

Noise Impact Assessment

Site: The Shamrock, Manchester

Reference: 51-415-R1-2

Date: February 25





E3P

Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

+ 44 (0) 161 707 9612
<https://e3p.co.uk>

Registered in England
CRN: 08725262

QUALITY ASSURANCE

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WRITTEN BY	QUALIFICATIONS	POSITION
Lee Faulkner	BSc (Hons) MEnvSci MIOA	Associate Director

REVIEWED BY	QUALIFICATIONS	POSITION
Melissa Bailey	BEng (Hons) AMIOA	Consultant

AUTHORISED BY	QUALIFICATIONS	POSITION
Lee Faulkner	BSc (Hons) MEnvSci MIOA	Associate Director



EXECUTIVE SUMMARY

Site Address	The Shamrock, 17 Bengal Street, Manchester M4 6AQ
National Grid Reference	E 384990, N 398823.
Proposed Development	Redevelopment of existing Public House including single storey extension and installation of roof mounted plant.
Surveys Completed	E3P have undertaken a four-day unattended background and ambient sound survey in a position considered representative of the nearby residential receptors.
Assessments Completed	A 3D noise model has been constructed to assess beer garden usage and fixed plant noise upon residential facades. Beer garden usage noise is assessed in accordance with the criterion, for day and night, given in BS 8233:2014+A1:2019. Fixed plant noise is assessed in accordance with BS 4142:2014+A1:2019.
Mitigation Recommendations	The assessment has found that noise levels from the beer garden would be acceptable with noise from its usage only marginally perceptible to existing receptors. Noise from fixed plant was found to be well below background sound levels. As such, no mitigation measures are required.
Conclusion and Discussion	This assessment has shown that no adverse impact is predicted day or night at the receptors due to operation of the development.



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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Joseph Holt Ltd to undertake a Noise Impact Assessment for the proposed redevelopment and extension to The Shamrock Public House in Manchester, to be referred to hereafter as 'the Site'.

This assessment looks to determine the key noise sources associated with the development upon existing residential receptors.

1.2. REPORT OBJECTIVES

The objectives of this report are as follows.

- ✚ Establish and measure the existing sound levels across the site, day and night, at a representative location for nearby receptors.
- ✚ Consider the potential sources of sound associated with the site.
- ✚ Assess internal and external noise levels associated with beer garden usage in accordance with criteria given in BS 8233.
- ✚ Assess the impact of fixed plant sound upon the receptors in accordance with BS 4142
- ✚ Provide advice on mitigation measures, where required.

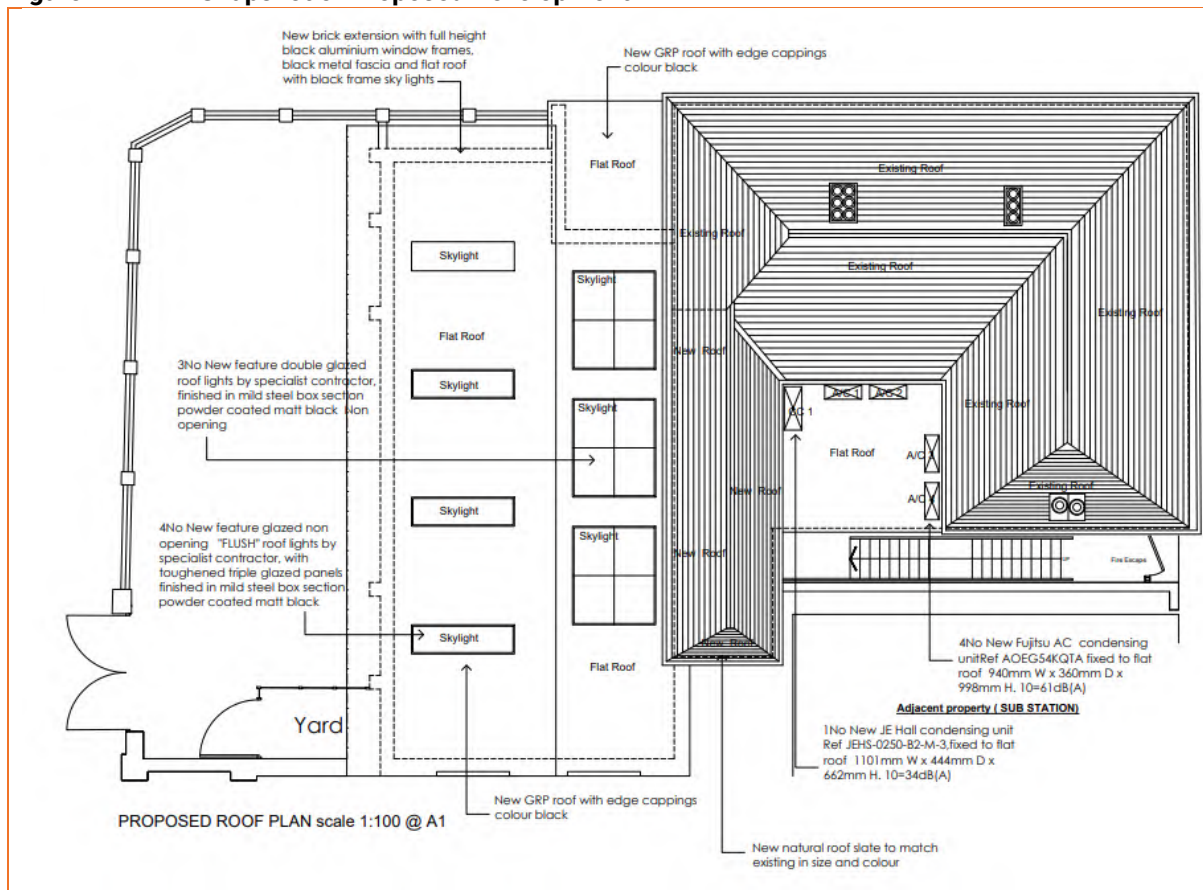
1.3. PROPOSED DEVELOPMENT

The client intends to reopen and extend The Shamrock Public House with a single storey extension. The beer garden is to be reinstated with new roof mounted plant items installed.

A snapshot of the proposed development roof layout is indicated in Figure 1.



Figure 1 **Snapshot of Proposed Development**





2. ASSESSMENT METHODOLOGY

2.1. NATIONAL PLANNING POLICY FRAMEWORK

To prevent unacceptable risks from pollution, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be considered.

The national planning policy framework states that planning policies and decisions should aim to:

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

2.2. NATIONAL PLANNING PRACTICE GUIDANCE

Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

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

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

In line with the explanatory note of the NPSE, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase, where 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.

The "observed effect levels" are as follows:



- 🔊 Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
- 🔊 Lowest observed adverse effect level: This is the level of noise exposure above which adverse effects on health and quality of life can be detected.
- 🔊 No observed effect level: This is the level of noise exposure below which no effect at all on health or quality of life can be detected.

Table 1 summarises the noise exposure hierarchy, based on the likely average response.

Table 1 Noise Exposure Hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
Not Applicable	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	No specific measures required
Lowest Observed Adverse Effect Level			
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, or having to close windows for some of the time because of the noise where there is no alternative ventilation. 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			
Noticeable and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion, having to keep windows closed most of the time because of the noise where there is no alternative ventilation. 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 effect	Avoid
Noticeable and Very Disruptive	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 (auditory and non-auditory).	Unacceptable adverse effect	Prevent

The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any situation. These factors include the following:



- ✿ The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day. The adverse effect can also be greater simply because there is less background noise at night.
- ✿ For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise can be important.
- ✿ The spectral content of the noise and the general character of the noise. The local topology and topography should also be considered along with the existing and, where appropriate, the planned character of the area.

More specific factors to consider when relevant:

- ✿ Where applicable, the cumulative impacts of more than one source should be considered along with the extent to which the source of noise is intermittent and of limited duration.
- ✿ Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases, a suitable alternative means of ventilation is likely to be necessary.
- ✿ If external amenity spaces are an intrinsic part of the overall design, then the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.

2.3. BRITISH STANDARD BS 4142: 2014+A1:2019 - METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

This standard describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- ✿ Sound from industrial and manufacturing processes.
- ✿ Sound from fixed installations which comprise mechanical and electrical plant and equipment.
- ✿ Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and
- ✿ Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

The procedure detailed in the standard compares the measured or predicted specific noise level from any of the above with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is typical.

The specific noise level also acknowledges the reference time intervals depending upon whether the noise source operates during daytime (1-hour) or night-time (15-minute) periods.

There are several 'penalties' which can be attributed to the specific sound level depending upon the 'acoustic features' of the sound level under investigation as follows:

Tonality



- ✿ +2 dB: where the tonality is just perceptible.
- ✿ +4 dB: where the tonality is clearly perceptible; and
- ✿ +6 dB: where the tonality is highly perceptible.

Impulsivity

- ✿ +3 dB: where the impulsivity is just perceptible.
- ✿ +6 dB: where the impulsivity is clearly perceptible; and
- ✿ +9 dB: where the impulsivity is highly perceptible.

Intermittency

- ✿ +3dB: where the intermittency is readily distinctive against the acoustic environment.

In addition to the above, there is a penalty for 'other sound characteristics' of +3 dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment. BS 4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

Assessment of the rating level relative to the background sound level can yield the following commentary:

- ✿ Typically, the greater this difference (between the rating level and the background sound level), the greater the magnitude of 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; and
- ✿ 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. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

2.4. BRITISH STANDARD BS 8233:2014+A1:2019 – GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

The scope of this standard is the provision of recommendations for the control of noise in and around buildings including residential dwellings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 2.



Table 2 **BS 8233:2014 Recommended Internal Noise Levels**

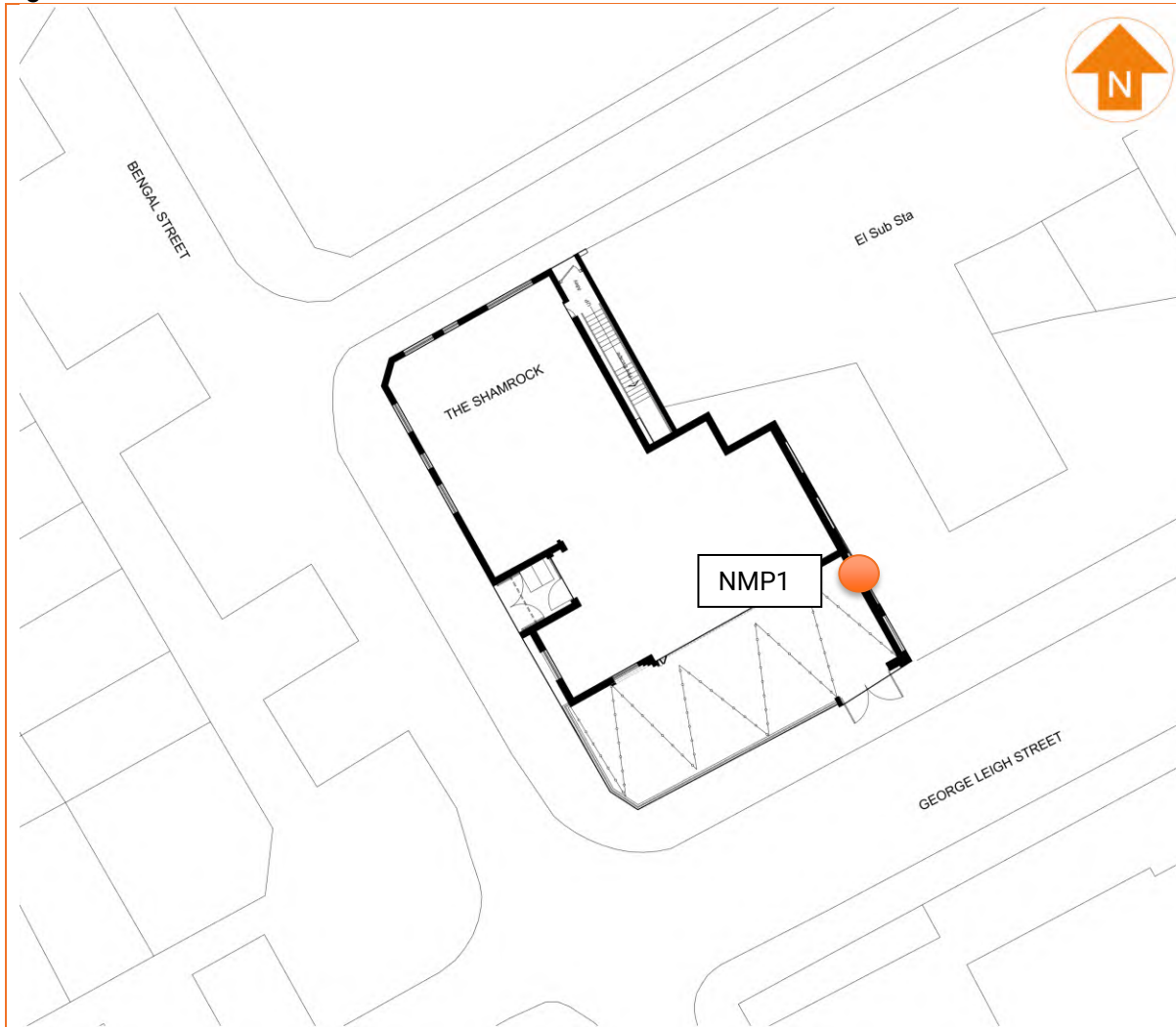
Criterion	Typical situation	Design criterion, $L_{Aeq,t}$ (dB)
Suitable resting and sleeping conditions	Living Room	35
	Bedroom	30



3. SURVEY RESULTS

A full weekday and weekend background and ambient sound survey has been conducted on the site in the following position:

Figure 2 Noise Measurement Position



3.1. UNATTENDED BACKGROUND AND AMBIENT SOUND SURVEY

E3P has conducted a full weekday and weekend Background and Ambient Sound Survey to quantify the existing levels of background and ambient sound at existing receptors in the immediate vicinity of the Site. The survey was carried out over the following time period:

- 📍 12:00 Thursday 31st October to 13:00 Monday 4th November 2024.

The following noise measurement position was chosen for the Background and Ambient Sound Survey:

- 📍 Noise Measurement Position 1 (NMP1): Located in the eastern area of the external yard of The Shamrock. The microphone was elevated 1.5 m above ground level and in free-field conditions. The sound climate was dominated by road traffic sound along the surrounding roads.



Table 3 details the range and average measured background and ambient sound levels. Appendix III details the full hourly data.

Table 3 Average and Range of Measured Background and Ambient sound pressure levels

Date	Time period	Range of measured background sound levels, $L_{A90,T}$ (dB)	Median measured background sound levels, $L_{A90,T}$ (dB)	Average measured ambient sound levels, $L_{Aeq,T}$ (dB)
Thursday 31 st October	13:00–23:00	40.8–45.8	43	51.7
	23:00–07:00	35.5–43.0	37	44.9
Friday 1 st November	07:00–23:00	41.8–46.6	44	50.6
	23:00–07:00	36.8–42.9	38	45.1
Saturday 2 nd November	07:00–23:00	39.8–44.2	43	50.5
	23:00–07:00	35.2–44.3	38	45.4
Sunday 3 rd November	07:00–23:00	36.6–41.9	41	46.8
	23:00–07:00	33.6–41.3	35	42.4

The worst-case typical background sound level to be used in the assessment are 41 dB during the day and 35 dB during the night.

During the survey, conditions remained dry and wind speeds rarely exceeded 5 m/s.

The equipment outlined in 4 was used for the noise survey.

Table 4 Noise Measurement Equipment and Calibration Dates

Measurement position	Equipment description	Manufacturer & type number	Serial number	Calibration due date
NMP1	Sound Level Meter	01dB Fusion	14616	10 th July 2026
	Pre-amplifier	01dB Pre22	20951	
	Microphone	GRAS 40CD	494264	
	Calibrator	Cirrus CR 515	99206	9 th July 2025

The sound level meter was field calibrated before and after measurements with no significant drift witnessed.



4. NOISE IMPACT ASSESSMENT – BEER GARDEN NOISE

For the purposes of this assessment, E3P has used noise modelling software, CadnaA 2024 MR1, to determine the impact of noise from the operation of the beer garden.

The following inputs have been included in the model:

- ✿ Proposed Site Plan.
- ✿ Ground elevations have been taken as existing by way of a 2 m grid Digital Terrain Model (DTM) which contains public sector information licensed under the Open Government License v3.0.
- ✿ Existing buildings have been included in the model and assumed to have a structured façade.
- ✿ A reflection order of 1 has been used in all calculations.
- ✿ No soft ground correction is applied.
- ✿ Noise levels generated using ISO 9613-1 and ISO 9613-2 "*Acoustics – Attenuation of sound during propagation outdoors*" as incorporated into CadnaA software.

A methodology for assessing and calculating the noise from small or medium sized crowds is proposed by Hayne, Rumble and Mee (2006) , which has been applied to noise from patrons using the beer garden. Hayne et al (2006) state that the A-weighted sound power level of crowd noise is a function of the following variables:

- ✿ An individual's voice effort.
- ✿ The total number of people in the crowd.
- ✿ Whether the crowd are synchronised or random with time, which can affect the maximum noise levels (LAmax).
- ✿ Whether the crowd is directional or has a diffused orientation.

A 4-person table is allowed for within the noise model, per point source to allow for talking with raised voices. A total of 6-point sources are inputted to account for 24 people all talking with raised voices for 100% of the hour. This allows for a 2-way conversation between 48 people.

A sound pressure level of 66 dB for raised speaking, at 1 m, is used and factored up to 4 people via a simple $10 \log$ (number of patrons) calculation. This results in a sound power level of 80 dB per 4 people.

No directivity correction is applied.

Figure 3 details the specific noise level at receptors in the immediate vicinity of the development site. Table 4 below details the assessments per receptor. It is assumed that the beer garden would be in use up to 23:00.



Table 5 Beer Garden Noise Levels

Receptor	Predicted sound pressure level, $L_{Aeq,T}$ (dB)	Average measured ambient sound pressure levels, $L_{Aeq,T}$ (dB)	Combined sound pressure levels, $L_{Aeq,T}$ (dB)	Change in noise level, +/- (dB)
One Silk Street	43	46.8	48.3	+1.5
Bengal Street West	47	46.8	49.9	+3.1
Offices to the south	48	-	-	-
Residential to the east	37	46.8	47.2	+0.4

As can be seen the expected change in noise levels range between 0.7 and 3.1 dB. These would border on perceptibility to residents. However, considering this is the same source of sound that had previously existing here and at the same time period, this level of change is not considered significant. Especially considering this assessment assumed around 50 people in the beer garden at any one time which would be rare.

For the offices, external noise levels of 48 dB are considered acceptable with internal noise levels of approximately 35 dB with windows open.



5. FIXED PLANT NOISE IMPACT ASSESSMENT

For the purposes of this assessment, E3P has used noise modelling software, CadnaA 2024 MR1, to determine the impact of noise from proposed roof mounted plant.

The following inputs have been included in the model:

- ✿ Proposed Roof Floor Plan Rev B.
- ✿ The client has confirmed that 4no. AC condensing units and 1No JE Hall condensing unit will be installed at high level on a flat roof behind all the pitched roofs facing the large electrical substation at the rear. Each AC condensing unit has a sound power level of 75 dB(A) and the JE Hall condensing unit has a sound power level of 62 dB(A) based on a measured sound pressure level of 34 dB at 10 m.
- ✿ Ground elevations have been taken as existing by way of a 2 m grid Digital Terrain Model (DTM) which contains public sector information licensed under the Open Government License v3.0.
- ✿ Existing buildings have been included in the model and assumed to have a structured façade.
- ✿ A reflection order of 1 has been used in all calculations.
- ✿ Noise levels generated using ISO 9613-1 and ISO 9613-2 "Acoustics – Attenuation of sound during propagation outdoors" as incorporated into CadnaA software.

For the BS 4142:2014 assessments, penalties are applied to the specific sound level to provide the rating level. These penalties relate to the acoustic features of the sound source. Accordingly, the following objective and subjective features have been accounted for in the assessment, in accordance with the subjective method detailed in BS 4142:2014, for the Site as a whole operation.

Table 6 Acoustic features

Acoustic feature	Applicable?	Attributable penalty	Comment
Tonality	No	-	No tonality expected
Intermittency	No	-	No intermittency as plant will run continuously
Impulsivity	No	-	No impulsive sounds associated with the fixed plant
Other	No	+3 dB	It is expected that the source could be readily distinct from the background sound.

Figure 4 details the rating levels across the Site during the daytime and night-time periods due to fixed plant sound. Daytime levels are noted in the left hand quadrant of the circle and night-time on the right.



5.1. DAYTIME ASSESSMENT – 07:00-23:00

Figure 4 should be used to view the rating level at the receptors.

Table 7 Calculation of Rating Level and Comparison with Background Sound Level - Daytime

Receptor	Calculated rating level, $L_{A,r}$ (dB)	Background sound level, $L_{A,901hr}$ (dB)	Difference +/- (dB)
One Silk Street	37	41	-4
Bengal Street West	29		-11
Residential to the east	30		-11

The assessment has determined that the predicted rating level from the fixed plant items would fall comfortably below the background sound level during the daytime period.

5.2. NIGHT-TIME ASSESSMENT – 23:00-07:00

Figure 4 should be used to view the night-time rating level at the receptors.

Table 8 Calculation of Rating Level and Comparison with Background Sound Level - Night

Receptor	Calculated rating level, $L_{A,r}$ (dB)	Background sound level, $L_{A90,1mins}$ (dB)	Difference +/- (dB)
One Silk Street	37	35	+2
Bengal Street West	29		-6
Residential to the east	30		-5

The assessment has determined that the predicted rating level from the fixed plant items would fall comfortably below the background sound level during the night-time period at receptors to the west and east.

However, a minor exceedance is noted at One Silk Street. However, during night-time periods, residents are expected to be in bed, asleep, and, as such, it is considered more prudent to assess internal noise levels for potential sleep disturbance.

With windows open, -10 dB for summer cooling, internal specific noise levels are expected to be 24 dB, 6 dB below the criterion.

As such, no mitigation measures are required.



6. CONCLUSIONS AND DISCUSSION

E3P were commissioned to undertake a Noise Impact Assessment for the proposed redevelopment and extension of The Shamrock in Manchester.

E3P have undertaken a four-day unattended background and ambient sound survey in a position considered representative of the nearby residential receptors.

A 3D noise model has been constructed to assess beer garden usage and fixed plant noise upon residential facades.

Beer garden usage noise is assessed in accordance with the criterion, for day and night, given in BS 8233:2014+A1:2019.

Fixed plant noise is assessed in accordance with BS 4142:2014+A1:2019.

The assessment has found that noise levels from the beer garden would be acceptable with noise from its usage only marginally perceptible to existing receptors.

Noise from fixed plant was found to be well below background sound levels or at an acceptable internal noise level.

As such, no mitigation measures are required.

END OF REPORT

APPENDIX I

LIMITATIONS





GENERAL

1. This report and any associated works (together comprising the "Services") were compiled and carried out by E3P for the client (as present in Section 1) under the E3P "Terms of Business" or with those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.
2. Unless explicitly agreed otherwise, in writing, this report has been prepared under E3P Standard Terms and Business as included within our proposal to the Client.
3. Project-specific appointment documents may be agreed upon at our discretion and a charge may be levied for both the time to review and finalise appointment documents and also for associated changes to the appointment terms. E3P reserves the right to amend the fee should any changes to the appointment terms create an increased risk to E3P.
4. The report needs to be considered in light of the proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

NOISE AND VIBRATION IMPACT ASSESSMENTS

5. Where a noise or vibration survey is required to inform an assessment, E3P will endeavour to ensure that all noise and vibration measurements taken are robust, representative and reliable in order to inform an accurate assessment.
6. Where mitigation measures are specified in this report, it should be noted that these measures are relative to a specific sound or vibration source, both in terms of the measured sound pressure and vibration level and the character of the sound source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, E3P cannot be held responsible for any subsequent variations in the proposed mitigation performance.
7. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walkover inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. E3P cannot be held responsible for any disclosures that are provided post-production of our report and will not automatically update our report.
8. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, E3P reserves the right to review such information and, if warranted, to modify the opinions accordingly.
9. E3P does not warrant work/data undertaken/provided by others.

APPENDIX II

GLOSSARY





NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source. The most widely used weighting mechanism that best corresponds to the response of the human ear is the "A"-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or LAeq, LA90 etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective but, as a general guide, a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 9 **Typical Sound Pressure Levels**

SOUND PRESSURE LEVEL	LOCATION/EXAMPLE
0	Threshold of hearing
20-30	Quiet bedroom at night
30-40	Living room during the day
40-50	Typical office
50-60	Inside a car
60-70	Typical high street
70-90	Inside a factory
100-110	Burglar alarm at 1 m away
110-130	Jet aircraft on take off
140	Threshold of pain



ACOUSTIC TERMINOLOGY

Table 10 Terminology

DESCRIPTOR	EXPLANATION
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
LAeq, T	LAeq is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
LAmx	LAmx is the maximum A-weighted sound pressure level recorded over the period stated. LAmx is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the "fast" sound level meter response.
L10 and L90	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L10 is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L90 is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L10 index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Fast	A time weighting used in the root-mean-square section of a sound level meter with a 125-millisecond time constant.
Slow	A time weighting used in the root-mean-square section of a sound level meter with a 1000-millisecond time constant.
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

APPENDIX III

MEASURED SOUND PRESSURE LEVELS





Table 11 Measured sound pressure levels – NMP1

Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured background noise level, $L_{A90,T}$ (dB)
31/10/2024 12:00	55.4	45.8
31/10/2024 13:00	56.1	45.8
31/10/2024 14:00	51.5	45.5
31/10/2024 15:00	50.8	45.1
31/10/2024 16:00	50.5	44.2
31/10/2024 17:00	51.9	43.2
31/10/2024 18:00	49.3	42.3
31/10/2024 19:00	48.5	41.7
31/10/2024 20:00	50.0	41.4
31/10/2024 21:00	47.0	40.9
31/10/2024 22:00	47.4	40.8
31/10/2024 23:00	45.2	37.9
01/11/2024 00:00	45.6	37.7
01/11/2024 01:00	43.5	36.3
01/11/2024 02:00	43.0	35.8
01/11/2024 03:00	42.1	35.7
01/11/2024 04:00	43.9	36.2
01/11/2024 05:00	44.2	37.4
01/11/2024 06:00	48.2	40.9
01/11/2024 07:00	52.5	44.0
01/11/2024 08:00	51.9	45.4
01/11/2024 09:00	52.2	45.3
01/11/2024 10:00	52.6	45.3
01/11/2024 11:00	50.6	45.6
01/11/2024 12:00	52.1	46.6
01/11/2024 13:00	50.5	45.8
01/11/2024 14:00	50.4	45.2
01/11/2024 15:00	49.1	44.0
01/11/2024 16:00	50.1	44.0
01/11/2024 17:00	49.9	43.7
01/11/2024 18:00	49.0	42.8
01/11/2024 19:00	47.1	41.8
01/11/2024 20:00	49.4	41.8
01/11/2024 21:00	48.8	42.2
01/11/2024 22:00	49.3	42.3
01/11/2024 23:00	48.1	42.0
02/11/2024 00:00	45.9	40.3
02/11/2024 01:00	45.1	38.6
02/11/2024 02:00	43.8	37.9
02/11/2024 03:00	43.6	37.4
02/11/2024 04:00	43.4	37.7
02/11/2024 05:00	43.5	37.0
02/11/2024 06:00	45.2	37.1
02/11/2024 07:00	50.7	39.8
02/11/2024 08:00	49.3	42.0
02/11/2024 09:00	49.5	44.2
02/11/2024 10:00	50.4	43.3
02/11/2024 11:00	49.3	44.1
02/11/2024 12:00	53.0	43.7



Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured background noise level, $L_{A90,T}$ (dB)
02/11/2024 13:00	55.3	43.3
02/11/2024 14:00	48.2	42.4
02/11/2024 15:00	49.3	42.6
02/11/2024 16:00	48.2	41.6
02/11/2024 17:00	47.2	41.0
02/11/2024 18:00	52.0	42.3
02/11/2024 19:00	49.9	42.3
02/11/2024 20:00	50.0	43.1
02/11/2024 21:00	48.7	42.4
02/11/2024 22:00	48.1	42.8
02/11/2024 23:00	48.2	43.1
03/11/2024 00:00	46.3	41.5
03/11/2024 01:00	45.2	39.5
03/11/2024 02:00	43.8	37.9
03/11/2024 03:00	44.4	37.3
03/11/2024 04:00	44.3	36.8
03/11/2024 05:00	45.6	35.6
03/11/2024 06:00	42.8	35.7
03/11/2024 07:00	43.9	37.0
03/11/2024 08:00	46.0	38.0
03/11/2024 09:00	45.8	38.8
03/11/2024 10:00	46.6	39.9
03/11/2024 11:00	47.0	40.8
03/11/2024 12:00	47.7	41.2
03/11/2024 13:00	47.2	41.5
03/11/2024 14:00	47.3	41.3
03/11/2024 15:00	47.7	41.9
03/11/2024 16:00	48.0	40.7
03/11/2024 17:00	46.7	40.8
03/11/2024 18:00	48.0	41.0
03/11/2024 19:00	48.0	41.1
03/11/2024 20:00	46.3	39.3
03/11/2024 21:00	45.3	38.7
03/11/2024 22:00	44.8	36.6
03/11/2024 23:00	42.2	35.6
04/11/2024 00:00	43.0	34.9
04/11/2024 01:00	40.7	34.0
04/11/2024 02:00	40.1	34.1
04/11/2024 03:00	38.9	33.8
04/11/2024 04:00	40.1	34.4
04/11/2024 05:00	41.9	35.6
04/11/2024 06:00	46.7	38.0
04/11/2024 07:00	50.2	42.6
04/11/2024 08:00	51.4	45.4
04/11/2024 09:00	51.0	44.7
04/11/2024 10:00	50.3	44.5
04/11/2024 11:00	49.8	44.8
04/11/2024 12:00	55.6	45.5

APPENDIX IV

FIGURES



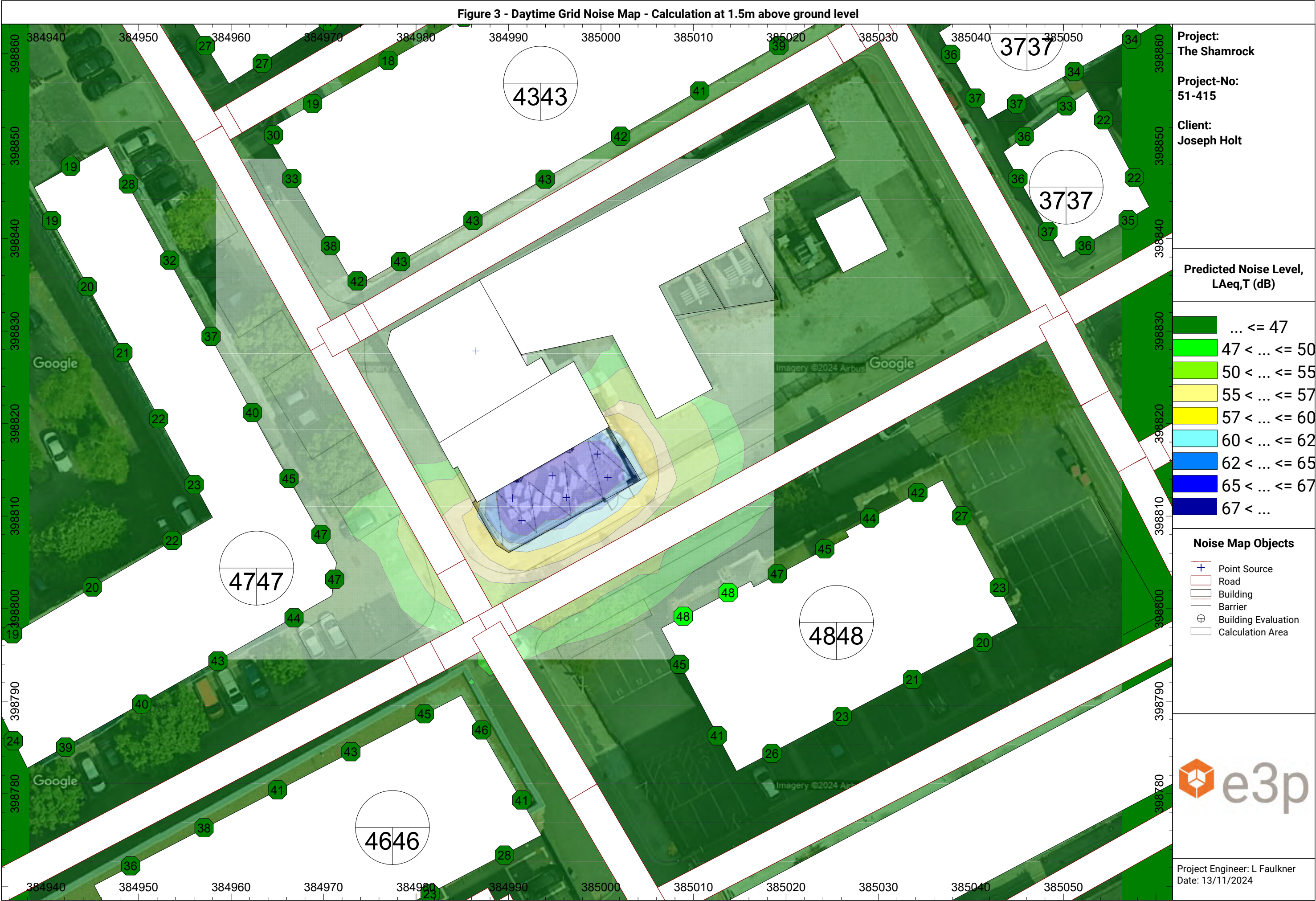
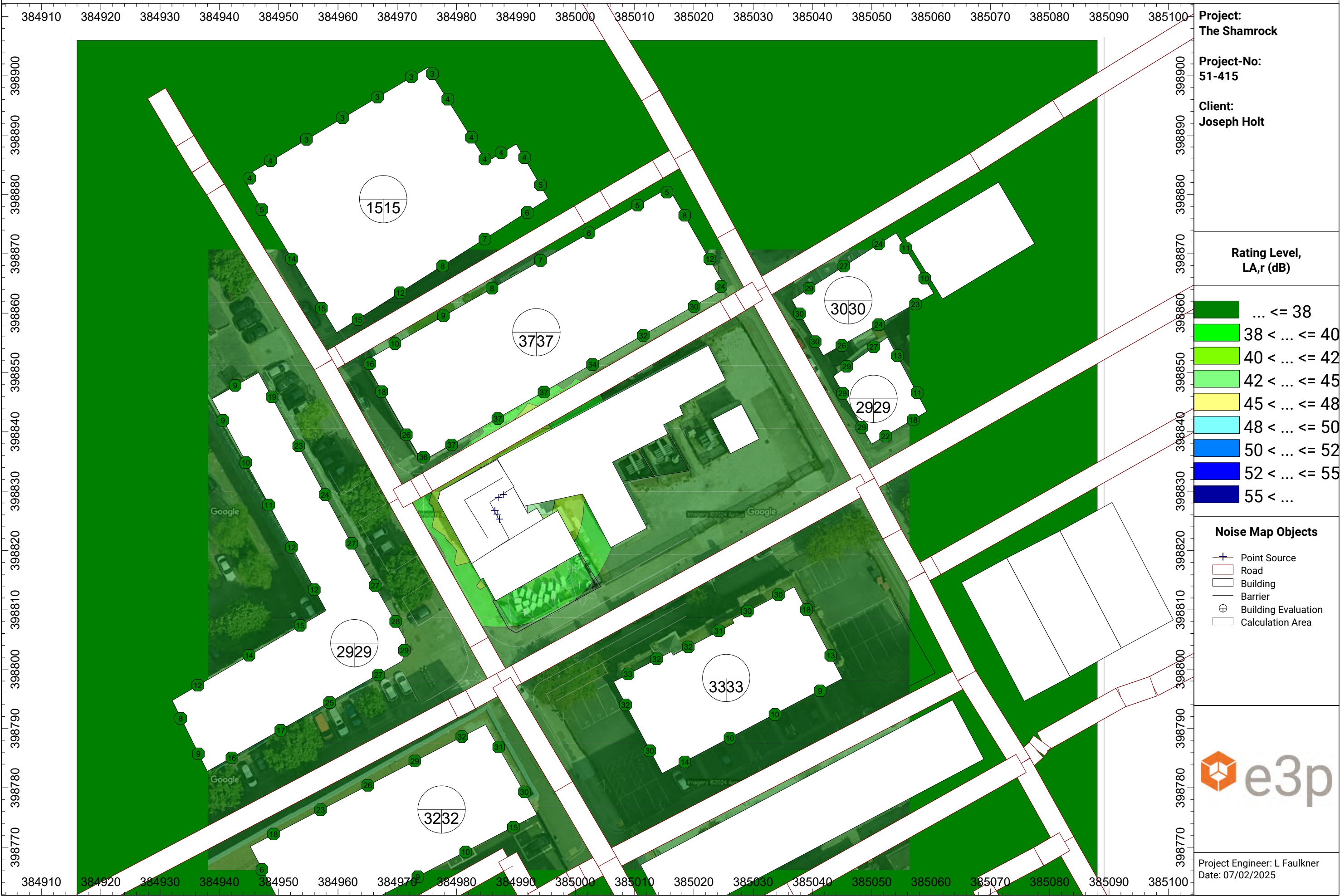


Figure 4 - Fixed Plant Grid Noise Map - Calculation at 15 m above ground level



Project Engineer: L Faulkner
Date: 07/02/2025