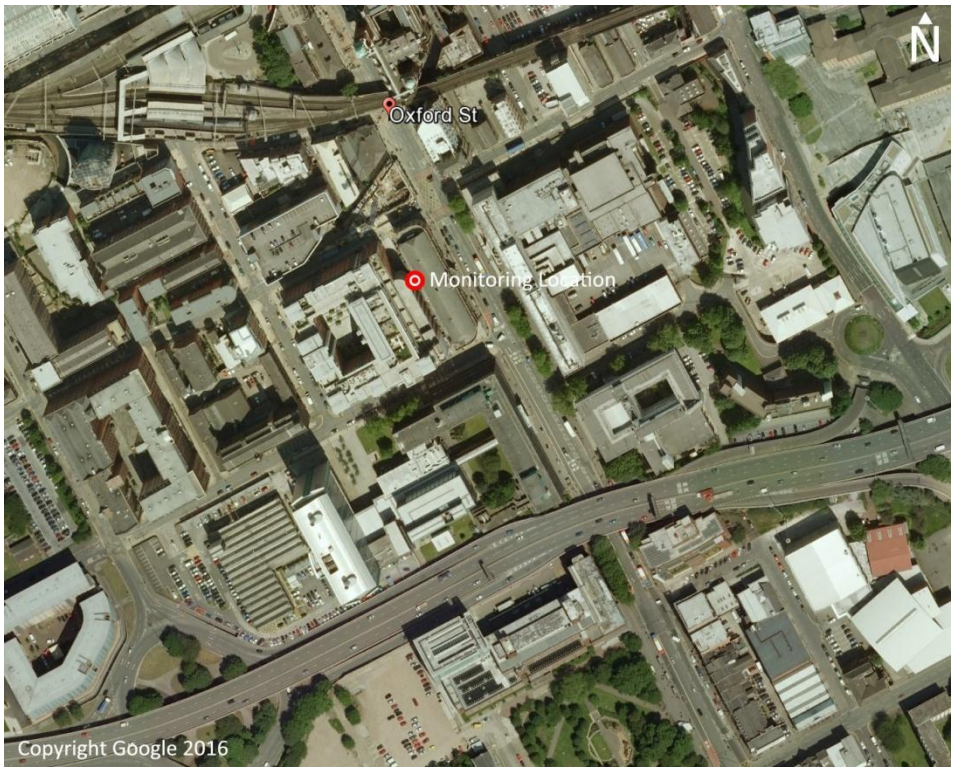


Figure 5 – Location of the unattended monitoring equipment

7.3. Measurement and timescale

7.3.1. Unattended noise monitoring took place over a typical period between Friday 9th September 2016 and Monday 12th September 2016. The following quantities were measured:

$$L_{A90,15min}, L_{Aeq,15min}$$

7.3.2. The acoustic measurements and their interpretation have been in accordance with BS 7445: Parts 1, and 2. All sound pressure levels are in dB (re 20μPa).

7.4. Meteorology

7.4.1. During the survey the weather information was noted. This is shown in Table 3

	Friday 9th September 2016	**Monday 12th September 2016**
Roads (Wet/Dry)	Dry	Dry
Wind Speed (ms^{-1}) / Direction	3/S	4/SW

Table 3 - Meteorological data noted during the survey

7.5. Noise climate

7.5.1. The general noise climate was described by the survey technician as follows:

"At the time of the survey the noise climate at the nearest residential receiver was dominated by the existing fixed plant in Measham Mews. Continuous road traffic noise was also audible as would be expected from an urban area"

8. Measurement results

8.1. Background sound pressure level

8.1.1. The background noise data has been considered over a full 24-hour period because the Greggs Store operates during parts of the daytime (07:00-23:00) and night-time (23:00-0700).

8.1.2. Figure 6 shows the results of the data analysis in terms of the frequency of occurrence of each data value.

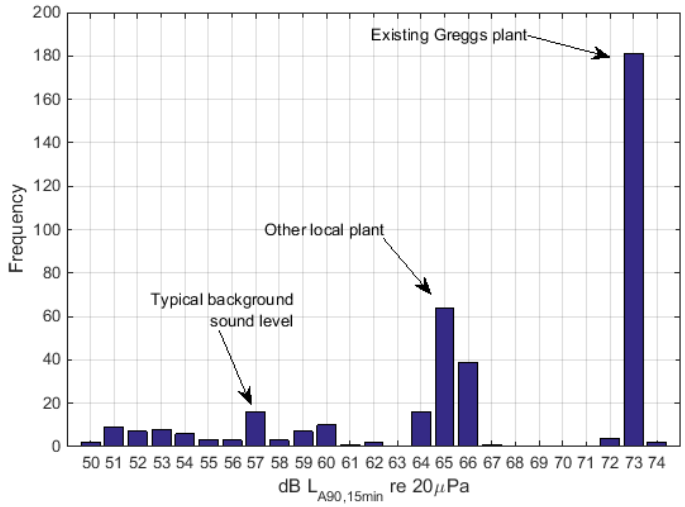


Figure 6 – Background sound level measurements arranged as a histogram

8.1.3. It is clear from Figure 6 that there are three distinct populations that make up the background sound. Based on this figure and the raw background sound levels (plotted in appendix) it is clear that the highest background sound levels are due to the existing plant serving the Greggs bakery. This has been excluded from the typical background sound level.

8.1.4. The population concentrated around 65dB $L_{A90,15min}$ is expected to be due to plant serving other commercial premises nearby because it isn't present late at night. The background sound level for the purposes of BS4142 would typically include the noise from other fixed mechanical plant; however, in order to adopt a conservative approach this has also been excluded.

8.1.5. The remaining population below 63dB$L_{A90,15min}$ would be expected to comprise the remaining environmental sources. Based on this, the typical background sound level has been taken to be 57dB $L_{A90,15mins}$.

8.2. 3D noise model

8.2.1. A 3D noise model has been constructed in SoundPLAN™ to calculate the sound pressure level 1m from the facades of the nearby residential receivers. The model uses the calculation method from ISO9613-1:1996[6] to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings.

8.2.2. The spectral content for the condenser units has been provided by the manufacturer and has been reproduced in the appendix. The extraction fans have been assumed to be standard wall units, this information has also been summarised in the appendix. The spectral content of the Venti-Axia extractor fans has been assumed to be 'axial-flow fan'[7] for the purposes of the calculation.

8.2.3. In each case the new fixed plant items have been assumed to be point sources on the rear façade of the bakery. The worst-case operating point of each plant item has been considered.

8.2.4. The results of the 3D noise model are summarised in Figure 7.

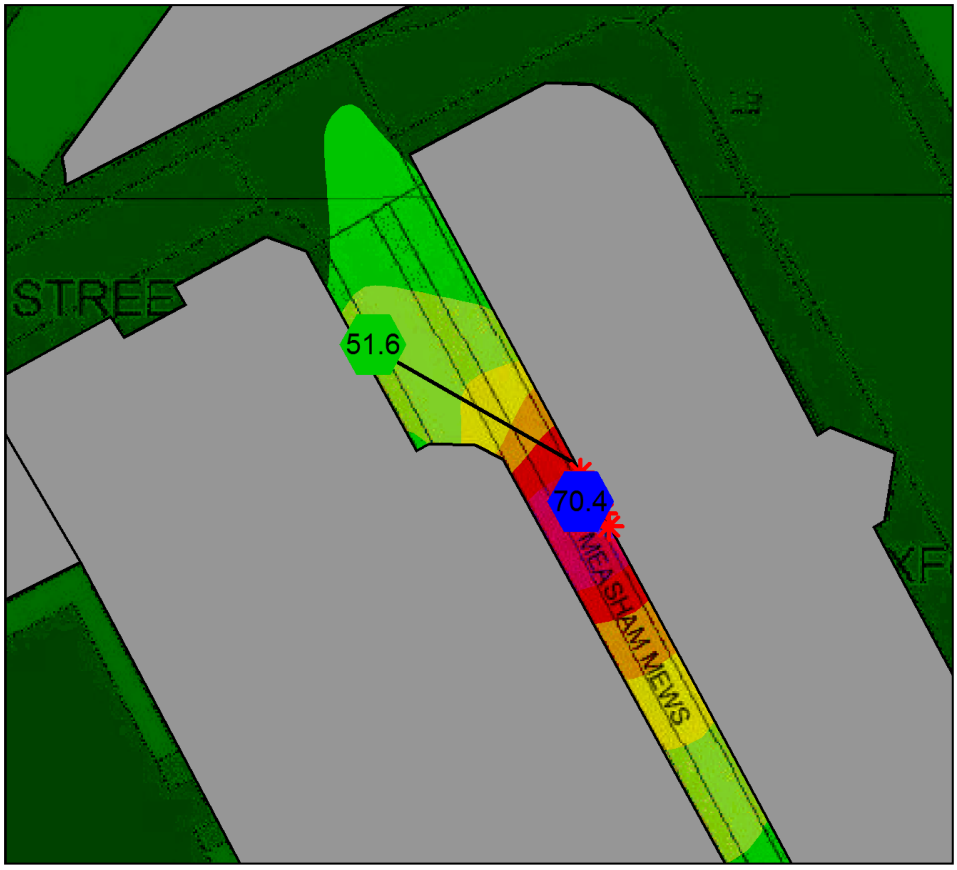


Figure 7 – 3D noise model output showing the level 1m from the facade of the bakery and 1m from the facade of the nearest residential receiver

[6] ISO9613-1:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"
[7] Axial flow fan, C.M. Harris, Acoustical Measurements and Noise Control, 1991

9. BS4142 assessment

9.1.1. Figure 7 shows that the sound pressure level 1m from the rear façade of the bakery is predicted to be 70.4dB(A). This results in a specific sound level of 51.6dB(A) at the nearest residential receiver. It should be noted that this does not include noise from the existing plant serving either the Greggs bakery or any other nearby commercial premises.

9.1.2. The measured background sound levels have been used to assess the likelihood of adverse impact due to the proposed new fixed plant.

9.2. Rating level

9.2.1. The items of fixed plant have been specified but not installed; it is, therefore, not possible to make a subjective judgment of the character of the specific sound. Character corrections have been applied based on experience of similar items of plant.

Tonality

9.2.2. Most items of heating, ventilation and air conditioning plant have rotating components that would be likely to produce modest tones. It is possible that these tones could be just perceivable; however, they would be indistinguishable from those already produced by the existing plant. Therefore, no correction for tonality has been made

Impulsivity

9.2.3. The items of plant would be expected to emit continuous sound. No correction has been made for impulsivity.

Intermittency

9.2.4. It is possible that the fixed plant will not operate 100% of the time. However, in any 1-hour daytime or 15-min night-time reference period the plant would not be expected to switch on and off more than once. Therefore, no correction for intermittency has been made.

9.3. BS4142 assessment

9.3.1. For the purposes of the BS4142 assessment the worst case façade level from the 3D noise model has been reported, this was 51.7dB(A). The latest revision of the standard makes the assessment using a free-field sound pressure level; because the equipment and the receiver are located in an acoustic ‘canyon’ no façade correction has been made. The specific sound level has been rounded-up to make the assessment using whole numbers.

9.3.2. The BS4142 assessment is detailed in Table 4.

	Nearby residential receiver
Background sound level, dB $L_{A90,15min}$	57
Specific sound level, dB(A)	52
Character corrections Tonality Impulsivity Intermittency	 0 0 0
Rating level Specific sound level + corrections	52
Assessment Level Rating level – Background sound level	-5
"Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact."	

Table 4 - The assessment procedure from BS4142

9.4. LPA criteria

5dB criterion

9.4.1. The LPA requires that the rating level be at least 5dB below the background sound level. This criterion has been achieved within 1dB.

9.4.2. Given the exclusion of background sound levels from periods when existing plant at the Gregg Store and other nearby commercial premises was operating, this assessment is likely to be conservative.

Existing plant

9.4.3. The LPA has requested that the existing ambient sound conditions be reported

9.4.4. The L_{Aeq} of the existing plant serving the Greggs bakery has been plotted in Figure 8 and includes periods from the night-time, daytime and weekends.

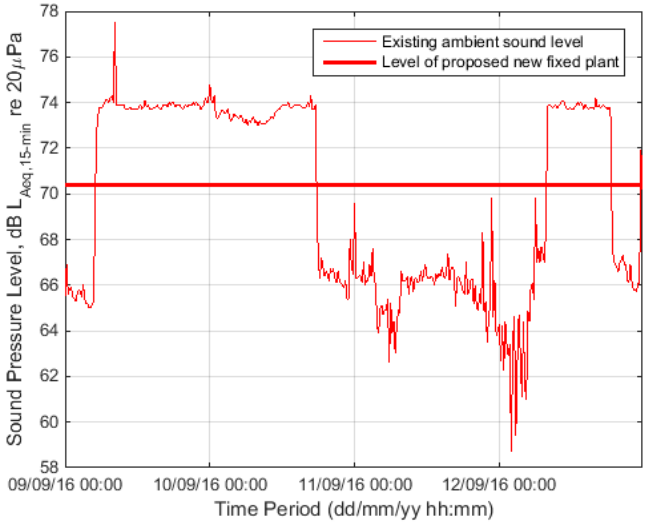


Figure 8 – Plot of the ambient sound level at the rear of the Greggs bakery

9.4.5. Figure 8 shows that the level of the proposed new plant is approximately 3-4dB below the level of the existing sound pressure level. It should be noted that the new plant will only operate at the times that the existing plant does i.e. not on the quieter Sunday period.

10. Uncertainty

10.1.1. BS4142 requires that uncertainty is reported and minimised wherever possible. The document acknowledges that all calculation-based modelling practices are ultimately an approximation. However, rather than ignore this fact or consider the results absolute, it is considered good practice to honestly report factors which can affect the robustness of any assessment.

10.2. Source sound complexity and variability

10.2.1. The data for the specific sound sources has been provided by the manufacturer and taken from the SoundPLAN™ library. This data is unlikely to have been affected by other, residual, sound.

10.3. Background sound complexity and variability

10.3.1. The ambient noise climate at the assessment site is reasonably simple and the background sounds levels measured (which include busier and quieter periods) are readily interpretable. Wind speeds during the survey visits were typically under 5ms^{-1} and the effect of wind generated noise is not considered to have been significant.

10.3.2. There will inevitably be times when the background level at nearby residential receivers is higher or lower than that used in assessment; however, using the typical level is considered to represent the most pragmatic and reasonable solution.

10.4. 3D noise model

10.4.1. The attenuation of sound propagating outdoors between fixed source and receivers fluctuates due to variations in the meteorological conditions along the propagation path. ISO9613:1996 restricts the prediction to moderately downwind conditions of propagation. There is an expected uncertainty of ±3dB in the predicted sound pressure levels.

10.4.2. Ultimately, algorithms used to calculate distance attenuation are approximations. However, within all calculations, ground absorption and diffusion (which can be helpful in terms of attenuating sound with distance) have been set to pessimistic levels. In this way, a worst-case scenario can be modelled, increasing the robustness of the assessment.

10.5. Instrumentation

10.5.1. The instrumentation used in noise.co.uk's surveys has been calibrated by UKAS-approved laboratories. It is, however, noted that the degree of measurement tolerance of most Type 1 sound level analysers is approximately 1-2 dB, meaning that two independently-verified meters could measure the same sound level and report marginally differing values.

11. Conclusions

11.1.1. An environmental noise assessment has been carried out to assess the noise impact of new fixed plant at a Greggs bakery at 10 Oxford Road, Manchester. The assessment shows that the new fixed plant is unlikely to result in adverse impact to local residents.

11.1.2. The rating level of the plant is expected to be 5dB below the typical background sound level at the nearest residential receiver.

11.1.3. We strongly recommend that this report be passed to the local authority for approval before any works are carried out.

Matt Torjussen **MSc, MIOA, CEng**
Noise & Vibration Consultant

Appendix

APPENDIX A: Summary Information

Required ISO Test Report Information (cross referenced where required)			
		Measurements carried out to:	Analysed to:
A	Standards	BS 7445-1: 2003 BS 7445-1: 1991	BS4142:2014
B	Organisation performed the measurements	noise.co.uk Ltd, The Haybarn, Newnham Grounds, Kings Newnham Lane, Bretford, Coventry, CV23 0JU.	
C	Name of Client	Greggs Plc	
D	Full site address	10 Oxford Road, Manchester	
E	Date of surveys	Unattended survey date: Friday 9th September – Monday 12th September 2016	
F	Description & identification of proposed development	A new commercial development is proposed with fixed plant.	
G	Brief Description of details of Procedure & equipment	See Section 5 of this report.	

APPENDIX B: Technical appendix

11.1.4. Measurements were made using the following equipment:

Monitoring Position	Sound Level Meter (Serial Number)	Calibrator (Serial Number)
Position 1	Norsonic 118 (31475)	Norsonic 1251 (31011)

11.1.5. The equipment has traceable calibration.

11.1.6. The sound level meter was calibrated immediately prior to and immediately after the measurements were carried out.

Sound Level Meter	Before	After
Norsonic 118 (31475)	113.9 dB	113.9 dB

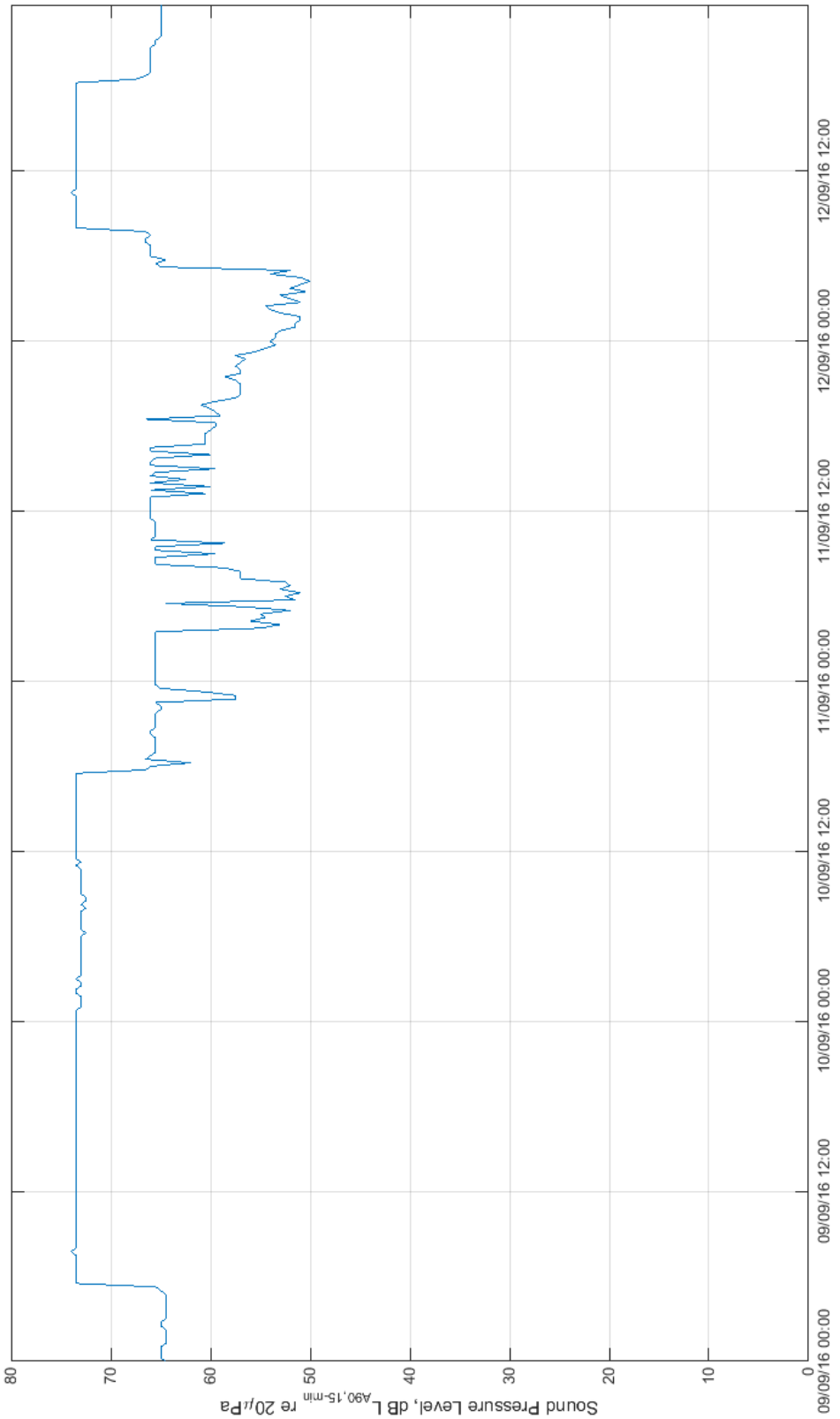
11.1.7. There was no adverse deviation.

APPENDIX C: Background sound level data

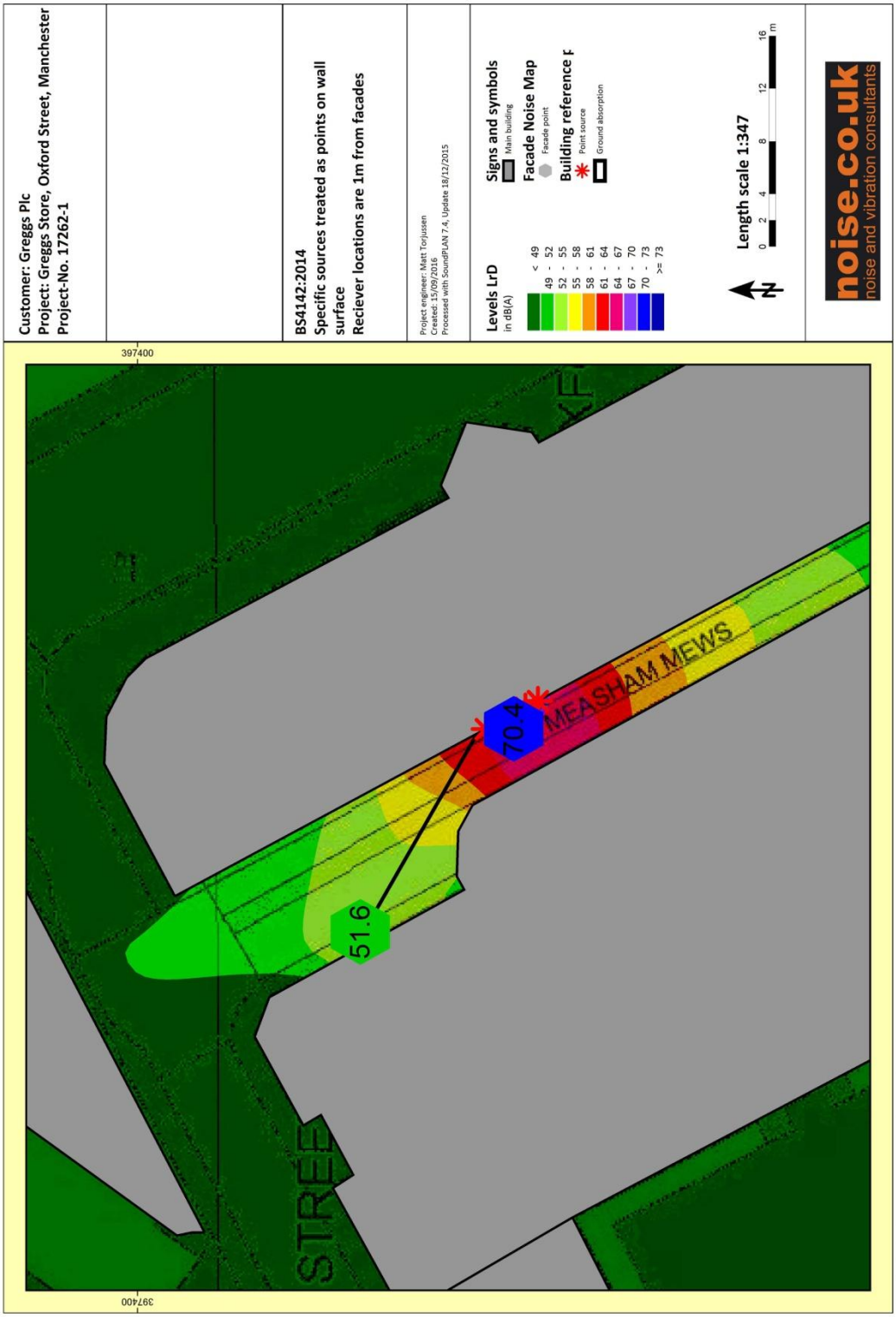
Time	09/09/2016 dB $L_{A90,15min}$	10/09/2016 dB $L_{A90,15min}$	11/09/2016 dB $L_{A90,15min}$	12/09/2016 dB $L_{A90,15min}$
00:00:00	64.5	73.5	65.5	54.0
00:15:00	65.0	73.5	65.5	53.5
00:30:00	65.0	73.5	65.5	53.5
00:45:00	65.0	73.5	65.5	53.0
01:00:00	65.0	73.0	65.5	51.5
01:15:00	64.5	73.0	65.5	51.5
01:30:00	64.5	73.0	65.5	51.0
01:45:00	64.5	73.0	65.5	51.0
02:00:00	64.5	73.5	65.5	53.0
02:15:00	64.5	73.5	65.5	54.0
02:30:00	65.0	73.0	65.5	54.5
02:45:00	65.0	73.0	65.5	51.0
03:00:00	64.5	73.5	65.5	52.0
03:15:00	64.5	73.0	65.5	53.0
03:30:00	64.5	73.0	65.5	50.5
03:45:00	64.5	73.0	55.0	52.0
04:00:00	64.5	73.0	53.0	51.0
04:15:00	64.5	73.0	56.0	50.0
04:30:00	64.5	73.0	54.5	51.0
04:45:00	64.5	73.0	55.0	54.0
05:00:00	65.0	73.0	52.0	52.0
05:15:00	65.5	73.0	56.5	65.0
05:30:00	73.5	73.0	64.5	65.5
05:45:00	73.5	73.0	51.5	64.5
06:00:00	73.5	73.0	52.5	66.0
06:15:00	73.5	72.5	51.0	66.0
06:30:00	73.5	73.0	53.0	66.0
06:45:00	73.5	73.0	52.0	66.0
07:00:00	73.5	73.0	52.5	66.5
07:15:00	73.5	73.0	57.0	66.5
07:30:00	73.5	73.0	57.0	66.0
07:45:00	74.0	73.0	57.0	66.5
08:00:00	73.5	72.5	58.5	73.5
08:15:00	73.5	73.0	65.5	73.5
08:30:00	73.5	72.5	65.5	73.5
08:45:00	73.5	72.5	65.5	73.5
09:00:00	73.5	73.0	59.5	73.5

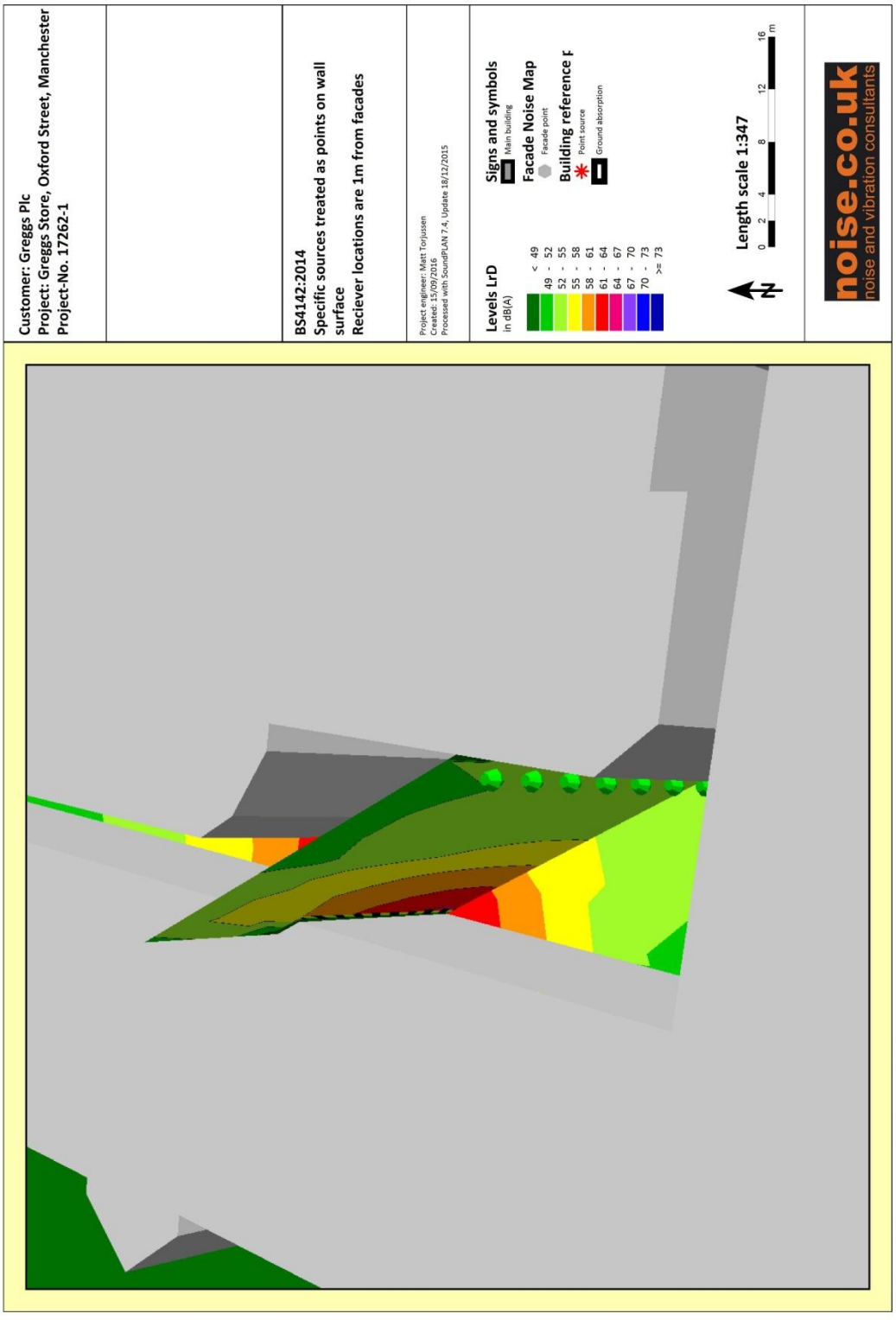
Time	09/09/2016 dB $L_{A90,15min}$	10/09/2016 dB $L_{A90,15min}$	11/09/2016 dB $L_{A90,15min}$	12/09/2016 dB $L_{A90,15min}$
09:15:00	73.5	73.0	65.5	73.5
09:30:00	73.5	73.0	65.5	73.5
09:45:00	73.5	73.0	58.5	73.5
10:00:00	73.5	73.0	66.0	73.5
10:15:00	73.5	73.0	65.5	73.5
10:30:00	73.5	73.0	65.5	74.0
10:45:00	73.5	73.0	65.5	73.5
11:00:00	73.5	73.5	65.5	73.5
11:15:00	73.5	73.0	65.5	73.5
11:30:00	73.5	73.5	66.0	73.5
11:45:00	73.5	73.5	66.0	73.5
12:00:00	73.5	73.5	66.0	73.5
12:15:00	73.5	73.5	66.0	73.5
12:30:00	73.5	73.5	66.0	73.5
12:45:00	73.5	73.5	66.0	73.5
13:00:00	73.5	73.5	66.0	73.5
13:15:00	73.5	73.5	60.5	73.5
13:30:00	73.5	73.5	66.0	73.5
13:45:00	73.5	73.5	60.0	73.5
14:00:00	73.5	73.5	66.0	73.5
14:15:00	73.5	73.5	62.5	73.5
14:30:00	73.5	73.5	66.0	73.5
14:45:00	73.5	73.5	65.5	73.5
15:00:00	73.5	73.5	59.5	73.5
15:15:00	73.5	73.5	66.0	73.5
15:30:00	73.5	73.5	66.0	73.5
15:45:00	73.5	73.5	65.5	73.5
16:00:00	73.5	73.5	60.0	73.5
16:15:00	73.5	73.5	66.0	73.5
16:30:00	73.5	73.5	66.0	73.5
16:45:00	73.5	73.5	60.5	73.5
17:00:00	73.5	73.5	60.5	73.5
17:15:00	73.5	73.5	60.5	73.5
17:30:00	73.5	73.5	60.5	73.5
17:45:00	73.5	66.5	60.0	73.5
18:00:00	73.5	66.0	59.5	73.5
18:15:00	73.5	62.0	59.5	73.5
18:30:00	73.5	66.5	66.5	67.5

Time	09/09/2016 dB $L_{A90,15min}$	10/09/2016 dB $L_{A90,15min}$	11/09/2016 dB $L_{A90,15min}$	12/09/2016 dB $L_{A90,15min}$
18:45:00	73.5	66.0	59.0	66.5
19:00:00	73.5	65.5	59.5	66.0
19:15:00	73.5	65.5	60.0	66.0
19:30:00	73.5	65.5	61.0	66.0
19:45:00	73.5	65.5	59.5	66.0
20:00:00	73.5	65.5	57.5	66.0
20:15:00	73.5	66.0	57.0	66.0
20:30:00	73.5	66.0	57.0	66.0
20:45:00	73.5	65.5	57.0	66.0
21:00:00	73.5	65.5	57.0	65.5
21:15:00	73.5	65.5	57.5	65.5
21:30:00	73.5	65.5	58.5	65.0
21:45:00	73.5	65.5	57.0	65.0
22:00:00	73.5	65.0	57.0	65.0
22:15:00	73.5	65.0	57.5	65.0
22:30:00	73.5	65.5	57.0	65.0
22:45:00	73.5	57.5	56.5	65.0
23:00:00	73.5	57.5	57.5	65.0
23:15:00	73.5	60.5	55.5	65.0
23:30:00	73.5	65.0	54.5	65.0
23:45:00	73.5	65.5	53.5	65.0

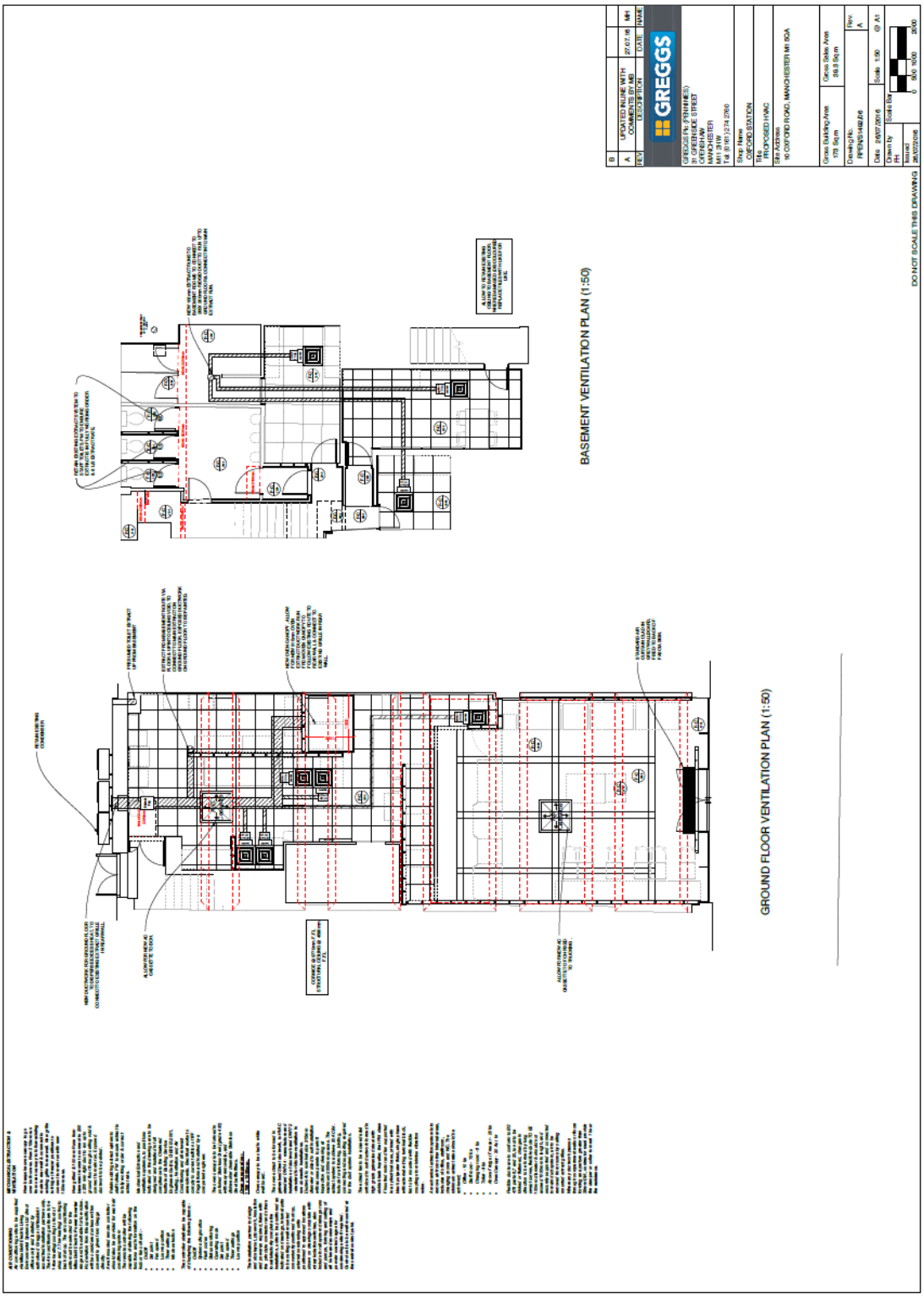

Sound Pressure Level, dB $L_{A90,15\text{-}min}$ re 20μPa
0
10
20
30
40
50
60
70
80
09/09/16 00:00
09/09/16 12:00
10/09/16 00:00
10/09/16 12:00
11/09/16 00:00
11/09/16 12:00
12/09/16 00:00
12/09/16 12:00

APPENDIX D: 3D noise model



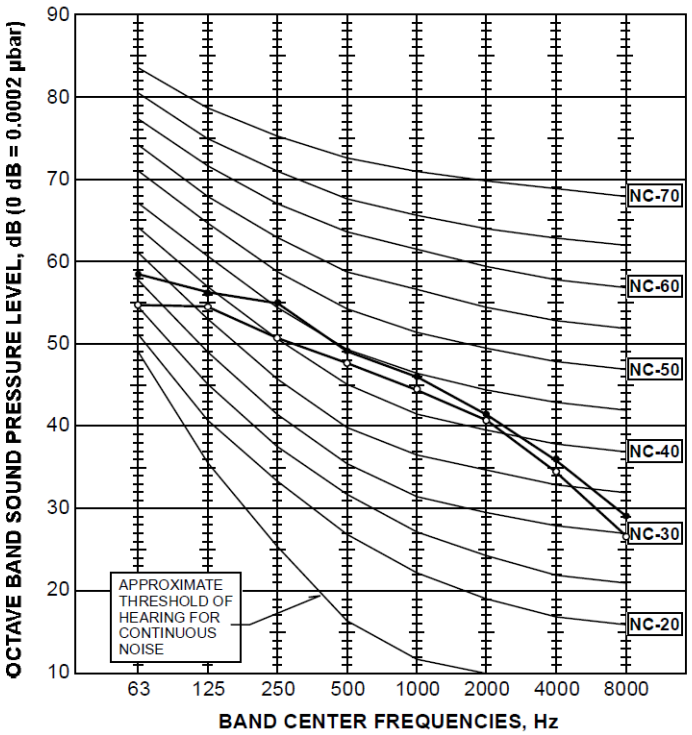

Customer: Greggs Plc
Project: Greggs Store, Oxford Street, Manchester
Project-No. 17262-1
BS4142:2014
Specific sources treated as points on wall surface
Reciever locations are 1m from facades
Project engineer: Matt Torjussen
Created: 15/09/2016
Processed with SoundPLAN 7.4, Update 18/12/2015
Levels LrD
in dB(A)
< 49
49 - 52
52 - 55
55 - 58
58 - 61
61 - 64
64 - 67
67 - 70
70 - 73
>= 73
Signs and symbols
Main building
Facade Noise Map
Facade point
Building reference p
Point source
Ground absorption
Length scale 1:347
0 2 4 8 12 16 m
N
noise.co.uk
noise and vibration consultants
C:\Users\matt\Desktop\Greggs Store, Oxford Street, Manchester\BS4142 - 3D.sgs

APPENDIX E: Client drawings and information



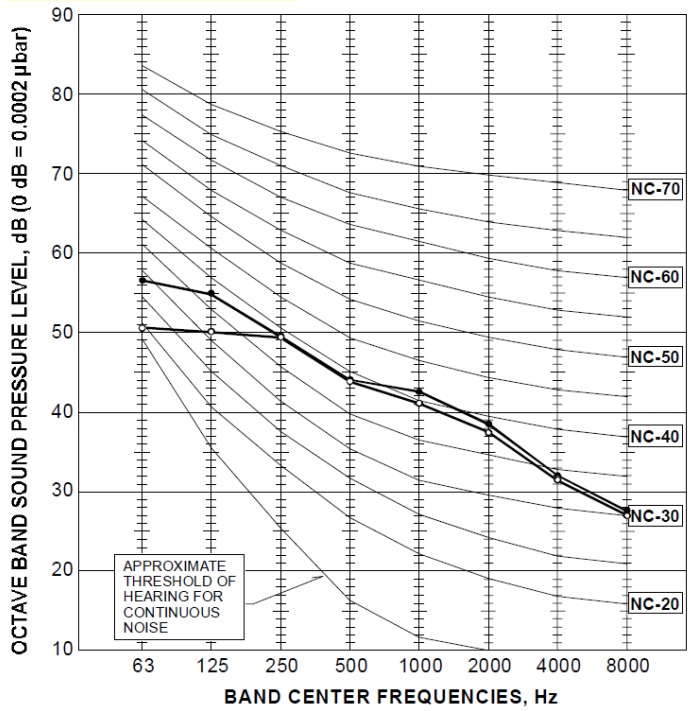
PUHZ-RP140VKA
PUHZ-RP140YKA

MODE	SPL(dB)	LINE
COOLING	50	
HEATING	52	



PUHZ-RP60VHA4
PUHZ-RP71VHA4

MODE	SPL(dB)	LINE
COOLING	47	
HEATING	48	



It has been assumed this data was measured at 1m distance

Vent-Axia
Commercial Range

Traditional Standard Range®

Wall Models



Features & Benefits

- Extract/intake models in 4 sizes: 6", 7", 9" and 12"
- IPX4 Rated
- White fascia, wall sleeve and black external weather louvre
- Optional shutter available
- Manufactured in weather-resistant polymeric materials
- For the best performance from your fan, use an Ecotronic controller

Classic Retro-Styled Ventilation

The proven Standard Range Wall models are designed to fit flush into most double brick walls using the rigid wall liner supplied with the unit. Provision is made within the liner for conduit entry. When installed, only the ivory fascia is visible on the internal wall face. The external weather louvre fits flush to the outside. A shutter is available as an accessory which can be easily fitted within the unit.

On new building work the installation and wiring of the wall liner can be completed prior to the final installation of the unit and controller. Fully shrouded connectors on the fascia automatically connect the wiring to the motor when fitted to the wall liner.

Motor

The motor is purpose-designed. Suitable for running at any angle. Quiet running, enclosed, sealed for life ball bearings.

Supply voltage: 220-240V/1/50Hz.

Suitable for operation in ambient temperatures from -40°C to +50°C.

Fitted with Standard Thermal Overload Protection (S.T.O.P.).

Shutter

Type SD/R

The extract/intake shutter fits inside the Vent-Axia unit and closes against unwanted back draughts. It can be fitted at the same time as the unit or at a later date if required. Airflow operated for extract use, cord operated lock for intake use.

Controller

The Ecotronic controller is recommended for use with this model to give full function control of the fan including auto mode using an electro-mechanical sensor from Vent-Axia's sensor range. Alternatively, single speed extract is achieved using a normal On/Off switch.

Models

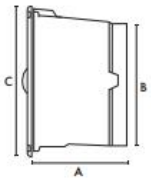
Size	Stock Ref
S6WL	131510
S7WL	132510
S9WL	133510
S12WL	134510

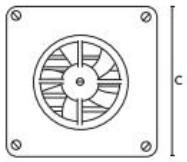
Shutters

Size	Stock Ref
S6SD/R	231710
S7SD/R	232710
S9SD/R	233710
S12SD/R	234710

Dimensions (mm)

Size	6 in	7 in	9 in	12 in
A	279	279	279	279
B	203	279	279	356
C	279	362	362	448
Fixing hole Ø	235	311	311	400
Weight kg	4.1	5.7	6.7	10.1





Performance

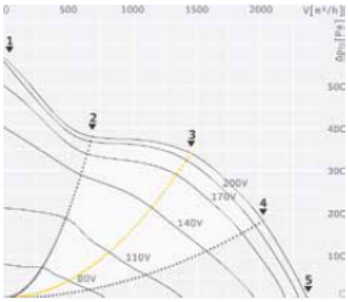
Model	Extract Performance m³/h (l/s) F.I.D.	Watts MAX.	Sound dB(A) @ 3m	Amps @ 240V
S6/WL	340 (94)	32	39	0.16
S7/WL	544 (151)	34	35	0.16
S9/WL	856 (238)	53	43	0.24
S12/WL	1767 (491)	84	46	0.36



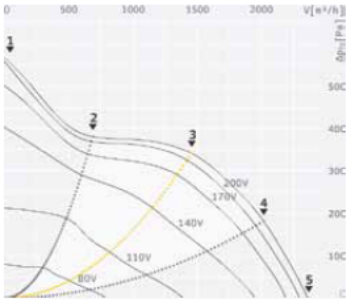
ETALINE ... E

Highly efficient, voltage controllable

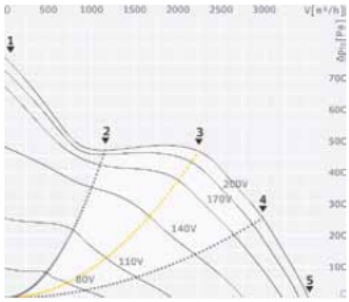
A EL 280 E2 02
ID 115334



B EL 315 E2 03
ID 117010



C EL 315 E2 01
ID 112202



Operating data

		1	2	3	4	5
I	A	1.1	0.9	1.2	1.2	1.1
P_1	W	242	198	263	273	250
n	1/min	2862	2888	2819	2813	2838
L_{WA5}	dB(A)	80	77	75	76	79
L_{WA6}	dB(A)	84	81	79	81	82
L_{WA2}	dB(A)	64	62	58	56	58

	1	2	3	4	5
A	1.1	0.9	1.2	1.2	1.1
W	242	198	263	273	250
1/min	2862	2888	2819	2813	2838
dB(A)	80	77	75	76	79
dB(A)	84	81	79	81	82
dB(A)	64	62	58	56	58

	1	2	3	4	5
A	2.1	1.7	2.3	2.3	2.1
W	465	385	515	527	476
1/min	2801	2850	2776	2772	2809
dB(A)	84	80	76	78	81
dB(A)	88	84	81	83	85
dB(A)	68	66	61	61	63

Sound power [Operating point 3]

dB(A)	Σ	125	250	500	1k	2k	4k	8k
L_{WA5}	75	49	63	68	70	69	66	57
L_{WA6}	79	51	69	73	75	73	66	58
L_{WA2}	58	44	46	49	53	51	49	45

Σ	125	250	500	1k	2k	4k	8k
75	49	63	68	70	69	66	57
79	51	69	73	75	73	66	58
58	44	46	49	53	51	49	45

Σ	125	250	500	1k	2k	4k	8k
76	48	64	69	70	70	69	66
81	50	70	75	77	75	71	65
61	46	50	52	57	54	53	46