Station Fields, Foxton

Preliminary Acoustic Appraisal

On behalf of [redacted]

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1 Introduction

1.1 Background

1.1.1 Stantec has been commissioned by [redacted] to undertake a preliminary acoustic appraisal of the development proposals to inform the Regulation 18 process of the Local Plan and also to inform the masterplan for the development of Land at Station Fields, Foxton.

1.1.2 The purpose of this report is to appraise the existing sound climate at the proposed development site, provide advice on the likely noise constraints and identify potential mitigation measures.

1.1.3 Environmental sound surveys have not been undertaken however noise maps produced by Defra (http://extrium.co.uk/noiseviewer.html) have been used to inform the appraisal.

1.1.4 The mitigation measures identified in this report are subject to the results of a detailed environmental sound survey and assessment of the site.

1.1.5 An explanation of the terminology used in this report is contained in Appendix A.

1.2 Site Location and Description

1.2.1 The site currently comprises arable farmland with the Great Northern Railway Line bisecting the development site in an east-west direction.

1.2.2 The site is bound by the A10 to the south, Barrington Road to the east, Foxton Road to the north, and arable land to the west. Existing residential dwellings are situated to the east of the site. Foxton Water Treatment Plant is situated in the northern section of the site.

1.2.3 Figure 1 details the proposed site location along with indicative masterplan layout.

Figure 1: Site Location and Indicative Masterplan

(Indicative Masterplan provided by Axis Land Partnerships Limited)

2 Legislation, Planning, Guidance and Criteria

2.1 Local Authority

2.1.1 South Cambridgeshire District Council adopted their Local Plan in September 2018.

2.1.2 Policy HQ/1: Design Principles states:

> *"1 . All new development must be of high quality design, with a clear vision as to the positive contribution the development will make to its local and wider context. As appropriate to the scale and nature of the development, proposals must:*
>
> *[…] n. Protect the health and amenity of occupiers and surroundings uses from development that is overlooking, overbearing or results in a loss of daylight or development which would create unacceptable impacts such as noise, vibration, odour, emissions and dust: […]*

2.2 National Policy

The National Planning Policy Framework (NPPF)

2.2.1 The revised NPPF was published in February 2019. In respect of noise, paragraph 170 states that in relation to conserving and enhancing the natural environment:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by…*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of … noise pollution..."*

2.2.2 In relation to ground conditions and pollution, paragraph 180 states that:

> *"Planning policies and decisions should also 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 impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and 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…"

2.2.3 In relation to the integration of new development with existing premises and community facilities, paragraph 182 states that:

> *"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."*

2.2.4 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define the *"significant adverse impacts"*.

Noise Policy Statement for England

2.2.5 The Noise Policy Statement for England (NPSE) was published in March 2010 and clarifies the underlying principles and aims of existing policy documents that relate to noise. It also sets out the long-term vision of Government noise policy which is: *"to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"*.

2.2.6 The NPSE states that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and its effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

2.2.7 Paragraphs 2.20 and 2.21 define 'significant averse' and 'adverse' impacts as applied to noise as follows:

> *"There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:*
>
> *NOEL – No Observed Effect Level*
>
> *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
>
> *LOAEL – Lowest Observed Adverse Effect Level*
>
> *This is the level above which adverse effects on health and quality of life can be detected.*
>
> *Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*
>
> *SOAEL – Significant Observed Adverse Effect Level*
>
> *This is the level above which significant adverse effects on health and quality of life occur."*

2.2.8 It is necessary to define the LOAEL and SOAEL for the potential source of noise to relate the potential impact to the aims and requirements of the NPSE

National Planning Practice Guidance

2.2.9 The National Planning Practice Guide (PPG) was launched on 6th March 2014 (latest update – July 2019) and provides additional guidance and interpretation to the Government's strategic policies outlined within the NPPF in a regularly updated, web-based resource.

2.2.10 The PPG provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.

2.2.11 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

2.2.12 The LOAEL is described in PPG (Paragraph: 005 Reference ID: 30-005-20190722) as the level above which *"noise starts to cause small changes in behaviour and/or attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise)."*

2.2.13 PPG identifies the SOAEL (Paragraph: 005 Reference ID: 30-005-20190722) as the level above which *"noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by*

use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused."

2.3 Guidance

Professional Practice Guidance on Planning and Noise, 2017

2.3.1 The Professional Practice Guidance on Planning and Noise (ProPG) provides guidance on a recommended approach to the management of noise within the planning system in England.

2.3.2 The scope of ProPG is limited to new residential development that will be predominantly exposed to airborne noise from transport sources.

2.3.3 The guidance is mostly focused on new flats and houses, although there is some relevant content in regard to other types of residential units, such as care homes and residential institutions.

2.3.4 Noise sources other than airborne transport (i.e. industrial, commercial, entertainment, etc.) and ground-borne noise and vibration fall outside of the scope of ProPG.

2.3.5 ProPG details a two-stage approach to the consideration of noise issues including:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of four key elements.

2.3.6 Table 2.1 summarises the noise risk categories as defined in ProPG for Stage 1 of the assessment process.

Table 2.1: Stage 1 ProPG Risk Categories

Site Noise Risk Level	Indicative Noise Levels excluding Mitigation (dB $L_{Aeq,T}$)		Pre-Planning Application Advice
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)	
High	> 70	> 60	Increased risk that development may be refused on noise grounds. The risk may be reduced by following a good acoustic design process
Medium	60 – 70	50 - 60	The site is likely to be less suitable from a noise perspective and an application may be refused unless a good acoustic design process is followed
Low	50 – 60	40 – 50	The site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed
Negligible	< 50	< 40*	The site is likely to be acceptable from a noise perspective
* Site Noise Risk Level should not be considered negligible where there could be more than 10 noise events with $L_{Amax,f}$ > 60 dB			

British Standard 8233: 2014 'Guidance on Sound Insulation and noise reduction for buildings'

2.3.7 BS 8233 sets out desirable guideline values in habitable rooms, such as living rooms and bedrooms.

2.3.8 The guideline values relate to steady external noise without a specific character, previously termed 'anonymous noise'. According to the standard, noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate. Examples of noise with a character may include tonal/intermittent plant noise emissions, music playback, and workshop noise. Examples of external steady noise sources may include environmental noise sources such as busy road traffic.

2.3.9 The desirable internal ambient sound levels for dwellings are presented in Table 2.2.

Table 2.2: BS 8233 Desirable Internal Ambient Sound Levels for Dwellings

Activity	Location	Daytime 07:00 to 23:00 hours	Night-time 23:00 to 07:00
Resting	Living room	35 dB LAeq,16h	-
Dining	Dining room/area	40 dB LAeq,16h	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16h	30 dB LAeq,8h
Note 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,f, depending on the character and number of events per night. Sporadic noise events could require separate values.			
Note 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative source of ventilation that does not compromise the façade insulation or the resulting noise levels.			
Note 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.			

**A selection of the available notes*

2.3.10 The standard also provides advice in relation to design criteria for external sound. It states that:

> *"for traditional external areas that are used for amenity space, such as gardens and patios, 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 recognized 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, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.*
>
> *Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate.*
>
> *Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation.*

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

2.4 Proposed Assessment Criteria

2.4.1 A stage 1 assessment of the site has been undertaken in general accordance with ProPG. In addition, based on the requirements of the Local Authority, national policy and relevant standards, adverse effect levels have been proposed.

2.4.2 Table 2.3 provides details of the proposed adverse effect levels.

Table 2.3: Proposed Assessment Criteria – Adverse Effect Level

Adverse Effect Level	Indicative Internal Noise Levels excluding Mitigation (dB $L_{Aeq,T}$)		External Noise Levels in Amenity Areas (dB $L_{Aeq,T}$)
	Daytime (07:00 – 23:00)	Night-time (07:00 to 23:00 hours)	Daytime (07:00 – 23:00)
LOAEL	35 $L_{Aeq,16h}$ (dB)	30 $L_{Aeq,8h}$ (dB) 45 dB $L_{Amax\ 10}$ times per night	55 $L_{Aeq,16h}$ (dB)
SOAEL	50 $L_{Aeq,16h}$ (dB)	45 $L_{Aeq,8h}$ (dB) 65 dB $L_{Amax\ 10}$ times per night	65 $L_{Aeq,16h}$ (dB)

3 Acoustic Constraints and Masterplan Development

3.1 Assessment Methodology

3.1.1 Defra noise maps[1] have been used to predict the likely noise levels across the site. The strategic noise maps of England are produced under the Environmental Noise (England) Regulations, 2006. The Regulation has three core objectives; to produce strategic noise maps, to produce noise action plans, and to make information available to the public.

3.1.2 The strategic noise maps are required to be produced every five years. They must be produced for agglomerations with a population of more than 100,00 people; for major roads with more than 3,000,000 vehicle passages per year, and for major railways with more than 30,000 train movements per year.

3.1.3 Figures 2 and 3 below show the Defra predicted noise levels during the daytime (07:00 – 23:00 hours) and night-time (23:00 – 07:00) periods respectively for road noise. Figures 4 and 5 show the same periods for rail noise.

3.2 External Noise Levels

3.2.1 The indicative masterplan has been overlaid onto the Defra noise contours to show the extent of potential noise in relation to the proposed development. Due to how the Defra noise maps are produced, road and rail contours are shown separately. It should be noted that road and rail sources are usually combined within the overall background sound climate and therefore levels may be higher than shown below.

3.2.2 Figures 2 and 3 show the indicative masterplan overlaid onto the daytime and night-time predicted road noise levels.

[1] http://www.extrium.co.uk/noiseviewer.html [Accessed 30/01/2020]

Road Traffic Noise

Figure 2: Defra Predicted Road Noise Levels (Daytime – 07:00 – 23:00 hours)

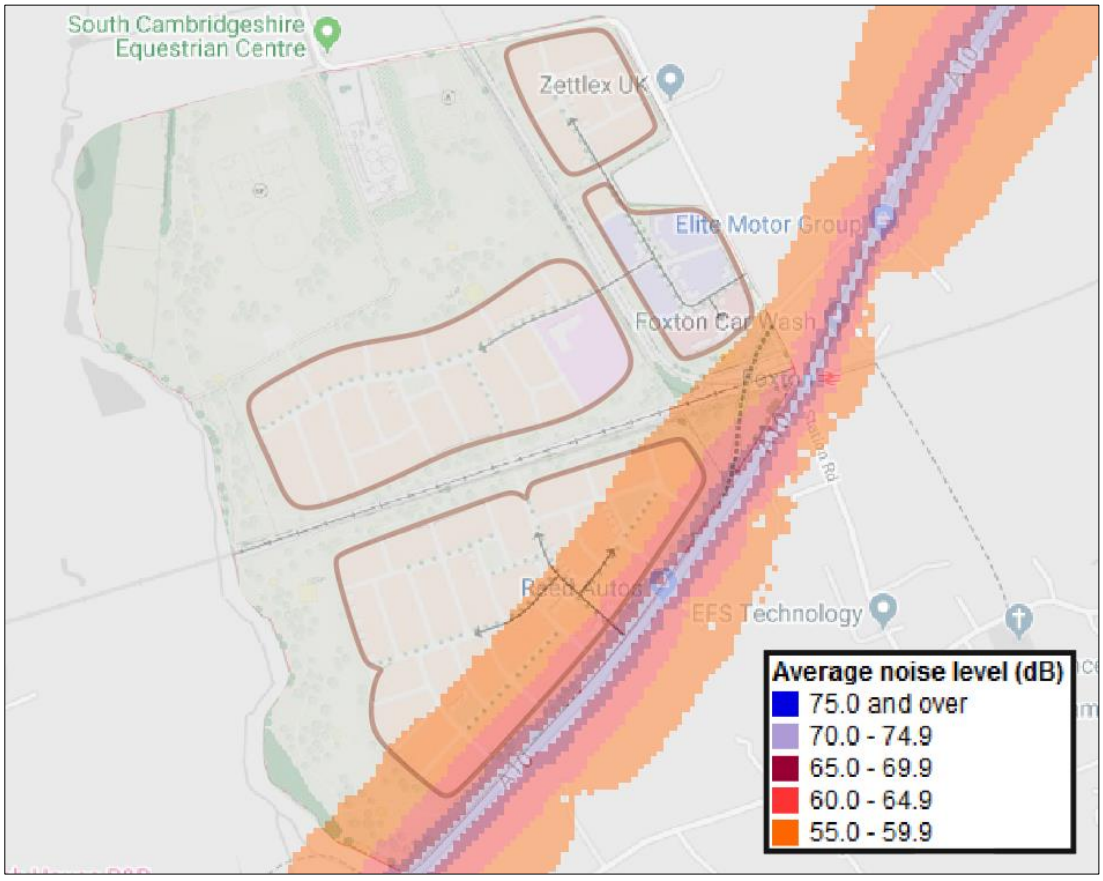
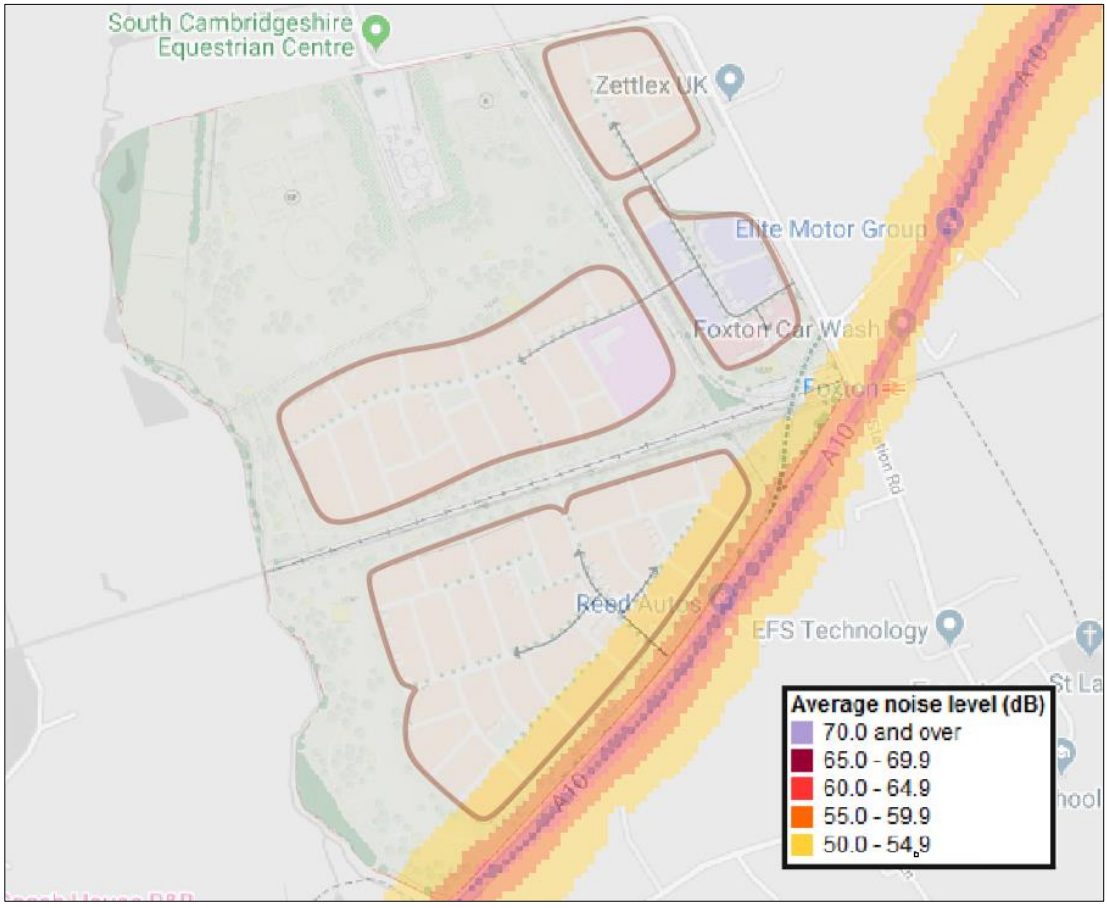


Figure 3: Defra Predicted Road Noise Levels (Night-time – 23:00 - 07:00)



3.2.3 For proposed residential areas directly adjacent to the A10 sound levels are likely to fall between 60 dBA and 70 dBA during the daytime (07:00 – 23:00 hours). During the night-time period (23:00 – 07:00 hours) sound levels are likely to fall between 50 dBA and 55 dBA.

Railway Noise

3.2.4 Figures 4 and 5 show the indicative masterplan overlaid onto the Defra daytime and night-time predicted rail noise levels.

Figure 4: Defra Predicted Rail Noise Levels (Daytime – 07:00 – 23:00 hours)

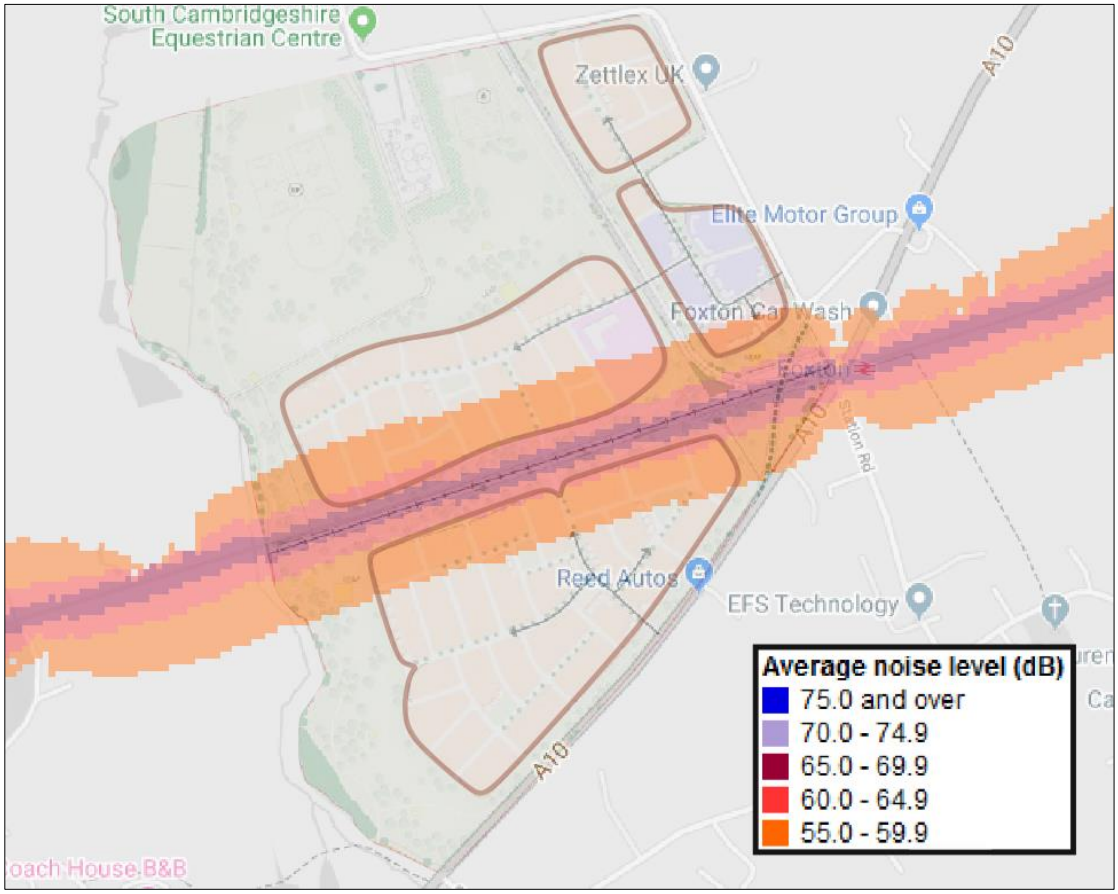
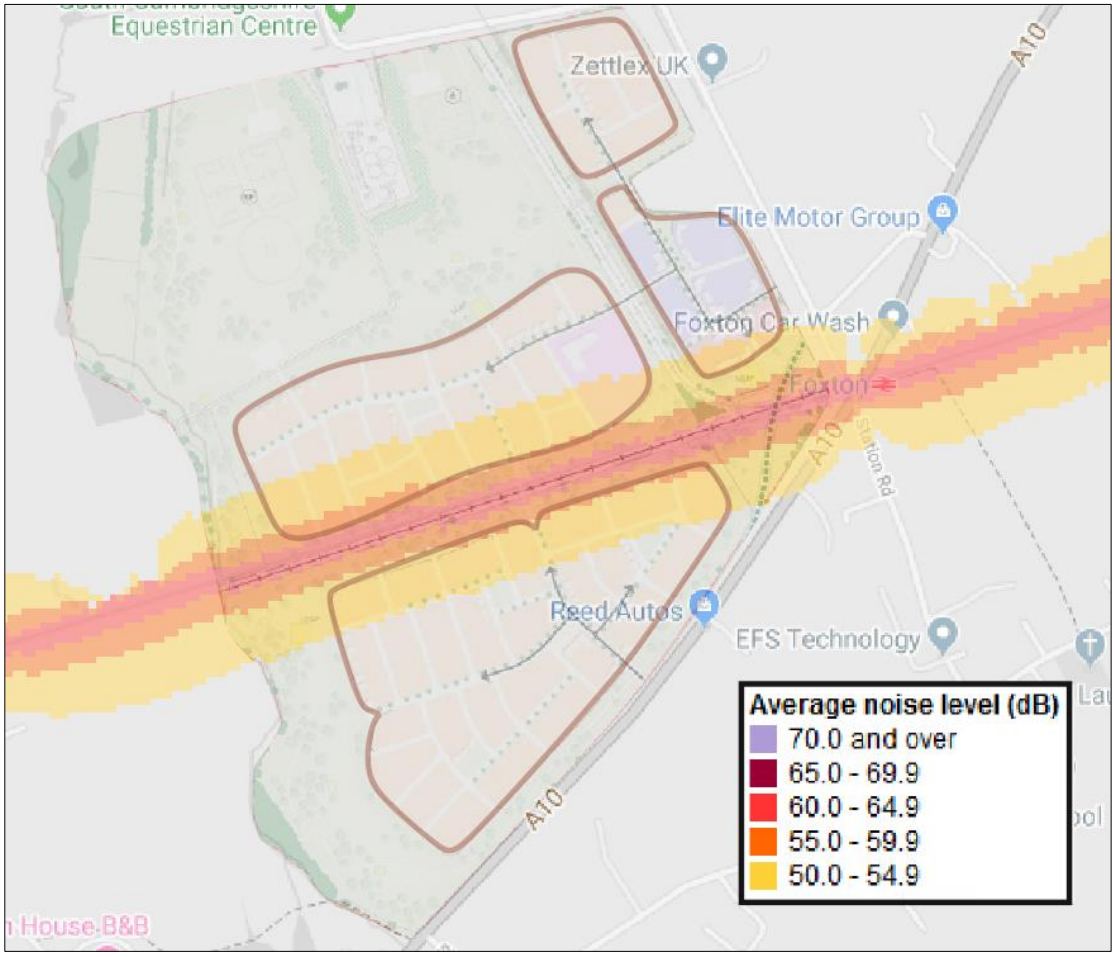


Figure 5: Defra Predicted Rail Noise Levels (Night-time – 23:00 - 07:00)



3.2.5 For proposed residential areas directly adjacent to the Great Northern Railway Line sound levels are likely to fall between 55 dBA and 70 dBA during the daytime (07:00 – 23:00 hours). During the night-time period (23:00 – 07:00 hours) sound levels are likely to fall between 50 dBA and 60 dBA.

Railway Vibration

3.2.6 It is typically advised that set back from railway tracks due to vibration is 30 m. However, with respect to vibration, a reduced setback of 15 m may be acceptable provided the buildings are large masonry set on piles.

3.2.7 It should be noted that the proposed illustrative masterplan (as shown in Figure 1) has provided a set back from the railway tracks which is likely to be considered suitable. However it is suggested that a baseline vibration survey is undertaken at the appropriate stage to confirm.

Discussion

3.2.8 With reference to BS 8233 guidance levels, unmitigated noise levels in external amenity spaces adjacent to the A10 and Great Northern Railway Line are likely to be above the proposed LOAEL of 55 dB $L_{Aeq,T}$. Amenity areas away from these noise sources are likely to be below the LOAEL of 55 dB $L_{Aeq, T}$.

3.2.9 In regards to ProPG (see Table 2.1) the majority of the site is considered to be a low to negligible risk. A small minority of properties adjacent to the A10 and the Great Northern Railway Line are considered to be a medium risk. For properties in the medium risk noise levels, good acoustic design process should be followed to allow suitable internal and external noise levels to be achieved.

3.2.10 It should be noted that the proposed illustrative masterplan (as shown in Figure 1) details buildings set back from both the A10 and Great Northern Railway Line, making use of good acoustic design.

3.2.11 We understand that the development proposals include for alignment changes to the A10. Detailed modelling would need to be undertaken as part of a future planning application to confirm the impacts. However, based on the illustrative alignment and the existing noise contours, the noise levels at the closest effected receptors are likely to be similar to receptors adjacent to the existing A10 and be categorised as being medium risk. Therefore, for receptors adjacent to the changed alignment are likely to also require good acoustic design process to be followed to allow suitable internal and external noise levels to be achieved.

3.3 Good Acoustic Design

Internal Noise Levels

3.3.1 Suitable internal noise levels with windows closed and alternative ventilation being provided are achievable with appropriate specification of glazing and ventilators. In this instance, it is likely that uprated acoustic double glazing with acoustic trickle ventilators will be required for properties within close proximity of the A10 and Great Northern Railway Line. Mechanical ventilation may be required to some dwellings.

3.3.2 Consideration should also be given to the internal layout of properties. Habitable rooms located on the façades fronting onto noise sources should be avoided. Rooms such as bedrooms and living rooms should ideally be placed onto quieter facades so as to reduce disturbance.

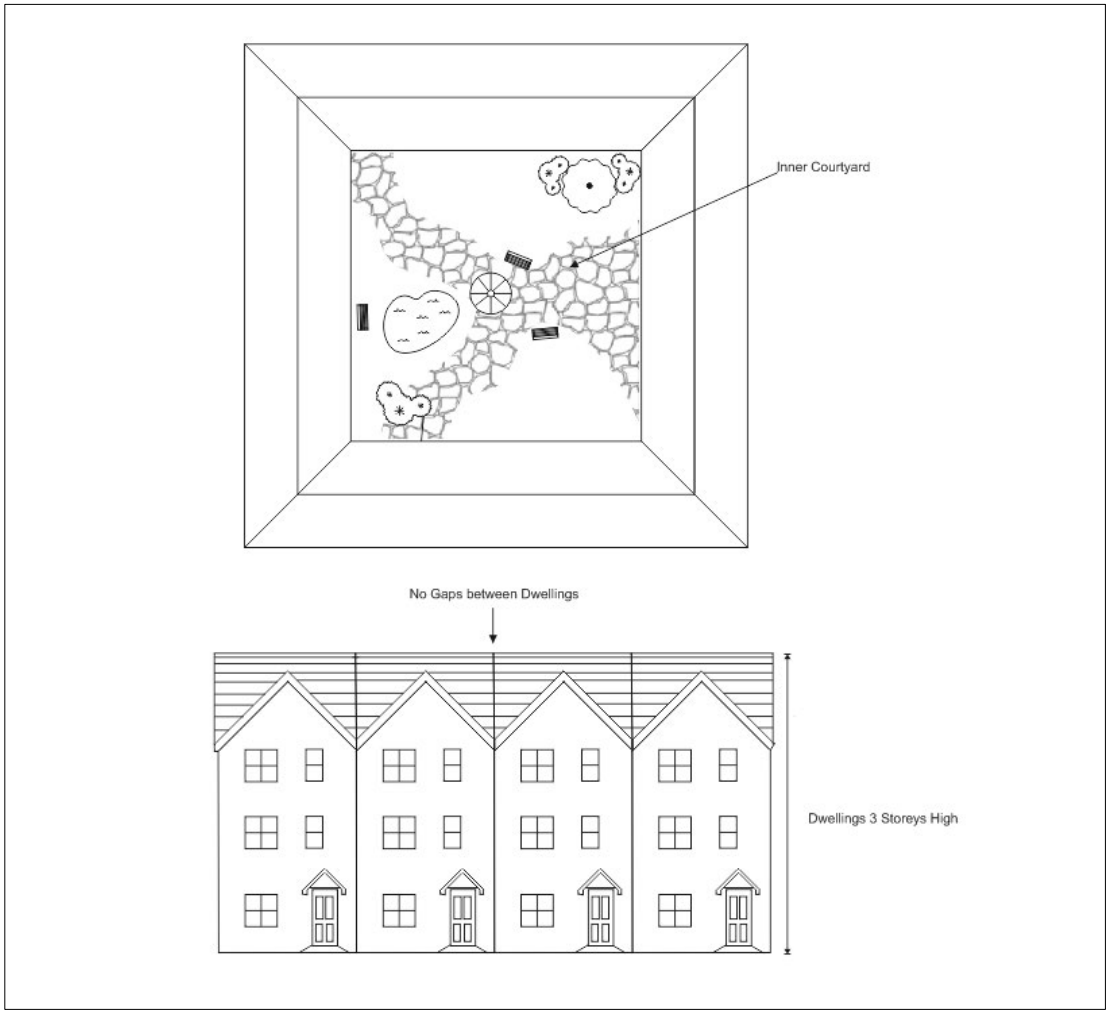
External Noise Levels

3.3.3 The existing proposed illustrative masterplan already details the use of set back distances from both the A10 and Great Northern Railway Line.

3.3.4 Mitigation in the form of building orientation and acoustic barrier may be implemented.

3.3.5 Buildings may be orientated to ensure gaps between dwellings are reduced such that no garden area has a direct line-of-sight/overlooks the A10/Great Northern Railway. Terraced buildings adjacent to these noise sources may be implemented to provide a screening effect to the rest of the Site. Courtyard style development may also be implemented to provide shielded amenity space as presented in Figure 6.

Figure 6: Illustrative 3 Storey Terraced House Design and Courtyard Style Buildings



3.3.6 The use of acoustic barriers may also be implemented to reduce noise levels, however due to the relatively small size of the site, and the size of the A10 and Great Northern Railway, a detailed assessment would be required to determine whether a barrier led approach would be suitable.

3.3.7 With regards to external amenity spaces, ProPG does advise the following where guidance levels cannot be met:

"*Where, despite following good design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:*

- *A relatively quiet façade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. enclosed balcony) as part of their dwelling; and/or*
- *A relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected location); and/or*
- *A relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *A relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such*

provision to the definition and management of Quite Areas under the Environmental Noise Regulations."

3.3.8 We would highlight that during the detailed design of the scheme the effect of acoustic barriers and site layout on noise levels in external amenity areas should be explored in more detail.

3.3.9 The ProPG also recommends:

"*Developers are particularly encouraged to enter into pre-application discussions with the LPA* (Local Planning Authority) *where noise levels in proposed amenity spaces are likely to be above 55 dB* $L_{Aeq,\ 16\ hr}$ *during a reasonably foreseeable worst case day. […] This judgement will partly depend on the type of residential development and the intended occupancy, which, in turn, may need to be secured by condition."*

3.3.10 It should also be noted that the ProPG states:

"*Good acoustic design is not just compliance with recommended internal and external noise exposure standards. Good acoustic design should provide an integrated solution whereby the optimum acoustic outcome is achieved, without design compromises that will adversely affect living conditions and the quality of life of the inhabitants or other sustainable design objectives and requirements."*

4 Summary and Conclusions

4.1.1 Stantec has been commissioned to provide a noise impact assessment of the development proposals to inform the regulation 18 process of the Local Plan and also inform masterplan proposals for a proposed residential led mixed-use development at Station Fields, Foxton.

4.1.2 Defra noise maps have been utilised to aid the assessment.

4.1.3 Adequate internal noise levels with windows closed and alternative ventilation provided are achievable with appropriate specification of glazing and ventilators. In this instance, it is likely that uprated acoustic double glazing with acoustic trickle ventilators will be required for properties within close proximity of the A10 and Great Northern Railway Line. Mechanical ventilation may be required to some dwellings.

4.1.4 Noise levels in external amenity areas directly adjacent to the A10 and Great Northern Railway Line are likely to exceed the proposed LOAEL. Mitigation measures to reduce noise levels in external amenity areas will therefore be required.

4.1.5 The development already includes the use of setback distances from the existing noise sources. It is recommended that the design of the scheme should further consider the principles of good acoustic design and include:

- Consideration of the layout of the scheme (including the internal layout of dwellings);
- Targeted use of acoustic barriers (where deemed effective).

4.1.6 Based on a review the acoustic climate and incorporation of good acoustic design, the site is considered suitable for residential development.

Appendix A Glossary of Acoustic Terminology

Parameter	Description
Daytime	The period 07:00-23:00 hours.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s^1 and s^2 is given by 20 $\log^{10}$ (s^1/s^2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$ or Background Noise Level	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
LOAEL	Lowest Observed Adverse Effect Level. This is the noise level above which adverse effects on health and quality of life can be detected.
Night-time	The period 23:00-07:00 hours.
NOEL	No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
Noise Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
SOAEL	Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level, L_p	The sound pressure level, L_p is the sound pressure relative to a standard reference pressure of 20µPa ($20x10^{-6}$ Pascals) on a decibel scale.