



e3p

Noise Impact Assessment

Land at Woodend, Netherley Road, Tarbock Green

Reference: 50-528-R1-1

Date: March 2022



NOISE IMPACT ASSESSMENT

Land at Woodend, Netherley Road
Tarbock Green, Prescott

Prepared for:

G D B Property Investments Ltd

Report Ref: 50-528-R1-1

Date Issued: 11th May 2022

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QUALITY ASSURANCE

PROJECT NUMBER	50-528		
VERSION	Version 1		
REMARKS	Initial version for review		
DATE	11th May 2022		
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EXECUTIVE SUMMARY

BACKGROUND

Site Address	Land at Woodend, Netherley Road, Tarbock Green, Prescott L35 1QE
National Grid Reference	E 346253 N 387656
Proposed Development	Full planning application for the erection of 10no. new build dwellings with associated car parking, landscaping and access.
Report Objectives	The objectives of this report are to: Identify, measure and assess the potential impact of any existing noise sources near the Site upon proposed residential receptors. The report follows current and relevant British Standards to provide a robust assessment.

ASSESSMENT

Surveys Completed	E3P have undertaken attended and unattended measurements of commercial sound associated with an industrial site to the north east during typical weekday periods. Noise from the premises was found to be limited and very infrequent during the 5 day period. An attended road traffic sound measurement was conducted for Netherley Road.
Assessments	A 3D noise model has been constructed to assess road traffic and commercial sound impact in accordance with the criterion, for day and night, given in BS 8233:2014. Given the infrequent nature of the industrial sound and that the site was only operational for an hour or two on 2 days out of 5, a BS 4142 assessment is not considered appropriate. Consideration has been given to external amenity areas and internal habitable rooms.
Mitigation Requirements	The assessment has determined that a whole dwelling ventilation system is required for all plots in the form of System 1. Standard double glazing is sufficient for most plots except The Coach House. Various acoustic barriers are required for certain rear gardens adjacent to the road at various heights.

CONCLUSIONS

The assessment has shown that, with mitigation measures in place, no adverse impact is predicted day or night at the receptors due to road traffic and commercial sound.

As such, there are no noise related reasons why planning permission should not be granted for the proposed development as long as the recommendations of this report are followed and included within the design stage.



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1. INTRODUCTION

1.1. BACKGROUND

E3P was commissioned by G D B Property Investment Ltd to undertake a Noise Impact Assessment for a proposed residential development on land at Woodend, Netherley Road in Tarbock Green, to be referred to hereafter as '*the Site*'.

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

1.2. PROPOSED DEVELOPMENT

The client intends to construct ten new build dwellings, two detached and eight semi-detached, along with access, parking, landscaping, drainage works and features, open space, and associated infrastructure.

The site lies in a mixed use area and bounds Netherley Road to the south, existing residential to the east and west and an industrial open site to the north east.

This assessment has been undertaken per the following supplied drawings:

-  Proposed Site Plan (Drawing Number 19-112-20 Rev X) dated April 2022.

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 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

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

- ✿ mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.
- ✿ identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and
- ✿ limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

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

2.3.1. NOISE CRITERIA LIMITS

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 2.2.

TABLE 2.2 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



BS 8233 goes on to recommend noise levels for gardens:

It is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors might be warranted.

BS 8233 goes on to say:

In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.

2.3.2. VENTILATION REQUIREMENTS

Where a partially open window cannot be relied upon to provide an adequate level of façade sound insulation performance, it is necessary to consider alternative ventilation for habitable rooms. Section 8.4.5.4 within BS 8233 states:

The Building Regulations' supporting documents on ventilation [48, 49, 50] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

Alternatively, acoustic ventilation units (see 7.7.2 below) are available for insertion in external walls. These can provide sound reduction comparable with double glazed windows. However, ducted systems with intakes on the quiet side of the building might be required in very noisy situations, or where appearance rules out through-the-wall fans.

Section 7.7.2 states:

NOTE 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level

2.4. BS4142: 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

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

Impulsivity

- ✳ +3dB: where the impulsivity is just perceptible.
- ✳ +6dB: where the impulsivity is clearly perceptible; and
- ✳ +9dB: 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 +3dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment. BS4142 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 +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- ✿ A difference of around +5dB 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.

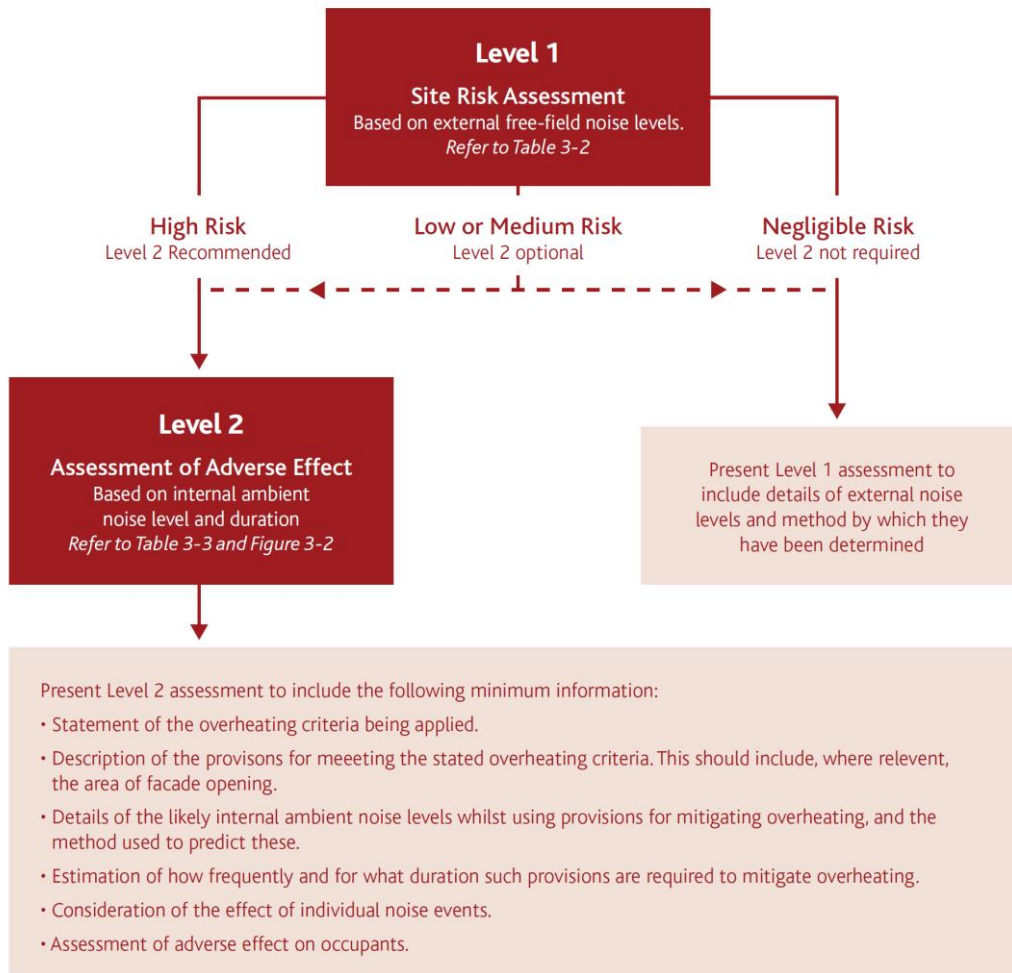
2.5. INSTITUTE OF ACOUSTICS AND ASSOCIATION OF NOISE CONSULTANTS (2020) ACOUSTICS VENTILATION AND OVERHEATING: RESIDENTIAL DESIGN GUIDE

The Acoustics Ventilation and Overheating (AVO) Residential Design Guide provides an approach as to how the competing aspects of thermal and acoustic comfort can be managed. The AVO Guide aims to assist designers to adopt an integrated approach to the acoustic design within the context of the ventilation and thermal comfort requirements.

The AVO Guide provides a method for assessing the impact of opening windows and providing whole house ventilation due to the impact of noise via a two-level noise assessment procedure, as below:



DIAGRAM 2.1 TWO LEVEL NOISE ASSESSMENT PROCEDURE – OVERHEATING CONDITION



A level 1 risk assessment is based on external free-field noise levels with the assumption of a partially opened window in use for mitigation of overheating. A level 1 assessment is appropriate for scenarios where the risk to a development is deemed 'Negligible'. 'Low' and 'Medium' risk sites only require a level 2 assessment on an optional basis in order to give further confidence in the suitability of internal noise conditions. The noise levels suggested in Table 2.3 and 2.4 assume a steady road traffic noise source but can be adapted for other transport sources.



TABLE 2.3 GUIDANCE FOR LEVEL 1 SITE RISK ASSESSMENT OF NOISE FROM TRANSPORT NOISE SOURCES RELATING TO OVERHEATING CONDITION

RISK CATEGORY FOR LEVEL 1 ASSESSMENT - EXTERNAL		RISK LEVEL	POTENTIAL EFFECT WITHOUT MITIGATION	RECOMMENDATION FOR LEVEL 2 ASSESSMENT
$L_{Aeq,T}$ during 07:00 - 23:00	$L_{Aeq,8hr}$ during 23:00 - 07:00			
≥65dB	≥55dB	High	Increasing risk of adverse effect	Recommended
>55 dB and <63 dB	>45 and <55 dB	Medium		Optional
>50dB and <55 dB		Low		
≤50 dB	≤45 dB	Negligible	Use of opening window as means of mitigating overheating is not likely to result in adverse effect	Not Required

A level 2 assessment will be carried out when the risk of adverse effect is 'High' or it is deemed appropriate for a 'low' or 'medium' risk site. An increase in internal ambient noise level can cause a change in human behaviour. At high levels this creates situations where occupants can no longer open windows for ventilation due to high external noise levels. A level 2 assessment identifies these situations and allows for appropriate alternative ventilation systems to be recommended.

TABLE 2.4 GUIDANCE FOR LEVEL 2 ASSESSMENT OF NOISE FROM TRANSPORT NOISE SOURCES RELATING TO OVERHEATING CONDITION

INTERNAL AMBIENT NOISE LEVEL AT FAÇADE LOCATIONS			EXAMPLE OF OUTCOMES
$L_{Aeq,T}$ during 07:00 - 23:00	$L_{Aeq,8hr}$ during 23:00 - 07:00	Individual noise events during 23:00 - 07:00	
>50 dB	>42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time
Increasing noise levels			Increasing the likelihood of impact on reliable speech communication during the day or sleep disturbance at night
≤35 dB	≤30 dB	Do not normally exceeds $L_{AF,max}$ 45 dB more than 10 times a night	Noise can be heard but does not cause any change in behaviour



3. NOISE SURVEY DATA

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

The acoustic climate at the proposed development site is dominated by road traffic sound along Netherley Road and birdsong due to the wooded area to the north and abundance of trees. During an initial site visit, heavy vehicle movements were noted from the open industrial site to the north east. It is also noted that from previous studies undertaken, commercial sound is noted from this Site. As such, a full 5-day monitoring period was undertaken, Monday to Friday to capture commercial sound and determine its impact.

Upon review of the data, industrial sound from the premises was only notable on a handful of periods where the ambient sound level was notably higher than normal. This occurred on Monday 25th April between 13:07-16:07, with varying levels of noise and again on Wednesday 27th April between 15:07 and 16:07. All other hour periods were mostly similar throughout the remaining days.

During the above periods, the only sound from the site was heavy vehicle movements which included bouncing of machinery, most likely due to uneven ground and loads of vehicles.

It may be that more industrial sounds occurred, but these are absorbed into the residual sound level made up of birdsong and road traffic sound.

Indeed, apart from a single hour period, birdsong between 05:00 and 06:00 resulted in the highest measured ambient sound levels on all days.

3.1. UNATTENDED SOURCE NOISE SURVEY

E3P have installed a meter adjacent to the industrial premises to the north east over a 5 day period. The purpose of which was to capture commercial sound during these periods via the use of audio recordings set at a threshold of 55 dB. The survey was undertaken during the following period:

 10:00 Monday 25th April to 10:00 Friday 29th April 2022.

The following noise measurement position was chosen for the Noise Survey:

 Noise Measurement Position 1 (NMP1): Located on the north eastern tip of the site bounding the open industrial site and with line of sight to the visible plant and machinery on the Site. The microphone was located in free-field conditions and at a height of 1.5m above local ground level. Noise sources at this location were dominated by road traffic noise from Netherley Road, birdsong and very infrequent commercial sound.

Table 3.1 details the highest measured sound pressure levels sorted highest to lowest. Audio recordings were listened to for all notable periods below to ensure which sound sources were included in each hour period. Full hourly data is shown in Appendix II.



TABLE 3.1 HIGHEST MEASURED SOUND LEVELS

MEASUREMENT PERIOD	COMMENTARY	MEASURED SOUND PRESSURE LEVELS (dB)			
		L _{Aeq,T}	L _{Amax,fast}	L _{A10,T}	L _{A90,T}
25/04/2022 15:07-16:07	Heavy plant movement, bouncing of machinery	63.4	79.0	67.0	46.3
26/04/2022 05:07-06:07	Birdsong	58.6	78.5	61.8	49.4
25/04/2022 14:07-15:07	Birdsong, airplane, heavy plant movement and machinery	57.3	77.1	58.0	47.6
28/04/2022 05:07-06:07	Birdsong	56.6	72.3	59.4	51.2
28/04/2022 10:07-11:07	Birdsong	56.6	86.5	55.0	44.5
29/04/2022 05:07-06:07	Birdsong	56.5	81.0	59.7	49.2
27/04/2022 15:07-16:07	Heavy plant movement, bouncing of machinery	56.4	74.4	59.1	44.4
28/04/2022 06:07-07:07	Birdsong	56.2	74.7	58.4	49.4
25/04/2022 13:07-14:07	Aircraft, birdsong, vehicle engine	56.0	84.5	56.4	48.0
27/04/2022 06:07-07:07	Birdsong	56.0	73.6	57.6	52.1
27/04/2022 12:07-13:07	Road traffic and birdsong	55.9	86.7	55.8	44.9
26/04/2022 13:07-14:07	Road traffic and birdsong	55.1	73.1	56.0	40.0
27/04/2022 05:07-06:07	Birdsong	55.1	72.4	57.8	50.6
29/04/2022 06:07-07:07	Birdsong	55.1	70.2	57.6	50.5
26/04/2022 06:07-07:07	Birdsong	54.7	73.0	57.0	48.1
26/04/2022 11:07-12:07	Road traffic and birdsong	54.7	81.2	53.1	40.4
27/04/2022 08:07-09:07	Road traffic and birdsong	54.7	81.7	55.4	48.6
26/04/2022 10:07-11:07	Road traffic and birdsong	54.3	76.5	57.8	40.6
28/04/2022 07:07-08:07	Road traffic and birdsong	54.2	73.5	57.0	46.8

The noise levels after those above are attributed to residual sound only with the overall ambient sound levels being more than 5 to 9 dB below the highest levels of commercial sound noted. If commercial sound was audible outside the above worst-case periods, it would not affect the assessment which will be based on the highest measured levels.

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

3.2. ROAD TRAFFIC SOUND SURVEY – NETHERLEY ROAD

E3P have undertaken a road traffic sound survey in accordance with the shortened measurement procedure given in Calculation of Road Traffic Noise (CRTN) during a typical weekday period. The survey was undertaken during the following period:

 10:30-13:30 Friday 29th April 2022.



The following noise measurement position was chosen for the Road Traffic Noise Survey:

- 📍 Noise Measurement Position 2 (NMP2): Located on the southern boundary of the site approximately 5 m from the nearside kerbstone of Netherley Road. The microphone was located at a height of 1.5 m above ground level and in free-field conditions. Sound sources consisted of road traffic along Netherley Road.

Table 3.2 details the measured sound pressure levels.

TABLE 3.2 MEASURED ROAD TRAFFIC SOUND LEVELS – WOLVERHAMPTON ROAD

MEASUREMENT START TIME	MEASURED SOUND PRESSURE LEVELS (dB)			
	L _{Aeq,T}	10th Highest L _{Amax,fast}	L _{A90,T}	L _{A10,T}
10:30	65.9	81.4	43.8	71.0
11:30	67.4		44.5	72.0
12:30	67.1		43.9	71.9
Derived Daytime Noise Level, L _{Aeq,16hr}				69
Derived Night-time Noise Level, L _{Aeq,8hr}				60

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

During the survey, conditions remained dry and wind speeds rarely exceeded 5 m/s. The equipment outlined in Table 3.3 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	Norsonic Nor145	14529152	18th June 2021
	Pre-amplifier	Norsonic Nor1209	22293	
	Microphone	Norsonic Nor1227	332220	
	Calibrator	Norsonic Nor1255	125525208	18th June 2021
NMP2	Sound Level Meter	01dB Fusion	12039	30th June 2021
	Pre-amplifier	01dB Pre22	1805124	
	Microphone	GRAS 40CE	330832	
	Calibrator	01dB Cal31	87281	31st January 2022

The sound level meters were 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

For the purposes of this assessment, E3P has used noise modelling software, CadnaA 2021 MR1, to determine the impact of noise from road traffic and industrial sound.

The following inputs have been included in the model:

- ✳ Proposed Site Plan Rev X.
- ✳ Site elevations have been taken as existing by way of a 2 m grid Digital Terrain Model (DTM) and contains public sector information licensed under the Open Government Licence v3.0.
- ✳ The industrial site is inputted as an area source with a height of 1.5 m to replicate the heavy vehicle movements and engine noise. The sound power of this area is calibrated to NMP1 and the assessed noise levels.
- ✳ Ground absorption is set at 0.5 with all hardstanding areas inputted into the model and roads and buildings set as acoustically hard.
- ✳ Boundary treatments noted on the plan are included.
- ✳ A reflection order of 2 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.

In relation to the industrial sound impact, normally a BS 4142 assessment would be undertaken. However, the frequency of audible sound from the site is so low that a traditional BS 4142 assessment is not considered appropriate. Indeed, of the potential 46 operational hours monitored, only 4 hours of operational sound was noted and captured with any other commercial sound falling below the typical hourly residual noise level.

As such, consideration of worst-case measured noise levels during these periods is given. The highest measured level is not taken however given the difference between this single hour and the other periods. As such, an average across the 3 hours of captured commercial sound on Monday 25th April between 13:07 and 16:07 is used to inform the assessment, specifically 59 dB.

Figures 2 and 3 determine the noise levels across the Site during the daytime and night-time periods, respectively, due to road traffic associated with Netherley Road and the open industrial site. Although it is unlikely that the industrial site would operate at night, it is included here to inform a worst-case assessment.

4.1. EXTERNAL AMENITY AREA NOISE LEVEL ASSESSMENT

The predicted levels range from 45 dB up to 61 dB in the worst affected areas. As such, most external areas that could be used for relaxation achieve levels of below 55 dB. Indeed, only three plots will experience an exceedance of 55 dB, one due to industrial sound and two due to road traffic sound.

As such, it is predicted that the No Observed Adverse Effect Level (NOAEL) is achieved in most external areas with the following commentary:



"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."

Accordingly, no action is required.

However, three plots will require acoustic barriers in order to achieve levels below 55 dB. These are discussed in Section 5.0.

4.2. INTERNAL NOISE LEVEL ASSESSMENT

With regards to internal noise levels, E3P has assumed a standard glazing specification of 4 mm glass/20 mm air space/4 mm glass is assumed which affords a sound insulation performance in the order of 31 dB R_w however this is for a pink noise spectrum. The same unit, weighted for road traffic noise using the '+C_{tr}' correction, has a sound insulation performance value of approximately 25 dB and so this value has been used to calculate internal noise levels.

The recently published AVO has found that a common reduction for an open window is 13 dB based on research undertaken. As such, a figure of 13 dB is applied here.

The model has been used to predict façade noise levels at the ground, first and second floors for the worst affected facades. To determine any requirements for mitigation, E3P has added the reduction provided by the glazing (25 dB) to the relevant criterion for the day (35 dB) and night (30 dB). The below details the allowable external noise levels for each building, dependant on the glazing assumed:

✳ Limits of 60 dB daytime and 55 dB night-time before higher specification glazing is needed.

The highest predicted day and night façade levels are 64 dB during the day and 57 dB at night for The Coach House, with all other plots experiencing suitably low noise levels. As such, standard thermal double glazing is sufficient for most plots.

However, south facing habitable room windows at The Coach House will require higher specification glazing, which is discussed in Section 5.2.

With regards to opening windows, there is a requirement to consider the need to open windows for ventilation and the mitigation of overheating. At this stage, the assessment assumes that ventilation would be provided by way of extract fans in kitchens and bathrooms and openable windows.

4.2.1. VENTILATION CONDITION

When considering a partially open window for ventilation purposes, E3P has assessed whether the BS 8233:2014 internal criterion can be achieved with windows open for ventilation. Here ventilation is defined as:

To provide fresh air to the building and to dilute and disperse residual water vapour not dealt with by extract ventilation as well as removing other pollutants which are released throughout the building.

Thermal comfort and overheating are considered in Section 4.2.2. Purge ventilation is provided by an open window regardless of the ventilation strategy.



As such, a comparison of predicted internal noise levels, with windows open, with the BS 8233:2014 criterion is required. The allowable external noise level to achieve this condition is 48 dB during the day and 43 dB during the night. As such, any levels above this would result in an exceedance of the internal ambient noise level criteria and a whole dwelling ventilation system, that does not rely on open windows, will be required. As can be seen on the Figures, all plots are subject to exceedances during both periods.

4.2.2. OVERHEATING CONDITION

E3P has undertaken a level 1 assessment in accordance with the AVO Guide and adopted the noise levels outlined for negligible and low risk. Any plots that pass this test will not require whole house ventilation to control the overheating as external noise levels would be sufficiently low enough that an open window can provide the overheating mitigation without compromising internal noise levels. As such, the allowable façade noise levels are 63 dB during the day and 55 dB during the night which accords with a medium risk level in the AVO Guide. Any facades experiencing higher noise levels than these will be subject to a level 2 assessment.

As can be seen from the Figures, only The Coach House exceeds these levels. However, quieter facades are available to open windows to mitigate overheating and, as such, a mechanical system is not deemed to be required for this plot. Therefore, System 1 ventilation is sufficient in order to satisfy the ventilation condition with no requirement to mitigate overheating. Openable windows will be sufficient mitigation.



5. MITIGATION

5.1. ACOUSTIC BARRIERS

The previous section determined that the eastern garden of Farmstead North would be subject to unacceptable commercial sound and that the gardens associated with The Barns would be subject to unacceptable levels of road traffic sound without mitigation measures in place. As such, an additional grid noise map has been run with acoustic barriers in place to achieve the required levels. Figure 4 details the resultant noise map.

The following barriers are proposed:

- ✿ 3.4 m high barrier at the north east corner of Farmstead North (plot 6). It is understood that proposed banking in this area and tree planting is to be incorporated into the design with an acoustic fence on top. As such, it has been modelled as a 1 m earth bund with a 2.4 m high fence on top but any combination would be sufficient in controlling noise; and
- ✿ 2.1 m high barrier at the southern and eastern edges of the gardens associated with The Barns (plots 2 and 3).

The above barriers can be of wooden fence or brick wall construction, should be sealed at the base, be free from holes and have a minimum mass of 10 kg/m².

E3P noted feature walls on the plan at The Coach House. It is assumed these would be at 1.8 m in height.

5.2. FAÇADE INSULATION REQUIREMENTS

The previous section determined that a whole house ventilation system would be required for all plots. Standard thermal double glazing is sufficient for most plots.

System 1 is sufficient for the development as internal noise levels with windows open to mitigate overheating are not considered significantly adverse.

Where trickle ventilators form part of the ventilation system, the sound reduction, in the open position, must achieve at least that provided by the glazing unit, 25 dB $D_{n,e,w} + C_{t,r}$ or 29 dB $D_{n,e,w} + C_{t,r}$ in the case of The Coach House.

With regards to The Coach House, any living room and/or bedroom windows on eastern, southern or western elevations will require the following glazing:

- ✿ 29 dB $R_w + C_{t,r}$ (example configuration = 10 mm glass / 6 to 20 mm air space / 4 mm glass).

It is also recommended that a glazier is consulted to ensure any system installed achieves the assessed reduction as a minimum.



6. CONCLUSION AND RECOMMENDATIONS

E3P was commissioned to undertake a Noise Impact Assessment for a proposed residential development on land off Netherley Road in Tarbock Green.

A long term, attended and unattended commercial sound survey has been conducted in order to capture activity associated with the open industrial site to the north east. Furthermore, an attended road traffic sound survey has been conducted for Netherley Road.

The results of which were used to inform a 3D noise model. The model was used to assess road traffic and commercial sound impact in external amenity areas and impacting upon proposed facades.

The assessment was undertaken in accordance with the criterion, for day and night, given in BS 8233:2014 for road traffic and commercial sound.

The assessment has determined that standard thermal double glazing is sufficient for most plots but The Coach House will require higher specification glazing. Acoustic barriers are required to control road traffic and commercial sound and whole dwelling ventilation systems are required for all plots in order to achieve acceptable noise levels in gardens and within habitable rooms.

As such, the assessment has shown, with mitigation measures in place, that no adverse impact is predicted day or night at the receptors due to road traffic and commercial sound.

As such, there are no noise related reasons why planning permission should not be granted for the proposed development as long as the recommendations of this report are followed and included within the design stage.

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 A1: HOURLY SOUND LEVEL DATA

PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	MAXIMUM NOISE LEVEL, $L_{AMAX,Fast}$ (dB)	STATISTICAL SOUND LEVEL, $L_{A10,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
25/04/2022 10:07	52.3	81.1	55.0	45.2
25/04/2022 11:07	53.9	75.5	55.9	43.1
25/04/2022 12:07	52.3	77.1	53.0	42.9
25/04/2022 13:07	56.0	84.5	56.4	48.0
25/04/2022 14:07	57.3	77.1	58.0	47.6
25/04/2022 15:07	63.4	79.0	67.0	46.3
25/04/2022 16:07	52.5	69.4	53.7	49.5
25/04/2022 17:07	52.0	74.7	51.8	45.8
25/04/2022 18:07	47.2	71.6	49.2	42.4
25/04/2022 19:07	52.4	72.3	54.2	46.3
25/04/2022 20:07	51.4	82.3	52.8	46.5
25/04/2022 21:07	49.6	68.2	51.0	46.5
25/04/2022 22:07	49.7	70.7	51.0	45.0
25/04/2022 23:07	48.2	60.4	51.2	43.4
26/04/2022 00:07	44.5	57.6	47.3	39.2
26/04/2022 01:07	43.9	56.9	47.0	38.2
26/04/2022 02:07	43.0	56.3	45.9	37.9
26/04/2022 03:07	44.4	54.8	47.2	39.5
26/04/2022 04:07	50.2	67.3	53.0	43.1
26/04/2022 05:07	58.6	78.5	61.8	49.4
26/04/2022 06:07	54.7	73.0	57.0	48.1
26/04/2022 07:07	52.5	70.7	55.6	43.3
26/04/2022 08:07	52.6	74.1	56.0	42.4
26/04/2022 09:07	51.3	74.0	54.7	41.3
26/04/2022 10:07	54.3	76.5	57.8	40.6
26/04/2022 11:07	54.7	81.2	53.1	40.4
26/04/2022 12:07	51.8	76.0	51.2	40.3
26/04/2022 13:07	55.1	73.1	56.0	40.0
26/04/2022 14:07	49.6	69.2	53.6	39.1
26/04/2022 15:07	52.1	72.9	55.0	41.9
26/04/2022 16:07	52.7	75.4	54.0	40.7
26/04/2022 17:07	50.7	73.7	52.2	41.9



PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	MAXIMUM NOISE LEVEL, $L_{AMAX,Fast}$ (dB)	STATISTICAL SOUND LEVEL, $L_{A10,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
26/04/2022 18:07	53.6	74.5	53.9	49.4
26/04/2022 19:07	52.2	69.0	53.6	49.7
26/04/2022 20:07	51.6	70.0	53.2	49.3
26/04/2022 21:07	50.5	70.3	52.0	47.7
26/04/2022 22:07	50.2	68.3	51.7	46.5
26/04/2022 23:07	48.6	58.4	51.4	44.3
27/04/2022 00:07	44.8	59.1	47.4	39.7
27/04/2022 01:07	42.7	58.7	45.6	37.8
27/04/2022 02:07	43.0	55.2	46.0	38.1
27/04/2022 03:07	45.8	56.7	48.6	41.4
27/04/2022 04:07	50.5	71.5	53.2	42.7
27/04/2022 05:07	55.1	72.4	57.8	50.6
27/04/2022 06:07	56.0	73.6	57.6	52.1
27/04/2022 07:07	53.9	79.0	55.0	49.7
27/04/2022 08:07	54.7	81.7	55.4	48.6
27/04/2022 09:07	52.4	73.3	52.9	45.8
27/04/2022 10:07	53.0	71.3	56.3	46.4
27/04/2022 11:07	52.1	74.4	53.9	44.2
27/04/2022 12:07	55.9	86.7	55.8	44.9
27/04/2022 13:07	52.4	80.7	52.0	45.8
27/04/2022 14:07	53.7	81.7	55.7	44.3
27/04/2022 15:07	56.4	74.4	59.1	44.4
27/04/2022 16:07	47.5	73.7	48.9	41.8
27/04/2022 17:07	49.7	71.6	50.0	43.8
27/04/2022 18:07	53.3	71.9	55.1	49.1
27/04/2022 19:07	52.0	70.1	54.3	48.0
27/04/2022 20:07	51.6	71.8	53.0	47.0
27/04/2022 21:07	48.8	58.1	50.9	45.9
27/04/2022 22:07	50.9	58.1	52.8	48.5
27/04/2022 23:07	50.0	67.7	52.0	45.2
28/04/2022 00:07	46.1	64.7	48.8	41.4
28/04/2022 01:07	43.4	56.8	46.1	38.6



PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	MAXIMUM NOISE LEVEL, $L_{AMAX, Fast}$ (dB)	STATISTICAL SOUND LEVEL, $L_{A10,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
28/04/2022 02:07	42.6	53.2	45.6	37.0
28/04/2022 03:07	46.7	55.8	49.7	41.1
28/04/2022 04:07	51.0	64.9	53.7	46.5
28/04/2022 05:07	56.6	72.3	59.4	51.2
28/04/2022 06:07	56.2	74.7	58.4	49.4
28/04/2022 07:07	54.2	73.5	57.0	46.8
28/04/2022 08:07	52.6	69.5	55.6	44.3
28/04/2022 09:07	53.7	73.7	57.0	44.6
28/04/2022 10:07	56.6	86.5	55.0	44.5
28/04/2022 11:07	54.1	77.9	56.0	44.0
28/04/2022 12:07	53.7	75.3	56.8	41.0
28/04/2022 13:07	51.6	72.1	53.8	43.6
28/04/2022 14:07	52.2	76.1	53.7	45.6
28/04/2022 15:07	54.0	80.1	56.9	43.9
28/04/2022 16:07	53.5	73.8	56.2	45.5
28/04/2022 17:07	52.1	72.3	52.6	44.3
28/04/2022 18:07	50.0	73.9	52.8	44.6
28/04/2022 19:07	50.1	82.0	50.3	44.2
28/04/2022 20:07	51.1	73.4	53.1	43.2
28/04/2022 21:07	48.6	68.4	50.0	42.5
28/04/2022 22:07	46.5	67.7	48.0	40.8
28/04/2022 23:07	44.6	58.2	47.7	39.4
29/04/2022 00:07	42.3	59.2	45.1	36.5
29/04/2022 01:07	41.5	56.7	44.8	35.3
29/04/2022 02:07	41.3	56.4	44.6	34.4
29/04/2022 03:07	40.3	53.6	42.9	35.6
29/04/2022 04:07	49.9	67.7	54.6	37.9
29/04/2022 05:07	56.5	81.0	59.7	49.2
29/04/2022 06:07	55.1	70.2	57.6	50.5
29/04/2022 07:07	53.1	76.6	55.8	46.3
29/04/2022 08:07	53.3	73.2	54.6	41.8
29/04/2022 09:07	53.9	74.6	55.7	39.7



Netherley Road, Tarbock Green

Noise Impact Assessment

May 2022

PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	MAXIMUM NOISE LEVEL, $L_{AMAX,Fast}$ (dB)	STATISTICAL SOUND LEVEL, $L_{A10,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
29/04/2022 10:07	50.2	69.4	54.0	38.3



APPENDIX III

FIGURES

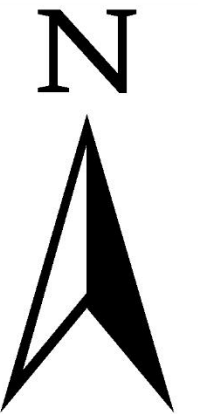
Figure 1 - Noise Survey Measurement Positions



Project:
Netherley Road
Tarbock Green

Project-No:
50-528

Client:
G D B Property
Investments Ltd



Project Engineer: L Faulkner
Date: 11/05/2022

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

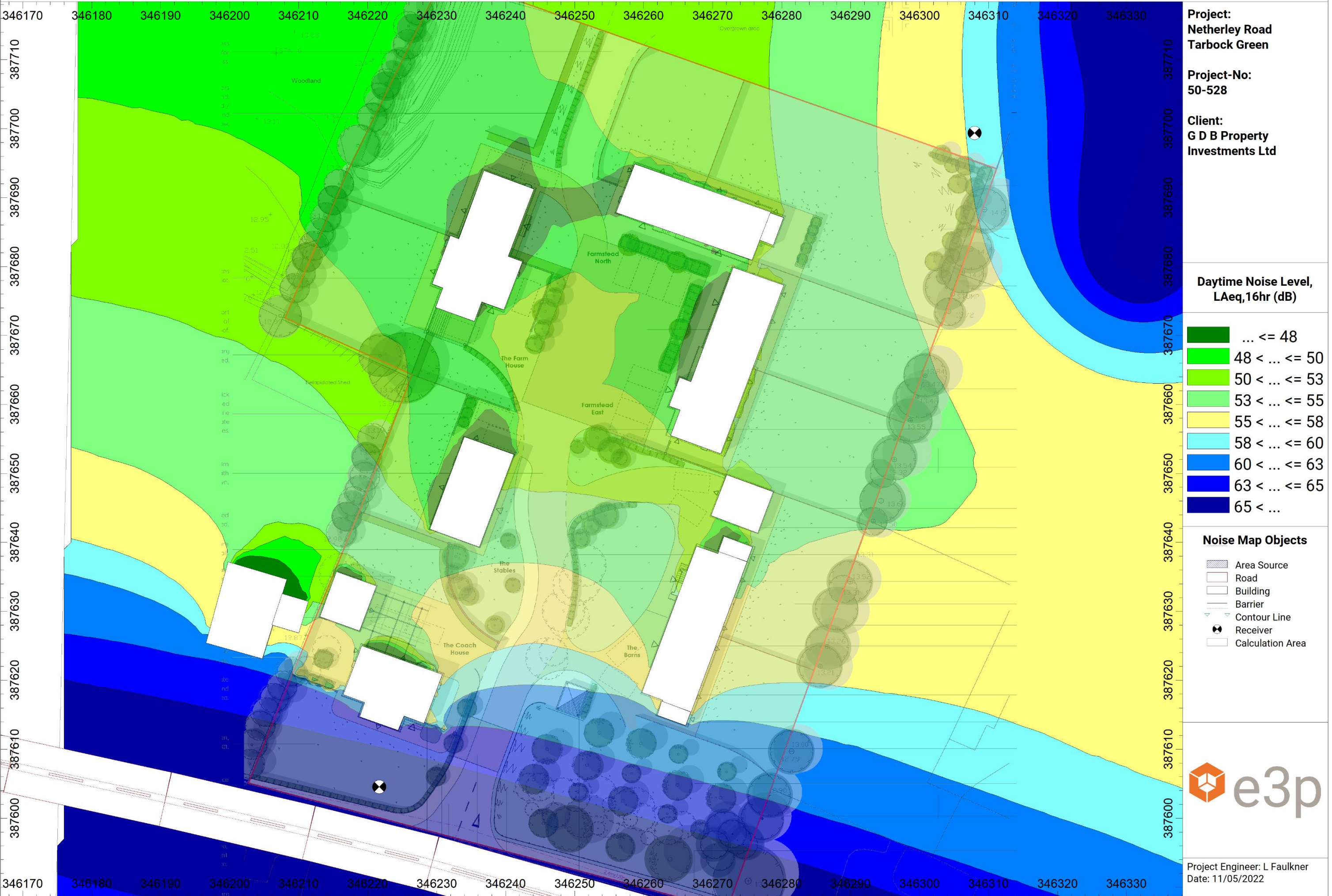


Figure 3 - Night-time Grid Noise Map - Calculation at 4m above ground level

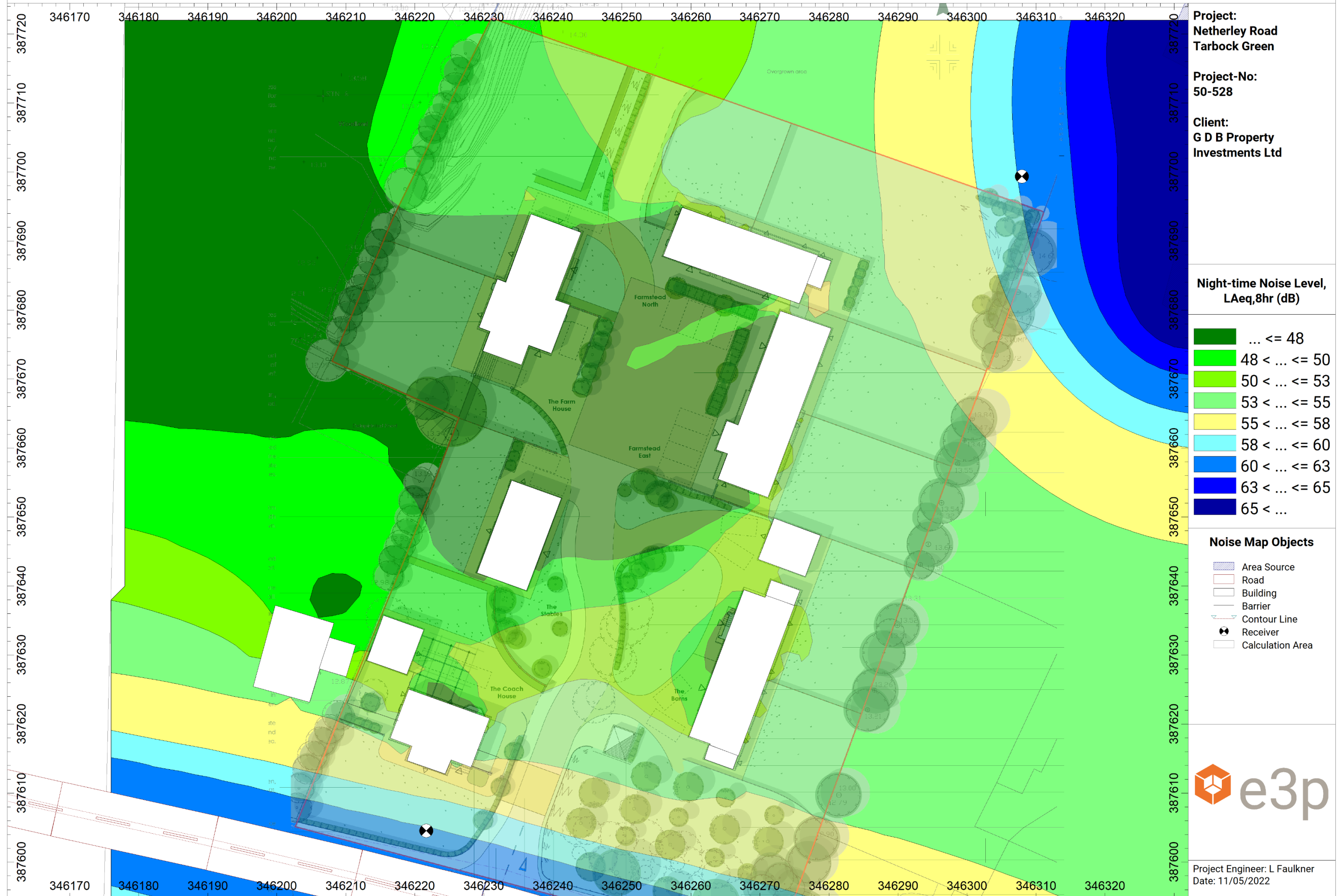


Figure 4 - Daytime with Mitigation Grid Noise Map - Calculation at 1.5m above ground level

