



e3p

Noise Impact Assessment

Hill Top Farm, Earl Shilton

Reference: 50-974-R1-2

Date: September 2023



NOISE IMPACT ASSESSMENT

Hill Top Farm
Earl Shilton

Prepared for:

Tricas Construction

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EXECUTIVE SUMMARY

BACKGROUND

Site Address	Hill Top Farm, Leicester Road, Earl Shilton LE9 7DP
National Grid Reference	E 446809 N 298307
Proposed Development	Proposed residential development comprising 50no. dwellings with associated access and landscaping.
Report Objectives	The objectives of this report are to: Identify, measure and assess the potential impact of any existing noise sources in the immediate vicinity of the Site upon proposed residential receptors. The report follows current and relevant British Standards in order to provide a robust assessment. This report aims to discharge condition 5 of the outline planning permission.

ASSESSMENT

Surveys Completed	E3P have undertaken a 24-hour unattended road traffic sound measurement for Leicester Road and supplemented this with attended source measurements of any commercial sound associated with the units to the south. It was found that no noise or activity was noted with the units to the south except for a piece of fixed plant that was noted to output very low levels of noise, along with occasional car movements in car parks. Furthermore, it is considered that the recording studio would be suitably insulated against external noise not to warrant any assessment of potential noise break-out.
Assessments	A 3D noise model has been constructed to assess road traffic sound impact in accordance with the criterion, for day and night, given in BS 8233:2014. Consideration has been given to average noise levels, day and night, and maximum instantaneous noise levels at night.
Mitigation Requirements	Acoustic barriers are required along the eastern areas of the site at heights of 2.4 and 2.6 m in order to achieve levels of 55 dB or below. The assessment has determined that higher specification glazing is required for certain facades closest to the road. The assessment also found non-compliance with the ADO requirements for noise levels in bedrooms, at night, with windows open. As such, a Part O overheating assessment is required for the plots.

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.



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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Tricas Construction to undertake a Noise Impact Assessment for a proposed residential development on land at Hill Top Farm, Leicester Road in Earl Shilton, to be referred to hereafter as 'the Site'.

This assessment looks to determine the key noise sources in the immediate vicinity of the Site and to assess their impact, if any, upon proposed residential receptors and to specify mitigation measures, where required. Specifically, this report is to be used to discharge condition 5 of the planning permission:

5. Noise

No development shall commence until a scheme for protecting the proposed dwellings from noise from Leicester Road and the adjacent industrial/commercial operations has been submitted to and approved by the Local Planning Authority. All works which form part of the approved scheme shall be completed before any of the permitted dwellings are first occupied.

Reason: To ensure that the development is protected from nearby noise sources in accordance with Policy DM10 of the Site Allocations and Development Management Policies DPD (2016).

1.2. PROPOSED DEVELOPMENT

The client intends to construct 50 residential dwellings with access and landscaping. The key sources of sound impacting upon the Site is road traffic sound associated with Leicester Road.

This assessment has been undertaken in accordance with the following supplied drawings:

-  Proposed Layout (Drawing Number 40963/008L).

The layout 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 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

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.

2.4. BUILDING REGULATIONS: APPROVED DOCUMENT F - VOLUME 1: DWELLINGS (JUNE 2022)

Approved document F Volume 1: Dwellings (ADF) provides guidance set by the Department for Levelling Up, Housing and Communities, that relates to means of ventilation within dwellings. The ventilation strategy specified within the ADF are as follows.

1.9 The ventilation strategy in this approved document relies on a combination of all of the following.

a. Extract ventilation from rooms where water vapour or pollutants are likely to be released (e.g. bathrooms and kitchens), to minimise their spread to the rest of the building. Ventilation fans may be either intermittent operation or continuous operation.

b. Whole dwelling ventilation to provide fresh air to the building and to dilute, disperse and remove water vapour and pollutants not removed by extract ventilation.

c. Purge ventilation to remove high concentrations of pollutants and water vapour. Purge ventilation is used intermittently and required only for pollutants produced by occasional activities (e.g. fumes from painting).

1.10 Ventilation may be delivered through natural ventilation, mechanical ventilation or a combination of both.

1.11 The ventilation systems in this approved document are examples of systems that comply with Part F of the Building Regulations. Other ventilation systems may be acceptable if they can be shown to meet an equal level of performance.

Within the ADF there are three system specific ventilation systems that can be utilised to provide sufficient ventilation. These methods are as follow.

- 1. Natural ventilation with background ventilators and intermittent extract fans** (guidance suitable only for less airtight dwellings) - Ventilation provided by thermal, wind or diffusion effects through doors, windows or other intentional openings without the use of mechanically driven equipment. For the purposes of this approved document, natural ventilation refers to a ventilation strategy using background ventilators and intermittent extract ventilation.



2. **Continuous mechanical extract ventilation** - Mechanically driven ventilation that continuously extracts indoor air and discharges it to the outside.
3. **Mechanical ventilation with heat recovery** - A mechanically driven ventilation system that both continuously supplies outdoor air to the inside of the dwelling and continuously extracts indoor air and discharges it to the outside. For the purposes of this approved document, the guidance for mechanical ventilation with heat recovery applies to centralised or decentralised supply and extract systems, with or without heat recovery.

2.5. BUILDING REGULATIONS: APPROVED DOCUMENT O – OVERHEATING (JUNE 2022)

Approved document O - Overheating (ADO) provides guidance set by the Department for Levelling Up, Housing and Communities, that relates to the mitigation of overheating. In relation to noise the ADO provides the following guidance.

3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
- b. 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).

3.4 Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants'

Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.

NOTE: Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020)

2.6. 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 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.

It is common that a Local Planning Authority (LPA) will specify their own 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. NOISE SURVEY DATA

3.1. ROAD TRAFFIC SOUND MEASUREMENT – LEICESTER ROAD

Due to the open nature of this area of the site it was not possible to install the meter for 24 hours therefore 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:

📍 10:00 Thursday 31st August to 10:00 Friday 1st September 2023.

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

📍 Noise Measurement Position 1 (NMP1): Located on the eastern boundary of the Site, approximately 6 m from the nearside kerbstone of Leicester 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 Leicester Road.

Table 3.1 details the measured sound pressure levels.

TABLE 3.1 MEASURED ROAD TRAFFIC SOUND LEVELS – LEICESTER ROAD

MEASUREMENT START TIME	MEASURED SOUND PRESSURE LEVELS (dB)			
	$L_{Aeq,T}$	10th Highest $L_{Amax,fast}$	$L_{A90,T}$	$L_{A10,T}$
10:00	64.9	N/A	40.8	69.4
11:00	64.9		40.4	69.5
12:00	65.3		39.9	69.7
13:00	65.5		40.6	70.0
14:00	65.8		44.1	70.1
15:00	66.5		44.5	70.6
16:00	67.2		47.7	71.1
17:00	67.2		45.8	71.3
18:00	66.6		44.1	70.8
19:00	65.2		39.6	70.2
20:00	64.7		35.9	69.2
21:00	63.8		33.1	67.8
22:00	60.2		29.6	64.6
23:00	58.4	80.2	28.0	61.4
00:00	54.5		25.2	48.8
01:00	54.2		24.1	50.8
02:00	53.2		23.0	44.6
03:00	54.9		23.6	46.9



04:00	57.2		23.7	53.4
05:00	63.0		27.8	66.1
06:00	66.1		39.0	70.9
07:00	67.7	N/A	47.2	72.3
08:00	68.0		52.8	72.4
09:00	67.6		48.5	71.6
Derived Daytime Noise Level, L _{Aeq,16hr}				66.0
Derived Night-time Noise Level, L _{Aeq,8hr}				60.2

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

3.2. COMMERCIAL SOUND MEASUREMENTS

In addition to the above, E3P have undertaken site walkovers and measurements of any activity associated with the units to the south.

The surveys were carried out over the following time periods:

- 📅 Thursday 31st August 2023 between 06:00 and 09:00; and
- 📅 Friday 1st September 2023 between 11:00 and 13:00.

During the site walkovers, no noise from the commercial premises was noted. Indeed, the only activity seen was car movements within the small car parking areas immediately to the south.

The surveyor attended the commercial units to the rear also, within the car park area, and only noted a single item of plant that, when measured at 1 m, was only at 43 dB, which would be inaudible above the road traffic noise at the receptors.

As such, commercial sound is not considered further. Indeed, the only notable units would be the recording studio and the Airsoft site. However, it is assumed that the recording studio would be mitigated against external noise ingress with little to no noise break-out and E3P are aware of the Noise Assessment and mitigation strategy for the Airsoft site which aims to ensure no adverse impact at receptors that neighbour the site and are much closer than those proposed here.

The commercial units were noted to only open their gates around 08:00. As such, no consideration to night-time noise is needed. The car parks will be assessed during daytime hours.

The equipment outlined in Table 3.4 was used for the noise survey.



TABLE 3.2 NOISE MEASUREMENT EQUIPMENT AND CALIBRATION DATES

MEASUREMENT POSITION	EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE AT TIME OF SURVEY
NMP1	Sound Level Meter	01dB Fusion	14616	29th June 2024
	Pre-amplifier	01dB Pre22	20951	
	Microphone	GRAS 40CE	494264	
	Calibrator	Cirrus CR515	99206	25th July 2024

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



4. ROAD TRAFFIC NOISE IMPACT ASSESSMENT

For the purposes of this assessment, E3P has used noise modelling software, CadnaA 2023 MR2, to determine the impact of noise from road traffic sound.

The following inputs have been included in the model:

- ✳ Proposed Layout (Drawing Number 40963/008L).
- ✳ 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.
- ✳ Contours are altered to although for Finished Floor Levels (FFLs).
- ✳ Ground absorption is set at 0.5 with roads and roads and buildings set as acoustically hard.
- ✳ A reflection order of 1 has been used in all calculations.
- ✳ Noise levels generated using ISO 9613-1 and ISO 9613-2 "*Acoustics – Attenuation of sound during propagation outdoors*" as incorporated into CadnaA software.

Figures 2 and 3 determine the noise levels across the Site during the daytime and night-time periods, respectively.

4.1. EXTERNAL AMENITY AREA NOISE LEVEL ASSESSMENT

In rear garden areas, the predicted levels range from 41 dB and up to 67 dB in the worst affected areas due to road traffic sound. As such, these areas will require acoustic barriers should they be used for relaxation purposes.

Accordingly, mitigation measures are required.

4.2. INTERNAL NOISE LEVEL ASSESSMENT

With regards 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 29 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 Acoustics, Ventilation and Overheating Guide (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 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 day (35 dB) and for 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 66 dB during the day and 60 dB at night. As such, standard thermal double glazing will not be sufficient for the worst affected plots. However, a glazing specification achieving a sound reduction of 25 dB $R_w + C_{tr}$ would be sufficient for plots not located along the road.

It is also important to consider maximum noise levels at bedroom windows. As such, the measured value of 80 dB $L_{Amax,fast}$ at 6 m for Leicester Road has been distance corrected to the closest façade resulting in an expected external maximum noise level of 80 dB. With a reduction of 29 dB provided by standard glazing, internal maximum noise levels would be no more than 51 dB, 6 dB above the criterion.

The facades that require higher specification glazing are as follows:

- 🏠 Plot 001.
- 🏠 Plots 031 and 032.
- 🏠 Plots 033 to 035.
- 🏠 Plots 036 and 037.

With regards 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

It is assumed that the developer would be installing a whole dwelling ventilation system in accordance with Part F of the Building Regulations as it is assumed Natural Ventilation is not appropriate for these dwellings.

Where background ventilators form part of the system, consideration is required to the sound reduction provided by these when in the open position and, as such, are discussed in Section 5.0.

4.2.2. OVERHEATING CONDITION

E3P has considered the potential impact of noise, internally, should windows be opened to mitigate overheating, as per the criteria stipulated in ADO. Any plots/facades that pass this test can open windows for this without resulting in unacceptable internal noise levels. Those that fail the test would be subject to a Part O Overheating Assessment by a suitably qualified consultant.

Part O only applies to bedrooms at night in relation to the average 8-hour noise level and 10th highest maximum noise level.

As such, the allowable façade noise levels are 53 dB $L_{Aeq,8hr}$ over the night time period and a maximum level of 68 dB $L_{Amax,fast}$. These levels are set based on a sound reduction of 13 dB provided by a partially open window.

As can be seen from the Figures, the same facades that require higher specification glazing exceed these levels and are subject to a Part O Overheating Assessment:

As such, the above facades may require an alternative means of ventilation that can provide suitable air changes necessary to provide 'comfort cooling' dependent on the outcome of the overheating assessment.



5. MITIGATION

5.1. ACOUSTIC BARRIERS

The previous section determined that certain plots would experience noise levels in excess of 55 dB without mitigation measures in place. As such, an additional grid noise map has been run with acoustic barriers in place in order to achieve levels of below 55 dB. The grid is shown in Figure 4.

The following barriers are proposed in order to control road traffic sound:

- ✿ 2.4 m high barrier along the northern and eastern elevation of Plot 001.
- ✿ 2.6 m high barrier along the northern, eastern and southern elevations of Plot 031 and 032.
- ✿ 2.6 m high barrier along the northern, eastern and southern elevations of Plot 033 and 037.

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.

5.2. FAÇADE INSULATION REQUIREMENTS

The previous section determined that an alternative whole house ventilation system may be required for certain plots, depending on the outcome of the overheating assessment. All plots are assumed to have a Part F compliant ventilation system installed as standard. For trickle ventilators, the performance of these, in the open position, must achieve at least that of the glazing stipulated in Table 5.1.

Standard thermal double glazing is sufficient for north facing habitable room windows, but certain facades close to the road will require higher specification glazing.

The worst-case required glazing is chosen per facade. For example, where a glazing needed due to night-time noise is higher than for daytime periods, the night-time requirements are recommended.



TABLE 5.1 GLAZING REQUIREMENTS – LIVING ROOM AND BEDROOM WINDOWS

PLOT	REQUIRED GLAZING REDUCTION, $R_w + C_{t,r}$ (dB)	EXAMPLE CONFIGURATION (mm)
001	30 (35 R_w)	10 / 16 / 4
002 to 030	25 (Standard)	4 / 20 / 4
031 and 032	31 (35 R_w)	10 / 16 / 6
033 to 035	31 (35 R_w)	
036 and 037	31 (35 R_w)	
038 to 050	25 (Standard)	4 / 20 / 4

It is recommended that a glazier is consulted to ensure any system installed achieves the above reduction as a minimum. These specifications should be reviewed by an acoustician.

Figure 5 highlights the facades that are subject to an overheating assessment due to non-compliance with the noise limits in Part O.



6. CONCLUSION AND RECOMMENDATIONS

E3P were commissioned by Tricas Construction to undertake a Noise Impact Assessment for a proposed residential development on land at Hill Top Farm in Earl Shilton.

A Road traffic sound measurement has been conducted for Leicester Road during a typical weekday period. E3P have considered the potential for commercial sound but found no existing sources of sound that have the potential to adversely affect the development.

3D noise modelling has been undertaken to assess road traffic sound in accordance with BS 8233.

The assessment has determined that acoustic barriers are required on eastern and northern elevations at heights of 2.4 and 2.6 m. Furthermore, higher specification glazing is needed for certain facades with the same facades subject to a detailed overheating assessment.

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 sound.

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

FIGURES

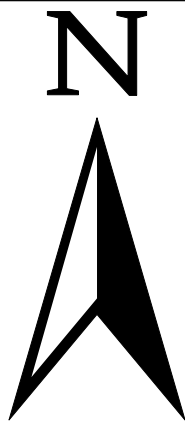
Figure 1 - Noise Survey Measurement Positions



Project:
Hill Top Farm,
Earl Shilton

Project-No:
50-974

Client:
Tricas Construction



Project Engineer: L Faulkner
Date: 05/09/2023

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

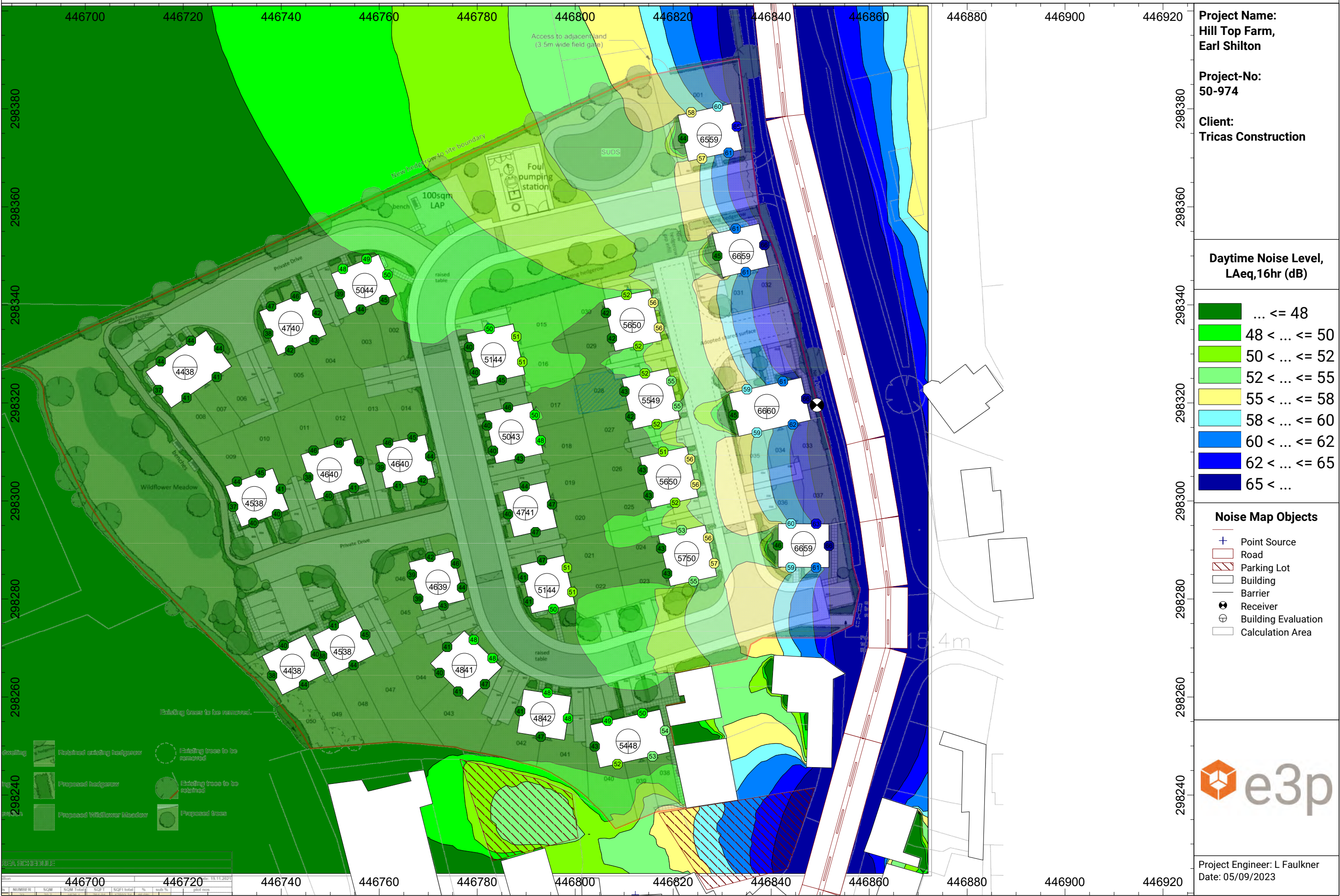


Figure 3 - Night-time Grid Noise Map - Calculation at 4m above ground level



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

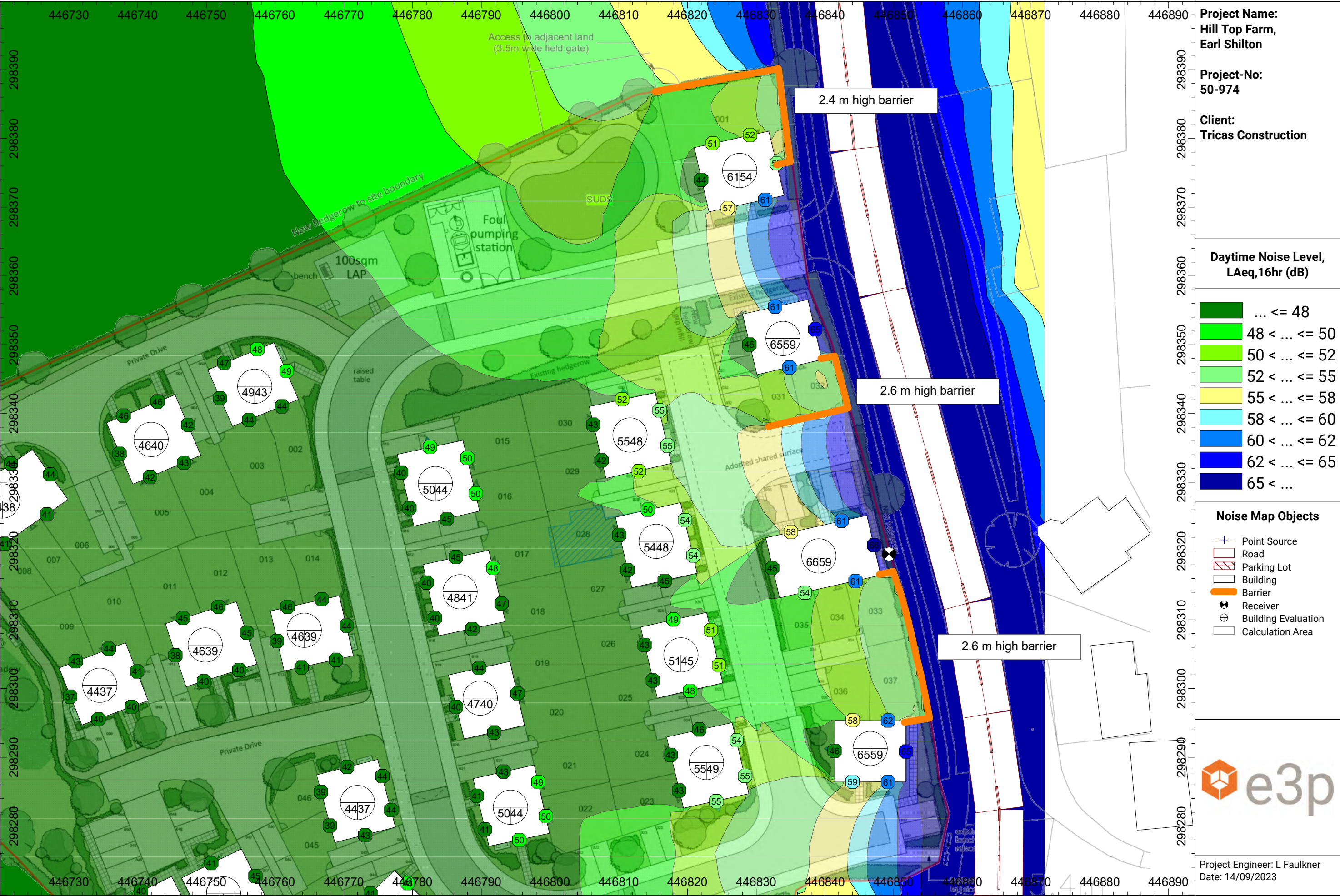


Figure 5 - Part O Overheating Requirements

