

Anglia Square, Norwich

Environmental Statement Environmental Noise

Stansted Environmental Services Ltd
on behalf of Weston Homes Plc

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1. NON-TECHNICAL SUMMARY

- 1.1 The purpose of an Environmental Noise Assessment is to ascertain the existing noise environment in which a proposed development is located within.
- 1.2 The assessment includes the undertaking of measurements from different areas of the site over a minimum of 24 hours so as to review both daytime and night-time noise.
- 1.3 Once measurements have been retrieved, the primary source of noise is identified, which in the instance of Anglia Square is road traffic noise associated with vehicle movements on St Crispins Road located on the southern boundary of the proposed development site.
- 1.4 Following this, a review of the proposed development is undertaken which looks at how noise from the primary source may affect future residents of the development and to propose mitigation measures that will afford adequate protection as required by recognised UK Standards/Guidance.
- 1.5 An assessment for the proposed Anglia Square development has been undertaken by Stansted Environmental Services Ltd (SES) which confirms that mitigation measures will be required.
- 1.6 Mitigation measures include;
- The fitting of windows with an acoustic reduction value of R_w+C_{tr} 32dB.
 - This can be achieved with a typical glazing configuration of 10mm/6-16mm/6mm.
 - Acoustically treated trickle vents with an acoustic reduction value of R_w+C_{tr} 32dB will be needed for the habitable rooms.
- 1.7 The assessment also confirms that the mitigation measures can be achieved with standard construction materials.
- 1.8 Following implementation of the proposed mitigation measures into the design of the scheme the internal noise requirements as stated within BS8233:2014 will be achieved, thus affording protection from noise and protecting the health and well-being of future residents of the development.

2. INTRODUCTION

- 2.1 This chapter of the ES has been prepared by Silvio Petrasso of Stansted Environmental Services Ltd who is the Associate Director (Environment) and has over 14 years' experience working in the construction industry.
- 2.2 Silvio is a Chartered Health and Safety Practitioner with the Institute of Occupational Safety and Health (IOSH), a Corporate Member of the Institute of Acoustics (IOA), an Associate Member of the Chartered Institute of Environmental Health (CIEH) as well as an Incorporated Member of the Association for Project Safety (APS). This chapter of the Environmental Statement (ES) assesses the likely significant noise effects of the development at nearby sensitive locations during the construction and operational phases. Stansted Environmental Services Ltd (SES) was commissioned by Weston Homes Plc to carry out an environmental noise assessment for the proposed development site known as Anglia Square, Norwich.
- 2.3 The proposed development will comprise a mixture of residential and commercial space with associated roadways and communal areas.
- 2.4 This chapter describes the assessment methodology; the baseline conditions currently existing at the site and surroundings; the likely significant effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

3. POLICY CONTEXT

National Policy

3.1 **The National Planning Policy Framework (NPPF)** was published in March 2012. In respect of noise, the document states in Section 11, Paragraph 109 that; “The planning system should contribute to and enhance the natural and local environment bypreventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution”.

It goes on to advise in Section 11, Paragraph 123, 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”.

3.2 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define “significant adverse impacts”. A summary of the NPSE is provided below and it is understood that the UK Government is currently undertaking research to quantify the significant observed adverse effect levels for noise.

3.3 NPSE was published in March 2010 and seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out, in Paragraph 1.6 the long term vision of the Government’s noise policy;

“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development”.

3.4 The NPSE clarifies 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 effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

Table 3.1 – summary of the noise exposure hierarchy, based on the likely average response

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, eg turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. 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, eg avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. 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 Adverse 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, eg regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, eg auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.5 **BS8233:2014 Sound insulation and noise reduction for buildings - Code of practice**, provides recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

3.6 The standard suggests suitable internal noise levels within different types of buildings, including dwellings, and these are repeated in the Table below;

Table 3.2 - Internal noise levels for noise sensitive rooms (BS8233:2014)

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35dB LAeq,16 hour	---
Dining	Dining room area	40dB LAeq,16 hour	---
Sleeping	Bedroom	35dB LAeq,16 hour	30dB LAeq,8 hour

3.7 World Health Organisation (WHO) 1999; Guidelines for community noise provided established guideline values for community noise in specific environments, which are summarised below;

- Outdoor living area – serious annoyance 55dB(A), 16 hours between 07:00 and 23:00
- Outdoor living area – moderate annoyance 50dB(A), 16 hours between 07:00 and 23:00
- Indoor speech intelligibility – moderate annoyance 35dB(A), hours between 23:00 and 07:00
- Outside bedrooms with window open (outdoor values), sleep disturbance 45dB(A)

3.8 **BS4142:2014 'Methods for rating and assessing an Industrial and Commercial Sound' (BS4142:2014)** provides guidance on the assessment of the likelihood of complaints relating to noise from industrial sources. It replaced the 1997 edition of the standard in October 2014 and key aspects of the standard are summarised below;

3.9 The standard presents a method for assessing potential noise impact comparing the noise level due to industrial sources (the rating level) with that of the existing background noise level at the nearest noise sensitive receiver in the absence of the source (the background sound level).

Local Policy

- 3.10 The Norwich City Council Local Plan contains provisions with respect to noise.
- 3.11 The Local Plan was adopted at the end of 2014 and is titled - *Norwich Local Plan – Development Management Policies Plan, Adopted December 2014*.
- 3.12 Policy DM2 Amenity states for the purpose of this Policy “amenity” is defined as ‘the desirable features of a place that ought to be protected or enhanced in the public interest’. This includes factors such as achieving and maintaining acceptable levels of privacy, safeguarding occupiers from excessive noise or light pollution and ensuring sufficient internal and external space and light. Consideration should not only be given to the impact of individual developments, but also to cumulative impacts. The policy will consider both the use or activity itself and its direct and indirect impacts (e.g. increases in traffic).
- 3.13 Policy DM2 – Amenity is reproduced below;

Policy DM2 – Amenity

Existing occupiers

Development will be permitted where it would not result in an unacceptable impact on the amenity of the area or the living or working conditions or operations of neighbouring occupants. Particular regard will be given to:

- a) the prevention of overlooking and the loss of privacy;
- b) the prevention of overshadowing and loss of light and outlook; and
- c) the prevention of disturbance from noise, odour, vibration, air or artificial light pollution.

Future occupiers

Development will only be permitted where:

- a) it provides for a high standard of amenity, satisfactory living and working conditions, adequate protection from noise and pollution and adequate levels of light and outlook for future occupiers; and
- b) such a standard can be achieved and maintained without preventing or unreasonably restricting the continued operation of established authorised uses and activities on adjacent sites.

- 3.14 Policy DM11 Environmental Hazards states that the policy should be read alongside other relevant policies of the plan seeking to manage particular forms of development (in particular late night activities subject to policy DM23 and hot food takeaways subject to policy DM24). It seeks to apply a precautionary principle, recognising that it will be necessary in certain circumstances to limit the impacts of noise generating uses in the interests of amenity, albeit not to the extent where it would impact unreasonably on the operating conditions of business (see policy DM22). The acceptability and the precise impact of noise will vary according to where the proposed development is located, but the expectation is that in the City Centre the intensity of commercial uses and activities, particularly those relating to the evening and late night economy, will typically generate higher levels of neighbourhood noise than would characterise a quiet suburban area, and that some noise in these areas is inevitable. Accordingly, relative noise sensitivity and the level at which noise becomes significantly harmful to health and quality of life (the “significant observed adverse effect level” or SOAEL) will vary from place to place, and this will have a bearing on the scope and nature of any conditions or mitigating measures required.
- 3.15 In forming conditions necessary to manage and mitigate the impact of noise either by means of insulation, limits on amplified sound or mechanical noise or the restriction of hours of operation, account will be taken of the technical advice from Environmental Health Officers on what is appropriate in individual cases. Such conditions will be proportionate and reasonable to the circumstances of the case.
- 3.16 Policy DM11 Environmental Hazards - noise, has been reproduced below;

Policy DM11

Environmental hazards

Noise

To help reduce the impact of noise, appropriate and proportionate mitigating measures will be required and appropriate limiting conditions will be attached to permissions for development which, on the best available evidence, is likely to:

- a) give rise to sources of environmental noise, neighbour noise, or neighbourhood noise which will have some adverse impact on the health, well-being and quality of life of existing adjoining and nearby occupiers; or
- b) result in some adverse impact on the health, well-being and quality of life of future occupiers of the proposed development by increasing their potential exposure to existing sources of noise in the vicinity.

In determining individual proposals for noise generating uses or uses which may increase noise exposure, account will be taken of the operational needs of business, the character and function of the area, the levels of neighbourhood noise which might be reasonably expected in the daytime, evening and late at night, the disposition of uses and activities in the vicinity in relation to residential occupation, and the reasonable expectation of residents for a high standard of amenity and outlook and a period of quiet enjoyment for at least part of the day.

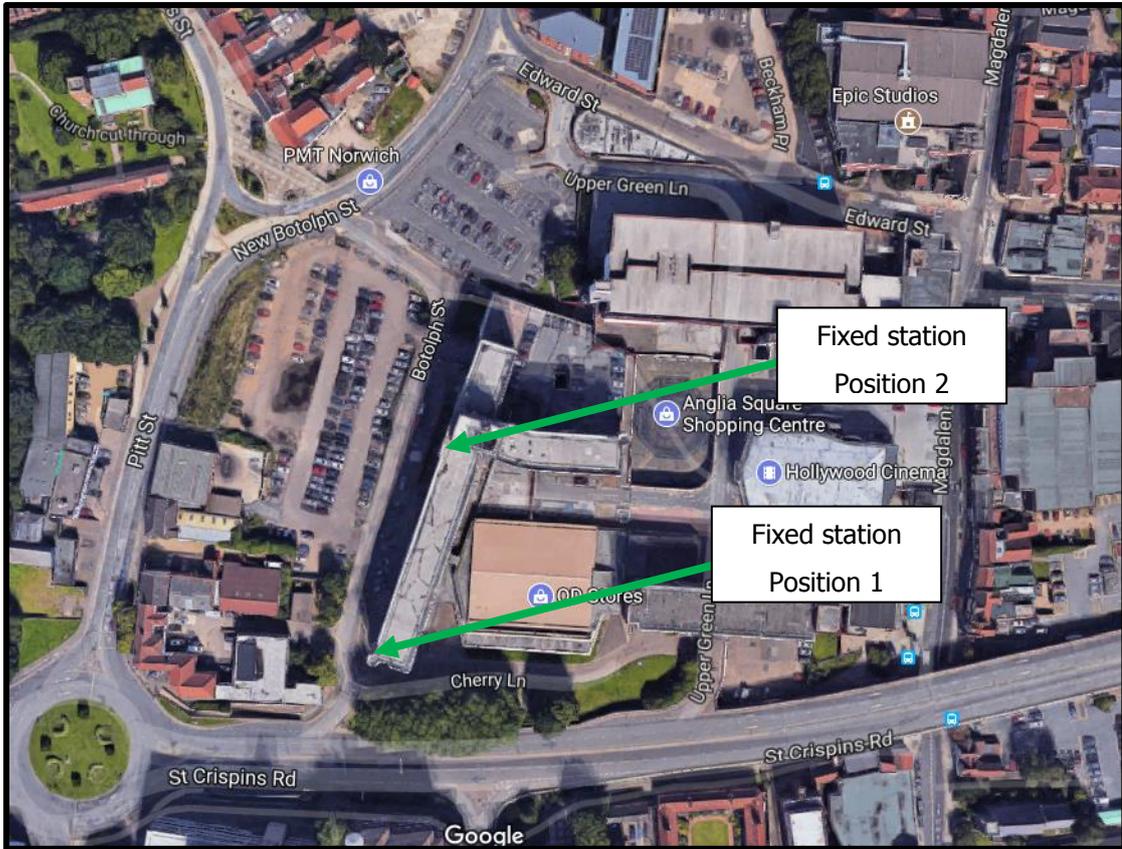
Permission may be refused exceptionally in cases where the exposure of adjoining occupiers to noise from the proposed development could not be reduced through planning conditions or other mitigating measures below the significant observed adverse effect level (SOAEL) which is assessed as appropriate for that location.

4. METHODOLOGY AND ASSESSMENT CRITERIA

4.1 The method of assessment has included the following steps;

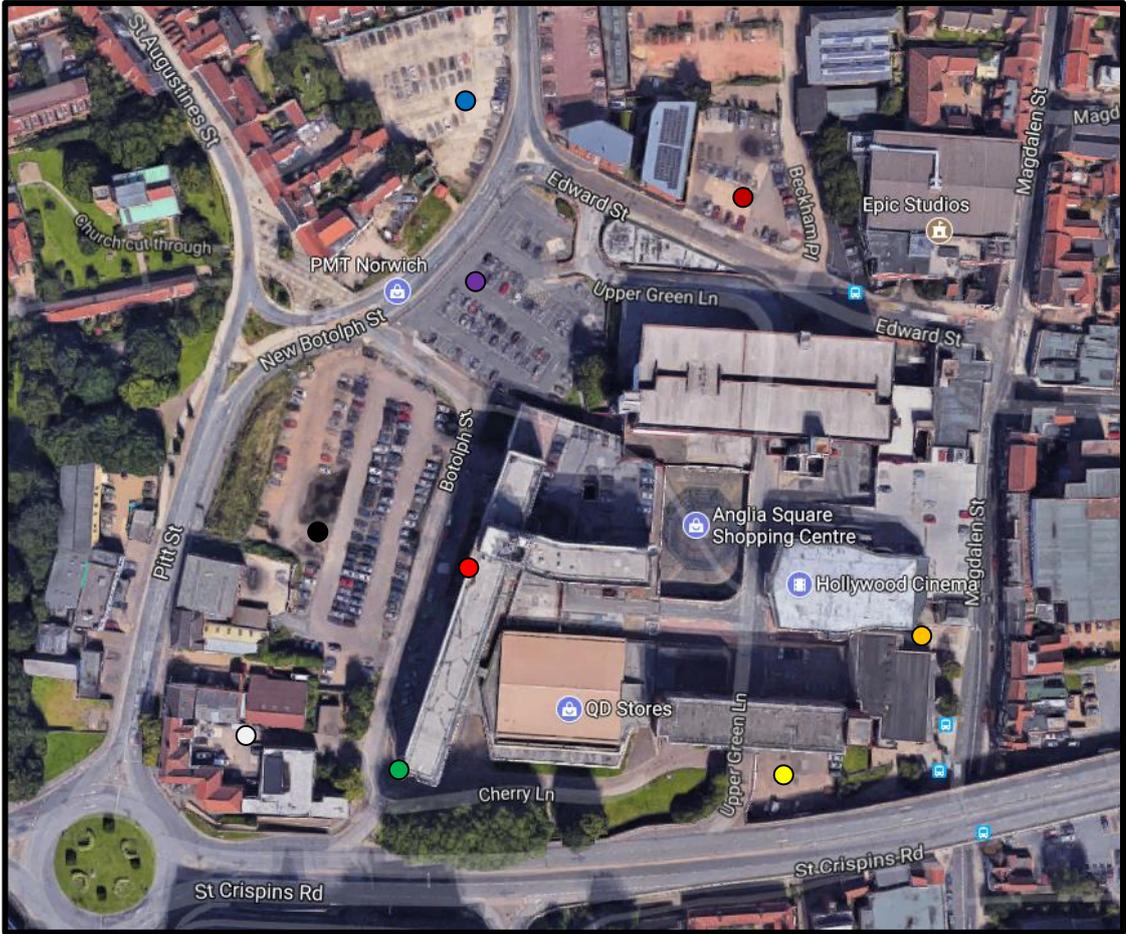
- Establishing the existing baseline noise climate by baseline survey including desk-based research and field noise monitoring.
- Identify a set of noise conditions (internal and external) which are suitably protective of sensitive receptors as part of the development.
- Assess the impact on sensitive receptors based on the difference between the acceptance criteria and the predicted noise levels.
- Present mitigation measures which allow the acceptance criteria to be met.
- Assess any residual impacts and effects with mitigation in place.
- Due to the size of the proposed development site, it was considered that two continuous noise monitoring positions would be required to suitably assess the existing noise environment.
- Two fixed monitoring locations were set up to the front of the site on Sovereign House facing Botolph Street. Continuous measurements were taken over a 7 day period.
- The monitoring exercise captured a total of 5 day time periods (16 hours between 07:00-23:00) and 7 night time periods (8 hours between 23:00-07:00).
- The locations of the fixed monitoring stations are shown in Figure 4.1.

Figure 4.1: Fixed Monitoring Locations



4.2 Seven separate 30 minute 'spot measurement' positions were also considered to be appropriate to confirm the fixed noise monitoring data. All of the monitoring locations are identified in Figure 4.2.

Figure 4.2 - Environmental noise monitoring measurement locations



- Fixed Noise Monitoring Station 1 ● Fixed Noise Monitoring Station 2
- Spot Position 1 ● Spot Position 2 ● Spot Position 3 ○ Spot Position 4
- Spot Position 5 ● Spot Position 6 ● Spot Position 7

4.3 This assessment considered the worst case scenario with respect of construction, traffic and operational noise from the site.

4.4 The exact detail of construction techniques and types of plant can only be estimated at this stage. Therefore, it is difficult to predict the actual potential noise effects, and on this basis a worst case assessment will be undertaken in accordance with BS5228.

4.5 Potential worst case noise generation scenarios will be investigated by reviewing the demolition and construction activities for each phase of the works as summarised in the following tables:

Table 4.1 Typical demolition activities and associated plant

Demolition Activities	
Soft strip	Hand tools, waste skips, telescopic handler – short duration
Demolition of superstructure and foundations	360 tracked excavators with munchers or breakers – short duration
Crushing and screening	Crusher, 360 tracked excavators
Load and remove demolition rubble	360 tracked excavators, 20 tonne tipper trucks – short duration

Table 4.2 Typical construction activities and associated plant

Construction Activities	
Placement of piling mat	360 tracked excavator
CFA piling	Piling rigs, concrete mixer, pumps and 360 tracked excavator
Groundwork's	Breaking down and forming pile caps Excavations for drainage and services Concrete pour for floor slab and pile cap Lorries and excavators in use daily Compressors, breakers and hand power tools
Masonry Works	Laying bricks and blocks by hand Placing floor beams by crane Mortar mixed by silos Materials movement by tower crane and forklift Occasional use of petrol masonry saw
Scaffolding	Proprietary scaffold system to be used Materials movement by tower crane and forklift

5. EXISTING BASELINE CONDITIONS

- 5.1 The results from the noise monitoring at fixed monitoring location 1, demonstrate that there are elevated noise levels along St Crispins Road which is an elevated dual carriageway located on the Southern boundary of the proposed development site.
- 5.2 Fixed monitoring location 2 was located in a more central area of the proposed development site away from St Crispins Road, which demonstrated that noise levels were up to 8dB lower in this location when compared against the levels recorded at fixed monitoring location 1.
- 5.3 As such recommendations have been made with respect to noise control which will need to be considered as part of the scheme's design.
- 5.4 Table 5.1 - Measurement Results

Time period - 24 hour fixed monitoring station	L_{Aeq}	L₉₀
23:00 – 07:00 (8 hour) 18 th /19 th August 2016	51.7	40.5
23:00 – 07:00 (8 hour) 19 th /20 th August 2016	52.2	44.4
23:00 – 07:00 (8 hour) 20 th /21 st August 2016	54.0	47.9
23:00 – 07:00 (8 hour) 21 st /22 nd August 2016	55.2	40.9
23:00 – 07:00 (8 hour) 22 nd /23 rd August 2016	60.1	47.1
23:00 – 07:00 (8 hour) 23 rd /24 th August 2016	60.1	47.5
23:00 – 07:00 (8 hour) 24 th /25 th August 2016	60.6	47.3
07:00 – 23:00 (16 hour) 19 th August 2016	58.2	54.4
07:00 – 23:00 (16 hour) 20 th August 2016	59.8	55.0
07:00 – 23:00 (16 hour) 21 st August 2016	58.1	54.1
07:00 – 23:00 (16 hour) 23 rd August 2016	67.2	62.3
07:00 – 23:00 (16 hour) 24 th August 2016	67.2	61.8
Time period – spot monitoring locations	L_{Aeq}	L₉₀
SP1 – 25 th August 2016 (30mins)(12:57-13:27)	59.5	52.6
SP2 – 25 th August 2016 (30mins)(13:29-13:59)	66.2	56.4
SP3 – 25 th August 2016 (30mins)(14:01-14:31)	58.9	50.2
SP4 – 25 th August 2016 (30mins)(14:34-15:04)	57.3	52.5
SP5 – 25 th August 2016 (30mins)(15:07-15:37)	65.6	63.5
SP6 – 25 th August 2016 (30mins)(15:43-16:13)	68.2	62.5
SP7 – 25 th August 2016 (30mins)(12:25-12:55)	64.0	49.3

6. ASSESSMENT OF POTENTIAL EFFECTS

- 6.1 The noise monitoring has demonstrated that St Crispins Road is affecting the noise environment at the Southern boundary of the site. As such, units on this elevation will need some form of protection to avoid disturbance to future occupiers of the units.
- 6.2 With respect to other areas of the proposed development site, whilst protection will still be required, this will be lower as noise levels are currently lower, the further away the receptor is from St Crispins Road. Furthermore, they will be afforded protection by the new buildings which will be on the St Crispins Road elevation.

Construction Effects

- 6.3 Some predicted noise levels generated by the proposed site operations during the construction phase of the development have been prepared in accordance with the recommendations made in British Standard BS5228 (2009) 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' with baseline data used for reference material.
- 6.4 The results will be compared with baseline data and the 75dB typical noise limit applied to the boundaries of construction sites.
- 6.5 BS5228 comments that experience of complaints associated with industrial noise sources indicates that the likelihood of complaints increases as the difference between the industrial noise and the existing background noise increases. However, it is generally assumed that a greater difference might be tolerated, than for an industrial source, when it is known that the operations are of short or limited duration.
- 6.6 The following significance criteria will be applied to the construction noise impacts review based on values stated within BS5228 (Annexe E).

Table 6.1 – Significance Criteria for Noise Impacts

Construction Impact Description	Significance
Daytime L_{Aeq} up to 65dB (10dB in excess of ambient L_{Aeq})	Negligible
Daytime L_{Aeq} up to 75dB for short duration	Minor Adverse
Daytime L_{Aeq} up to 75dB for moderate duration	Moderate Adverse
Daytime L_{Aeq} in excess of 75dB	Major Adverse

Operational Effects

- 6.7 Noise impact from existing noise sources are limited to impacts from the surrounding road network, with St Crispins Road (located on the southern boundary of the proposed development) being the primary noise source.

Mitigation Measures

Construction Phase

- 6.8 A suite of mitigation measures is proposed to minimise noise and vibration including selection of plant and working methods, controlled working hours, enforcement of noise and vibration limits, boundary fencing and noise monitoring.
- 6.9 Mitigating measures will include;
- Controlled working hours, which are typically;
Monday – Friday 08.00 to 18.00 hours and
Saturday 08.00 to 13.00 hours
No work on Sundays or Bank Holidays
 - Provide site boundary barriers as needed.
 - Adopt the principals of “Best Practicable Means”.
 - Use compressors that have silencers or are sound reduced models.
 - Fit silencers or mufflers to pneumatic tools, when necessary.
 - Programme deliveries to arrive only during daylight hours, and act carefully when unloading vehicles to minimise disturbance to local residents.
 - Delivery vehicles should be prohibited from waiting within the site with their engines running.
 - All plant items will be properly maintained and operated according to the manufacturer’s instructions.
 - Plant will be sited, as far as possible, away from noise sensitive receptors.
- 6.10 This will ensure that noise and vibration levels are kept within acceptable limits, although these will be in excess of the existing baseline. These measures will be detailed in a Construction Environmental Management Plan (CEMP) which will incorporate best practice measures.

Operational Phase

- 6.11 In this case, receptors are considered to comprise new residents of the application scheme. The environmental noise assessment undertaken by SES has demonstrated that standard double glazing with an R_w+C_{tr} of 32dB is appropriate to achieve the required internal acoustic environment and to mitigate impacts from existing noise

sources on residents of the proposed development. The impact on future residents of the scheme from existing noise sources is therefore considered to be negligible.

- 6.12 Part F of the Building Regulations specifies required rates of background ventilation to domestic properties. These requirements must be achieved without compromising internal noise levels. When a window is opened for ventilation, it will only give 10-15dB reduction in noise.
- 6.13 As such some form of acoustic ventilation will be required to negate the need to open windows for fresh air.
- 6.14 Trickle ventilators or mechanical ventilation will need to be acoustically treated at the inlet point to afford an R_w+C_{tr} attenuation level of 32dB.
- 6.15 BS8233 includes design criteria for external noise.
- 6.16 The standard states that it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$ with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments.
- 6.17 The proposed scheme does not include gardens or grassed areas, however balconies to apartments will be provided.
- 6.18 Based upon the noise monitoring exercise, it can be seen that the upper noise limit of 55dB is achieved for the entire site bar the St Crispins Road elevation.
- 6.19 Noise conditions will improve as the development progresses as there will be shielding from the new buildings on the St Crispins Road elevation.
- 6.20 The proposed scheme includes the provision of commercial space, which will include the installation of plant associated with individual businesses.
- 6.21 Installed plant should not cause the existing noise level to increase when measured at one metre from the façade of the nearest noise sensitive premises. In order to achieve this, plant should be designed/selected (or attenuated) so that it is 5dB below the existing background level.

Residual Effects

Construction Phase

- 6.22 After mitigation, noise levels will be within acceptable limits for construction sites, but will be in excess of the baseline levels currently experienced at the site this is short term in duration.
- 6.23 Noise and vibration impacts on neighbouring sensitive receptors are predicted to be **moderate adverse** and **short term** for demolition noise and **minor adverse medium term** for construction noise. The overall impact of construction noise is considered to be of **minor significance**.

Operational Phase

- 6.24 Provided the mitigation referred to above is implemented, the operational phase impacts are considered to be **negligible**.

Conclusions

- 6.25 The scheme requires demolition of a number of structures in close proximity to existing neighbouring residential receptors.
- 6.26 Mitigation and control measures will be required to ensure that noise is kept within acceptable limits during the demolition works. This will include the selection of plant, controlled working hours and a monitoring programme. Noise levels will however be in excess of existing baseline levels. On this basis, the impact on existing residents is considered to be **moderate adverse** but **short term** and of **minor significance**.
- 6.27 Construction works associated with the scheme are predicted to be within noise limits and good practice measures will be put in place throughout the construction works to ensure that this is the case. Noise levels will however be in excess of existing baseline levels. The impact on existing residents is considered to be **minor adverse** but **medium term** and of **minor significance**.
- 6.28 Environmental noise is unlikely to place significant constraints on the proposed future land use of the site. Provided appropriate mitigation measures are included, operational phase noise impacts will be **negligible**.
- 6.29 The development scheme proposals are considered to be consistent with the requirements of legislation, national/regional/local planning policy and good practice guidance with regard to noise and vibration issues.

7. GLOSSARY AND ABBREVIATIONS

dB (Decibel)	The scale on which sound pressure level is expressed. It is defined as 20 x the logarithm of the ratio between the ratio root mean square pressure of the sound field and a reference pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$)
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_{Aeq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the fast sound level meter response.
L_{Cpeak}	The absolute highest sound pressure of the noise signal of either the positive or negative part of the sound with a 'C' weighting. 'C' weighting is the frequency response often used to measure very high noise levels.
L_{10} and L_{90}	If a non steady noise is to be described it is necessary to know both its level and degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for the 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 Noise	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 constraint.
Slow	A time weighting used in the root mean square section of a sound level meter with a 1000 millisecond time constraint.