



Noise Impact Assessment

Edenfield Road/Greenbooth Road, Norden

Reference: 50-868-R1-3

Date: June 2023



NOISE IMPACT ASSESSMENT

Edenfield Road/Greenbooth Road,
Norden

Prepared for:

Stonebond Properties Ltd

Report Ref: 50-868-R1-3

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EXECUTIVE SUMMARY

BACKGROUND

Site Address	Edenfield Road/Greenbooth Road, Norden OL12 7TD
National Grid Reference	E 385677 N 414772
Proposed Development	Proposed residential development comprising 49 residential dwellings with associated access, car parking 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.

ASSESSMENT

Surveys Completed	An attended 3-hour road traffic noise survey has been undertaken for Edenfield Road during a typical weekday period. E3P also attended the boundaries with existing commercial premises during daytime and night-time periods but noted no audible commercial sound on site.
Assessments	A 3D noise model has been constructed to assess road traffic noise impact at the residential development. Road traffic sound is assessed in accordance with the criterion, for day and night, given in BS 8233:2014+A1:2019 for shared external amenity areas and internal habitable rooms.
Mitigation Requirements	The assessment has determined that all plots will require a whole dwelling ventilation system to meet ventilation requirements and for certain plots to mitigate overheating. Certain plots require higher specification glazing to control internal noise levels.

CONCLUSIONS

This assessment has shown that no adverse impact is predicted day or night at the receptors due to existing sound sources.

As such, noise need not be a material consideration in the granting of planning permission if the recommendations of this report are followed and included within the design stage.



TABLE OF CONTENTS

EXECUTIVE SUMMARY	2
Background	2
Assessment.....	2
Conclusions	2
1. INTRODUCTION	4
1.1. Background	4
1.2. Proposed Development.....	4
1.3. Limitations	4
2. ASSESSMENT METHODOLOGY	5
2.1. National Planning Policy Framework	5
2.2. National Planning Practice Guidance.....	5
2.3. Building Regulations: Approved Document F - Volume 1: Dwellings (June 2022)	7
2.4. Building Regulations: Approved Document O – Overheating (June 2022)	8
2.5. BS 4142: 2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’	9
2.6. British Standard BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings	10
2.6.1. Noise Criteria Limits	10
2.6.2. Ventilation Requirements	11
2.7. Institute of Acoustics and Association of Noise Consultants (2020) Acoustics Ventilation and Overheating: Residential Design Guide	11
2.8. World Health Organisation (WHO) – Guidelines for Community Noise	14
3. SURVEY RESULTS.....	15
3.1. Sound Climate	15
3.2. Road Traffic Sound Measurement – Edenfield Road.....	15
3.3. Commercial Sound Measurements.....	16
4. ROAD TRAFFIC SOUND IMPACT ASSESSMENT	18
4.1. External Amenity Area Noise Level Assessment.....	18
4.2. Internal Noise Level Assessment	18
4.2.1. Ventilation Condition	19
4.2.2. Overheating Condition	19
5. MITIGATION	21
5.1.1. façade Insulation	21
6. CONCLUSION AND RECOMMENDATIONS.....	22
APPENDIX I GLOSSARY OF ACOUSTIC TERMINOLOGY	23
APPENDIX II FIGURES	26



1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Stonebond Properties Ltd to undertake a Noise Impact Assessment for a proposed residential development at Edenfield Road, Norden, 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.

1.2. PROPOSED DEVELOPMENT

The client intends to develop the existing site for residential use comprising 49 residential units, with associated access, car parking and landscaping.

The key sources of sound impacting upon the site is road traffic sound from Edenfield Road.

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

- 📎 reference plan SBM-001-PL01 Rev A.

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. 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.

2.4. 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)



2.5. BS 4142: 2014+A1:2019 'METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND'

This standard describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- ✿ Sound from industrial and manufacturing processes.
- ✿ Sound from fixed installations which comprise mechanical and electrical plant and equipment.
- ✿ Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and
- ✿ Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

The procedure detailed in the standard compares the measured or predicted specific noise level from any of the above with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is typical.

The specific noise level also acknowledges the reference time intervals depending upon whether the noise source operates during daytime (1-hour) or night-time (15-minute) periods.

There are several 'penalties' which can be attributed to the specific sound level depending upon the 'acoustic features' of the sound level under investigation as follows:

Tonality

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

Impulsivity

- ✿ +3 dB: where the impulsivity is just perceptible.
- ✿ +6 dB: where the impulsivity is clearly perceptible; and
- ✿ +9 dB: where the impulsivity is highly perceptible.

Intermittency

- ✿ +3dB: where the intermittency is readily distinctive against the acoustic environment.

In addition to the above, there is a penalty for 'other sound characteristics' of +3 dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment. BS 4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.



Assessment of the rating level relative to the background sound level can yield the following commentary:

- ✿ Typically, the greater this difference (between the rating level and the background sound level), the greater the magnitude of impact.
- ✿ A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- ✿ A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
- ✿ The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

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

2.6.1. 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.



2.6.2. 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.

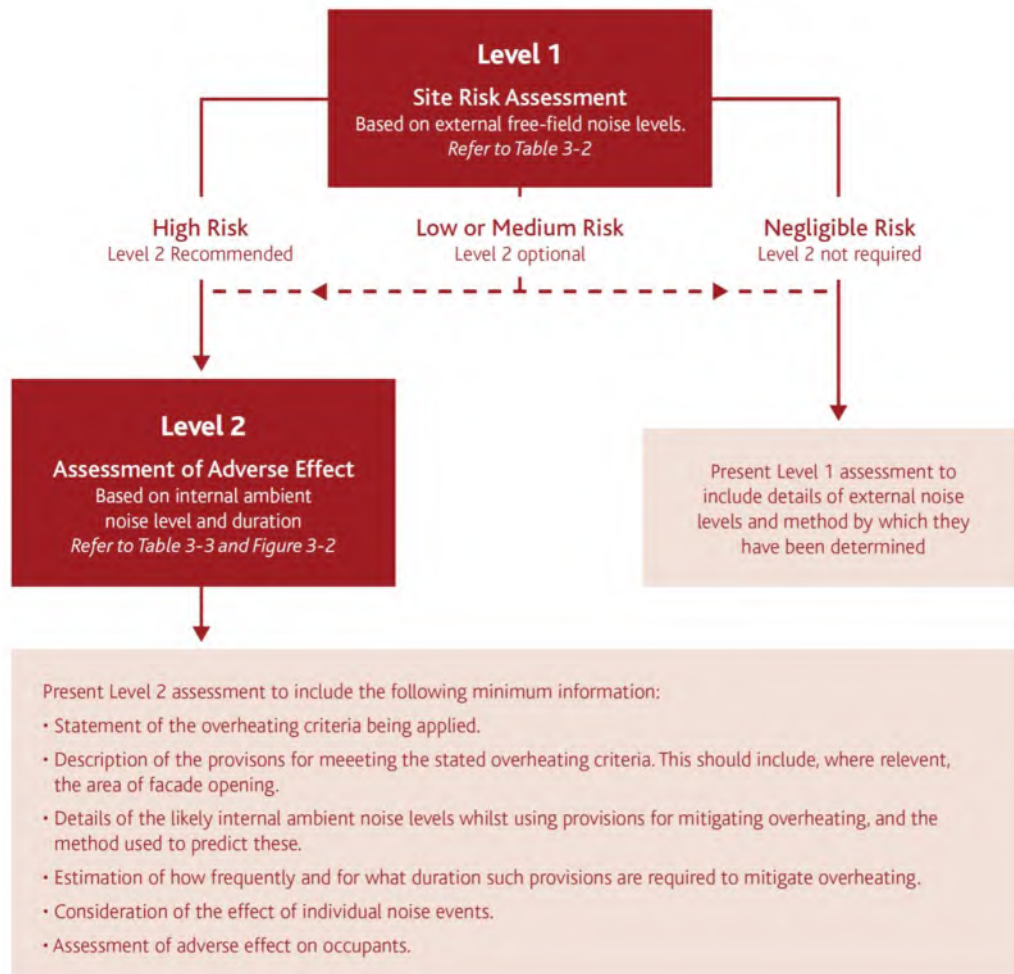
2.7. INSTITUTE OF ACOUSTICS AND ASSOCIATION OF NOISE CONSULTANTS (2020) ACOUSTICS VENTILATION AND OVERHEATING: RESIDENTIAL DESIGN GUIDE

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



2.8. 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. The 1980 WHO document suggested that *“general daytime outdoor noise levels of less than 55 dB(A) $L_{eq,16hr}$ are desirable to prevent any significant community annoyance.”* This level is an external free-field noise level. The 1980 document also stated in relation to internal levels, *“that night-time noise levels of 35 dB(A) $L_{eq,8hr}$ or less will not interfere with the restorative process of sleep”*.

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 $L_{Aeq,8hr}$ or an external level of 45 dB $L_{Aeq,8hr}$. It also recommends that internal L_{Amax} levels of 45 dB and external L_{Amax} levels of 60 dB should be limited where possible.



3. SURVEY RESULTS

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

3.1. SOUND CLIMATE

Prior to the surveys and during, E3P undertook a site walkover across the Site to determine the existing sound climate and associated sources.

It was noted that the main source of sound was road traffic sound associated with Edenfield Road and running water from the stream. As such, E3P carried out attended road traffic measurements in accordance with the Calculation of Road Traffic Noise (CRTN).

E3P noted existing commercial premises along the southern boundary and attended during key periods in order to establish whether commercial sound has the potential to impact upon the site.

3.2. ROAD TRAFFIC SOUND MEASUREMENT – EDENFIELD ROAD

Due to the open nature of the site, it was not possible to install the meter in a suitable location on site for 24 hours. As such, 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:

📍 10:17 - 13:17 Tuesday 9th May 2023.

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

📍 Noise Measurement Position 1 (NMP1): Located on the southern boundary of the site approximately 4 m from the roadside edge. 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 Edenfield Road.

Table 3.1 details the measured sound pressure levels.

TABLE 3.1 MEASURED ROAD TRAFFIC SOUND LEVELS – EDENFIELD ROAD

MEASUREMENT START TIME	MEASURED SOUND PRESSURE LEVELS (dB)			
	L _{Aeq,T}	10th Highest L _{Amax,fast}	L _{A90,T}	L _{A10,T}
10:17	69.8	85.3	51.2	74.0
11:17	70.1		54.4	74.0
12:17	69.8		51.7	73.8
Derived Daytime Noise Level, L _{Aeq,16hr}				70.9
Derived Night-time Noise Level, L _{Aeq,8hr}				61.9



3.3. COMMERCIAL SOUND MEASUREMENTS

E3P has undertaken attended measurements of commercial properties surrounding the site. The surveys were carried out over the following time periods:

- 📍 Wednesday 10th May 10:14–11:11.
- 📍 Wednesday 10th May 12:07–12:42.
- 📍 Wednesday 17th May 05:00–15:00.

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 adjacent to commercial properties. The close proximity of the properties to each other and the open nature of site allowed line of site to each commercial property from this position. 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 Edenfield Road and running water from the stream.

Table 3.2 details the measured sound pressure levels.

TABLE 3.2 MEASURED COMMERCIAL SOUND LEVELS

MEASUREMENT DURATION	MEASURED SOUND PRESSURE LEVELS (dB)	
	$L_{Aeq,T}$	$L_{A90,T}$
05:00-05:15	48.9	45.6
05:15-05:30	49.1	44.9
05:30-05:45	49.0	44.5
05:45-06:00	48.5	44.0
06:00-06:15	50.2	45.7
06:15-06:30	50.2	45.3
06:30-06:45	49.5	45.1
06:45-07:00	49.5	45.6
07:00-08:00	50.8	46.8
08:00-09:00	50.4	46.2
09:00-10:00	49.6	44.7
10:00-11:00	48.5	44.0
11:00-12:00	48.8	43.9
12:00-13:00	48.7	44.1
13:00-14:00	48.7	43.9
14:00-15:00	48.1	43.3



During the survey and site walkover, no significant commercial noise was noted, therefore a commercial noise impact assessment is not required.

TABLE 3.3 NOISE MEASUREMENT EQUIPMENT AND CALIBRATION DATES

MEASUREMENT POSITION	EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE
NMP1	Sound Level Meter	01dB Fusion	14226	01/12/2023
	Pre-amplifier	01dB Pre22	2135072	
	Microphone	GRAS 40CD	470570	
	Calibrator	Cirrus CR 515	99204	25/07/23
NMP2	Sound Level Meter	01dB Fusion	12039	30/06/2023
	Pre-amplifier	01dB Pre22	1805124	
	Microphone	GRAS 40CE	330832	18/01/2024
	Calibrator	01dB Cal31	87281	

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. ROAD TRAFFIC SOUND IMPACT ASSESSMENT

For the purposes of this assessment, E3P has used noise modelling software, CadnaA 2023 MR1, to determine the impact of noise from road traffic sound.

The following inputs have been included in the model:

- ✿ reference plan SBM-001-PL01 Rev A.
- ✿ NMP1 has been used to calibrate Edenfield Road.
- ✿ Site elevations have been taken as existing by way of a 2 m grid Digital Terrain Model (DTM) which contains public sector information licensed under the Open Government Licence v3.0.
- ✿ A reflection order of 2 has been used in all calculations. Ground absorption has been assumed as 0.5 due to the mixed landscape surrounding the site.
- ✿ Noise levels generated using ISO 9613-1 and ISO 9613-2 "Acoustics – Attenuation of sound during propagation outdoors" as incorporated into CadnaA software.

4.1. EXTERNAL AMENITY AREA NOISE LEVEL ASSESSMENT

The noise model has been used to predict noise levels in the shared amenity spaces which are to be used for relaxation. The predicted levels range from 42 dB and up to 55 dB in the worst affected external amenity areas.

As such, it is predicted that the No Observed Adverse Effect Level (NOAEL) is achieved in most rear garden 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 further action is required to mitigate noise levels in these areas.

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 affords sound insulation performance in the order of 29 dB 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 guide recommends that a partially open window provides approximately 13 dB attenuation.

The model has been used to predict façade noise levels at all floors. In order 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). As such, any facades subject to noise levels higher than 60 dB during the day and/or 55 dB during the night will require higher specification glazing.



As can be seen from Figures 2 and 3, multiple facades closest to Edenfield Road are subject to external daytime noise levels that would result in the affected dwellings requiring higher specification glazing. As such, higher specification glazing is required.

Consideration must also be given to maximum noise levels generated by road traffic. The 10th highest maximum noise level has been used and distance corrected to the closest plot. Internal maximum noise levels of 45 dB L_{Amax} should also not be exceeded. The sound insulation performance achieved by standard glazing (31 dB) has been added to the 45 dB maximum internal noise level limit. As, such facades subject to maximum noise levels above 76 dB will require higher specification glazing.

The maximum noise level at the worst affected facades are as follows:

TABLE 4.1 MAXIMUM ROAD TRAFFIC SOUND LEVELS

ROAD	MEASURED 10 TH HIGHEST L_{Amax} , 1 min	DISTANCE TO RECEPTOR (m)	L_{Amax} AT CLOSEST RECEPTOR
Edenfield Road	85.3	25.0	77.3

As shown above, closest facades are subject to levels higher than 76 dB L_{Amax} . Therefore, higher specification glazing would be required to mitigate against maximum noise levels generated by road traffic from Edenfield Road.

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 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 53 dB during the night (in accordance with the criteria in Part O of the Building Regulations). Any facades experiencing higher noise levels than these may be subject to an optional level 2 assessment.

As can be seen from the Figures, certain facades of properties closest to Edenfield Road are subject to higher daytime and night-time noise levels than the limits above. As such, a Level 2 assessment has been undertaken for these plots.

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.



TABLE 4.2 PREDICTED INTERNAL NOISE LEVELS

PLOT	HIGHEST PREDICTED FAÇADE LEVELS (dB)	OPEN WINDOW SOUND REDUCTION (dB)	INTERNAL NOISE LEVEL (dB)
Plot 1- 3 – Daytime	63	13	50
Plot 1 - 3 – Night-time	55		42
Plot 1 - 3 - L _{Amax,fast}	77		64
Plot 4 -6 – Daytime	63		50
Plot 4 -6 – Night-time	56		43
Plot 4 -6 - L _{Amax,fast}	77		64
Plot 7-10 – Daytime	62		49
Plot 7-10 – Night-time	55		42
Plot 7-10 - L _{Amax,fast}	76		63

Considering these levels on the AVO diagrams, the levels for most plots during the day are below the “SOAEL” level, and below a level at which noise causes a material change in behaviour.

However, for plots 1 to 10, the night-time levels are above “SOAEL” level and exceed the criteria in Part O, and above a level at which noise causes a material change in behaviour. Given this, it is recommended that an overheating assessment is conducted by an appropriate professional in order to determine whether mitigation is required.

The exact requirements on a plot-by-plot basis are detailed in Section 5.1.



5. MITIGATION

5.1.1. FAÇADE INSULATION

The previous section determined that certain facades would require higher specification glazing. 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.

Maximum noise level events will also determine the glazing requirement and where mitigation is required due to maximum noise levels the sound reduction values will be given in terms of R_w and R_w+C_{tr} . This will allow for the correct glazing units to be selected for each facade.

TABLE 5.1 GLAZING AND VENTILATION REQUIREMENTS

PLOT	REQUIRED GLAZING REDUCTION, (dB)	EXAMPLE GLAZING	WHOLE DWELLING VENTILATION SYSTEM
Plot 1	28 R_w + Ctr (32 R_w)	6 / 16 / 4	Whole dwelling ventilation in accordance with the requirements in Approved Document Part F Volume 1 and an overheating assessment will be required as the criteria in Approved Document Part O has been exceeded.
Plot 2	28 R_w + Ctr (32 R_w)	6 / 16 / 4	
Plot 3	28 R_w + Ctr (32 R_w)	6 / 16 / 4	
Plot 4	28 R_w + Ctr (32 R_w)	6 / 16 / 4	
Plot 5	28 R_w + Ctr (32 R_w)	6 / 16 / 4	
Plot 6	28 R_w + Ctr (32 R_w)	6 / 16 / 4	
Plot 7	27 R_w + Ctr (31 R_w)	6 / 16 / 4	
Plot 8	27 R_w + Ctr (31 R_w)	6 / 16 / 4	
Plot 9	27 R_w + Ctr (31 R_w)	6 / 16 / 4	
Plot 10	27 R_w + Ctr (31 R_w)	6 / 16 / 4	

Figure 4 outlines the specification and locations of these glazing requirements.

The system should be in line with the requirements of Approved Document Part F, Volume 1: Dwellings.

It is assumed that this would be continuous mechanical extract ventilation as the dwellings are not likely to be suitable for natural ventilation. This will consist of either a central extract system, individual room extract fans or a combination of both.

Additionally, background ventilators should satisfy the requirements of ADF and, in order to achieve the required internal ambient noise levels, must achieve a reduction of at least that of the glazing specified for each facade, which is at most 32 dB $D_{n,e,w}$ in the open position. This level of reduction is likely to be achieved by a standard background ventilator.



6. CONCLUSION AND RECOMMENDATIONS

E3P were commissioned by Stonebond Properties Ltd to undertake a Noise Impact Assessment for a proposed residential development at Edenfield Road, Norden.

An attended 3-hour road traffic noise survey has been undertaken for Edenfield Road during a typical weekday period. This provided the daytime average noise levels.

A 3D noise model has been constructed to assess potential road traffic sound upon the proposed receptors in accordance with the criterion, for day and night, given in BS 8233:2014+A1:2019.

The assessment determined that certain facades require higher specification glazing and all plots require a whole dwelling ventilation system to meet ventilation requirements.

This assessment has shown that no adverse impact is predicted day or night at the receptors due to existing sound sources.

As such, noise need not be a material consideration in the granting of planning permission if 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

FIGURES

Figure 1 - Noise Measurement Positions



Project:
Edenfield Road,
Norden

Project-No:
50-868

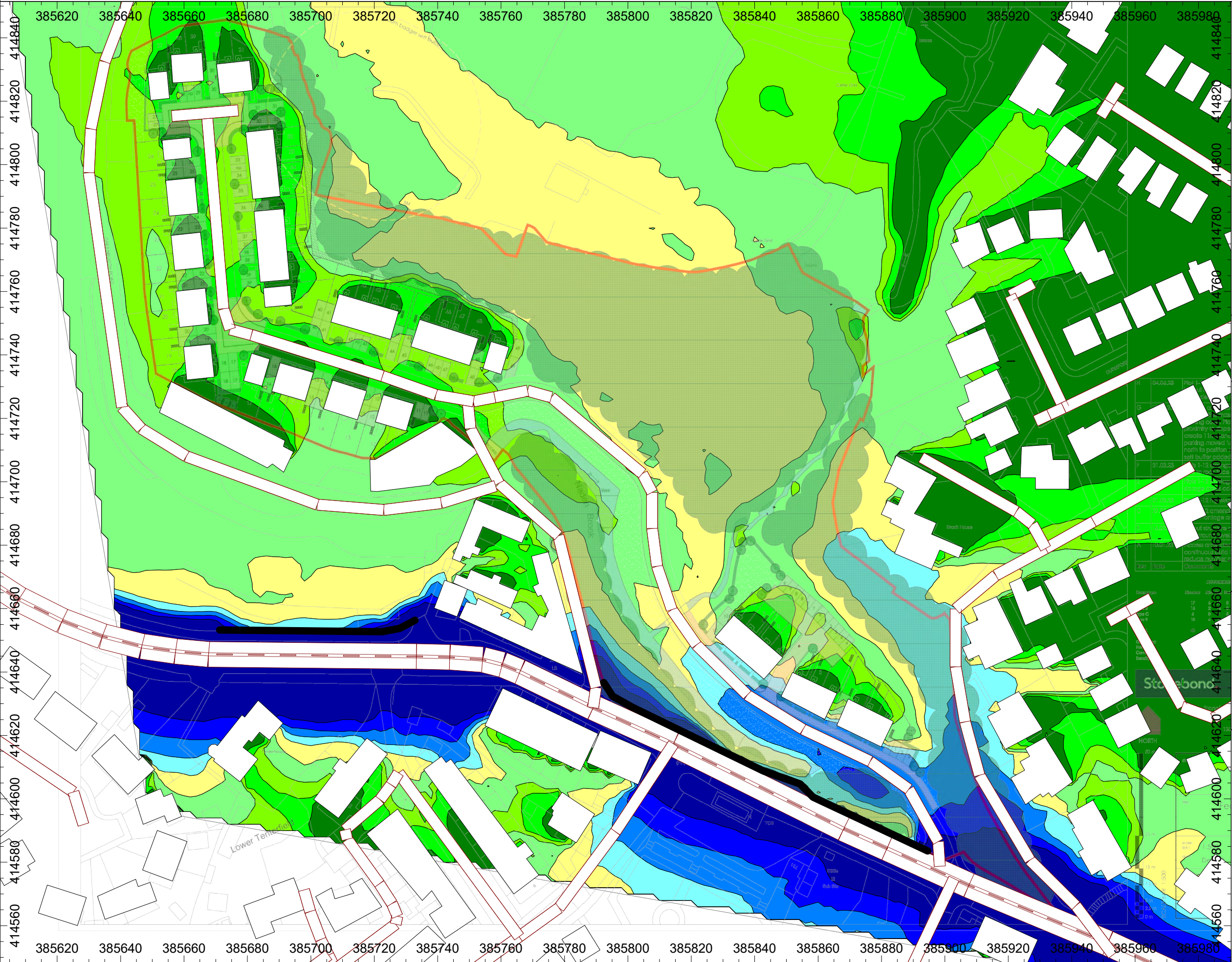
Client:
Stonebond

N

e3p

Project Engineer: Melissa Bailey
Date: 18/05/2023

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



Project:
Edenfield Road,
Norden

Project-No:
50-868

Client:
Stonebond

**Daytime Noise Level,
LAeq 16hr (dB)**

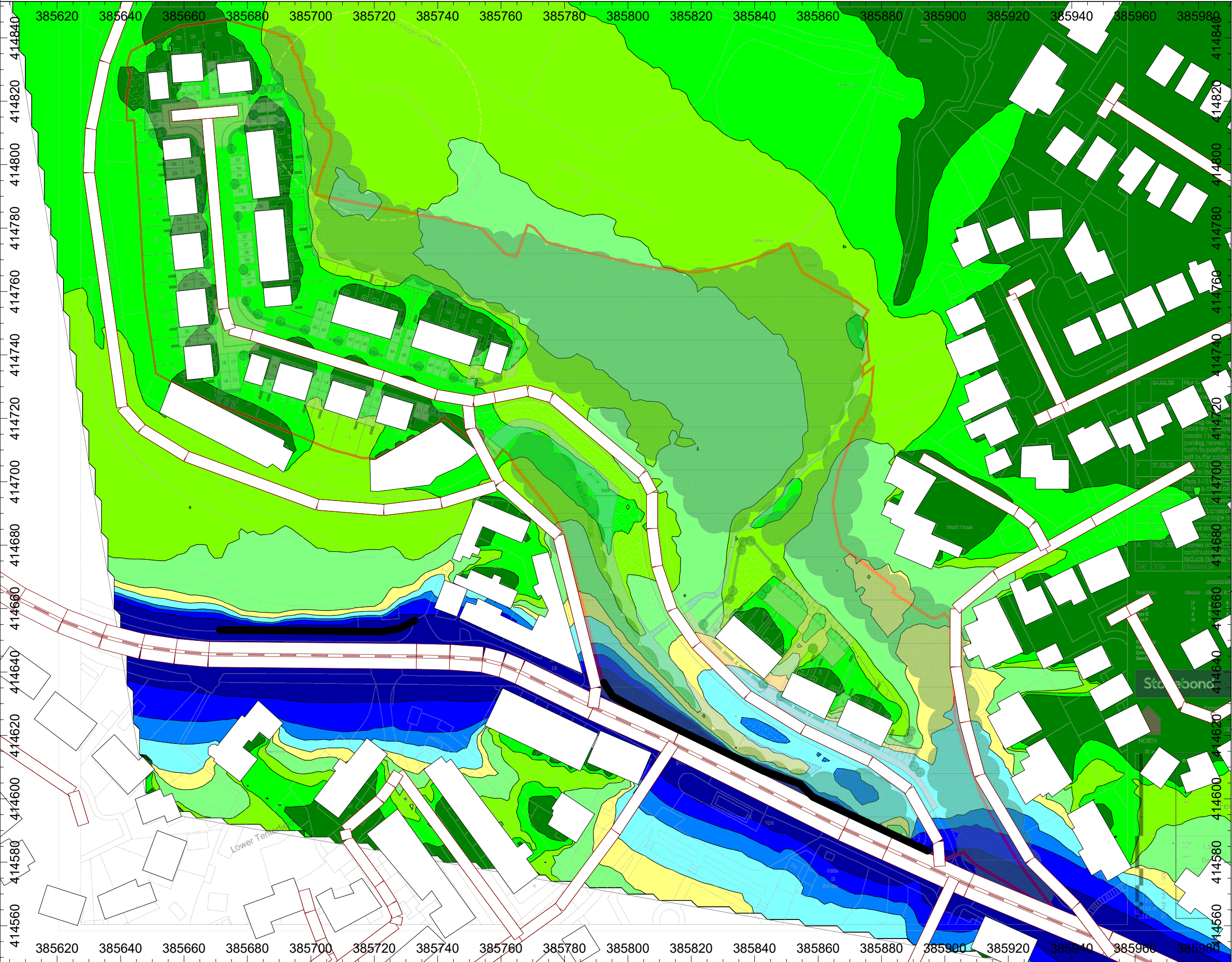
...	<= 48
48 < ...	<= 50
50 < ...	<= 52
52 < ...	<= 56
56 < ...	<= 58
58 < ...	<= 60
60 < ...	<= 62
62 < ...	<= 65
65 < ...	

Noise Map Objects

	Road
	Building
	Barrier
	Calculation Area

Project Engineer: Melissa Bailey
Date: 05/06/2023

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



Project:
Edenfield Road,
Norden

Project-No:
50-868

Client:
Stonebond

**Night-time Noise Level,
LAeq 8hr (dB)**

Dark Green	... ≤ 42
Light Green	42 < ... ≤ 45
Yellow-Green	45 < ... ≤ 47
Light Green	47 < ... ≤ 50
Yellow	50 < ... ≤ 52
Light Blue	52 < ... ≤ 55
Medium Blue	55 < ... ≤ 57
Dark Blue	57 < ... ≤ 60
Very Dark Blue	60 < ...

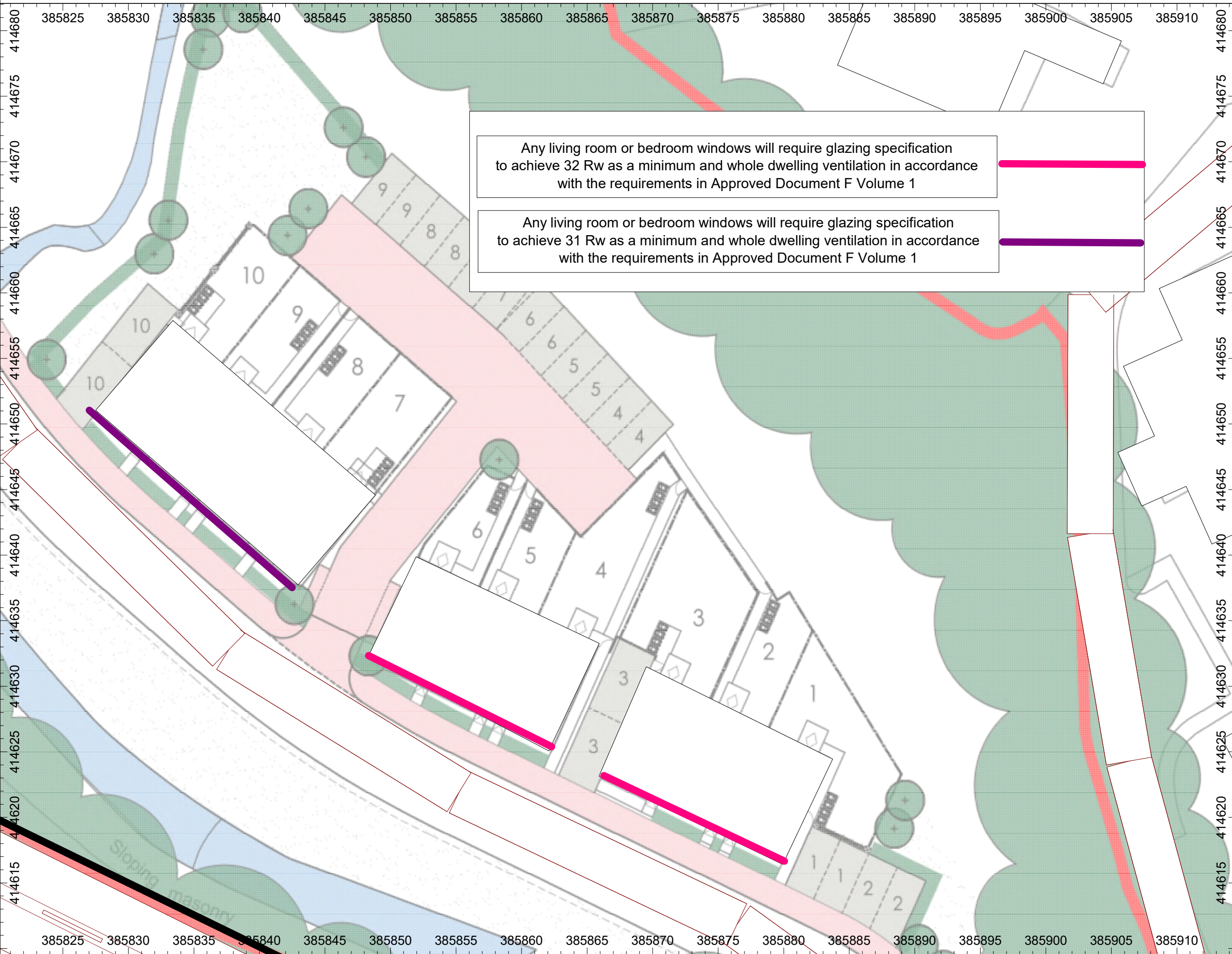
Noise Map Objects

Red Line	Road
White Polygon	Building
Thick Black Line	Barrier
Thin White Polygon	Calculation Area



Project Engineer: Melissa Bailey
Date: 05/06/2023

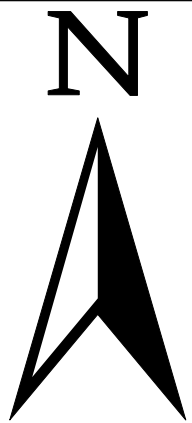
Figure 4 - Glazing Requirements



Project:
Edenfield Road,
Norden

Project-No:
50-868

Client:
Stonebond



Project Engineer: Melissa Bailey
Date: 05/06/2023