Noise Impact Assessment

Land at Dearne Valley Parkway

Barnsley

Reference: 50-269-R1-1

NOISE IMPACT ASSESSMENT

Land at Dearne Valley Parkway
Barnsley

Prepared for:

GREGORY PROPERTY GROUP

Report Ref: 50-269-R1-1
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EXECUTIVE SUMMARY

BACKGROUND

Site Address	Land at Dearne Valley Parkway, Barnsley S74 0QA
National Grid Reference	E 435256 N 400725
Proposed Development	Full planning application comprising 141,750 sqft industrial floorspace (use class B1/B2/B8) across three units with site access, car parking, landscaping and associated works.
Report Objectives	To identify, measure and assess the potential impact of the proposed commercial development upon existing residential receptors in the immediate vicinity of the Site. The report follows current and relevant British Standards to provide a robust assessment.

ASSESSMENT

Surveys Completed	Unattended weekday and weekend background sound survey has been completed in a position considered representative of the closest receptors to the south-west of the development.
Assessments	BS4142:2014 assessment accounting for any unloading/loading activities and vehicle movements associated with the proposed development. The predicted rating levels have been compared to the existing typical background sound level for the daytime and night-time periods. Consideration has been given to any acoustic characteristics associated with the proposed development.
Mitigation Requirements	No specific measures are required due to the impact of sound upon existing receptors.

CONCLUSIONS

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

The assessment has determined that the typical background sound level will not be exceeded at either receptor during both daytime and night-time periods.

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1. INTRODUCTION

1.1. BACKGROUND

E3P was commissioned by Gregory Property Group to undertake a Noise Impact Assessment for the proposed commercial development at land at Dearne Valley Parkway and Rockingham Roundabout in Barnsley, to be referred to hereafter as '*the site*'.

This assessment looks to determine the key noise sources associated with the development and undertake an assessment of any impacts upon existing noise-sensitive receptors.

1.2. PROPOSED DEVELOPMENT

The client intends to submit a full planning application comprising 141,750 sqft industrial floorspace (use class B1/B2/B8) with site access, car parking, landscaping and associated works.

The key sources of the sound associated with the development will be Heavy Goods Vehicle (HGV) movements and loading/unloading activities and vehicle movements within the Site.

This assessment has been undertaken in accordance with the following supplied drawings produced by The Harris Partnership:

- Proposed Site Plan (15315-111 Rev D) dated 16th November 2020.

The Site Plan is shown in Figure 1 of Appendix II.

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 and which inform an accurate assessment at the time.

E3P will endeavour to capture all existing and proposed sources of sound and vibration at the time of the surveys and/or assessments. However, should new sources of sound be introduced, existing sources modified/changed, or characteristics of the sound be altered following completion of such, E3P cannot be held accountable for this.

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, for either absolute levels or frequency content.

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 the 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 making decisions about a 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 the volume of the 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 a change in the 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 the 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 'METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND'

This standard describes methods for rating and assessing industrial or commercial sound and 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 the 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.

A Local Planning Authority (LPA) will typically specify their criterion and, where this is the case, this criterion will usually take precedence over a simple comparison of the rating level against the background sound level.

3. SURVEY RESULTS

3.1. UNATTENDED BACKGROUND AND AMBIENT SOUND SURVEY

As the proposed development could 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 a position considered representative of the closest non-associated residential receptors to the development, specifically to the south-west. The survey was carried out over the following period:

- 10:00 Friday 22nd January to 12:00 Monday 25th January 2021.

It is worth noting that the survey was conducted during a national lockdown and, as such, the levels are considered worst-case. Indeed, during normal conditions, it is expected that typical background sound levels would be higher although the highest and lowest measured backgrounds are not likely to change.

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

- Noise Measurement Position 1 (NMP1): Located on the southwestern corner of the Site along the existing treeline to the immediate northeast of the dwellings along Cross Keys Lane. The microphone of the sound level meter was attached to a tripod and located in free-field conditions at a height of 1.2 m above ground level. Sound sources here were dominated by road traffic with the local road network and occasional existing industrial sound.

Table 3.1 details the range and modal measured background sound levels. The daytime levels correspond to the $L_{A90,1hr}$ and the night-time levels to the $L_{A90,15mins}$. The modal levels are displayed as it is considered these correspond to the 'typical' levels required for the BS 4142:2014 assessment. The levels to be used in the assessment are highlighted in bold and correspond to the most robust and worst-case assessment possible. The full hourly data are tabulated in Appendix III.

TABLE 3.1 AVERAGE AND MEDIAN MEASURED BACKGROUND SOUND PRESSURE LEVELS

DATE	ASSESSMENT PERIOD	RANGE OF MEASURED BACKGROUND SOUND LEVELS, $L_{A90,T}$ (dB)	MEDIAN MEASURED BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)
Friday 22nd January 2021	Day (10:00 – 23:00)	46.4-54.8	53
	Night (23:00 – 07:00)	36.8-49.7	44
Saturday 23rd January 2021	Day (07:00 – 23:00)	45.9-54.5	51
	Night (23:00 – 07:00)	35.5-45.3	43
Sunday 24th January 2021	Day (07:00 – 23:00)	44.9-54.7	**51**
	Night (23:00 – 07:00)	38.6-56.7	**42**
Monday 25th January 2021	Day (07:00 – 12:00)	56.9-58.1	N/A

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 10 mph.

The equipment outlined in Table 3.2 was used for the noise survey.

TABLE 3.3 NOISE MEASUREMENT EQUIPMENT AND CALIBRATION DATES

MEASUREMENT POSITION	EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER	LAST CALIBRATION DATE
NMP1	Sound Level Meter	01dB Fusion	12039	21st June 2021
	Pre-amplifier	01dB Pre22	1805124	
	Microphone	GRAS 40CE	330832	
	Calibrator	01dB Cal31	87281	25th February 2021

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

4. NOISE IMPACT ASSESSMENT

This assessment has used previously measured noise levels for HGVs and unloading/loading activities, applied at previous similar B8 use sites, to predict the noise level impact on the existing closest residential dwellings during the daytime and night-time periods.

B8 use is considered the worst case. Other uses may be present, but details of potential sound sources are not known at this stage. As such, the main noise sources associated with B8 are known to a degree as loading bays and car parking provision are detailed on the plans and so reasonable assumptions can be made.

Regarding assumptions for the assessment, the following has been considered within a 3D noise model:

- The daytime period has been assessed between the hours of 07:00 to 23:00. For the assessment, BS 4142:2014 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.
- During the daytime periods, it is assumed, in order to inform a worst-case assessment, that all dock levellers can be in use at once with HGVs driving up and reversing into the levellers and then unloading/loading activities then taking place in any given 1-hour period.
- During the night-time, given the shorter period, only 50% of the dock levellers are proposed to be in use. The closest levellers to the receptors have been chosen to be in use within the model to inform a worst-case assessment.
- The measured on-time periods have been corrected to account for the hourly and 15-minute assessment periods given in BS 4142:2014.
- Additional external activities, such as forklift trucks, etc, have not been accounted for as the exact usage at the units is unknown at this stage and dock levellers have been proposed for all units at this stage. However, it is considered that the main source of noise impacting the receptors will be HGV movements and loading/unloading activities.
- Existing Site elevations in the form of 5 m contours from OS Terrain 5 maps.
- A reflection order of 2 has been used in all calculations; and
- 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 subjective features have been accounted for in the assessment, in accordance with the subjective method detailed in BS 4142:2014, for the units as a whole operation.

TABLE 4.1 ACOUSTIC PENALTIES

SOURCE	CHARACTERISTIC	ATTRIBUTABLE PENALTY	COMMENT
Class B8 Warehouse Unit with Service Bays	Tonality	2 dB	It is assumed all HGVs would be fitted with white noise reverse alarms. However, the tones from these are likely to be just perceptible.
	Impulsivity	-	Given loading/unloading is an internal operation, no impulsivity is likely to be audible.
	Intermittency	3 dB	HGV movements and activity is likely to be intermittent.
	Other Sound Characteristics	-	Other penalties applied.

4.1. DAYTIME ASSESSMENT

Table 4.2 details the resultant specific noise level at each receptor, outputted from the model. The grid noise map can be seen in Figure 2. The Rating Level is then calculated based on the acoustic penalties in Table 4.1. The lowest modal background sound levels during the daytime periods have been used. This informs a worst-case assessment.

Acoustic penalties are applied on a receptor-by-receptor basis depending on the perceptibility of certain features accounting for distance from sources.

TABLE 4.2 CALCULATION OF RATING LEVEL AND COMPARISON WITH BACKGROUND SOUND LEVEL - DAYTIME

RECEPTOR	CALCULATED SPECIFIC NOISE LEVEL, $L_{Aeq,1hr}$ (dB)	TOTAL PENALTY (dB)	TOTAL RATING LEVEL, $L_{A,r}$ (dB)	LOWEST MODAL MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)	DIFFERENCE +/- (dB)
Cross Keys Lane	38	+5	43	51	-8
Tinker Lane	31	+5	36	51	-15
Rockingham Street	26	+5	31	51	-20
Locksley Gardens	21	+2	23	51	-28
Allotments	33	-	-	-	-

Table 4.2 indicates that the predicted rating level falls below the existing typical background sound level during daytime periods within the closest garden areas and facades at all receptors. As such, no consideration of mitigation measures is required. Indeed, all rating levels even fall below the lowest measured background sound level of 45 dB.

With regards to the allotments, the specific noise levels are suitably low enough not to cause an adverse impact.

4.2. NIGHT-TIME ASSESSMENT

The noise model has been used to predict the specific noise level at the receptors during the night-time period. Table 4.3 details the resultant specific noise level at each receptor, outputted from the model. The grid noise map can be seen in Figure 3.

Acoustic penalties are applied on a receptor-by-receptor basis depending on the perceptibility of certain features accounting for distance from sources.

TABLE 4.3 CALCULATION OF RATING LEVEL AND COMPARISON WITH BACKGROUND SOUND LEVEL - NIGHT

RECEPTOR	CALCULATED SPECIFIC NOISE LEVEL, $L_{Aeq,15mins}$ (dB)	TOTAL PENALTY (dB)	TOTAL RATING LEVEL, $L_{A,r}$ (dB)	LOWEST MODAL BACKGROUND SOUND LEVEL, $L_{A90,15mins}$ (dB)	DIFFERENCE +/- (dB)
Cross Keys Lane	35	+5	40	42	-2
Tinker Lane	32	+5	37	42	-5
Rockingham Street	23	+5	28	42	-14
Locksley Gardens	22	+2	24	42	-18

Table 4.3 indicates that the predicted rating level falls below the typically measured background sound level during the night-time period at all receptors. In addition to the BS 4142:2014 assessment, it is also important to consider internal noise levels within bedrooms with windows open. Here the highest predicted internal noise level would be 23 dB, accounting for a 13 dB reduction due to an open window. This falls well below the criterion given in BS8 233:2014 for suitable sleeping conditions.

As such, no mitigation measures are required.

4.3. NIGHT-TIME MAXIMUM INSTANTANEOUS NOISE IMPACT

As well as average noise levels due to the development, consideration is given to maximum instantaneous events impacting upon receptors at night, Specifically, the resultant noise level from banging associated with unloading/loading activities, specifically trolley rattles at the opening of the trailer, resulting in a level of 72 dB at 10 m. This assessment is only applicable to residential receptors.

Table 4.4 details the maximum noise level assessment with a comparison against the WHO Guidelines criterion. No line of sight removal is applied to inform a worst-case assessment.

TABLE 4.4 MAXIMUM NIGHT-TIME NOISE LEVEL ASSESSMENT

RECEPTOR	MEASURED MAXIMUM NOISE LEVEL AT 10 m, $L_{Amax,fast}$ (dB)	DISTANCE FROM RECEPTOR TO CLOSEST DOCK LEVELLER (m)	PREDICTED MAXIMUM NOISE LEVEL AT RECEPTOR (dB)	WHO GUIDELINES EXTERNAL CRITERION (dB)	DIFFERENCE, +/- (dB)
Cross Keys Lane	72	135	49	60	-11
Tinker Lane	72	112	51	60	-9
Rockingham Street	72	130	50	60	-10
Locksley Gardens	72	295	43	60	-17

The assessment has shown compliance with the WHO Guidelines external criterion

4.4. PROPOSED FIXED PLANT ITEMS

Where fixed plant items are proposed, such as air conditioning units or air condensers, it is recommended that these are located on the shadow side of the units in relation to the closest receptors to shield the closest receptors to the south-east and south. Where this is not possible and they need to be located facing receptors or on the roof of the respective unit, the plant units chosen should be lower noise-producing units or silencers, or other mitigation, options should be considered.

To limit any impact, it is recommended that any sound from fixed plant, when considering the cumulative impact of all sources, does not exceed 42 dB $L_{A,r}$ at the closest receptors so as not to exceed the typical background sound level, after accounting for any acoustic feature corrections. A detailed assessment of the plant items is recommended before installation and operation to ensure compliance.

5. CONCLUSION AND RECOMMENDATIONS

E3P was commissioned by Gregory Property Group to undertake a Noise Impact Assessment for the proposed commercial development on Land at Dearne Valley Parkway and Rockingham Roundabout in Barnsley.

This assessment looked to determine the key noise sources associated with the development and undertake an assessment of any impacts upon existing noise-sensitive receptors.

A full weekday and weekend background sound survey was undertaken in a position considered representative of the closest existing residential receptors to the site.

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

The assessment has shown that the predicted rating level falls below the typically measured background sound level during the daytime and night-time periods. Consideration has also been given to night-time maximum instantaneous noise impacts due to unloading/loading activities.

In addition to the BS 4142:2014 assessment, it is also important to consider internal noise levels within bedrooms with windows open. Here the highest predicted internal noise level would be 23 dB, accounting for a 13 dB reduction due to an open window. This falls well below the criterion given in BS 8233:2014 for suitable sleeping conditions.

As such, no mitigation measures are required.

This assessment has shown that there should be no adverse impact on 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.
L_{10} and L_{90}	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
BACKGROUND SOUND LEVEL DATA

TABLE A1 AVERAGE MEASURED AMBIENT AND BACKGROUND SOUND PRESSURE LEVELS

MEASUREMENT START TIME	AVERAGE MEASURED AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	AVERAGE MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
22/01/2021 10:00	57.8	53.7
22/01/2021 11:00	55.4	53.8
22/01/2021 12:00	56.0	54.1
22/01/2021 13:00	55.0	52.7
22/01/2021 14:00	56.2	54.8
22/01/2021 15:00	55.3	53.6
22/01/2021 16:00	54.2	52.6
22/01/2021 17:00	54.2	52.7
22/01/2021 18:00	51.9	49.3
22/01/2021 19:00	51.3	49.5
22/01/2021 20:00	51.4	47.6
22/01/2021 21:00	50.5	46.4
22/01/2021 22:00	50.3	46.6
22/01/2021 23:00	47.4	41.8
23/01/2021 00:00	47.5	43.9
23/01/2021 01:00	45.7	38.7
23/01/2021 02:00	46.5	39.6
23/01/2021 03:00	47.0	43.5
23/01/2021 04:00	46.9	43.0
23/01/2021 05:00	49.7	45.1
23/01/2021 06:00	51.1	48.0
23/01/2021 07:00	52.8	49.9
23/01/2021 08:00	53.3	50.9
23/01/2021 09:00	53.8	51.1
23/01/2021 10:00	53.7	51.3
23/01/2021 11:00	55.9	53.2
23/01/2021 12:00	55.9	53.1
23/01/2021 13:00	56.3	52.3
23/01/2021 14:00	55.8	53.6
23/01/2021 15:00	57.1	54.5
23/01/2021 16:00	56.2	53.4
23/01/2021 17:00	53.5	51.4

MEASUREMENT START TIME	AVERAGE MEASURED AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	AVERAGE MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
23/01/2021 18:00	53.2	50.6
23/01/2021 19:00	52.0	49.3
23/01/2021 20:00	52.5	48.8
23/01/2021 21:00	51.5	47.0
23/01/2021 22:00	50.2	45.9
23/01/2021 23:00	48.4	43.5
24/01/2021 00:00	46.7	41.7
24/01/2021 01:00	45.3	38.9
24/01/2021 02:00	43.5	37.7
24/01/2021 03:00	44.6	36.5
24/01/2021 04:00	43.4	39.5
24/01/2021 05:00	45.9	42.8
24/01/2021 06:00	46.6	43.5
24/01/2021 07:00	49.1	44.9
24/01/2021 08:00	48.2	45.5
24/01/2021 09:00	48.6	46.6
24/01/2021 10:00	50.8	46.3
24/01/2021 11:00	53.0	47.5
24/01/2021 12:00	55.7	49.7
24/01/2021 13:00	55.7	52.2
24/01/2021 14:00	57.8	54.7
24/01/2021 15:00	57.5	54.2
24/01/2021 16:00	55.4	50.7
24/01/2021 17:00	55.8	51.2
24/01/2021 18:00	55.2	51.4
24/01/2021 19:00	55.6	50.8
24/01/2021 20:00	52.3	47.2
24/01/2021 21:00	51.1	46.5
24/01/2021 22:00	49.6	45.1
24/01/2021 23:00	48.5	42.7
25/01/2021 00:00	46.9	41.7
25/01/2021 01:00	45.6	40.7
25/01/2021 02:00	45.9	42.2

MEASUREMENT START TIME	AVERAGE MEASURED AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	AVERAGE MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
25/01/2021 03:00	47.0	43.1
25/01/2021 04:00	50.2	46.3
25/01/2021 05:00	55.2	51.5
25/01/2021 06:00	57.8	55.6
25/01/2021 07:00	59.3	57.5
25/01/2021 08:00	59.4	58.1
25/01/2021 09:00	58.7	57.1
25/01/2021 10:00	58.6	56.9
25/01/2021 11:00	59.8	57.4

APPENDIX III
FIGURES

Figure 1 - Noise Survey Measurement Positions

Project:
Land at Dearne Valley Parkway, Barnsley

Project-No:
50-269

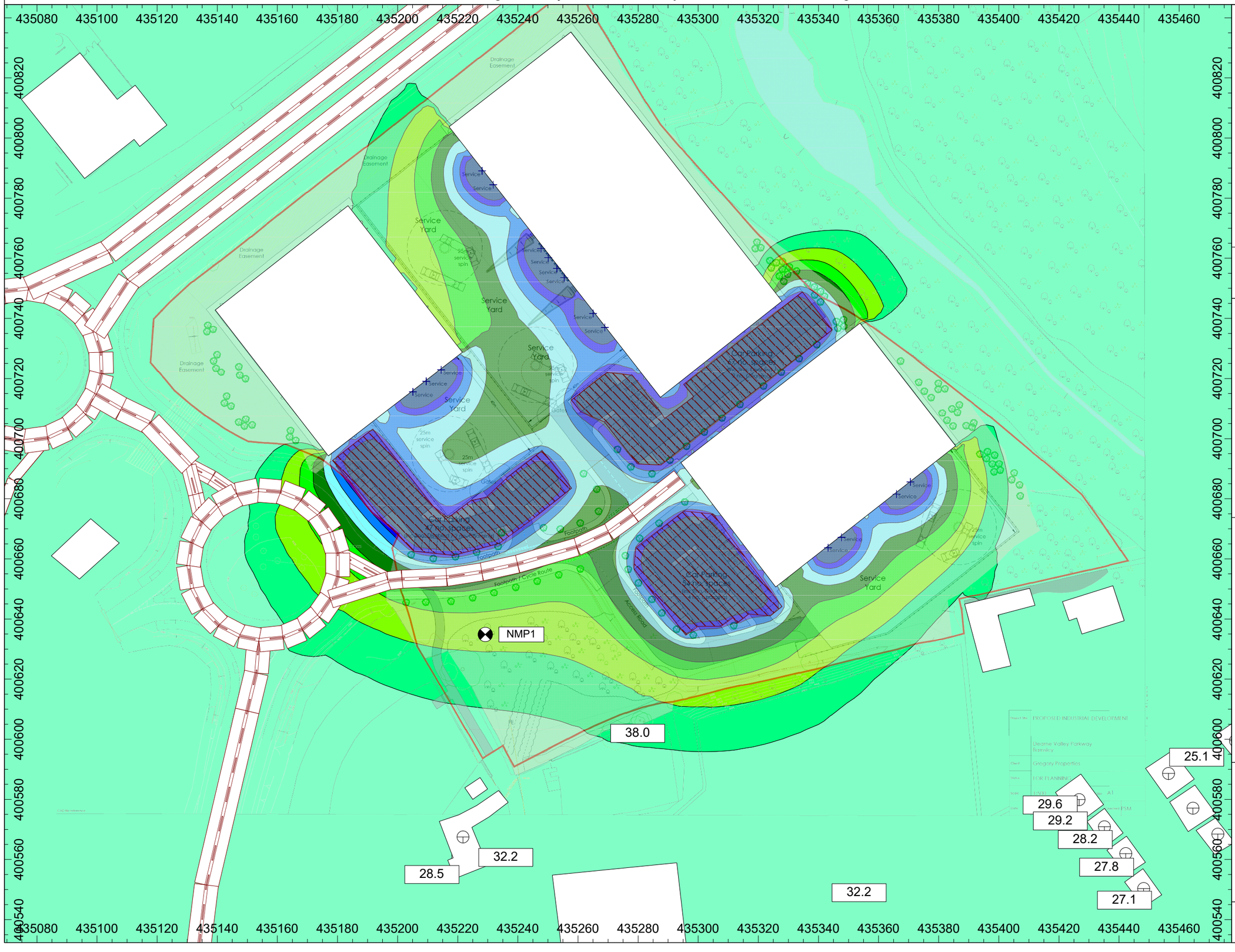
Client:
Gregory Property Group

N

e3p

Project Engineer: L Faulkner
Date: 27/01/2021

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



Project:
Land at Dearne Valley Parkway, Barnsley

Project-No:
50-269

Client:
Gregory Property Group

Daytime Rating Level, LA,r (dB)

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

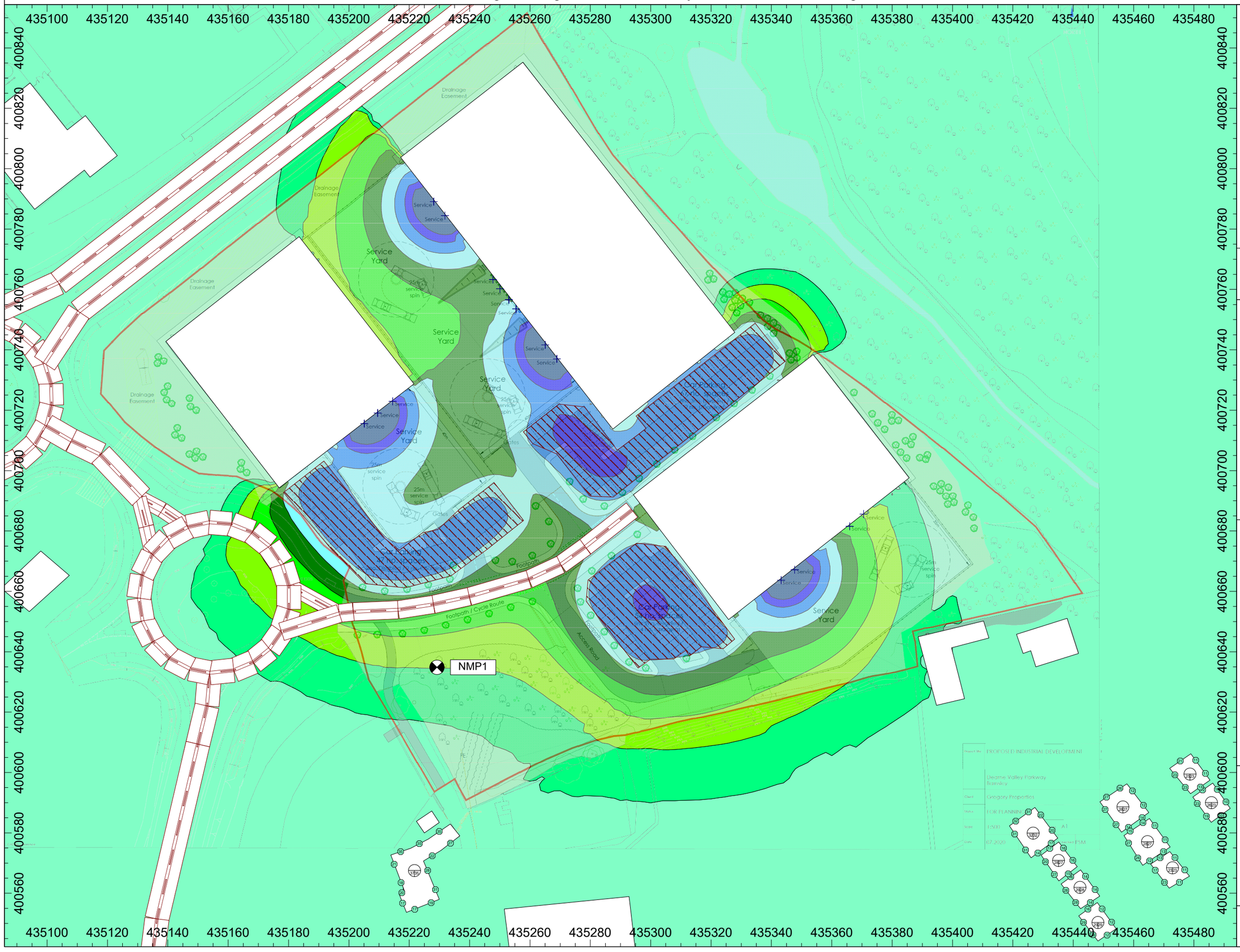
Noise Map Objects

- Point Source
- Road
- Crossing
- Parking Lot
- Building
- Contour Line
- Receiver
- Building Evaluation
- Calculation Area

e3p

Project Engineer: L Faulkner
Date: 27/01/2021

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



Project:
Land at Dearne Valley Parkway, Barnsley

Project-No:
50-269

Client:
Gregory Property Group

Night-time Rating Level, LA,r (dB)

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

Noise Map Objects

- Point Source
- Road
- Crossing
- Parking Lot
- Building
- Contour Line
- Receiver
- Building Evaluation
- Calculation Area

e3p

Project Engineer: L Faulkner
Date: 27/01/2021