



e3p

Noise Impact Assessment

New Smithfield Market

Reference: 50-110-R1-4

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NOISE IMPACT ASSESSMENT

New Smithfield Market

Prepared for:



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EXECUTIVE SUMMARY

BACKGROUND

Site Address	New Smithfield Market, Lawton Street, Manchester M11 2WJ
National Grid Reference	E 388543 N 397119
Proposed Development	Demolition of existing buildings and the erection of two warehouses (Class B8) with associated access, parking, service yard and landscaping. The main sources of sound associated with the development are Heavy Goods Vehicle movements, forklift truck movements, externally mounted fixed plant and internal operations within the main proposed building.
Report Objectives	The objectives of this report are to: Identify, measure and assess the potential impact of any proposed sound sources associated with the development upon existing and proposed receptors in the immediate vicinity of the Site. The report follows current and relevant British Standards in order to provide a robust assessment.

ASSESSMENT

Surveys Completed	An unattended background and ambient sound survey has been undertaken in the eastern corner of New Smithfield Market to quantify the existing levels of background sound at receptors to the immediate north east over a full weekday and weekend period.
Assessments	A 3D noise model has been constructed to assess commercial sound impact. The model has been used to predict the Rating Level at the receptors which has been compared with the typical background sound level, accounting for any acoustic characteristics associated with the sound in accordance with BS 4142:2014.
Mitigation Requirements	The assessment determined that the predicted rating level during the daytime and night-time periods would either achieve or fall below the existing background sound level. However, effective site management is required during night-time periods to ensure no adverse impact.

CONCLUSIONS

The assessment has shown compliance with Manchester City Council's criterion for new commercial developments with management procedures in place at night. As such, the application of pre-commencement conditions is not required.



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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Russells WBHO to undertake a Noise Impact Assessment for a proposed commercial development within New Smithfield Market, to be referred to hereafter as '*the Site*'.

This assessment looks to determine the key noise sources associated with the proposed development and to assess their impact, if any, upon existing and proposed residential receptors and to specify mitigation measures, where required.

1.2. PROPOSED DEVELOPMENT

The Site currently exists as existing open sided sheds, disused concreted area and car park as part of the New Smithfield Market. Lawton Street borders the Site to the south. The existing car park associated with New Smithfield Market lies to the north and the existing Barton & Redman unit site lies to the west.

Russells WBHO intends to develop the Site for commercial purposes and proposals include for the erection of two warehouses (Class B8) with associated access, parking, service yard and landscaping.

The key sources of sound associated with the development will be Heavy Goods Vehicle (HGV) movements, forklift truck movements and any internal operations.

This assessment has been undertaken in accordance with the following supplied drawings produced by Cube Architecture and Design:

-  Proposed Site Plan (AS763-03 Rev D) dated 4th February 2022.

The Proposed Site Plan is shown in Figure 1 of Appendix III.

1.3. LIMITATIONS

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.

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.



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

TABLE 2.1 NOISE EXPOSURE HIERARCHY

PERCEPTION	EXAMPLES OF OUTCOMES	INCREASING 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	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. 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

- ✳ +3 dB: 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.

Manchester City Council have their own criteria for new commercial developments which is $L_{A,r} = L_{A90} - 5$ dB. As such, this criterion will take precedence over a simple comparison of the rating level against the background sound level.



3. SURVEY RESULTS

The measurement positions are detailed in Figure 1 of Appendix II.

3.1. UNATTENDED BACKGROUND AND AMBIENT SOUND SURVEY

As the proposed development can operate 24 hours per day over 7 days, E3P has conducted a full weekday and weekend Background Sound Survey to quantify the existing levels of background sound at the closest non-associated residential receptor to the development. The survey was carried out over the following time period at the time of initial submission of the application:

📍 12:00 Friday 5th April to 09:00 Monday 8th April 2019.

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

📍 Noise Measurement Position 1 (NMP1): Located on the south eastern boundary adjacent to the existing residential dwellings to the immediate east, along Cornwall Street. Dominant sources of noise included road traffic and existing commercial sound in the immediate vicinity.

Table 3.1 details the range and median measured background sound levels. The daytime levels correspond to the $L_{A90,1hr}$ and the night-time levels to the $L_{A90,15mins}$. The median levels are displayed as these correspond to the 'typical' levels required for the BS4142:2014 assessment. The levels to be used in the assessment are highlighted in bold and correspond to the most robust and worst-case assessment possible.

TABLE 3.1 MEDIAN AND RANGE OF MEASURED BACKGROUND SOUND PRESSURE LEVELS

DATE	TIME PERIOD	RANGE OF MEASURED BACKGROUND SOUND PRESSURE LEVELS, $L_{A90,T}$ (dB)	MEDIAN MEASURED BACKGROUND SOUND PRESSURE LEVELS, $L_{A90,T}$ (dB)
FRIDAY 5 th APRIL 2019	12:00–23:00	47.1-52.8	48.9
	23:00–07:00	40.2-48.1	46.0
SATURDAY 6 th APRIL 2019	07:00–23:00	40.5-50.2	45.6
	23:00–07:00	34.8-62.1	38.1
SUNDAY 7 th APRIL 2020	07:00–23:00	41.9-63.2	46.9
	23:00–07:00	39.7-52.5	42.7
MONDAY 8 th APRIL 2020	07:00–23:00	33.6 – 42.2	40.4
	23:00–07:00	31.1 – 44.5	35.5

3.2. METEOROLOGICAL CONDITIONS

Table 3.2 details the recorded meteorological conditions at the start and end of the noise survey.



TABLE 3.2 RECORD OF METEOROLOGICAL CONDITIONS AT START AND END OF SURVEY

PERIOD	MEASURED WIND SPEED AND DIRECTION (m/s)	PRECIPITATION OCCURRED?	FOG OR MIST EVIDENT?	WAS THE GROUND WET, FROZEN OR SNOW COVERED?	MEASURED TEMP (°C)	CLOUD COVER (%)
Start	7	No	No	No	10.0	95
End	2	No	No	No	11.5	15

Weather forecasts were monitored throughout the survey to ensure no adverse conditions as the location of the Site was not suitable for the installation of an unattended weather station. During the survey, conditions remained dry and wind speeds rarely exceeded 10mph.

The following equipment was used for the Noise Survey.

TABLE 3.3 NOISE MEASUREMENT EQUIPMENT AND CALIBRATION DRAFT

MEASUREMENT POSITION	EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER
NMP1	Sound Level Meter	01dB Fusion	11891
	Pre-amplifier	01dB Pre22	1707013
	Microphone	01dB 40CE	330621
	Calibrator	01dB Cal31	86009

The sound level meter was field-calibrated on site using the above-mentioned calibrator prior to and after noise measurements were taken. No significant drift was witnessed as noted above. Calibration certificates are available upon request.



4. NOISE IMPACT ASSESSMENT

4.1. CALCULATION OF SOUND POWER LEVELS

This assessment has used previously measured noise level data and information provided by Russells WBHO to predict likely noise levels from the Site upon the closest receptors. Furthermore, the following equipment has been assessed:

- ✿ HGV movements.
- ✿ Forklift truck movements; and
- ✿ Unloading of HGVs via trolleys and/or forklift trucks.

With regards the externally mounted fixed plant, noise level information for these are not yet available, however, E3P have set plant noise emission limits based on the background sound level and predicted specific noise level due to other operations.

3D Noise Modelling Software, CadnaA, has been used to predict the specific noise level at the receptor. Regarding assumptions for the assessment, the following has been considered:

- ✿ The daytime period has been assessed between the hours of 07:00 to 23:00. BS4142:2014 has been used to determine the likelihood of adverse impact within the garden areas over a reference period of 1 hour.
- ✿ The night-time period has been assessed between the hours of 23:00 and 07:00 for a reference period of 15 minutes.
- ✿ A reflection order to 2 has been applied in the model.
- ✿ Site elevations have been taken as existing by way of a 1 m grid Digital Terrain Model (DTM) which contains public sector information licensed under the Open Government Licence v3.0.
- ✿ It is assumed that 1 forklift truck will operate externally in any given 1 hour or 15-minute period, with 2 operating internally.
- ✿ 5 HGVs is assumed in any given 1 hour and 2 HGVs in any given 15-minute period.
- ✿ A building evaluation calculation has been undertaken for the closest dwellings on Cornwall Street in order to predict noise levels at ground to 2nd floor heights.
- ✿ Calculations are based on the guidance given in ISO 9613-1 and ISO 9613-2 "*Acoustics – Attenuation of sound during propagation outdoors*" as incorporated into CadnaA software; and
- ✿ The following noise levels and information have been used for each plant/operation. From this the sound power level for each plant/operation was calculated and inputted into the model:



TABLE 4.1 NOISE LEVELS AND ON-TIME FOR EACH PLANT/OPERATION

OPERATION/ PLANT	MEASURED SOUND LEVEL, $L_{Aeq,T}$ (dB)	MEASUREMENT DISTANCE (m)	NUMBER OF UNITS	ON-TIME IN 1-HOUR PERIOD (DAYTIME) (mm:ss)	ON-TIME IN 15- MINUTE PERIOD (NIGHT- TIME) (mm:ss)	HEIGHT (m)
Internal Areas						
Forklift Truck 1	92 L_W	-	1	20:00	12:30	1
Forklift Truck 2	92 L_W	-	1	20:00	12:30	1
External Areas						
Trolleys Removed	64.1	10	1	15:00	15:00	1
Forklift Truck	92 L_W	-	1	20:00	12:30	1

The above sources have inputted into the noise models as line sources (mobile plant) using calculated sound power levels based on the above information. Side unloading of HGVs and loading bays are inputted as point sources

With regards the main building, internal to external calculations have been undertaken below. Therefore, the noise levels of the facades of the buildings have been calculated as follows assuming the equipment detailed in Section 1.2.

The direct sound pressure levels (Direct SPL) within the reception building have been calculated based on the following formula:

$$\text{Direct SPL} = L_W + (10 \times \log (1 / ((4 \times 3.14) \times D^2)))$$

Where: L_W is the sound power level of the source
 D is the distance of the source from the facade

Each Direct SPL of each item of plant on each façade have been logarithmically added together to provide the Direct SPL for each façade.

The reverberant sound pressure level (Reverb SPL) has been calculated as follows:

$$\text{Reverb SPL} = L_W + (10 \times \log (4 / R_c))$$

Where: L_W is the sound power level of the source
 R_c is the room constant

These have again been logarithmically added together to provide the Reverb SPL for each façade for all sources. The Reverb SPL has then been logarithmically added to the Direct SPL for each façade.

Assuming a Sound Reduction Index of 23 dB for a single steel skin for the reception building, the following equation has been used to determine the sound power level of each façade:

$$L_W = L_P + (10 \times \log (S))$$



Where: L_p is the sound pressure level of the façade assuming -6 directivity
 S is the surface area of the facade

The building has been inputted into the model as an industrial building with area sources applied to each façade and roof.

For the BS4142:2014 assessments, penalties are applied to the specific sound level in order 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 BS4142:2014.

TABLE 4.2 ACOUSTIC PENALTIES

PENALTY	APPLICABLE?	ATTRIBUTABLE PENALTY	COMMENT
Tonality	No	0	No tonality is expected, and it is expected that white noise reverse alarms are used
Impulsivity	No	0	No impulsivity is likely to be audible given that most loading will be undertaking at the loading docks. Furthermore, impulsive sounds due to loading already exist on site.
Intermittency	No	0	Perceived intermittency due to HGV movements not audible due to existing movements and activities
Other Sound Characteristics	Yes	+3	Given the potential for HGV movements and other activities to be closer to the receptor, than existing, a correction of +3dB is applied here for assumed higher perceptibility

4.2. BS 4142 DAYTIME ASSESSMENT

The Noise Model has been used to predict the specific noise level at the receptors during the daytime period.

Table 4.3 details the calculated specific noise levels at the receptors, applies the penalties and compares the rating level with the typical background sound level. The criterion specified by MCC has been used to inform the assessment, i.e. $L_{A,r} = L_{A90} - 5\text{dB}$. The lowest median measured background sound level was found to be 46 dB during the day.



TABLE 4.3 BS4142:2014 ASSESSMENT – DAYTIME

RECEPTOR	PREDICTED SPECIFIC NOISE LEVEL, $L_{Aeq,1hr}$ (dB)	ACOUSTIC PENALTIES (dB)	RATING LEVEL, $L_{A,r}$ (dB)	MCC CRITERION, $L_{A,r} = L_{A90} - 5dB$	DIFFERENCE +/- (dB)
Ground Floor Living Room	35	+3	38	41	-3
1 st Floor Bedroom	35	+3	38	41	-3
2 nd Floor Bedroom	35	+3	38	41	-3

Table 4.4 indicates that the predicted rating level falls below the MCC criterion, in relation to the lowest median Background Sound Level, at all floors of the closest receptor during the daytime period. As such, no consideration towards mitigation measures is required.

4.3. BS 4142 NIGHT-TIME ASSESSMENT

For the night-time period, it is assumed that only one HGV would be unloaded at Unit 2 within any given 15 minute period, furthest from the receptors which is considered best practice.

The noise model has been used to predict the specific noise level at the receptors during the night-time period. Table 4.4 details the calculated specific noise levels at the receptors, applies the penalties and compares the rating level with the MCC criterion. The lowest median background sound level was 38 dB during the night-time period.

TABLE 4.4 BS4142:2014 ASSESSMENT – NIGHT-TIME

RECEPTOR	PREDICTED SPECIFIC NOISE LEVEL, $L_{Aeq,1hr}$ (dB)	ACOUSTIC PENALTIES (TABLE 4.4) (dB)	RATING LEVEL, $L_{A,r}$ (dB)	MCC CRITERION, $L_{A,r} = L_{A90} - 5dB$	DIFFERENCE +/- (dB)
1 st Floor Bedroom	30	+3	33	33	0
2 nd Floor Bedroom	30	+3	33	33	0

Table 4.5 indicates that the predicted rating level achieves the MCC criterion, in relation to the lowest median Background Sound Level, at all floors of the closest receptor during the night-time period.

This assumes that side unloading of HGVs at Unit 2 would be undertaken furthest from the receptors which is considered reasonable and enforceable. Where these are not followed, the model has shown an exceedance of the criteria.

As such, Section 5.0 details the required restrictions at night that should be followed upon operation of the development.



4.4. PROPOSED FIXED PLANT ITEMS

As part of the development, it is assumed that some form of fixed plant will be included, such as air extract or air conditioning. However, at this stage, any details of such are unknown and so the following advice is provided to ensure no adverse impact at the receptors.

Considering the equalling of the night-time rating level with the background sound level, it is imperative that any fixed plant items are either sufficiently silenced, to ensure that the resultant rating level at existing receptors is less than 33 dB $L_{A,r}$ when accounting for any tonality. Locations of plant are shown on the plans and, as such, reasonable limits on sound power levels can be set here. Below details the maximum allowable sound power levels for all combined plant, per unit, assuming no mitigation such as barriers:

-  Unit 1 – 89 dB $L_{A,r}$; and
-  Unit 2 – 81 dB $L_{A,r}$.



5. MITIGATION

5.1. EFFECTIVE SITE NOISE MANAGEMENT

The assessment has determined that there should be no adverse impact at the receptors due to the proposed operations.

However, to ensure this is achieved, the following measures should be enforced on Site, once operational:

- ✿ The unloading areas at Unit 2 under the canopy closest to the receptors must not be used at night as the movement of HGVs, FLT movements and unloading activities this close to the receptors will result in adverse impact. Where adverse weather requires the use of the canopied area, this will be acceptable as it is assumed the adverse weather will result in higher background sound levels at the receptor.
- ✿ All plant and equipment should be regularly maintained to ensure that no item will produce excessive noise.
- ✿ All engines should be switched off when stationary or being loaded/unloaded.
- ✿ Site staff should be made aware, particularly at night, that residential receptors are in the immediate vicinity of the Site and that they should avoid any unnecessary noise due to misuse of tools and equipment, and unnecessary shouting and radios; and
- ✿ All doors and windows should always be kept closed, where practicable, except when access is required, to attenuate any sound generated within the building.



6. CONCLUSION AND RECOMMENDATIONS

E3P were commissioned by Russells WBHO in order to undertake a Noise Impact Assessment for a proposed commercial development on land off Lawton street in Manchester.

A full weekday and weekend background sound survey was undertaken in a position considered representative of the closest existing residential receptor to the east on Cornwall Street.

E3P has undertaken detailed 3D noise modelling of all the proposed sources in order to predict noise levels at ground, 1st and 2nd floor windows for the daytime and night-time periods, in accordance with BS 4142:2014, at the closest receptors along.

The assessment has shown compliance with MCC's criterion for new commercial developments without the need for physical mitigation measures. As such, the application of pre-commencement conditions is not required.

However, E3P have recommended and incorporated best practice site management in the assessment to ensure the criterion is not exceeded.

As such, this report details some simple measures that should be followed upon operation of the development.

This assessment has shown that there should be no adverse impact upon existing residential receptors due to the proposed operations. As such, noise should not be a determining factor in the determination of the planning application.

END OF REPORT



APPENDIX I

GLOSSARY OF ACOUSTIC TERMINOLOGY

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 L_{Aeq} , L_{A90} 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 A1 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 A2 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.
L_{Aeq, T}	L _{Aeq} 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.
L_{Amax}	L _{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L _{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L _{eq} 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 L _n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L ₁₀ is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L ₉₀ is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L ₁₀ 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.



APPENDIX II

MEASURED SOUND PRESSURE LEVELS

TABLE A.1 HOURLY MEASURED AMBIENT AND BACKGROUND SOUND LEVELS

PERIOD START	MEASURED AMBIENT SOUND PRESSURE LEVEL, $L_{Aeq,1HR}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1HR}$ (dB)
04/07/2019 10:00	51.6	46.3
04/07/2019 11:00	53.3	47.9
04/07/2019 12:00	52.4	46.0
04/07/2019 13:00	52.7	45.9
04/07/2019 14:00	54.6	48.1
04/07/2019 15:00	52.4	47.3
04/07/2019 16:00	54.1	47.3
04/07/2019 17:00	53.6	46.9
04/07/2019 18:00	50.0	44.3
04/07/2019 19:00	50.5	42.8
04/07/2019 20:00	48.3	42.3
04/07/2019 21:00	45.5	43.6
04/07/2019 22:00	44.3	41.3
04/07/2019 23:00	42.6	40.5
05/07/2019 00:00	40.8	38.1
05/07/2019 01:00	39.3	37.0
05/07/2019 02:00	38.8	36.7
05/07/2019 03:00	40.8	37.7
05/07/2019 04:00	47.9	40.5
05/07/2019 05:00	46.3	42.7
05/07/2019 06:00	47.7	44.2
05/07/2019 07:00	51.1	45.6
05/07/2019 08:00	53.4	47.3
05/07/2019 09:00	51.6	46.2
05/07/2019 10:00	57.6	46.3
05/07/2019 11:00	57.9	48.6
05/07/2019 12:00	53.7	46.9
05/07/2019 13:00	52.3	46.6
05/07/2019 14:00	51.3	47.3
05/07/2019 15:00	57.2	49.1
05/07/2019 16:00	57.4	50.8
05/07/2019 17:00	55.4	49.5
05/07/2019 18:00	53.7	49.2



PERIOD START	MEASURED AMBIENT SOUND PRESSURE LEVEL, $L_{Aeq,1HR}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1HR}$ (dB)
05/07/2019 19:00	51.3	47.2
05/07/2019 20:00	48.4	45.3
05/07/2019 21:00	46.0	44.0
05/07/2019 22:00	44.7	42.7
05/07/2019 23:00	44.3	42.6
06/07/2019 00:00	43.2	41.2
06/07/2019 01:00	41.8	39.9
06/07/2019 02:00	42.9	40.6
06/07/2019 03:00	44.1	41.2
06/07/2019 04:00	46.8	40.9
06/07/2019 05:00	47.2	41.1
06/07/2019 06:00	45.6	41.8
06/07/2019 07:00	47.0	44.0
06/07/2019 08:00	47.6	44.7
06/07/2019 09:00	49.0	44.4
06/07/2019 10:00	49.3	46.0
06/07/2019 11:00	52.5	46.5
06/07/2019 12:00	50.2	47.3
06/07/2019 13:00	50.9	47.2
06/07/2019 14:00	50.6	46.4
06/07/2019 15:00	49.1	45.4
06/07/2019 16:00	49.9	45.3
06/07/2019 17:00	49.4	45.1
06/07/2019 18:00	55.6	45.0
06/07/2019 19:00	47.5	43.8
06/07/2019 20:00	45.1	43.2
06/07/2019 21:00	44.3	42.4
06/07/2019 22:00	41.4	38.1
06/07/2019 23:00	38.2	34.7
07/07/2019 00:00	34.4	31.2
07/07/2019 01:00	37.0	31.4
07/07/2019 02:00	34.8	31.6
07/07/2019 03:00	36.5	33
07/07/2019 04:00	39.9	35.4



PERIOD START	MEASURED AMBIENT SOUND PRESSURE LEVEL, $L_{Aeq,1HR}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1HR}$ (dB)
07/07/2019 05:00	44.1	38.1
07/07/2019 06:00	46.8	36.0
07/07/2019 07:00	40.7	33.6
07/07/2019 08:00	40.4	35.3
07/07/2019 09:00	47.1	39.2
07/07/2019 10:00	46.5	42.2
07/07/2019 11:00	47.3	42.1
07/07/2019 12:00	46.9	40.6
07/07/2019 13:00	46.9	41.7
07/07/2019 14:00	46.8	41.6
07/07/2019 15:00	47.3	42.0
07/07/2019 16:00	46.2	41.9
07/07/2019 17:00	47.7	41.4
07/07/2019 18:00	46.4	40.1
07/07/2019 19:00	46.2	39.5
07/07/2019 20:00	40.8	37.4
07/07/2019 21:00	44.5	37.2
07/07/2019 22:00	39.3	36.3
07/07/2019 23:00	39.3	35.8
08/07/2019 00:00	35.7	33.2
08/07/2019 01:00	34.7	32.6
08/07/2019 02:00	34.5	31.7
08/07/2019 03:00	37.2	34.9
08/07/2019 04:00	49.3	39.0
08/07/2019 05:00	55.7	40.0
08/07/2019 06:00	46.1	43.1
08/07/2019 07:00	49.5	42.4
08/07/2019 08:00	53.7	45.2
08/07/2019 09:00	51.1	43.4



TABLE A.2 15 MINUTE MEASURED AMBIENT AND BACKGROUND SOUND LEVELS – NIGHT-TIME ONLY

PERIOD START	MEASURED AMBIENT SOUND PRESSURE LEVEL, $L_{Aeq,15MINS}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,15MINS}$ (dB)
04/07/2019 23:00	43.4	40.7
04/07/2019 23:15	42.4	40.4
04/07/2019 23:30	42.7	40.4
04/07/2019 23:45	41.8	40.7
05/07/2019 00:00	40.8	39.2
05/07/2019 00:15	42.9	38.8
05/07/2019 00:30	39.6	37.8
05/07/2019 00:45	39.0	37.8
05/07/2019 01:00	40.8	38.7
05/07/2019 01:15	39.3	37.8
05/07/2019 01:30	38.5	36.9
05/07/2019 01:45	38.0	36.5
05/07/2019 02:00	39.1	36.8
05/07/2019 02:15	38.0	36.5
05/07/2019 02:30	38.4	36.2
05/07/2019 02:45	39.4	37.9
05/07/2019 03:00	38.9	37.4
05/07/2019 03:15	39.4	37.4
05/07/2019 03:30	39.6	37.9
05/07/2019 03:45	43.5	38.6
05/07/2019 04:00	42.9	40.3
05/07/2019 04:15	51.5	41.6
05/07/2019 04:30	41.7	40.2
05/07/2019 04:45	48.5	41.9
05/07/2019 05:00	47.5	41.7
05/07/2019 05:15	44.9	43.4
05/07/2019 05:30	46.1	45.1
05/07/2019 05:45	46.3	45.0
05/07/2019 06:00	49.4	45.6
05/07/2019 06:15	45.8	43.2
05/07/2019 06:30	47.0	44.8
05/07/2019 06:45	47.8	46.1



PERIOD START	MEASURED AMBIENT SOUND PRESSURE LEVEL, $L_{Aeq,15MINS}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,15MINS}$ (dB)
05/07/2019 23:00	44.6	42.6
05/07/2019 23:15	44.7	43.3
05/07/2019 23:30	44.1	42.3
05/07/2019 23:45	43.8	41.9
06/07/2019 00:00	43.5	41.7
06/07/2019 00:15	42.3	41.2
06/07/2019 00:30	42.9	41.4
06/07/2019 00:45	43.9	40.4
06/07/2019 01:00	42.6	40.1
06/07/2019 01:15	42.0	40.5
06/07/2019 01:30	41.5	39.8
06/07/2019 01:45	40.8	39.5
06/07/2019 02:00	42.4	40.5
06/07/2019 02:15	42.0	40.5
06/07/2019 02:30	43.2	40.3
06/07/2019 02:45	43.8	41.2
06/07/2019 03:00	44.4	41.5
06/07/2019 03:15	43.4	40.7
06/07/2019 03:30	45.1	42.2
06/07/2019 03:45	43.3	40.8
06/07/2019 04:00	47.2	42.1
06/07/2019 04:15	44.5	40.5
06/07/2019 04:30	43.7	41.4
06/07/2019 04:45	49.5	41.3
06/07/2019 05:00	42.8	40.4
06/07/2019 05:15	47.6	41.6
06/07/2019 05:30	49.8	40.9
06/07/2019 05:45	45.5	41.5
06/07/2019 06:00	43.6	41.5
06/07/2019 06:15	44.2	42.2
06/07/2019 06:30	47.2	42.2
06/07/2019 06:45	46.2	42.4



PERIOD START	MEASURED AMBIENT SOUND PRESSURE LEVEL, $L_{Aeq,15MINS}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,15MINS}$ (dB)
06/07/2019 23:00	39.6	37.0
06/07/2019 23:15	37.4	34.7
06/07/2019 23:30	38.6	34.7
06/07/2019 23:45	36.7	34.1
07/07/2019 00:00	35.6	31.7
07/07/2019 00:15	34.0	31.8
07/07/2019 00:30	33.3	30.7
07/07/2019 00:45	34.4	31.2
07/07/2019 01:00	40.9	31.1
07/07/2019 01:15	33.9	31.0
07/07/2019 01:30	34.1	31.7
07/07/2019 01:45	34.0	32.4
07/07/2019 02:00	35.3	30.7
07/07/2019 02:15	33.7	31.6
07/07/2019 02:30	34.0	31.3
07/07/2019 02:45	35.9	33.0
07/07/2019 03:00	36.7	33.5
07/07/2019 03:15	37.5	33.4
07/07/2019 03:30	36.0	32.2
07/07/2019 03:45	35.5	33.2
07/07/2019 04:00	39.6	35.4
07/07/2019 04:15	39.4	35.2
07/07/2019 04:30	39.1	34.7
07/07/2019 04:45	41.1	36.3
07/07/2019 05:00	43.5	37.0
07/07/2019 05:15	45.4	38.6
07/07/2019 05:30	40.9	37.8
07/07/2019 05:45	45.2	38.6
07/07/2019 06:00	45.3	38.9
07/07/2019 06:15	49.3	37.5
07/07/2019 06:30	48.0	36.0
07/07/2019 06:45	39.8	34.3
07/07/2019 23:00	39.4	36.0



PERIOD START	MEASURED AMBIENT SOUND PRESSURE LEVEL, $L_{Aeq,15MINS}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,15MINS}$ (dB)
07/07/2019 23:15	39.0	35.3
07/07/2019 23:30	39.5	36.4
07/07/2019 23:45	39.2	35.6
08/07/2019 00:00	36.8	34.1
08/07/2019 00:15	36.0	33.7
08/07/2019 00:30	34.9	33.2
08/07/2019 00:45	34.9	32.7
08/07/2019 01:00	35.0	32.3
08/07/2019 01:15	35.1	33.3
08/07/2019 01:30	34.2	31.8
08/07/2019 01:45	34.5	33.1
08/07/2019 02:00	33.4	31.3
08/07/2019 02:15	33.3	31.1
08/07/2019 02:30	34.7	32.4
08/07/2019 02:45	35.9	33.6
08/07/2019 03:00	36.7	34.8
08/07/2019 03:15	37.1	34.7
08/07/2019 03:30	37.6	35.9
08/07/2019 03:45	37.6	34.8
08/07/2019 04:00	42.1	38.1
08/07/2019 04:15	43.8	41.6
08/07/2019 04:30	41.3	38.6
08/07/2019 04:45	54.6	41.1
08/07/2019 05:00	61.5	39.3
08/07/2019 05:15	42.5	40.0
08/07/2019 05:30	44.4	41.3
08/07/2019 05:45	43.2	41.7
08/07/2019 06:00	46.0	42.8
08/07/2019 06:15	46.6	44.5
08/07/2019 06:30	45.7	43.0
08/07/2019 06:45	45.9	43.1



APPENDIX III

FIGURES

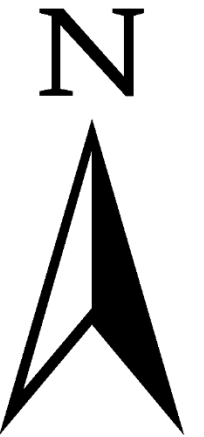
Figure 1 - Noise Survey Measurement Positions



Project:
New Smithfield Market

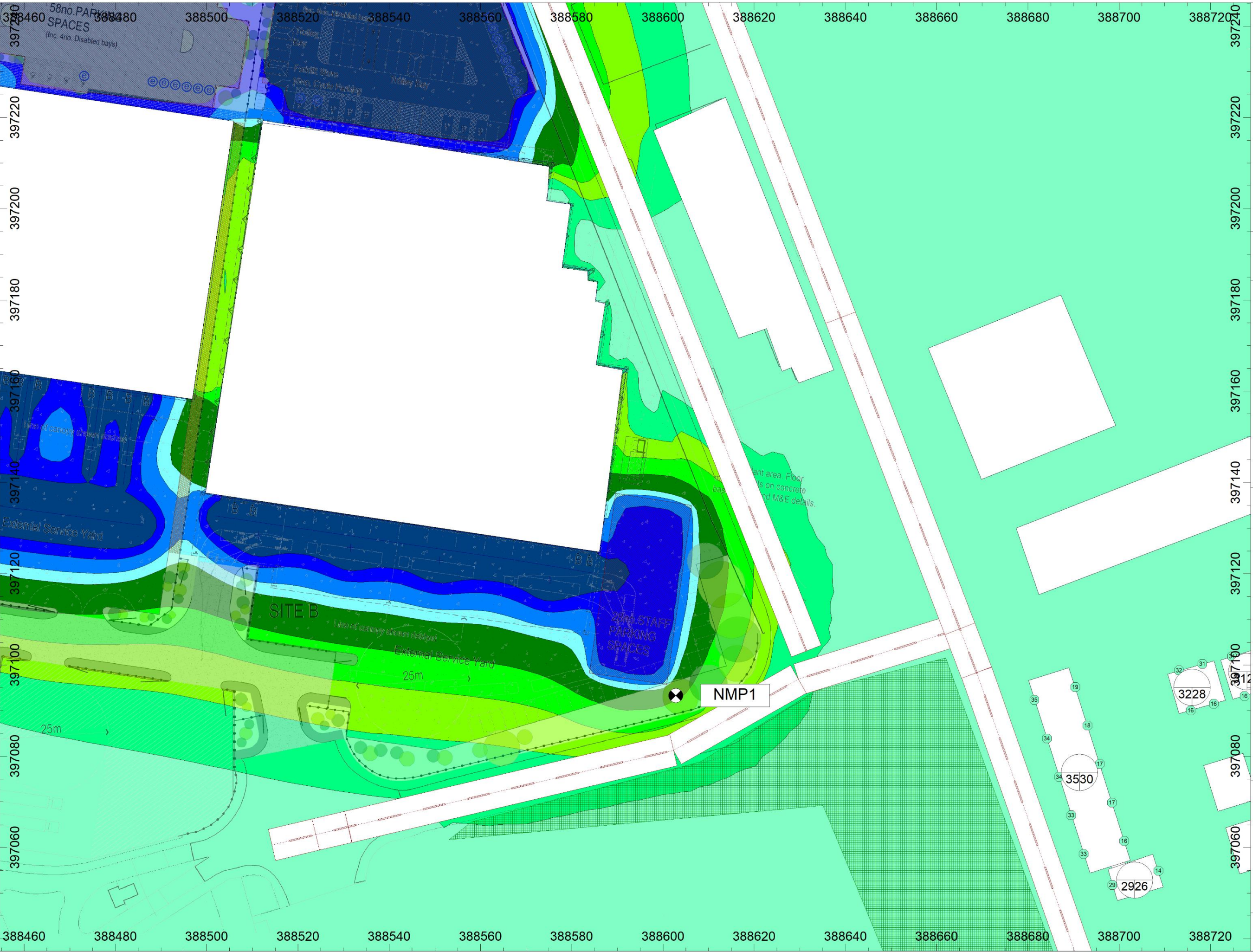
Project-No:
50-110

Client:
Russells WBHO



Project Engineer: L Faulkner
Date: 09/02/2022

Figure 2 - Daytime Grid Noise Map - Calculation at 1.5m above ground level



Project:
New Smithfield Market

Project-No:
50-110

Client:
Russells WBHO

Specific Noise Level, LAeq,T (dB)

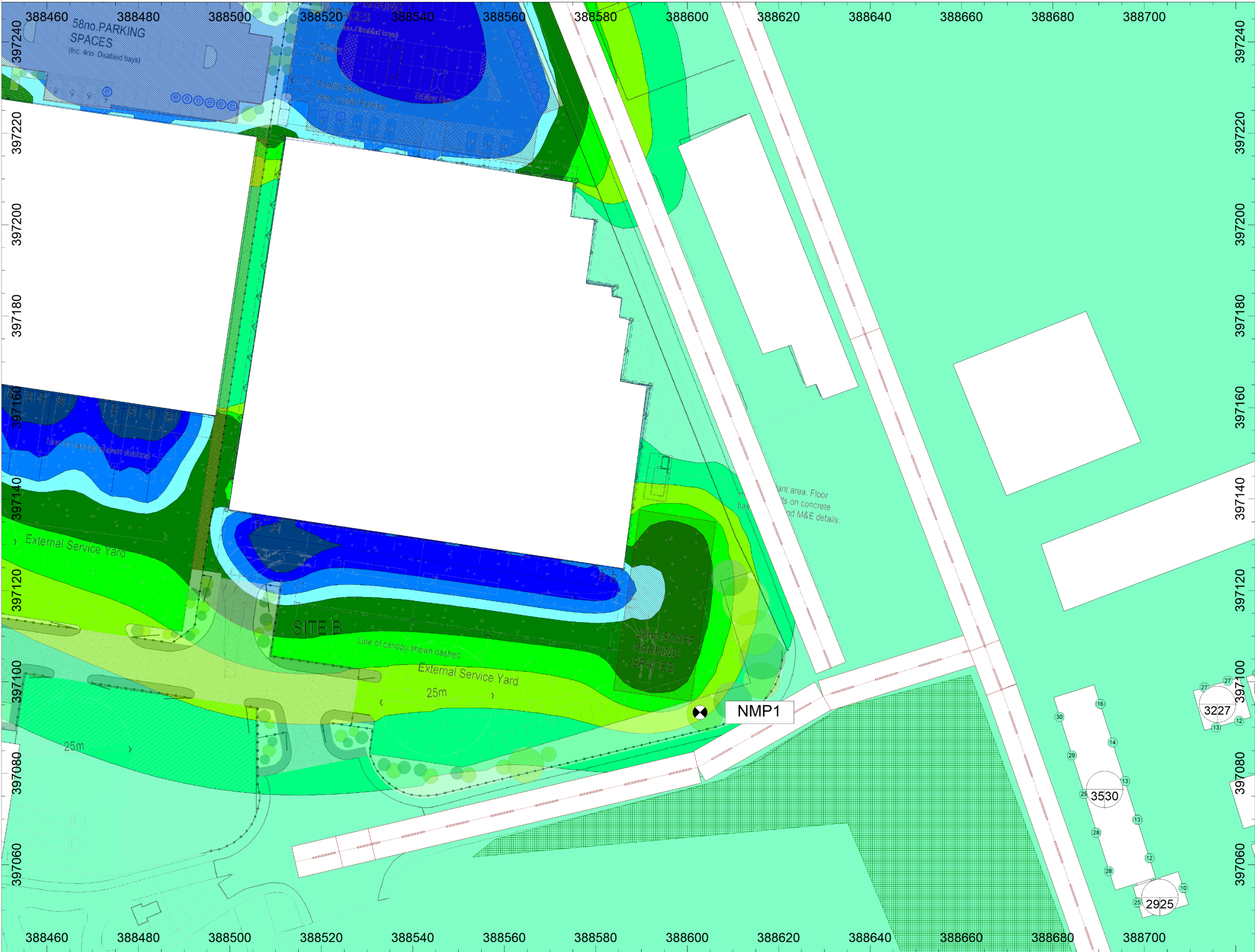
...	<= 38
38 < ...	<= 40
40 < ...	<= 43
43 < ...	<= 45
45 < ...	<= 48
48 < ...	<= 50
50 < ...	<= 53
53 < ...	<= 55
55 < ...	

Noise Map Objects

- + Point Source
- Line Source
- ▨ Area Source
- ⋯ vert. Area Source
- ▭ Road
- ▭ Parking Lot
- ▭ Building
- ▨ Foliage
- Contour Line
- ⊗ Receiver
- ⊕ Building Evaluation
- ▭ Calculation Area

Project Engineer: L Faulkner
Date: 09/02/2022

Figure 3 - Night-time Grid Noise Map - Calculation at 4m above ground level



Project:
New Smithfield
Market

Project-No:
50-110

Client:
Russells WBHO

Specific Noise Level,
LAeq,T (dB)

...	<= 38
38 < ...	<= 40
40 < ...	<= 43
43 < ...	<= 45
45 < ...	<= 48
48 < ...	<= 50
50 < ...	<= 53
53 < ...	<= 55
55 < ...	

Noise Map Objects

- + Point Source
- Line Source
- ▨ Area Source
- vert. Area Source
- ▭ Road
- ▨ Parking Lot
- ▭ Building
- ▨ Foliage
- Contour Line
- ⊗ Receiver
- ⊕ Building Evaluation
- ▭ Calculation Area



Project Engineer: L Faulkner
Date: 09/02/2022