



Noise Impact Assessment

Siemens Campus, Nell Lane, Didsbury

Reference: 50-363-R1-1

Date: June 2021



NOISE IMPACT ASSESSMENT

Siemens Campus,
Nell Lane, Didsbury

Prepared for:



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EXECUTIVE SUMMARY

BACKGROUND

Site Address	Nell Lane, Didsbury M20 2XZ
National Grid Reference	E 383466 N 392185
Proposed Development	Residential development comprising of 47 residential units and Apartment building with access and landscaping.
Report Objectives	The objectives of this report are to:  Provide sufficient information and evidence in order to discharge condition 5 in relation to the acoustic insulation of the residential plots. The report follows current and relevant British Standards in order to provide a robust assessment.

ASSESSMENT

Surveys Completed	E3P have relied upon previously measured data which was collected as part of the initial applications and undertaken by Bureau Veritas in March and April 2016. It is considered that the measured road traffic and source data are still applicable especially considering the recent and current restrictions due to the ongoing pandemic. Furthermore, the assessments have looked to mirror those previously undertaken which also accounted for future road traffic data.
Assessments	A 3D noise model has been constructed to assess road traffic sound impact externally and internally at all residential receptors. Road traffic sound is assessed in accordance with the criterion, for day and night, given in BS 8233:2014.
Mitigation Requirements	The assessment has found that the previous recommendations for acoustic barriers, higher specification glazing and whole dwelling ventilation are sufficient and the assessment has shown that acceptable external and internal noise levels can be achieved with the recommended mitigation.

CONCLUSIONS

With mitigation measures in place, this assessment has shown that no adverse impact is predicted day or night at the receptors due to road traffic sound thus providing sufficient information in order to discharge Condition 5.



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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by PJ Livesey to provide a Noise Assessment and Mitigation Schedule for the permitted residential development at Siemens Campus, Nell Lane in Didsbury, to be referred to hereafter as 'the Site'.

Specifically, the 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. This will provide sufficient information in order to discharge condition 5 of the planning permission, as follows:

5) Within one month of this decision a scheme for acoustically insulating the residential accommodation against noise from Princess Road and Nell Lane shall be submitted to and approved in writing by the City Council as local planning authority. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied.

1.2. DEVELOPMENT

The development consists of an apartment block in the northern area bounding Nell Lane and a further 47 residential units within the Site along with access and landscaping.

The key sources of sound impacting upon the Site is road traffic sound associated with Princess Road and Nell Lane. There is also potential for noise impact associated with the West Didsbury Police Station to the east.

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

-  Proposed Site Plan (Drawing Number 121-00-2100/K Rev K) dated 21st May 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 in order to inform an accurate assessment.

Where mitigation measures are specified in this report, it should be noted that these measures are relative to a specific sound or vibration source, both in terms of the measured sound pressure and vibration level and the character of the sound source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, E3P cannot be held responsible for any subsequent variations in the proposed mitigation performance.



2. ASSESSMENT METHODOLOGY

2.1. NATIONAL PLANNING POLICY FRAMEWORK

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

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

- ✳ Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development.
- ✳ Mitigate and reduce to a minimum, other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions.
- ✳ Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.
- ✳ Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.2. NATIONAL PLANNING PRACTICE GUIDANCE

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

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

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

In line with the explanatory note of the NPSE, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase, where applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.



The “observed effect levels” are as follows:

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

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

TABLE 2.1 NOISE EXPOSURE HIERARCHY

PERCEPTION	EXAMPLES OF OUTCOMES	INCREASING EFFECT LEVEL	ACTION
Not Noticeable	No effect.	No observed effect	No specific measures required
Noticeable and Not Intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television, speaking more loudly, or having to close windows for some of the time because of the noise where there is no alternative ventilation. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion, having to keep windows closed most of the time because of the noise where there is no alternative ventilation. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed effect	Avoid
Noticeable and Very Disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening, loss of appetite, significant/medically definable harm (auditory and non-auditory).	Unacceptable adverse effect	Prevent



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

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

More specific factors to consider when relevant:

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

2.3. 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. WORLD HEALTH ORGANISATION (WHO) – GUIDELINES FOR COMMUNITY NOISE

The WHO gives guidance on desirable levels of environmental noise. The levels presented in the WHO Community Guidelines are those at which adverse effects become measurable.

A report was submitted to the WHO in 1995 for consideration as a revision to the 1980 document and revised community guidelines were issued in 2000. In the 2000 guidelines, it is considered that the sleep disturbance criteria should be taken as an internal noise level of 30 dB $L_{Aeq,8\text{ hr}}$ or an external level of 45 dB $L_{Aeq,8\text{ hr}}$. It also recommends that internal L_{Amax} levels of 45 dB and external L_{Amax} levels of 60 dB should be limited where possible.

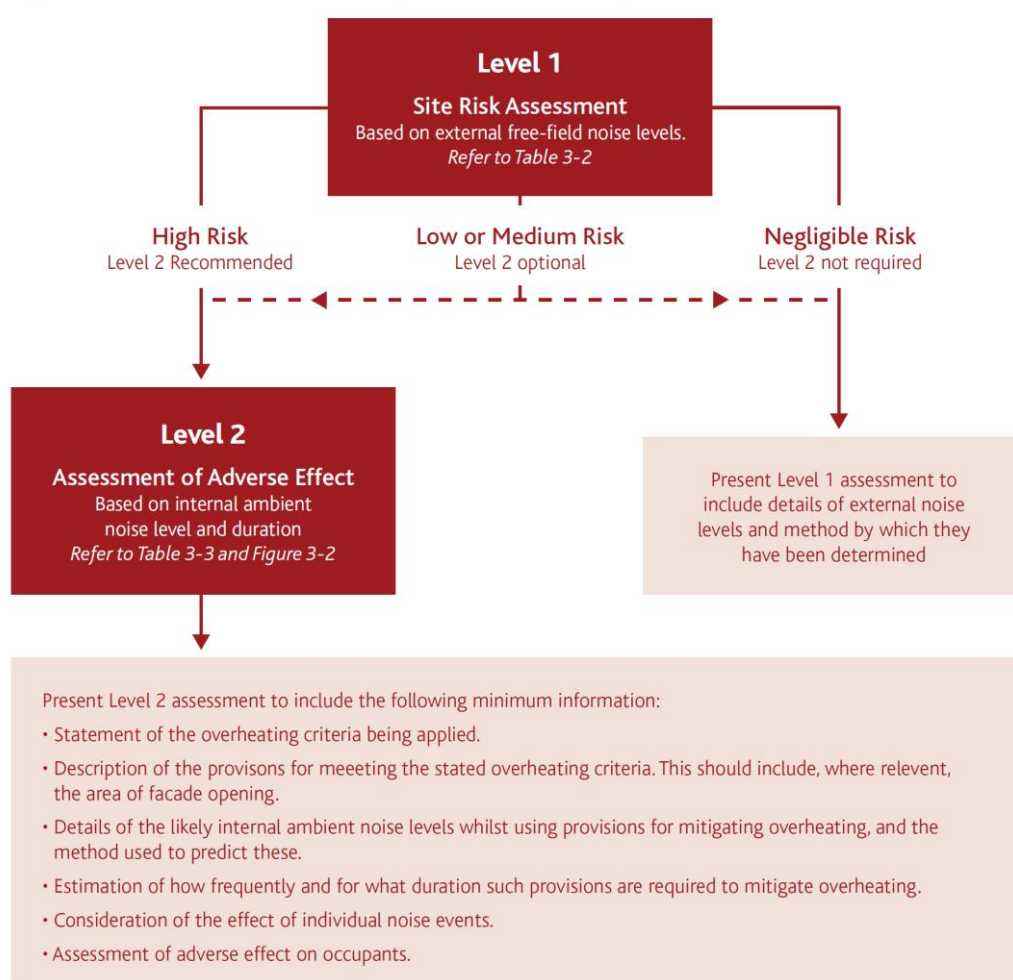


2.5. INSTITUTE OF ACOUSTICS AND ASSOCIATION OF NOISE CONSULTANTS (2020) ACOUSTICS VENTILATION AND OVERHEATING: RESIDENTIAL DESIGN GUIDE

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 <65 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
<i>Increasing noise levels</i>			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 IMPACT ASSESSMENT

E3P have relied upon noise level data and traffic flow information obtained from the Bureau Veritas Environmental Noise Report (6355803/01/v03) dated September 2016. The assessment is also further supplemented by originally proposed mitigation measures as detailed in the Bureau Veritas Discharge of Noise Related Planning Condition Report (6476505/02) dated 7th August 2018 and associated Noise Mitigation: Acoustic Specification for Glazing and Ventilation Plan (121-00-3501C Rev C) dated 1st August 2018.

Following submission of these reports, comments were received from the Environmental Health Department at Manchester City Council, as follows, specifically in relation to the discharge of condition 5:

In the August 2018 report, the plots were numbered differently, so the data does not correlate with the current map. The information on the submitted glazing drawing is incorrect as the annotation appears to be referring to the old plot numbers.

From the data in the 2018 report, it appears that the glazing for Plot 47 (previously 26) is not adequate for the second floor living room on the north façade and Plot 46, the Penthouse 3rd floor, guest suite on the north façade will not meet the noise criteria.

There are also concerns that many of the properties in the development are relying on the windows to be closed to ensure noise criteria are met, and no form of mechanical ventilation is being provided. This will leave the residents exposed to excessive noise levels during warmer weather. The plots on the eastern side of the site are of particular concern looking at the data in the 2018 report.

Unless the applicant can clearly demonstrate that the internal noise criteria are being met then EH will not be recommending discharging the condition. For a development of this size, it would be expected that a proper acoustic report demonstrating that the internal noise criteria would be met with the proposed glazing and ventilation. A simple map, which does not correlate to the old noise report is not adequate.

EH would also expect the applicant to provide an acoustic report to prove that the noise from the mechanical ventilation systems does not exceed the internal noise criteria.

As such, this assessment draws on information previously submitted and looks to provide a comprehensive assessment in order to determine the suitability of the proposed mitigation and provide an absolute schedule based on the final layout plan.

For the purposes of this assessment, E3P has used noise modelling software, CadnaA 2019 MR1, to determine the impact of noise from road traffic sound.

The following inputs have been included in the model:



- ✿ Proposed Site Plan Rev K.
- ✿ 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.
- ✿ Existing buildings that provide shielding from any of the noise sources have been included in the model.
- ✿ Ground absorption is set at 0.5.
- ✿ 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.

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 Princess Road, Nell Lane and Barlow Moor Road.

3.1. ROAD TRAFFIC - EXTERNAL AMENITY AREA NOISE LEVEL ASSESSMENT

The noise model has been used to predict noise levels in rear gardens which are to be used for relaxation. The predicted levels range from 44 dB and up to 57 dB in the worst affected garden areas.

As such, it is predicted that the No Observed Adverse Effect Level (NOAEL) is achieved in most private gardens 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, rear gardens along the western boundary will experience an exceedance of the 55 dB criterion and, as such, mitigation measures would be required. It is understood that a 2.1 m high barrier has been constructed along this boundary and, as such, will be considered in the mitigation section. Section 5.0 recommends appropriate measures.

3.2. ROAD TRAFFIC - INTERNAL NOISE LEVEL ASSESSMENT

E3P have relied upon the previous recommendations for glazing specification for the following plots:

- ✿ Apartments on Nell Lane Elevation plus NW and SE corners – 35 dB $R_w + C_{t,r}$ – 10 mm glass / 12 mm air space / 6.4 acoustic laminate glass.
- ✿ Dwellings on eastern boundary – 29 dB $R_w + C_{t,r}$ – 6 mm glass / 20 mm air space / 6 mm glass.
- ✿ Dwellings on western boundary – 27 dB $R_w + C_{t,r}$ – 4 mm glass / 20 mm air space / 4 mm glass; and
- ✿ Dwellings on centre of plot – 27 dB $R_w + C_{t,r}$ – 4 mm glass / 20 mm air space / 4 mm glass.



The recently published AVO has found that a common reduction for an open window is 13 dB based on research undertaken. As an overheating assessment was not previously undertaken, it is assumed that open windows would be used to mitigate overheating, except in the Apartments where mechanical ventilation is recommended.

The model has been used to predict façade noise levels at ground, first and second floors. In order to determine any requirements for mitigation, E3P has added the reduction provided by the glazing to the relevant criterion for day (35 dB) and for night (30 dB). As such, any facades subject to noise levels higher than the following will require higher specification glazing that that proposed:

- ✿ Apartments – 70 dB $L_{Aeq,16hr}$ and 65 dB $L_{Aeq,8hr}$.
- ✿ Dwellings on eastern boundary – 64 dB $L_{Aeq,16hr}$ and 59 dB $L_{Aeq,8hr}$.
- ✿ Dwellings on western boundary – 62 dB $L_{Aeq,16hr}$ and 57 dB $L_{Aeq,8hr}$; and
- ✿ Dwellings on centre of plot – 62 dB $L_{Aeq,16hr}$ and 57 dB $L_{Aeq,8hr}$.

The highest predicted day and night façade levels at the worst-case plot in each location are as follows.:

- ✿ Apartments – 64 dB $L_{Aeq,16hr}$ and 57 dB $L_{Aeq,8hr}$.
- ✿ Dwellings on eastern boundary – 58 dB $L_{Aeq,16hr}$ and 50 dB $L_{Aeq,8hr}$.
- ✿ Dwellings on western boundary – 60 dB $L_{Aeq,16hr}$ and 51 dB $L_{Aeq,8hr}$; and
- ✿ Dwellings on centre of plot – 59 dB $L_{Aeq,16hr}$ and 48 dB $L_{Aeq,8hr}$.

As shown above, all glazing specification would afford more than sufficient protection with internal noise levels falling below the criterion by between 2 and 9 dB at the worst affected lots. As such, the proposed glazing specifications are sufficient for all areas and worst-case plots.

It is also important to consider the maximum noise levels during the night-time period. The highest measured level along Nell Lane and incident at the apartment block is 76 dB $L_{Amax,fast}$. When considering a sound reduction of 35 dB for glazing, this results in an internal noise level of 41 dB, which falls below the criterion by 4 dB.

With regards opening windows, there is a requirement to consider the need to open windows for ventilation and the mitigation of overheating. From the previous assessments it is understood that the following was recommended and is to be installed at the Site:

- ✿ Apartments on Nell Lane Elevation – centralised constant mechanical extract ventilation (MEV) to Building Regulations Approved Document F, System 3 specification, provided with boost function. This is to be installed to each kitchen, bathroom and en-suite, with a trickle ventilator to each habitable room. As an alternative to MEV, it would also be acceptable to provide a mechanical extract with heat recovery system (MVHR) to AD-F System 4 specification. If MVHR is proposed, both supply and extract air will be ducted to the external façade and no trickle vent is necessary.
- ✿ Dwellings on eastern boundary – MEV system to AD-F System 3 specification with acoustically-rated trickle ventilator.
- ✿ All other houses: standard trickle ventilation, assumed to be System 1.



3.2.1. VENTILATION CONDITION

The proposed ventilation systems would all provide the necessary background ventilation in accordance with ADF. As such, consideration towards ventilation is not required.

3.2.2. 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 55 dB during the day and 50 dB during the night. Any facades experiencing higher noise levels than these may be subject to an optional level 2 assessment.

As can be seen from the Figures, dwellings along the north eastern and western boundaries will experience an exceedance of these noise levels and so a Level 2 assessment has been undertaken for these plots. Plots further into the development are below these levels but plots close to the Police Station are assessed separately based on the measured noise levels in this area of the Site.

Apartments are not considered here as they have a means for mitigating overheating with the proposed MEV System.

An overheating assessment of the site has been undertaken as per the method provided by Good Homes Alliance. The assessment determined a medium risk of overheating. Secondly, it is important to consider the predicted internal noise levels with windows open. The anticipated internal levels with a partially open window (13 dB attenuation) to control overheating would be 47 dB during the day and 38 dB at night for the worst affected plots as above.

Considering these levels on the AVO diagrams, these levels are below the "SOAEL" level (see Table 2.4), and below a level at which noise causes a material change in behaviour. Furthermore, given the medium risk of overheating and that quieter facades are available for ventilation, a mechanical system is not considered to be required for the remaining plots and System 1 or 2 ventilation would be appropriate.

As such, a means of providing ventilation only will be required for the affected plots, except the apartments, which a system 1 whole dwelling ventilation system would provide. This would typically entail extract fans to wet rooms and background ventilators installed in habitable rooms.

In order to achieve the required internal ambient noise levels, any background ventilators, where required, must achieve at least $25 \text{ dB } D_{n,e,w} + C_{tr}$ in the open position. Upon review of the previous reports, this would be easily achieved by the proposed ventilators (Velfac trickle ventilator $31 \text{ dB } D_{n,e,w}$). The number of background ventilators per room will be dependent on the requirements given in Building Regulations Part F.

The exact requirements on a plot-by plot basis are detailed in Section 5.0.

3.3. EASTERN BOUNDARY – POLICE STATION NOISE

The original assessments considered noise from the police station via short term attended and long-term unattended measurements and providing the following commentary in relation to eastern dwellings:



Both noise sources are present sporadically through the day although playground noise is limited to break and lunch periods during weekday term time. The police station car park includes police response vehicles which leave and enter the site throughout daytime and night-time periods and on occasion will sound emergency sirens (once on the public road).

It is considered that noise levels within gardens may be controlled to acceptable levels by the specification of an appropriate boundary fence. Internal noise levels, particularly at night, need to consider noise events from the police station and as such an appropriate glazing performance specification and alternative means of ventilation are proposed (as described in Table 5.1). Proposed mitigation measures are discussed further in Section 6.

As such, the previously recommended glazing and ventilation requirements are recommended here. Detailed noise modelling is not possible due to the source not having a fixed location and, as such, is based on worst case measured levels.



4. MITIGATION

4.1. ACOUSTIC BARRIERS

Section 4.1 determined that noise levels in certain garden areas would exceed the criterion of 55 dB due to road traffic sound impact. As such, the noise models have been used to predict noise levels in the affected gardens but with the proposed barriers in place. Figure 4 details the road traffic sound assessment with mitigation in place.

As can be seen from the Figure, the barriers are more than suitable in order to achieve levels of 55 dB or below.

The barriers proposed should be of close boarded wooden fence construction must be sealed at the base, be free from holes and have a minimum mass of 10 kg/m².

It is worth noting that the site is to be enclosed on all boundaries by a 2.1 m high barrier. The barrier is to be 'Envirofence' from Jacksons Fencing which has a minimum mass of 10-12 kg per sqm. As such, the proposed barriers will be more than sufficient and reduce noise levels further in areas where the criteria is achieved without.

4.2. FAÇADE INSULATION

The previous section determined that certain plots would require higher specification glazing and whole dwelling ventilation. Specifically, the following glazing specifications are required, per facade, along with details on whole dwelling ventilation.

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 4.1 GLAZING AND VENTILATION REQUIREMENTS

PLOTS	GLAZING GLASS/AIR SPACE/GLASS (mm)	GLAZING REDUCTION, $R_w + C_{t,r}$ (dB)	WHOLE DWELLING VENTILATION SYSTEM
Apartments – Nell Lane Elevations	10 / 12 / 6.4A	35	MEV System 3 or 4
Apartments – south	4 / 20 / 4	27	System 1
1 and 2	4 / 20 / 4	27	System 1
3 and 4	4 / 20 / 4	27	System 1
5 and 6	4 / 20 / 4	27	System 1
7 and 8	4 / 20 / 4	27	System 1
9 and 10	6 / 20 / 6	29	MEV System 3
11 and 12	4 / 20 / 4	27	System 1
14	4 / 20 / 4	27	System 1
15 and 16	6 / 20 / 6	29	MEV System 3
17 and 18	4 / 20 / 4	27	System 1
19 and 20	4 / 20 / 4	27	System 1
21	4 / 20 / 4	27	System 1
22	4 / 20 / 4	27	System 1
23	4 / 20 / 4	27	System 1
24	4 / 20 / 4	27	System 1
25	4 / 20 / 4	27	System 1
26	6 / 20 / 6	29	MEV System 3
27	4 / 20 / 4	27	System 1
28	4 / 20 / 4	27	System 1
29	4 / 20 / 4	27	System 1
30	4 / 20 / 4	27	System 1
31	4 / 20 / 4	27	System 1
32	4 / 20 / 4	27	System 1
33	4 / 20 / 4	27	System 1
34	4 / 20 / 4	27	System 1
35	4 / 20 / 4	27	System 1
36	4 / 20 / 4	27	System 1
37 and 38	4 / 20 / 4	27	System 1
39 and 40	4 / 20 / 4	27	System 1
41 and 42	4 / 20 / 4	27	System 1



PLOTS	GLAZING GLASS/AIR SPACE/GLASS (mm)	GLAZING REDUCTION, $R_w + C_{t,r}$ (dB)	WHOLE DWELLING VENTILATION SYSTEM
43 and 44	4 / 20 / 4	27	System 1
45 and 46	4 / 20 / 4	27	System 1
47	6 / 20 / 6	29	MEV System 3
*Given the potential for commercial sound in the future, it is recommended that System 1 ventilation is installed which is considered to be a standard installation.			

In order to achieve the required internal ambient noise levels, any background ventilators must achieve at least that of the glazing in the open position. This level of reduction is likely to be achieved by a standard background ventilator. The number of background ventilators per room will be dependent on the requirements given in Building Regulations Part F.

It is understood that the preferred MEV system is Nuaire MVHR systems. This will provide the necessary ventilation and mitigation for overheating. Upon review of online literature, it is understood that the noise level output of the system would range between 16 and 40 dB(A) at 3 m depending on the power consumption. At power consumptions of 0 to 50 % (considered for normal operating conditions) are below 24 dB and thus achieve the required criterion given in the AVO guide, drawing from ADF. For cooling situations, 75 -100 % power, levels are up to 40 dB. An upper criterion of 35 dB is considered acceptable in bedrooms when ventilative cooling is needed. Furthermore, the AVO guide goes on to state:

Higher noise levels, e.g. 5 or 10 dBA higher (refer to BS ISO 17772-1 are likely to be acceptable in some operating scenarios, where rapid changes to the cooling or ventilation rates quickly improve the thermal comfort of the occupant.

And:

Section 1.10.10 of CIBSE Guide A 2015 states that the values are only a guide and that: "Higher or lower values may be appropriate based on economics, space use, user needs etc. "

As such, the proposed system is considered acceptable.



5. CONCLUSION AND RECOMMENDATIONS

E3P were commissioned by PJ Livesey to undertake a Noise Impact Assessment for a residential development on land off Nell Lane in Didsbury.

E3P have used third party data for the surrounding roads in order to inform the assessment. The assessment is primarily to be used to discharge Condition 5 of the planning permission in order to determine the mitigation requirements for the Site.

A 3D noise model has been constructed to assess road traffic sound impact.

With regards road traffic, this is assessed in accordance with the criterion, for day and night, given in BS 8233:2014.

The assessment has determined that the proposed barriers to control road traffic are sufficient. Furthermore, the proposed glazing specifications and whole dwelling ventilation have been found to be sufficient.

With mitigation measures in place, this assessment has shown 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

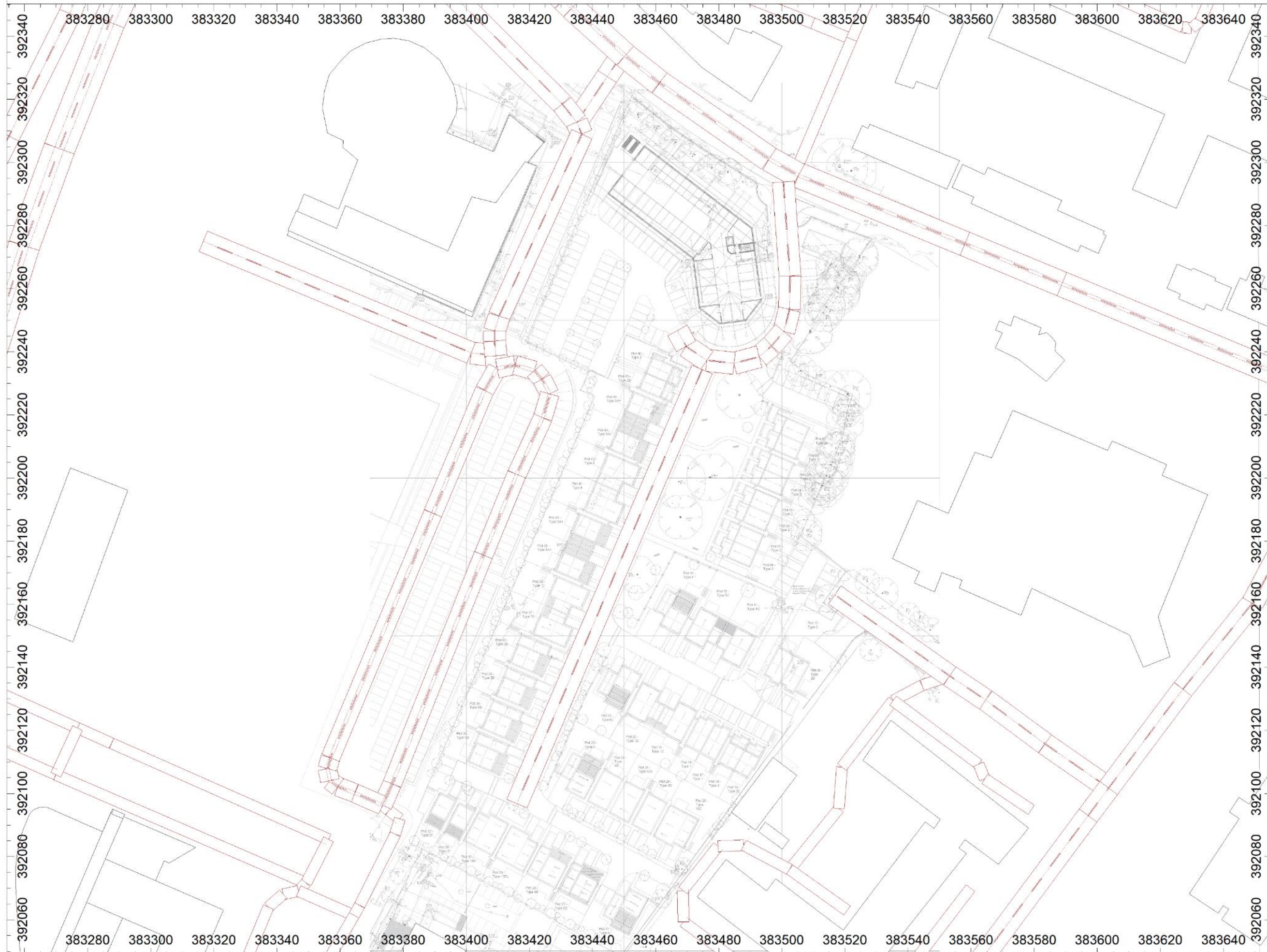
DESCRIPTOR	EXPLANATION
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level 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 - Proposed Site Layout



Project:
Nell Lane, Didsbury

Project-No:
50-363

Client:
PJ Livesey



Project Engineer: L Faulkner
Date: 10/06/2021

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

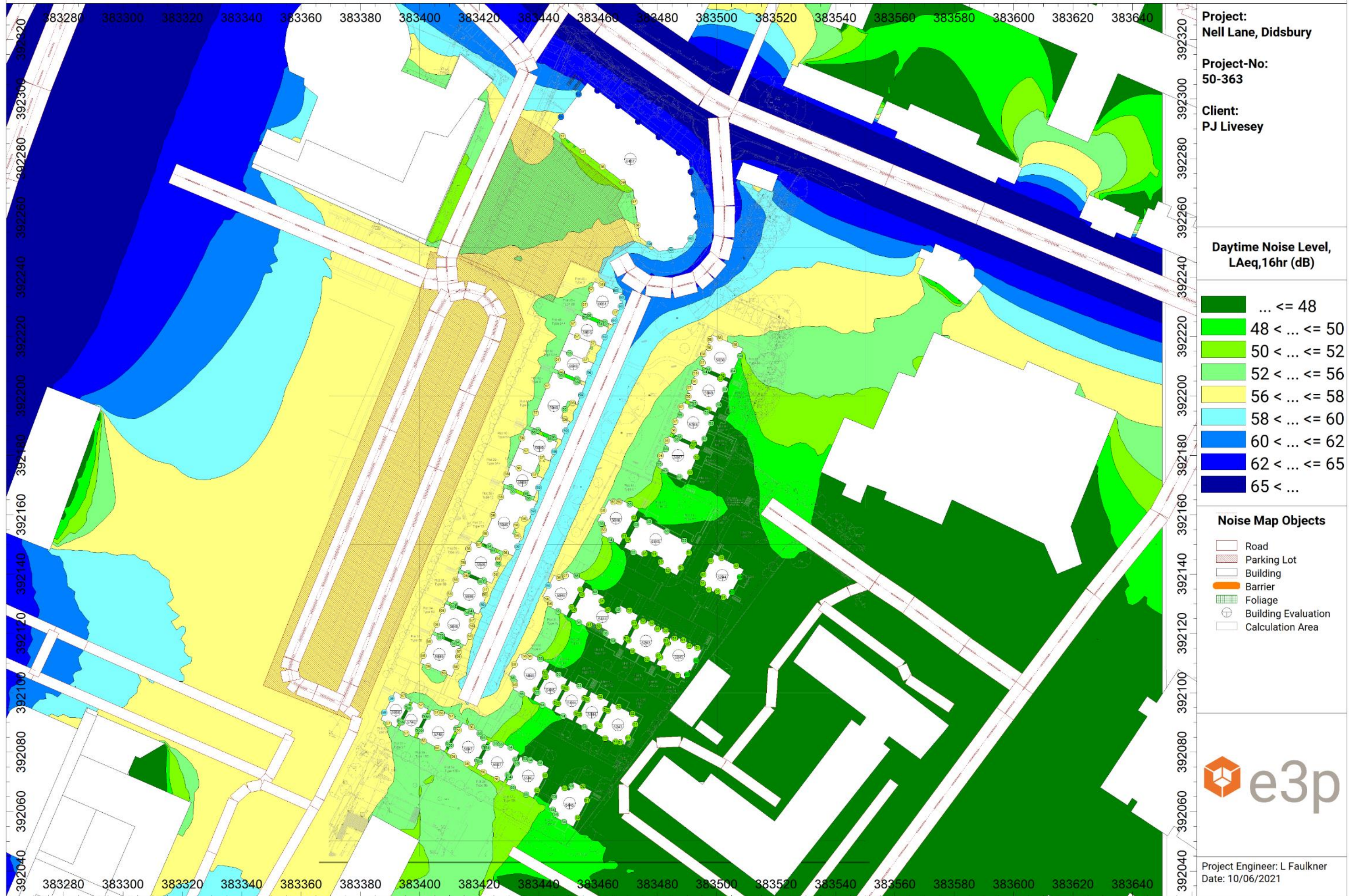


Figure 3 - Night-time Grid Noise Map - Calculation at 4m above ground level

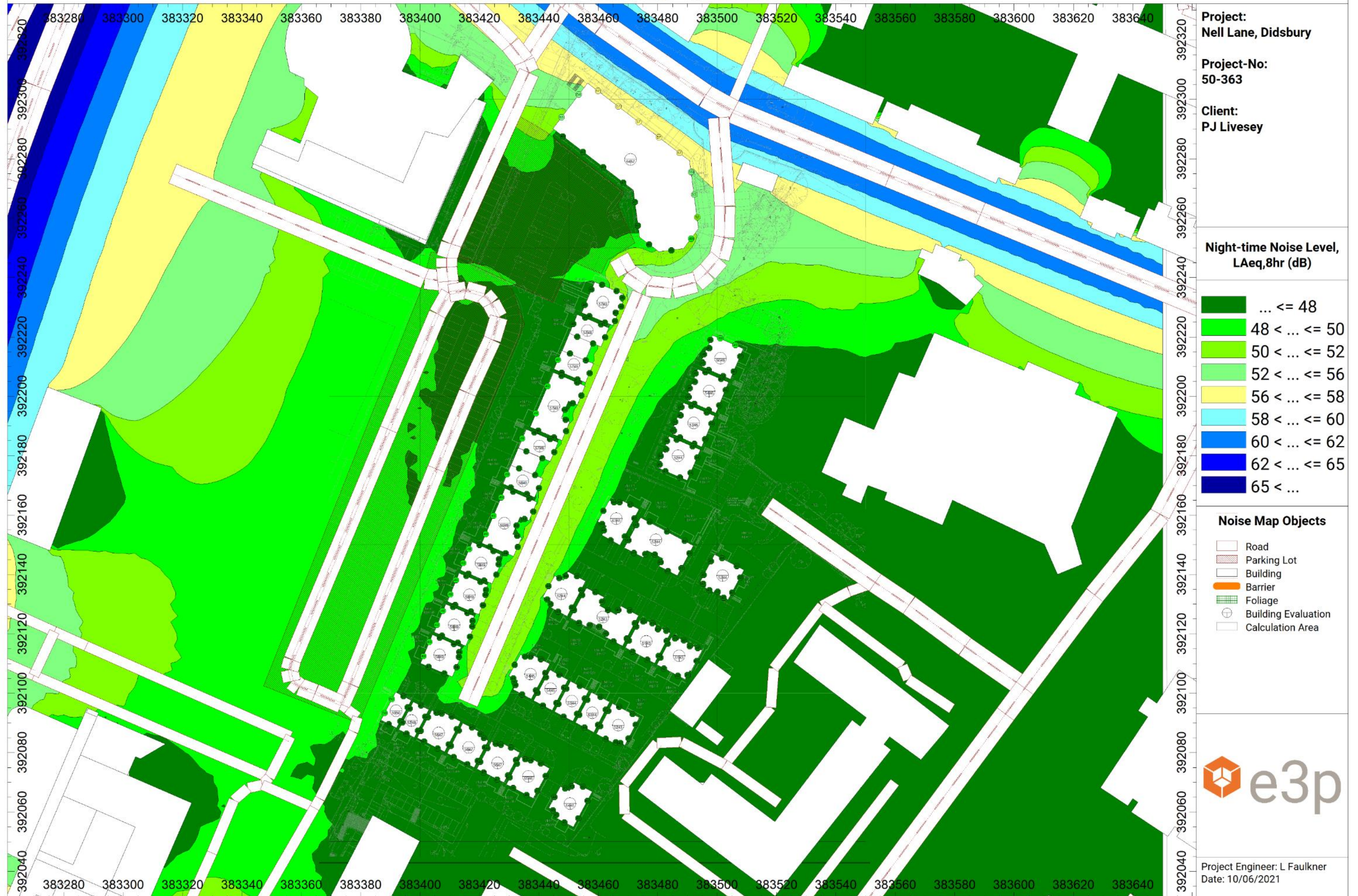


Figure 4 - Daytime Grid Noise Map with Mitigation - Calculation at 1.5m above ground level

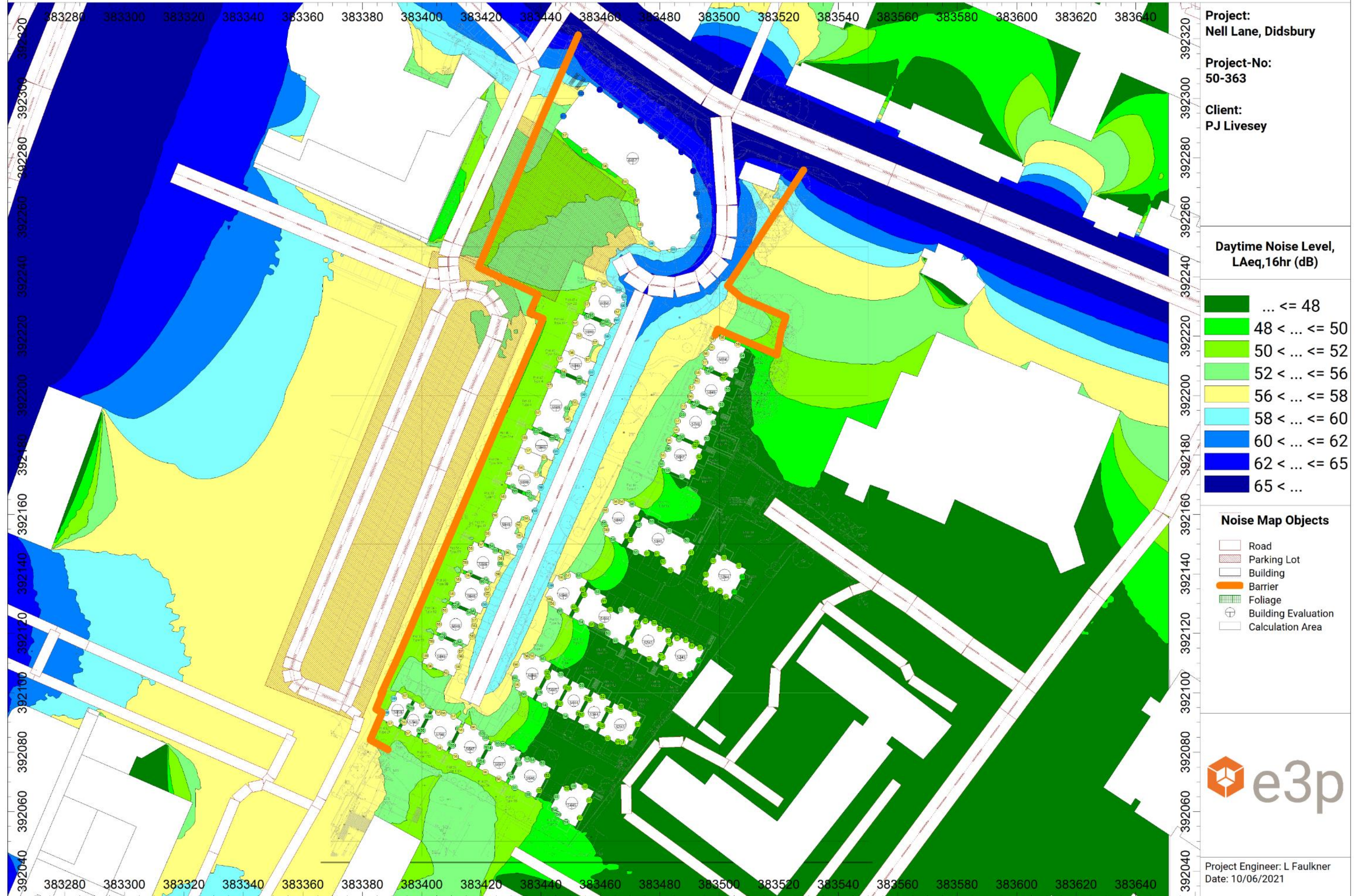


Figure 5 - Proposed Insulation of Facades

