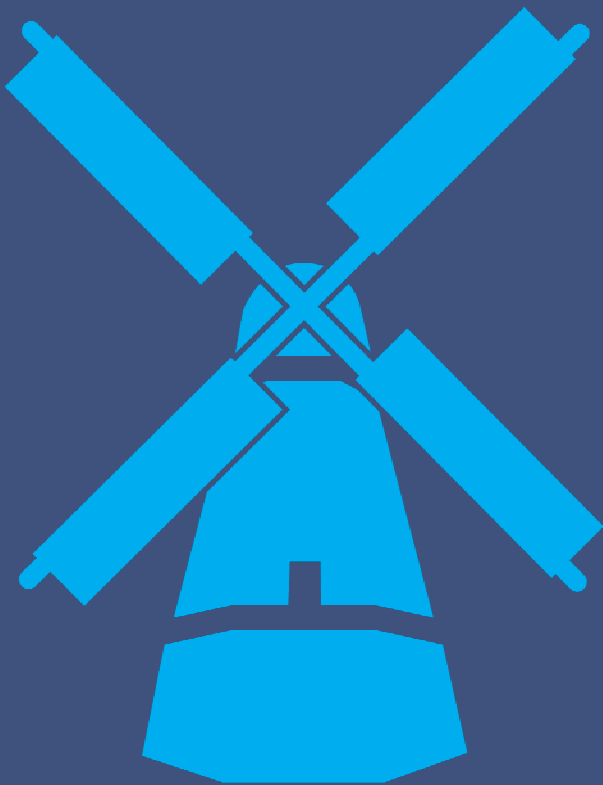


Hindsland, Eastbourne Road Willingdon, East Sussex

Noise Assessment



March 2021

Danescroft (FREOF V Willingdon) LLP

Noise Assessment

**Eastbourne Road,
Willingdon**

**Prepared for
Danescroft (FREOF V Willingdon) LLP**

by

**Stuart Michael
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March 2021



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ACRONYMS AND ABBREVIATIONS

'A' weighted	The weighting that is applied to measured sound pressure levels so that the levels correspond more closely to the subjective response of the human ear - expressed as dB(A)
ABC Method	BS 5228 Method for determining the threshold of significance and associated construction impacts
°C	Degrees Celsius
BRE	Building Research Establishment
BS 5228	Code of practice for noise and vibration control on construction and open sites (2014)
BS 8233	Guidance on sound insulation and noise reduction for buildings (2014)
CIRIA	Construction Industry Research and Information Association
CRN	Calculation of Railway Noise
CRTN	Calculation of Road Traffic Noise
dB	Decibel – unit of measurement of sound
EHO	Environmental Health Officer
$L_{A10, T}$	Noise level exceeded for 10% of the time period (T) expressed in decibels with an A weighting
$L_{Aeq, T}$	A weighted equivalent continuous noise level over a time
L_{Amax}	A weighted maximum noise level
ms^{-1}	Metres per second
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPSE	National Policy Statement for England
PPV	Peak Particle Velocity
SEL	Single Event Noise Exposure Level
SLM	Sound Level Meter
SMA	Stuart Michael Associates Limited
VDV	Vibration Dose Value
WDC	Wealden District Council
WHO	The World Health Organisation



1.0 INTRODUCTION

- 1.1 This Noise Assessment has been prepared by Stuart Michael Associates Limited (SMA), Consulting Engineers, on behalf of Danescroft (FROF V Willingdon) LLP. The report supports the outline planning application for a mixed use development at Eastbourne Road, Willingdon. Refer to **Figure 1.1** for the location of the development.

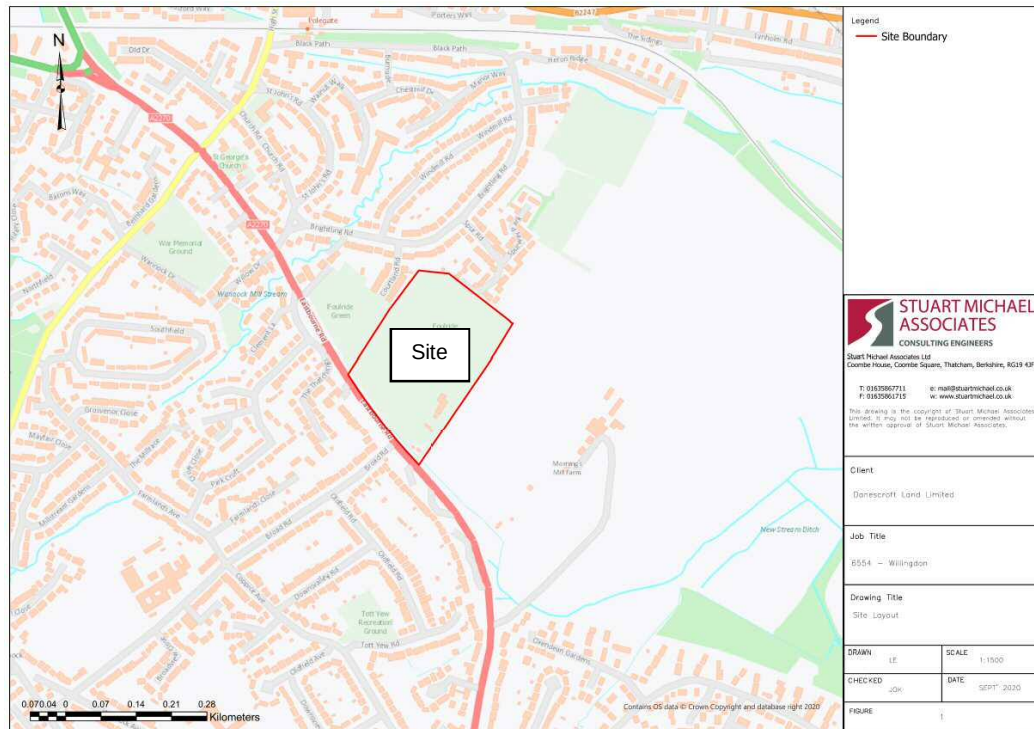


Figure 1.1: Site Location Plan

Scope of Assessment

- 1.2 This report has been produced in support of an Outline Application, all matters reserved except for Access (excluding internal estate roads beyond the access to serve the Medical Centre Plot), for the demolition of an existing vacant dwelling and erection of up to 180 no. dwellings and a medical centre together with all parking, servicing and onsite open space. The development site area is 6.48 hectares of land.
- 1.3 Architecture Planning Masterplanning (ASP) Design *Site Layout* (Drawing Number – 20089-P101 Rev. A) has been considered in this noise assessment (Refer to **Appendix 1**).
- 1.4 The constraints on the development as a result of the existing noise climate have been assessed in respect of the proposed site layout.



- 1.5 The potential impacts from construction noise have been assessed using the method detailed in BS5228-2009 *"Code of practice for noise and vibration control on construction and open sites – Part 1: Noise"*.
- 1.6 Where necessary, mitigation measures have been suggested to help reduce internal and external noise levels to below guidance levels.

Site Description

- 1.7 The Site is located at East Bourne Road, Willingdon, BN26 5BE (Grid ref: 558459E , 104149N), approximately 1.6km north of central Willingdon. The site lies to the north east of the A2270 Eastbourne Road, between existing residential dwellings to the north and open agricultural land to the east. On the south west side of Eastbourne Road are existing residential dwellings.
- 1.8 At the time of undertaking this assessment the development area is comprised of a vacant dwelling and with a derelict field that was previously used as university playing fields with associated ancillary services. Refer to Figure 1.1 for the site location.

The Nature, Measurement and Effect of Noise

- 1.9 Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to measure the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.
- 1.10 The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB(A), has been shown to correlate closely to the subjective human response.
- 1.11 When related to changes in noise, a change of ten decibels from, for example, 60 dB(A) to 70 dB(A) would represent a doubling in 'loudness'. Similarly, a decrease in noise from 70 dB(A) to 60 dB(A) would represent a halving in 'loudness'. A change of 3 dB(A) is generally considered to be just perceptible.

Table 1.1 details typical noise levels.



Table 1.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In a car
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain



2.0 LEGISLATION AND POLICY

- 2.1 It is important to consider the relevant legislation, policy and associated guidance in relation to noise effects on a proposed development. Following the revocation of Planning Policy Guidance Note 24 'Planning and Noise' (PPG24), the National Planning Policy Framework (NPPF), British and International Standards and local authority guidance have become the relevant national guidance with regard to noise and new residential developments.

National Planning Policy Framework (NPPF)

- 2.2 The revised National Planning Policy Framework (NPPF, February 2019) supersedes the 2012 and 2018 versions of the NPPF. The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The environmental role is to contribute to protecting and enhancing our natural, built and historic environment; and as part of this, make effective use of land, help to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate to adapt to climate change including moving to a low carbon economy.
- 2.3 One of the core planning principles is to contribute to conserving and enhancing the natural environment. Allocations of land for development should prefer land of lesser environmental or amenity value, where consistent with other policies in the Framework (Paragraph 171). The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability (Paragraph 170).
- 2.4 Paragraph 180 of the NPPF states:
- "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:
- a) *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 (see Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food and Rural Affairs, 2010));

- b) *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

2.5 Additionally, Paragraph 182 states:

"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."

Planning Practice Guidance (PPG-N)

2.6 The Planning Practice Guidance for Noise (PPG-N), provides advice on how to determine the noise impact on development:

"Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

whether or not a significant adverse effect is occurring or likely to occur;

whether or not an adverse effect is occurring or likely to occur; and

whether or not a good standard of amenity can be achieved.

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever 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. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy." (Paragraph 003).

2.7 The document goes on to provide a definition for the levels of noise exposure at which an effect may occur:



“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 and quality of life can be detected.” (Paragraph 005).

2.8 A fourth effect level is also introduced:

Unacceptable Adverse Effect: Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise lead to psychological stress or physical effects.

2.9 It is important to understand that as the PPG-N does not specifically provide any advice with respect to noise levels/limits for different sources of noise, it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment and the PPG-N signposts a number of appropriate guidance documents.

Noise Policy Statement for England (NPSE)

2.10 The National Policy Statement for England (NPSE) aims to “through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

avoid significant adverse impacts on health and quality of life;
mitigate and minimise adverse impacts on health and quality of life;
and
where possible, contribute to the improvement of health and quality of life” (Paragraph 1.8).

ProPG: Planning & Noise

2.11 The Professional Practice Guidance on Planning and Noise (ProPG) has been produced by the Institute of Acoustics (IOA), the Association of Noise Consultants (ANC), and the Chartered Institute of Environmental Health (CIEH) to provide practitioners with guidance on the management of noise within the planning system in England.



2.12 Amongst other things, ProPG aims to:

*“Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
encourages the process of good acoustic design in and around new residential developments;
outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
promote appropriate noise exposure standards;
And assist the delivery of sustainable development.” (Paragraph 1.6)*

- 2.13 The Guidance provides recommended approaches for new residential developments and offers recommendations to the decision maker. For example, ProPG recommends that maximum internal noise levels should not normally exceed 45 dB $L_{A_{MAX,F}}$ more than 10 times per night.

Calculation of Road Traffic Noise 1988 (CRTN)

- 2.14 It is common practice in the UK to assess the impacts of road traffic noise in accordance with the method prescribed in The Department for Transport document ‘Calculation of Road Traffic Noise 1988 (CRTN)’. Paragraph 1 of the introduction states that:

“These procedures are necessary to enable the entitlement under the Noise Insulation Regulations to be determined but they also provide guidance appropriate to the calculation of traffic noise for more general applications e.g. environmental appraisal of road schemes, highway design and land use planning”

- 2.15 Section II and Section III of CRTN outline the procedures to be followed when calculating the prediction method for future road traffic noise.
- 2.16 All noise levels are expressed in the terms of the index $L_{10,(T)}$ dB(A) where L_{10} is the noise level exceeded for 10% of the time period (T) expressed in decibels with an A weighting, which broadly agree with the range of human hearing.
- 2.17 The shortened measurement method comprises “measurement of L_{10} over any three consecutive hours between 1000 and 1700. Using L_{10} (3 hour) as the arithmetic mean of the three consecutive values of hourly L_{10} , the current value of L_{10} (18 hour) can be calculated using the formula:



$$L_{10,18 \text{ hour}} = L_{10,3 \text{ hour}} - 1 \text{ dB}$$

BS 8233:2014 and WHO Guidelines

- 2.18 Guidance on absolute limits for noise inside buildings is provided in BS 8233:2014 “Sound insulation and noise reduction for buildings – Code of practice”. Similar guidance can also be found in the current World Health Organisation (WHO) “Guidelines on Community Noise” and “Night Noise Guidelines for Europe” and the BRE / CIRIA document “Sound control for homes”. A summary of the noise criteria can be seen in **Table 2.1**.

Table 2.1: Summary of Internal Noise Criteria: BS 8233 & WHO

Criterion	Activity	Location	0700 to 2300	2300 to 0700
BS 8233:2014	Resting	Living room	35 dB $L_{Aeq,16hr}$	-
	Dining	Dining room / area	40 dB $L_{Aeq,16hr}$	-
	Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$
WHO Onset of sleep disturbance		Bedroom		30 dB $L_{Aeq,8hr}$

- 2.19 NOTE 4 of Section 7.7.2 in BS 8233:2014 states: 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 $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values.
- 2.20 Guidelines for external noise levels in public and private open space, such as gardens and parks, is available in the WHO guidelines. According to the WHO guidelines, during the daytime ($L_{eq,16hr}$), moderate annoyance may be experienced at noise levels between 50 dB(A) and 55 dB(A) and serious annoyance may be experienced above 55 dB(A).
- 2.21 During the night-time ($L_{eq,8hr}$), an interim target (IT) level of 55 dB(A) is recommended (from WHO Night Noise Guidelines for Europe – 2009). The 55 dB(A) is the lowest observed adverse effect level (LOAEL).
- 2.22 However, it should be noted that the WHO Guidelines for Community Noise – 1999 recommend an external night-time noise level of 45 dB(A) ($L_{eq,8hr}$) in relation to the reduction in noise level through an open window to achieve an internal noise level in bedrooms of 30 dB.



- 2.23 With regard to the prediction of noise levels from road traffic noise, the $L_{10,18hr}$ can be converted to $L_{Aeq,16hr}$ by subtracting 2 dB from the $L_{A10,18hr}$ (BS 8233 paragraph 6.2.2)

$$L_{Aeq,16hr} = L_{A10,18hr} - 2 \text{ dB.}$$

- 2.24 The night-time noise level, $L_{Aeq,8hr}$, can be calculated from $L_{A10,18hr}$ using the conversion formula in the TRL document “*Converting the UK traffic noise index $L_{A10,18hr}$ to EU noise indices for noise mapping*”.

BS 5228-1: 2009+A1: 2014

- 2.25 Within BS 5228 “*Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*” a method for predicting noise from construction activity is provided. It is the accepted Standard employed for the assessment of noise and vibration from construction sites.

- 2.26 The Standard also provides a framework for good working practice and guidance on methods of mitigating noise by employing a number of different techniques.

- 2.27 Annex E of BS 5228 outline three approaches to the assessment of significance of noise effects which are:

- i) Significance based on fixed noise limits. Noise levels should not exceed 70 dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise, or 75 dB(A) in urban areas near main roads in heavy industrial areas;
- ii) Significance based on noise change – method 1. Noise levels should not exceed thresholds determined from existing ambient noise levels using the “ABC Method”:

A - 65 dB (daytime) when ambient noise levels (when rounded to the nearest 5 dB) are less than this value,

B - 70 dB (daytime) when ambient noise levels (when rounded to the nearest 5 dB) are the same as the category A value,

C - 75 dB (daytime) when ambient noise levels (when rounded to the nearest 5 dB) are higher than the category A value.



- iii) Significance based on noise change – method 2. Construction noise levels are deemed to be significant if the total noise (ambient + construction) exceeds the pre-construction ambient noise level by 5 dB or more, subject to the lower cut-off value of 65 dB (daytime).

Design Manual for Roads and Bridges (DMRB)

Magnitude of Impacts

- 2.28 Whilst, DMRB is principally used for the assessment of the environmental impacts of roads it provides a useful method for considering the noise impacts of traffic generation onto the existing highway network from new development. DMRB includes a semantic scale for the classification of the magnitude of noise impacts following the completion of a consented development. This is a useful tool for assessing noise impacts. The scale is shown in **Table 2.2**.

Table 2.2: Classification of Magnitude of Noise Impacts in the Short Term

Noise change, $L_{A10,18\text{hour}}$	Magnitude of Impact
0.0	No change
0.1 – 0.9	Negligible
1.0 – 2.9	Minor
3.0 – 4.9	Moderate
5.0+	Major

- 2.29 The changes in noise level and the magnitude of impact presented in Table 2.2 are used to assess the daytime period. At the time of writing this report, DMRB recommends using the 'classification of magnitude of noise impacts in the long term' for the assessment of night time noise levels. The 'long term' scale is shown in **Table 2.3**.



Table 2.3: Classification of Magnitude of Noise Impacts in the Long Term

Noise change, $L_{A10,18\text{hour}}$	Magnitude of Impact
0	No change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

- 2.30 Also recommended in DMRB is the assessment of night time noise levels at sensitive receptors with an $L_{\text{night,outside}}$ exceeding 55 dB (until further research is available). The $L_{\text{night,outside}}$ 55 dB corresponds to the Interim Target level specified in the WHO Night Noise Guidelines for Europe.

Significance of Effects

- 2.31 Once the magnitude of impact is determined, the next step is to assess the significance of the effect. A commonly used method for the definition of the sensitivity of receptors is reproduced in **Table 2.4**.



Table 2.4: Criteria Used to Define Noise Sensitive Receptors (Watts, 1984*)

Sensitivity	Description	Examples of receptor use
High	Receptors where people or operations are particularly susceptible to noise	- Residential, - Quiet outdoor areas used for recreation, - Conference facilities, - Auditoria/studios, - Schools in the daytime, - Hospitals/residential care homes, - Religious institutions, e.g. churches, mosques.
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	- Offices, - Restaurants, - Sports grounds when spectator noise is not a normal part of the event and where quiet conditions are necessary, e.g. tennis, golf.
Low	Receptors where distraction or disturbance from noise is minimal	- Residences and other buildings not occupied during working hours, - Factories and working environments with existing high noise levels, - Sports grounds when spectator noise is a normal part of the event.

2.32 Based on the advice provided in HA 205/08 (DMRB) a matrix of 'overall level of significance' has been produced using the magnitude of change (Table 2.2 and Table 2.3), the sensitivity of the receptor (Table 2.4) and the significance of the effect and is presented in **Table 2.5**.

Table 2.5: Significance of Noise Effects

Magnitude of Impact	Sensitivity of receptor/resource		
	<i>Low</i>	<i>Medium</i>	<i>High</i>
Major	Slight/moderate	Moderate/large	Large/very large
Moderate	Slight	Moderate	Moderate/large
Minor	Neutral/slight	Slight	Slight
Negligible	Neutral/slight	Neutral/slight	Slight
No Change	Neutral	Neutral	Neutral

2.33 The cells within Table 2.5 shaded grey are considered to be significant effects and mitigation may be required. The remainder of the cells in Table 2.5 are an indication of the significance of effects below the significance threshold.

* Watts, G R, (1984) *Vibration nuisance from road traffic – results of a 50 site survey*, TRL Research Report 1119, Transport Research Laboratory, Department of Transport, Crowthorne.



Wealden District Council

Wealden District Council Local Plan

- 2.34 Wealden District Council's (WDC) current statutory development plan consist of the adopted Wealden District Core Strategy Local Plan (February, 2013), the 'saved' policies of the adopted Wealden Local Plan (1998) and the Affordable Housing Delivery Local Plan (May, 2016). At the time of writing this report, the Council is preparing a new local plan for the Wealden District and is in the first stage of the consultation process.

Wealden Local Plan (1998) 'saved' Policy EN27

- 2.35 *"EN27 Proposals for development will be permitted when the following layout and design criteria are met:-*

(2) the proposed development should not create an unacceptable adverse impact on the privacy and amenities of adjoining developments and the neighbourhood by reason of scale, height, form, noise and traffic movements;"

Target Noise Levels

Constraints on the Proposed Development

- 2.36 In line with the guidance documents outlined above, the target noise levels for the proposed development are as follows:

External noise levels within gardens and public spaces be within or below the range 50 dB to 55 dB $L_{Aeq,16hr}$;

Internal noise levels within habitable rooms (living rooms and bedrooms) should not exceed 35 dB $L_{Aeq,16hr}$ during the daytime and 30 dB $L_{Aeq,8hr}$ during the night-time;

- 2.37 Internal noise levels within bedroom should also not normally exceed 45 dB L_{AFmax} more than ten times during the night-time.



3.0 METHODOLOGY

- 3.1 This section describes the approach to assessing the noise constraints and potential construction impacts in respect of the proposed development. From on-site observations, it is evident that road traffic noise from the A2270 Eastbourne Road and the wider highway network is the dominant noise source. Therefore, the baseline conditions at local sensitive receptors and within the Site have been determined through modelling of road traffic using the computer modelling program SoundPLAN. The road traffic data has been provided by the Transport Consultants.

Noise surveys have previously been undertaken to establish the existing noise environment of the Site as part of the previous Mornings Mill Farm planning application (WD/2017/1942/MEA). Due to the on-going Covid-19 pandemic and resulting changes in road traffic flows and therefore reduced noise from the lower number of vehicles, the results from these surveys will be used to verify the noise modelling for the Site.

- 3.2 The basic outline methodology employed is detailed below:

- Utilise recorded sound levels to verify the SoundPLAN noise model and establish the noise profile of the site;
- Determine the constraints on proposed sensitive receptors with respect to noise standards and objectives discussed previously;
- Determine the impacts from construction activities on local receptors using BS 5228;
- Determine the impacts on existing sensitive receptors from development generated traffic; and
- Where necessary, detail a noise mitigation strategy on a Plot by Plot basis.

4.0 EXISTING NOISE PROFILE

Noise Measurement Survey

- 4.1 For the Morning Mills planning application (WD/2017/1942/MEA), an environmental noise assessment was undertaken by Idom Merebrook Ltd an IDOM group company which included noise level monitoring within the proposed site. The noise survey was undertaken over the 9th and 10th of May 2017. Noise levels were recorded at eight locations and the closest locations to the Danescroft site are NM1 (west of the site), NM2 (adjacent to the A2270 and within the site) and NM4 (northeast corner of the site). Refer to Figure 4.1 for the Idom noise monitoring locations.

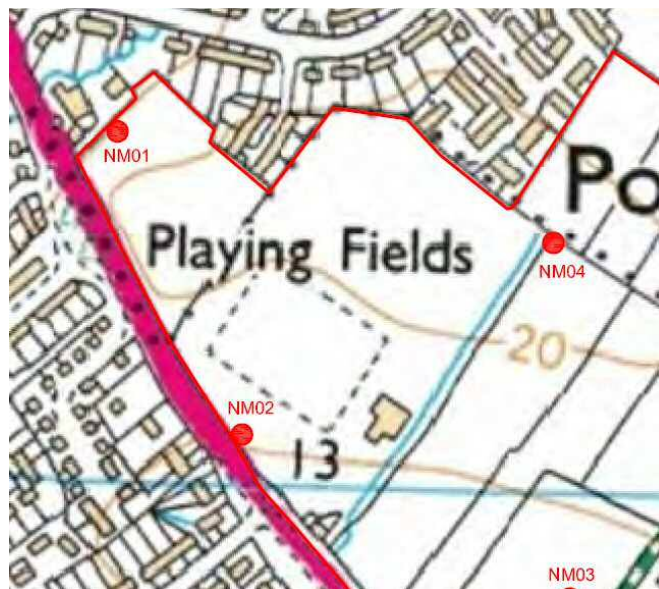


Figure 4.1: Idom Noise Monitoring Locations

- 4.2 At NM1 the average daytime noise level was recorded as 48 dB.
- 4.3 At NM2 the average daytime noise level was recorded as 62 dB.
- 4.4 At NM4 the average daytime noise level was recorded as 42 dB.
- 4.5 The maximum (L_{AFmax}) noise level recorded at NM2 was 74 dB which was attributed to typical noise levels of the traffic flow along the adjacent road network.
- 4.6 The noise levels recorded at NM2 have been used to verify the noise modelling.

Noise Modelling

- 4.7 The existing noise profile of the development site was determined through calculation of noise levels using the method detailed in CRTN. Daytime and



night time noise profiles have been calculated using road traffic data for the surrounding roads and modelled using SoundPLAN. The results are presented on **Figure 4.2** (daytime 0700 to 2300) and **Figure 4.3** (night time 2300 to 0700).

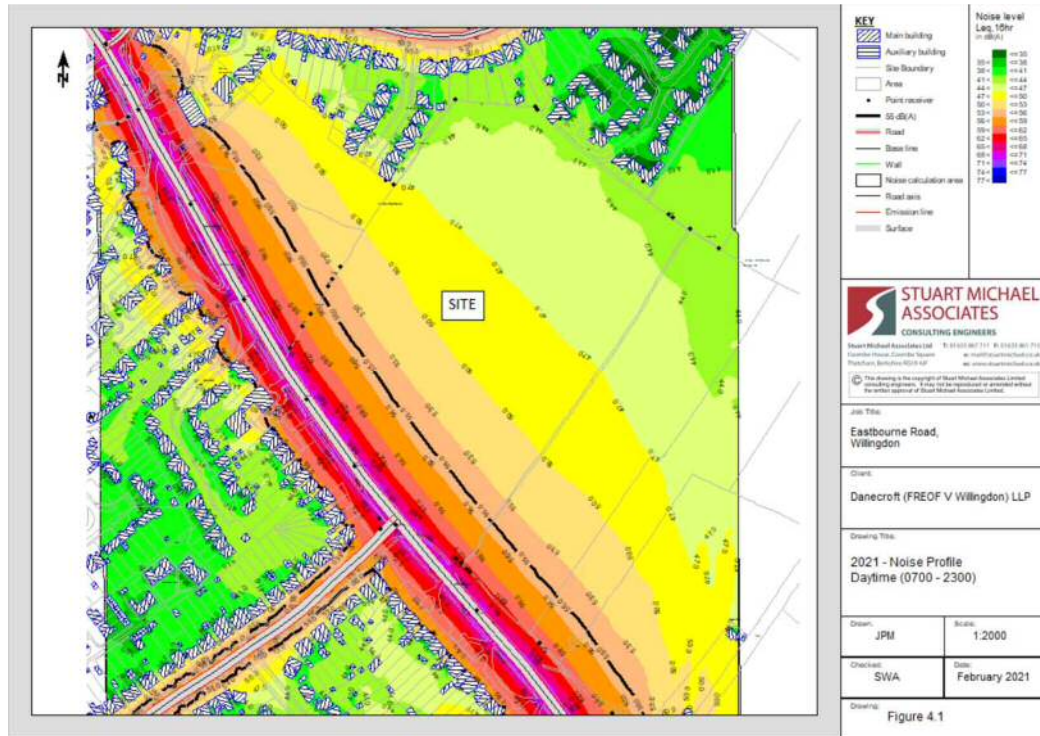


Figure 4.2: Daytime Noise Profile – 2021

4.8 With reference to Figure 4.2, it can be seen that during the daytime ($L_{Aeq,16hr}$), within the Proposed Development site there is a strip of land which is approximately 50m wide, adjacent to Eastbourne Road, which experiences noise levels above 55 dB. The remainder of the site is below 55 dB with the northern part of the site below 50 dB.



Figure 4.3: Night time Noise Profile – 2021

4.9 With reference to Figure 4.3, it can be seen that during the night time ($L_{Aeq,8hr}$) the northern half of the Proposed Development site experiences noise levels below 45 dB.



5.0 NOISE ASSESSMENT

- 5.1 From Figures 4.2 it can be seen that the site experiences daytime ($L_{Aeq,16hr}$) noise levels between 44 dB and 62 dB. Figure 4.3 it can be seen that the site is predicted to experience noise levels between 39 dB and 59 dB dB during night-time ($L_{Aeq,8hr}$). The maximum noise levels were recorded during the daytime as 74 dB at Idom noise monitoring location NM2.
- 5.2 Noise can enter a building, whether commercial or residential, through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path for noise. Section 8.4.5 and Table G.1 of BS 8233:2014 ("Windows") details the noise reduction and sound insulation properties of a window. Typically, a "6-12-6 insulated glass unit" provides a 33 dB reduction (e.g. a closed window).
- 5.3 As detailed in Table 2.1 of this report, BS 8233 recommends that internal daytime ($L_{eq,16hr}$) noise levels of 40 dB(A) and 35 dB(A) are design targets for dining rooms, and living rooms and bedrooms respectively. During the night-time ($L_{eq,8hr}$), internal noise levels in bedrooms should be 30 dB(A) and noise due to individual events ($L_{max,t}$) should not exceed the 45 dB(A) threshold. To achieve an internal noise level of 30 dB(A) with an open window, night-time façade noise levels must be no greater than 45 dB(A) ($45 - 15 = 30$ dB(A)).
- 5.4 The Buildings Research Establishment (BRE) and Construction Industry Research and Information Association (CIRIA) publication 'Sound Control for Homes' 1993 presents practical advice on the control within dwellings of noise from outside sources and noise transmitted within and between dwellings. Part B: Scheme Design – Planning to control external noise, amongst other things, gives advice on the potential noise reduction from low-rise dwellings acting as a barrier block between the noise source and noise sensitive areas.
- 5.5 The first paragraph on page 24 of BRE and CIRIA publication Sound Control for Homes states that "On an estate of low-rise dwellings, those closest to a noise source can give some protection to the remainder of the site". The order of reduction in noise levels behind these buildings can be in the order of 10 dB for the whole site, where the gaps between the dwellings do not exceed 30% of the site frontage.
- 5.6 Table 13 of the BRE and CIRIA publication Sound Control for Homes gives guidance on the 'design background noise levels arising from external sources'



and suggests that an internal noise level of <50 dB for less sensitive areas such as the kitchen, bathroom utility room, WC and internal and communal circulation areas is acceptable.

- 5.7 Section 8 of BS 8233:2014 "Sound insulation in a building" gives examples of how sound can be enclosed or obstructed by a solid barrier such as a fence between the noise source and receiver. Approximate attenuation levels of around 10 dB from a fence are common. All gardens within the proposed development site are expected to have boundary fences. A reduction of approximately 10 dB to those private amenity areas is possible.
- 5.8 The World Health Organisation (WHO): Guidelines for Community Noise report covers, amongst other things, recommended internal and external noise levels for residential dwellings. From "Table 6.1: Guideline values for community noise in specific environments", it can be seen that for outdoor living areas a guideline for serious and moderate annoyance for both daytime and evenings is 55 dB(A) and 50 dB(A) respectively.



6.0 EFFECTS OF THE PROPOSALS DURING CONSTRUCTION

Effect of Construction Noise on Nearby Sensitive Receptors

6.1 The magnitude of construction noise impacts can be predicted by considering noise emissions data for typical construction equipment based on the expected methods of construction for each phase of work on each worksite. The prediction method follows that recommended in BS 5228 Noise and Vibration Control on Construction and Open Sites, Part 1:2009.

6.2 The guidance contained in BS 5228 does not extend to provide criteria against which to assess construction noise. However, the Department of Environment (DoE) Advisory Leaflet (AL) 72 (1976) "Noise Control on Building Sites" gives advice on the maximum levels of construction site noise at residential locations during daytime hours based on levels associated with speech interference. This publication states that during daytime hours (07:00 to 19:00 hours) the L_{Aeq} noise level at the building façade should not exceed:

75 dB in urban areas, near main roads or in heavy industrial areas:

and

70 dB in rural, suburban and urban areas away from main road traffic and industrial noise.

6.3 During construction the potential impact from activities within the site has been assessed using the "Fixed" limit method described in BS 5228. At this stage, the timetable for construction and landscaping is not known. An approximation has been made as to what type of plant will be used for each phase. The closest existing residential properties are to the north of the site. The potential impacts have been assessed at distances of 15 metres to 100 metres from the noise source to the sensitive receptors.

6.4 At present, the exact program of works is not known. However, the following scope of works have been assessed:

Site preparation;

Groundwork;

Construction and highway works; and

Landscaping.

6.5 An assessment has been undertaken using generic construction machinery and operation at distances from 15 to 100 metres from the noise source. The



construction noise assessment is presented in **Appendix 2** and the results are summarised below.

6.6 Three “Sensitive Receptors” near to the site have been assessed:

R1: 32 Spurway Park (residential) which is to the north east of the Site;

R2: 5 Courtland Road (residential) which is north west of the Site;
and

R3: 211d Eastbourne Road (residential) which is south west of the Site.

6.7 The closest part of the proposed development site is approximately 15m from R1, 35m from R2 and 55m from R3. According to the BS 5228 ‘Fixed Method’, the daytime ($L_{Aeq,16hr}$) façade threshold of significance at the three receptors is 75 dB(A).

6.8 The results from the “Construction” noise calculations and the BS 5228 threshold of significance at the nearest location (worst-case scenario) for each receptor are summarised in **Table 6.1**.

Table 6.1: Construction noise levels at sensitive receptors (No Mitigation)

Receptor Location (distance from site in metres)	Existing Ambient dB(A)	Predicted Noise level, dB(A)				BS 5228 Threshold of Significance dB(A)
		<i>Site Prep.</i>	<i>Earthworks</i>	<i>Construction</i>	<i>Landscaping</i>	
R1 (15m)	45	74	75	80	64	75
R2 (35m)	50	69	73	73	64	75
R3 (55m)	63	67	69	69	61	75

6.9 Noise from some construction activities will be audible at the nearest sensitive receptor location and the calculations indicate that construction noise impacts may be significant for a short period of time. However, if Best Practical Means (BPM) is implemented then noise impacts can be minimised.

6.10 It should be noted that construction activities are temporary, although they do present direct effects on local receptors. From the above table it can be seen that the impacts are predicted to be minor adverse at 15m during the earthworks and construction phase, negligible adverse at 35m and 55m for all phases.



- 6.11 A list of common mitigation strategies and how BPM can be implemented is given in Section 7. It should be noted that construction impacts are temporary and people are generally more tolerant of higher noise levels if they know they are only going to be of a temporary duration.



7.0 EFFECTS OF THE PROPOSALS POST-CONSTRUCTION

Introduction

- 7.1 In order to consider the effects of the proposals during the operational phase it is necessary to split the assessment into constraints and impacts. As mentioned previously constraints deal with the effect of the existing environment on the development and impacts deal with the effect of the development on the existing environment.
- 7.2 The internal noise levels of the proposed residential development have been assessed by using calculated façade noise levels with the mitigation from both a closed window and also an open window in the façade. The resultant internal noise levels have been assessed against British Standards and WHO guidelines.
- 7.3 External noise levels in the amenity areas have been calculated including the mitigation provided by the proposed residential buildings. The resultant external noise levels have also been assessed against British Standards and WHO guidelines.

Constraints

- 7.4 The constraints of the proposal post-construction on sensitive receptors within the development have been examined. The constraints are assessed at sensitive receptors at the approximate location of proposed dwellings within the development site.
- 7.5 The SoundPLAN model has been used to predict the daytime and night time noise levels with the development in place. From the results, noise levels across the site are determined and assessed against current guidelines and British Standards. The noise levels for road traffic are adjusted from an $L_{A10,18hr}$ to $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ using the conversion formula in the TRL document *“Converting the UK traffic noise index $L_{A10, 18hr}$ to EU noise indices for noise mapping”*.
- 7.6 A “Site Layout” (Appendix 1) as submitted with the planning application has been used to establish the approximate location of the proposed buildings and the daytime and night time noise profiles of the development area are provided on **Figure 7.1** and **Figure 7.2** respectively. As with Figure 4.2 and Figure 4.3 the contour plots are displayed as 3 dB coloured bands with a key in the top right-hand corner.

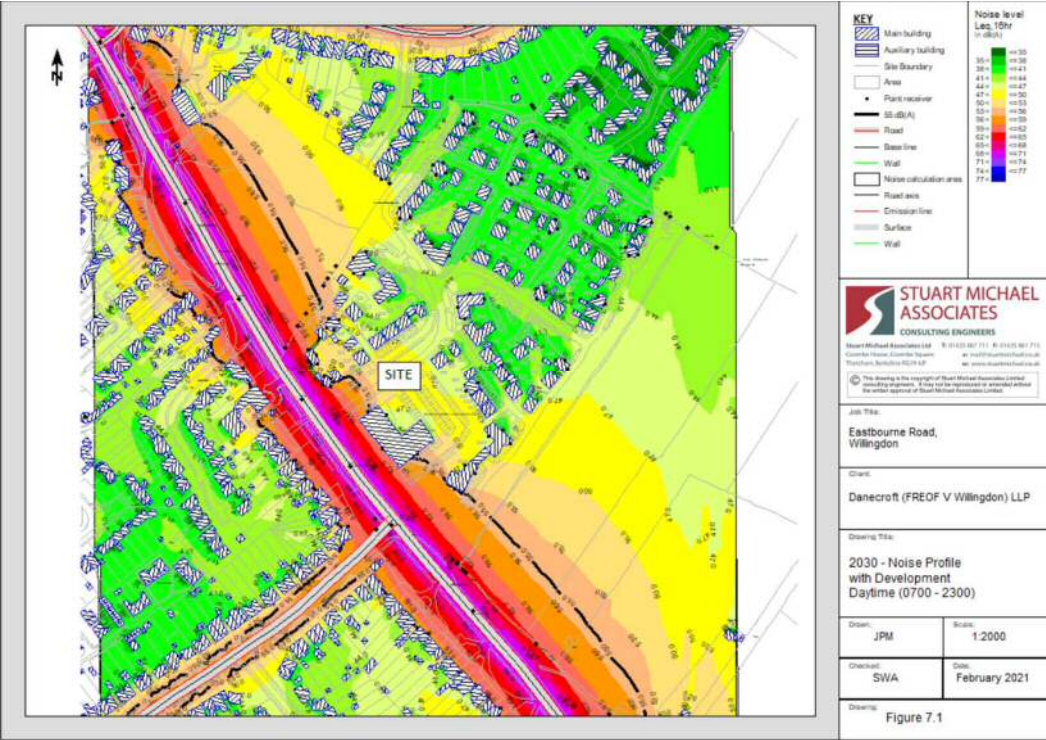


Figure 7.1: Daytime Noise Profile + Development



Figure 7.2: Night time Noise Profile + Development

7.7 This section of the report has been split into two sections. The first section addresses the predicted façade noise levels at the proposed dwellings and the

second section addresses the predicted free field noise levels with the proposed buildings in place.

Façade Noise Levels

7.8 Representative selections of façades at the approximate locations of the proposed dwellings which are illustrated on the “Site Layout” (Appendix 1) have been modelled within SoundPLAN. The Proposed Development receptors and Plot numbers are presented in **Figure 7.3** and the results of the modelling are presented in **Appendix 3**.

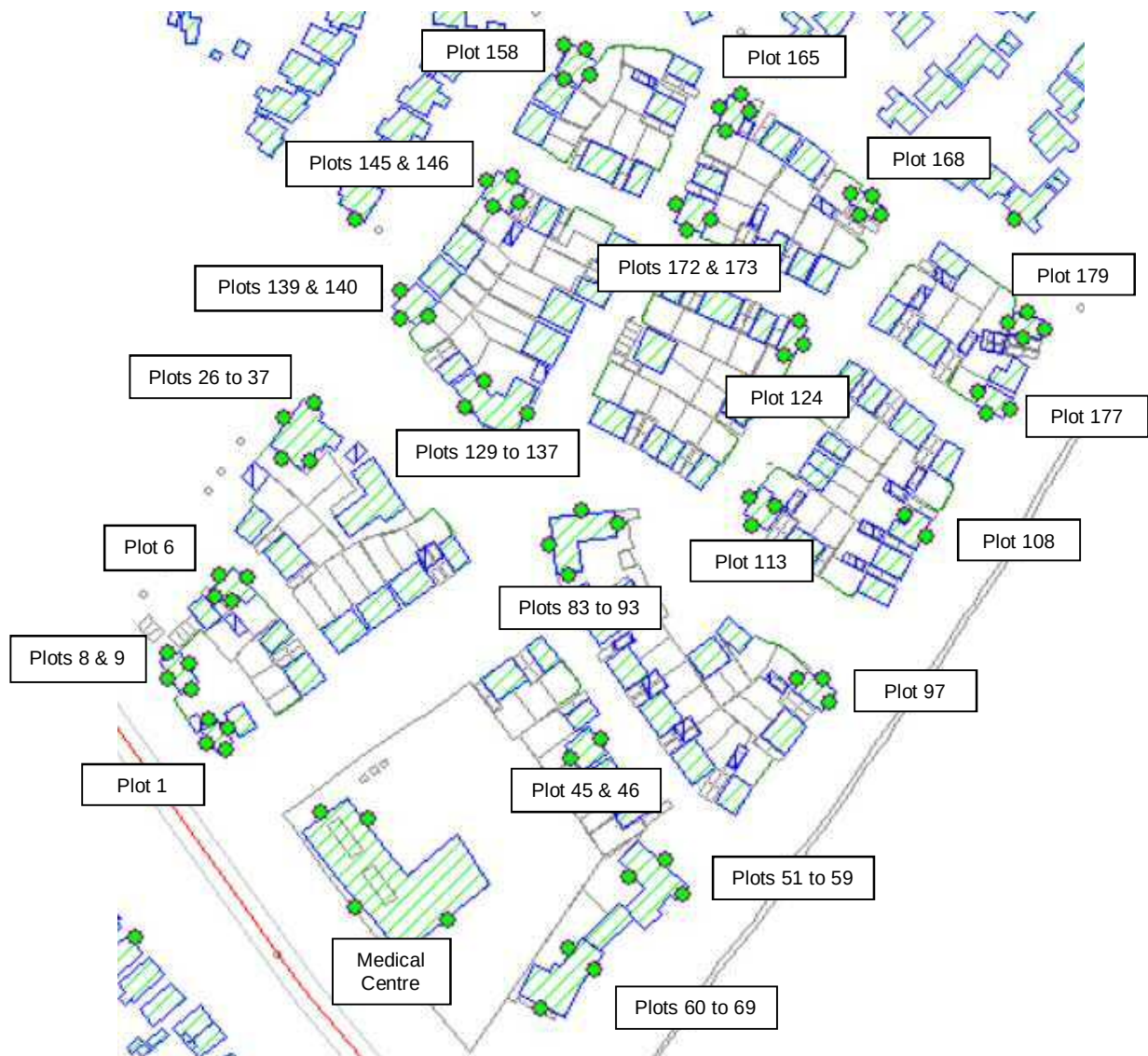


Figure 7.3: Proposed Development Receptors

7.9 Predicted façade noise levels at the Southern Boundary of the site are presented in Table 7.1.



- 7.10 Predicted façade noise levels at Plots 6 and 26 to 37 on the **Western Boundary** of the site are presented in **Table 7.2**.
- 7.11 Predicted façade noise levels at Plots 139 & 140 and 145 & 146 on the **Western Boundary** of the site are presented in **Table 7.3**.
- 7.12 Predicted façade noise levels at the Northern Boundary of the site are presented in Table 7.4.
- 7.13 Predicted façade noise levels at the Eastern Boundary of the site are presented in façade noise levels on the Northern boundary are predicted to be between 36 dB and 43 dB at ground floor level and 39 dB to 45 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 32 dB and 38 dB at first floor level.



- 7.14 Table 7.5.
- 7.15 Predicted façade noise levels at the South Eastern Boundary of the site are presented in Table 7.6.
- 7.16 Predicted façade noise levels **within** the Proposed Development are presented in **Table 7.7**.
- 7.17 Predicted façade noise levels at the location of the **Health Centre** within the Proposed Development are presented in **Table 7.8**.



Table 7.1: Façade noise levels on the Southern Boundary

Receptor Location	Southern Boundary			
	Floor Level and Façade Direction		Daytime L _{eq,16hr} dB(A)	Night Time L _{eq, 8hr} dB(A)
1	GF	NW	51	43
1	F 1	NW	58	51
1	GF	NE	52	45
1	F 1	NE	54	47
1	GF	SW	65	57
1	F 1	SW	67	59
1	GF	SE	62	54
1	F 1	SE	64	56
8 & 9	GF	SE	54	46
8 & 9	F 1	SE	61	53
8 & 9	GF	NE	50	43
8 & 9	F 1	NE	55	47
8 & 9	GF	SW	64	56
8 & 9	F 1	SW	67	58
8 & 9	GF	NW	61	53
8 & 9	F 1	NW	63	55
GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east				

7.18 From Table 7.1 it can be seen that façade noise levels fronting Eastbourne Road are predicted to be between 50 dB and 65 dB at ground floor level and 54 dB to 67 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 47 dB and 54 dB at first floor level.



Table 7.2: Façade noise levels for Plots 6 and 26 to 37 on the Western Boundary

Receptor Location	Plots 6 and 26 to 37 on the Western boundary			
	Floor Level and Façade Direction		Daytime L _{eq,16hr} dB(A)	Night Time L _{eq, 8hr} dB(A)
6	GF	NE	49	42
6	F 1	NE	51	44
6	GF	NW	56	49
6	F 1	NW	59	51
6	GF	SW	54	46
6	F 1	SW	56	48
6	GF	SE	45	38
6	F 1	SE	49	42
26 to 37	GF	NW	52	45
26 to 37	F 1	NW	55	47
26 to 37	GF	NE	45	38
26 to 37	F 1	NE	47	40
26 to 37	GF	SE	43	36
26 to 37	F 1	SE	45	38
26 to 37	GF	SW	51	44
26 to 37	F 1	SW	54	47

GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east

7.19 From Table 7.2 it can be seen that façade noise levels at Plots 6 and 26 to 37 on the Western boundary are predicted to be between 43 dB and 56 dB at ground floor level and 45 dB to 59 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 38 dB and 51 dB at first floor level.



Table 7.3: Façade noise levels for Plots 139 & 140 and 145 & 146 on the Western Boundary

Receptor Location	Plots 139 & 140 and 145 & 146 on the Western Boundary			
	Floor Level and Façade Direction		Daytime L _{eq,16hr} dB(A)	Night Time L _{eq, 8hr} dB(A)
139 & 140	GF	SW	49	42
139 & 140	F 1	SW	51	44
139 & 140	GF	SE	42	35
139 & 140	F 1	SE	43	36
139 & 140	GF	NW	49	42
139 & 140	F 1	NW	51	44
145 & 146	GF	SE	40	34
145 & 146	F 1	SE	42	35
145 & 146	GF	SW	45	38
145 & 146	F 1	SW	47	40
145 & 146	GF	NE	38	32
145 & 146	F 1	NE	41	34
145 & 146	GF	NW	45	38
145 & 146	F 1	NW	47	40

GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east

7.20 From Table 7.3 it can be seen that façade noise levels at Plots 139 & 140 and 145 & 146 on the Western boundary are predicted to be between 38 dB and 49 dB at ground floor level and 41 dB to 51 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 34 dB and 44 dB at first floor level.



Table 7.4: Façade noise levels at the Northern Boundary of the Site

Receptor Location	Northern Boundary of the Site		
	Floor Level and Façade Direction	Daytime L _{eq,16hr} dB(A)	Night Time L _{eq, 8hr} dB(A)
158	GF SW	38	31
158	F 1 SW	40	34
158	GF SE	39	32
158	F 1 SE	41	34
158	GF NW	43	36
158	F 1 NW	45	38
158	GF NE	38	31
158	F 1 NE	41	34
168	GF SW	42	35
168	F 1 SW	44	37
168	GF NW	41	34
168	F 1 NW	43	36
168	GF SE	39	32
168	F 1 SE	41	34
168	GF NE	36	30
168	F 1 NE	39	32

GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east

7.21 From Table 7.4 it can be seen that façade noise levels on the Northern boundary are predicted to be between 36 dB and 43 dB at ground floor level and 39 dB to 45 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 32 dB and 38 dB at first floor level.



Table 7.5: Façade noise levels at the Eastern Boundary of the Site

Receptor Location	Eastern Boundary of the Site		
	Floor Level and Façade Direction	Daytime L _{eq,16hr} dB(A)	Night Time L _{eq, 8hr} dB(A)
108	GF NW	40	33
108	F 1 NW	42	35
108	GF SE	45	38
108	F 1 SE	48	41
177	GF SE	44	37
177	F 1 SE	46	39
177	GF SW	45	38
177	F 1 SW	47	40
177	GF NW	41	34
177	F 1 NW	43	36
179	GF N	39	32
179	F 1 N	41	34
179	GF E	43	36
179	F 1 E	45	38
179	GF W	41	34
179	F 1 W	43	36
179	GF S	39	32
179	F 1 S	41	35

GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east

7.22 From façade noise levels on the Northern boundary are predicted to be between 36 dB and 43 dB at ground floor level and 39 dB to 45 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 32 dB and 38 dB at first floor level.



7.23 Table 7.5 it can be seen that façade noise levels on the Eastern boundary are predicted to be between 39 dB and 45 dB at ground floor level and 40 dB to 48 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 33 dB and 41 dB at first floor level.



Table 7.6: Façade noise levels at the South Eastern Boundary of the Site

Receptor Location	South Eastern Boundary of the Site		
	Floor Level and Façade Direction	Daytime L _{eq,16hr} dB(A)	Night Time L _{eq, 8hr} dB(A)
51 to 59	GF SE	51	44
51 to 59	F 1 SE	53	46
51 to 59	GF SW	49	41
51 to 59	F 1 SW	51	43
51 to 59	GF NE	39	32
51 to 59	F 1 NE	41	35
60 to 69	GF NW	50	42
60 to 69	F 1 NW	52	44
60 to 69	GF SE	53	45
60 to 69	F 1 SE	55	47
60 to 69	GF SW	58	50
60 to 69	F 1 SW	60	52
97	GF NW	42	35
97	F 1 NW	44	37
97	GF SE	47	40
97	F 1 SE	50	42
97	GF NE	39	32
97	F 1 NE	41	34

GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east

7.24 From Table 7.6 it can be seen that façade noise levels on the South Eastern boundary are predicted to be between 39 dB and 58 dB at ground floor level and 41 dB to 60 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 34 dB and 52 dB at first floor level

Table 7.7: Façade noise levels within the Proposed Development

Floor Level	Within the Proposed Development Site		
	Minimum and Maximum	Daytime L _{eq,16hr} dB(A)	Night Time L _{eq, 8hr} dB(A)
GF	MIN	36	
	MAX	39	32
F 1	MIN	49	
	MAX	50	43

GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east

7.25 From Table 7.7 it can be seen that façade noise levels within the Site are predicted to be between 36 dB and 49 dB at ground floor level and 39 dB to 50 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 32 dB and 43 dB at first floor level.



Table 7.8: Façade noise levels at the location of the Health Centre within the Proposed Development

Receptor Location	Health Centre			
	Floor Level and Façade Direction		Daytime L _{eq,16hr} dB(A)	Night Time L _{eq, 8hr} dB(A)
Medical Centre	GF	SW	63	55
Medical Centre	F 1	SW	65	57
Medical Centre	GF	NW	57	50
Medical Centre	F 1	NW	60	52
Medical Centre	GF	SE	56	49
Medical Centre	F 1	SE	59	51
Medical Centre	GF	NE	45	38
Medical Centre	F 1	NE	49	42
GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east				

- 7.26 From Table 7.8 it can be seen that façade noise levels at the location of the Health Centre within the Site are predicted to be between 45 dB and 63 dB at ground floor level and 49 dB to 65 dB at first floor level during the daytime. During the night time, façade noise levels are predicted to be between 42 dB and 57 dB at first floor level.

Free Field Noise Levels

From Figure 4.1 it can be seen that existing daytime noise levels within the development site range from 62 dB on the Southern Boundary to below 50 dB in the Northern Area.

The WHO guidance recommends free field noise levels in gardens and public open space should not be above 55 dB(A) during the daytime to limit the potential for serious annoyance. The positioning of buildings within the site between the noise source (Eastbourne Road) and private/public open space help reduce noise levels within these areas.

- 7.27 With the proposed buildings in place, free field noise levels in the gardens will be reduced. From Figure 7.1 it can be seen that all the private gardens of the proposed buildings will benefit from an area within the garden where noise levels are less than 55 dB during the daytime. It can also be seen that the majority of private gardens will have an area which is predicted to experience daytime noise levels below 50 dB.



Impacts – Operation (development generated traffic)

The effects of the development on the existing environment are considered in terms of modelled traffic data using SoundPLAN which incorporates the CRTN method. In line with the Transport Assessment, additional development generated traffic has been added to the local highway network road traffic and the impacts from the change has been assessed.

- 7.28 Façade noise levels have been predicted at existing sensitive receptors as a result of additional traffic movements that will be generated by the proposed Development. The traffic flow data has been used to calculate the future scenario “Future” (Do Nothing) for 2030 and the future scenario “Future + Proposed Development” (Do Something) scenario for 2030 at representative existing receptor locations. The receptor locations are identified on **Figure 7.4** and the results from the calculations are presented in **Table 7.9**.

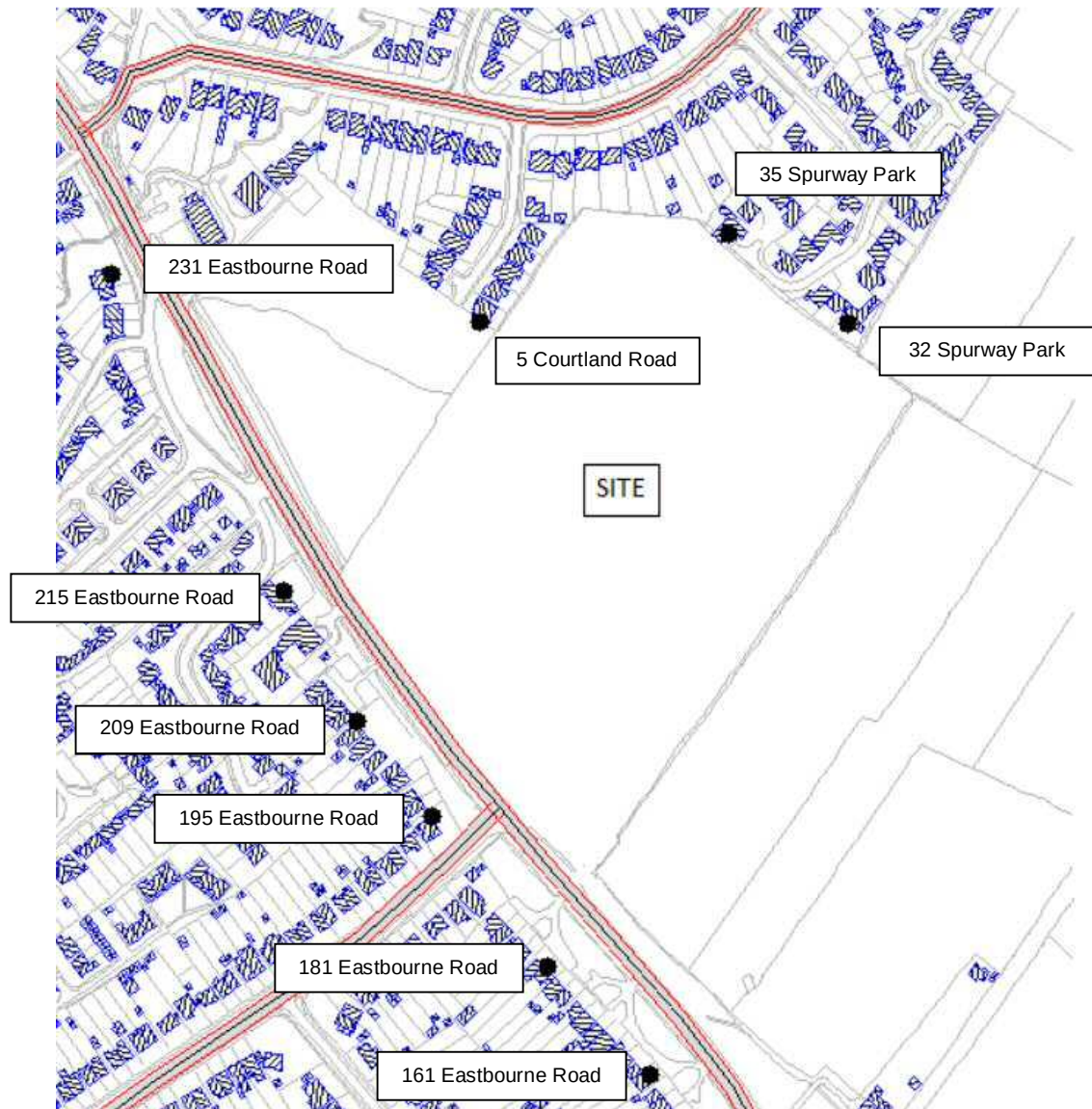


Figure 7.4: Existing Sensitive Receptors



Table 7.9: Predicted Change in Road Traffic Noise levels (2030)

Receptor Location	'Do Nothing' (2025 Baseline)		'Do Something' (2025 Baseline + Proposed Development)		Change in Road Traffic Noise Level (DS – DN)	
	Daytime $L_{Aeq,16hr}$ dB	Night Time $L_{Aeq,8hr}$ dB	Daytime $L_{Aeq,16hr}$ dB	Night Time $L_{Aeq,8hr}$ dB	Daytime $L_{Aeq,16hr}$ dB	Night Time $L_{Aeq,8hr}$ dB
North of the Proposed Development Site						
5 Courtland Road	GF	SW	51	44	50	42
5 Courtland Road	F 1	SW	53	46	52	44
32 Spurway Park	GF	SW	46	39	42	35
32 Spurway Park	F 1	SW	48	41	43	37
35 Spurway Park	GF	SE	45	38	38	32
35 Spurway Park	F 1	SE	47	40	41	34
South of the Proposed Development Site						
161 Eastbourne Road	GF	NE	62	54	62	54
161 Eastbourne Road	F 1	NE	64	56	64	56
181 Eastbourne Road	GF	NE	61	53	61	53
181 Eastbourne Road	F 1	NE	63	55	63	55
195 Eastbourne Road	GF	NE	62	54	62	54
195 Eastbourne Road	F 1	NE	64	56	64	56
209 Eastbourne Road	GF	NE	62	54	62	54
209 Eastbourne Road	F 1	NE	64	56	64	56
215 Eastbourne Road	GF	NE	64	56	64	56
215 Eastbourne Road	F 1	NE	66	57	66	58
231 Eastbourne Road	GF	E	64	56	64	56
231 Eastbourne Road	F 1	E	66	58	66	58

7.29 From Table 7.9 it can be seen that noise levels to the south of the Proposed Development are predicted to increase by less than 1 dB at all the sensitive receptors that would be affected by the additional development generated traffic. It should be noted that there is predicted to be betterment to the north of the site as a result of the proposed development.

Impact and Significance

7.30 To assess the impact, it is necessary to use the criteria outlined in Section 2. The impact from the development is determined by calculating the noise level difference between the 'Do Nothing' (without development) and 'Do Something' (with development) scenarios to identify the change in noise level at each receptor location. Outlined in **Table 7.10** is the impact assessment for the receptors outside the development for the 2030 road traffic scenarios.



Table 7.10: Impact Assessment for Development Generated Traffic

Receptor Location	Daytime		Night Time	
	Change in Noise Level, dB(A)	Magnitude of Impact	Change in Noise Level, dB(A)	Magnitude of Impact
<i>North of the Proposed Development Site</i>				
5 Courtland Road	-1.2	Minor	-1.1	Negligible
5 Courtland Road	-1.2	Minor	-1.2	Negligible
32 Spurway Park	-4.3	Moderate	-4.2	Minor
32 Spurway Park	-4.7	Moderate	-4.4	Minor
35 Spurway Park	-6.6	Major	-6.3	Moderate
35 Spurway Park	-6.4	Major	-6.1	Moderate
<i>South of the Proposed Development Site</i>				
161 Eastbourne Road	0.2	Negligible	0.1	Negligible
161 Eastbourne Road	0.2	Negligible	0.1	Negligible
181 Eastbourne Road	0.1	Negligible	0.1	Negligible
181 Eastbourne Road	0.1	Negligible	0.1	Negligible
195 Eastbourne Road	0.2	Negligible	0.2	Negligible
195 Eastbourne Road	0.2	Negligible	0.1	Negligible
209 Eastbourne Road	0.1	Negligible	0.1	Negligible
209 Eastbourne Road	0.1	Negligible	0.1	Negligible
215 Eastbourne Road	0.1	Negligible	0.1	Negligible
215 Eastbourne Road	0.2	Negligible	0.1	Negligible
231 Eastbourne Road	0.1	Negligible	0.1	Negligible
231 Eastbourne Road	0.1	Negligible	0.1	Negligible

- 7.31 As can be identified in Table 7.10, there is predicted to be a “Negligible” (0.1 to 0.2 dB) increase in noise levels at all the receptors south of the Proposed Development during the daytime and the night time.
- 7.32 It should be noted that there is predicted to be a “Minor”, “Moderate” and “Major” decrease in daytime noise levels and a “Negligible”, “Minor” and “Moderate” decrease in night time noise levels at receptors to the north of the Proposed Development.
- 7.33 All receptors are residential dwellings which considered “high” sensitivity to noise (refer to Table 2.4). The magnitude of impact to the south of the Proposed Development is predicted to be “Negligible”, therefore significance is considered “Slight Adverse” (refer to Table 2.5). The magnitude of impact to the north of the Proposed Development is predicted to be “Minor”, “Moderate” and “Major”, therefore significance is considered “Slight Beneficial”, “Moderate Beneficial” and “Large Beneficial”.



8.0 MITIGATION MEASURES

- 8.1 Proposed mitigation measures have been split into two sections. The first deals with the constraints on development and the second deals with potential construction noise impacts.

Constraints on Development

- 8.2 From Table 7.1 to Table 7.7, it can be seen that daytime façade noise levels within the site are predicted to be 65 dB or less at ground floor level and 67 dB or less at first floor level. Night time façade noise levels are predicted to be 59 dB or less at first floor level.
- 8.3 To comply with BS 8233:2014 and WHO guidelines internal noise levels of living rooms and bedrooms should not exceed 35 dB and internal noise levels of dining rooms should not exceed 40 dB during the daytime period. Internal noise levels of bedrooms should not exceed 30 dB during the night-time period.
- 8.4 Dwellings with façade noise levels greater than 50 dB during the daytime and above 45 dB during the night time will require a commensurate level of mitigation to adhere to daytime and night-time BS 8233:2014 guidelines for living rooms and bedrooms (35 dB $L_{Aeq,16hrs}$ and 30 dB $L_{Aeq,8hrs}$).
- 8.5 With reference to **Error! Reference source not found.** to Table 7.7, there are façades with habitable rooms with levels above 50 dB during the daytime and 45 dB during the night-time and therefore mitigation will be required. There are many ways for sound to enter a building. The routes are through the roof, the doors and the main route is through the windows. If the roof is built to current Building Regulations and is of sufficient mass it will provide an adequate barrier to the passage of sound. For example, tiles on felt, pitched roof with 100mm mineral wool on plasterboard ceiling have a weighted sound reduction of approximately 43 dB. Doors with adequate mass and minimal gaps between the door and door frame can provide sound reduction of approximately 35 dB when fitted to manufacturers' specification.
- 8.6 With regard to windows, thermal double-glazed units should be fitted in accordance with Building Regulations as a minimum standard. Units are normally of the configuration 6 – 12 – 6 (glass, air gap and glass) with a weighted sound reduction of approximately 33 dB. Presented in

8.7



8.8 **Table 8.1** are sound reduction values for window systems utilising various air gap and window thickness.

Table 8.1: Example Window Systems

Material	Configuration glass/air gap/glass (mm)	Total Thickness (mm)	Sound Reduction (dB)
Sealed Unit	4/12/4	20	27
Sealed Unit	6/12/6	24	33
Sealed Unit	4/12/12	28	36
Sealed Unit	6/12/10	28	37
Laminated glass	6/12/11	29	40
Laminated glass	10/12/16	38	42
Laminated glass	13/12/13	38	45
Sealed Unit	6/20/12	38	41

8.9 It should be noted that the sound reduction presented in

8.10 Table 8.1 does not consider the adjusted factor for road traffic noise (C , C_{tr}). Usually 1 to 2 dB is subtracted for highway road traffic > 80 kmph (C) and between 3 and 6 dB for urban road traffic (C_{tr})[†] depending on window configuration.

8.11 If the doors and windows are manufactured to a high standard and installed to the manufacturers' specification, the above sound reduction should be achieved.

8.12 **Table 8.2** details examples of windows systems and the expected internal noise level achieved when doors and windows are manufactured to a high standard and installed to the manufacturers' specification.

Table 8.2: Potential Transmission Loss and Resultant Internal Noise Levels

Façade Level (dB)	Window Attenuation (C_{tr}) (dB)	Internal Level (dB)
≤ 70	37 (35)	35
≤ 65	33 (31)	34
≤ 60	27 (25)	35

[†] BS EN ISO 717-1:1997, Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation, Annex A, Table A.1 – Relevant spectrum adaptation term for different types of noise source



- 8.13 Where façade noise is equal to or above 60 dB at first floor level during the daytime it is recommended that using a window with a sound reduction of 36 dB ($36 - 3 = 33$ dB).
- 8.14 Where façade noise is between 54 dB and 62 dB during the daytime it is recommended that using a window with a sound reduction of 33 dB ($33 - 3 = 30$ dB).
- 8.15 At all other façades it is proposed that using a standard thermal double-glazed unit with a sound reduction of 27 dB ($27 - 3 = 24$ dB).
- 8.16 With the windows and doors closed, the internal **night time** noise level of 30 dB ($59 - 33 = 26$ dB) will be achieved at all the proposed dwellings across the development site. Also achieved are internal **daytime** noise levels for living rooms of 35 dB ($65 - 33 = 32$ dB) and bedrooms (resting) ($67 - 33 = 34$ dB) as recommended in BS8233.
- 8.17 If any of the windows or doors is open in the façade, the sound reduction for the façade containing the window or door will be an approximate 15 dB reduction. The effect of having the window or door open is a reduction in transmission loss through the façade and results in a higher internal noise level within the room.
- 8.18 Façades with a noise level of greater than 45 dB during the night time and 50 dB during the daytime and a window or door open will not meet the BS 8233 internal noise levels for bedrooms and sitting rooms.
- 8.19 Where façade noise levels are above the aforementioned levels, another method of ventilating the rooms will have to be provided without opening the windows or doors.
- 8.20 Acoustically attenuated background / trickle vents are available with sound reduction properties equal to and greater than levels provided by windows and doors. For example, window mounted and wall mounted trickle vents are available with a sound reduction of approximately 42 dB and 38 dB respectively. Window trickle vents can be mounted in the window frame or above or below the window and provide adequate cross ventilation within the room or hallway.
- 8.21 To satisfy the Building Regulations purge ventilate requirement, all windows will be provided with the ability to be opened and extract ventilation will be provided in bathrooms and kitchens. Apartments with single façades will require a source of air extraction to provide adequate cross flow of air within the apartment.



- 8.22 Taking the above into account, internal noise levels can meet or be better than the guideline level of 30 dB (bedrooms at night) and 35 dB (living rooms and bedrooms during the daytime) can be achieved with the use of double glazing and background ventilation.
- 8.23 With regard to mitigation to noise levels in outside amenity areas, the construction of the proposed buildings, boundary treatments such as brick walls and high density closed board fences help reduce noise levels in these areas. For example, in the shadow zone of a building or brick wall, noise levels could be reduced by up to 10 dB.
- 8.24 Within the proposed residential development, there are no areas that require purpose built acoustic barriers to achieve external noise levels below 55 dB(A) during the daytime.

Impacts – Construction

- 8.25 Best practicable means will be used to minimise construction noise through the implementation of the recommendations set out in BS 5228. In particular, the following noise mitigation measures would be implemented:

Proper use of plant with respect to minimising noise emissions and regular maintenance will be required. All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order;

The use of inherently quiet plant where appropriate – all major compressors and generators will be 'sound reduced' models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers;

Machines in intermittent use will be shut down in the intervening periods between work or throttled down to a minimum;

All ancillary plant such as generators and pumps will be positioned so as to cause minimum noise disturbance, and where necessary, acoustic enclosures will be provided;

Where practicable the use of noisy plant will be limited to core daytime periods;



Channels of communication will be established between the contractor / developer, Local Authority and residents;

A site representative will be appointed responsible for matters relating to noise;

Typical levels of noise will be monitored during critical periods and at sensitive locations;

A 2m high solid site hoarding along the site boundaries will be erected where practical and feasible;

Localised noise barriers can be erected as necessary around items such as generators or heavy duty compressors;

Construction compounds will be laid out so as to minimise noise impacts to neighbouring noise sensitive receptors, by locating noisy operations well away from receptors and using on-site structures and materials to screen noise where practicable and necessary.



9.0 SUMMARY AND CONCLUSIONS

- 9.1 Stuart Michael Associates Limited, Consulting Engineers, has prepared a noise assessment on behalf of Danescroft (FREOF V Willingdon) LLP (the Applicant) in support of the proposed mixed-use development on Eastbourne Road, Willingdon.
- 9.2 From on-site observations, the dominant noise source in the local area is from road traffic noise from the A2270 Eastbourne Road to the south west of the site.
- 9.3 To determine the noise profile of the site, SoundPLAN has been used. The model has been verified using noise measurements recorded in the site.
- 9.4 During the daytime ($L_{Aeq,16hr}$), noise levels range between 62 dB at the southern boundary and 44 dB on the northern boundary. During the night time ($L_{Aeq,8hr}$), noise levels range between 59 dB at the southern boundary and 39 dB on the northern boundary.
- 9.5 Within the development site, façade noise levels have been calculated at the approximate locations of the proposed dwellings. Façades with an unobstructed view of Eastbourne Road are predicted to experience the highest noise levels.
- 9.6 Throughout the development there are façades where noise levels are above 50 dB during the daytime and 45 dB during the night time. Mitigation measures are proposed to ensure internal noise levels meet BS 8233, WHO guidelines and local planning policy.
- 9.7 Where façade noise is equal to or above 60 dB at first floor level during the daytime it is recommended that using a window with a sound reduction of 36 dB ($36 - 3 = 33$ dB). Where façade noise is between 54 dB and 62 dB during the daytime it is recommended that using a window with a sound reduction of 33 dB ($33 - 3 = 30$ dB). At all other façades it is proposed that using a standard thermal double-glazed unit with a sound reduction of 27 dB ($27 - 3 = 24$ dB).
- 9.8 The use of double-glazed windows incorporating acoustically attenuated ventilation with comparable sound reduction will reduce internal noise to within guideline levels.
- 9.9 With regard to noise levels in private gardens, plots within the development site will have an area which is predicted to experience daytime noise levels below 55 dB and the majority will experience noise levels below 50 dB.



- 9.10 The report has also calculated the potential worst-case impacts of construction noise at nearby sensitive receptors. Best practical means should be adopted to minimise construction noise insofar as possible.
- 9.11 Taking all of the above into account, the proposed development is in accordance with WHO Guidelines, British Standards, and WDC local policy. Thus, noise should not be a reason for withholding the granting of planning permission for this site.



10.0 APPENDICES

Appendix 1 Proposed Site Layout





Appendix 2 Construction Noise Assessment

No Mitigation

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	Site Preparation				
			15	35	55	75	100
R1: 32 Spurway Park (residential)	45	Specific construction noise level	74	68	64	61	59
R2: 5 Courtland Road (residential)	50	Total noise level (dB(A))	74	68	64	62	60
R3: 211d Eastbourne Road (residential)	63		74	69	65	62	60

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	Earthworks				
			15	35	55	75	100
R1: 32 Spurway Park (residential)	45	Specific construction noise level	75	73	69	66	64
R2: 5 Courtland Road (residential)	50	Total noise level (dB(A))	75	73	69	66	64
R3: 211d Eastbourne Road (residential)	63		75	73	69	66	64

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	Construction				
			15	35	55	75	100
R1: 32 Spurway Park (residential)	45	Specific construction noise level	80	73	69	66	64
R2: 5 Courtland Road (residential)	50	Total noise level (dB(A))	80	73	69	66	64
R3: 211d Eastbourne Road (residential)	63		80	73	69	66	64

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	Landscaping				
			15	35	55	75	100
R1: 32 Spurway Park (residential)	45	Specific construction noise level	64	64	60	57	55
R2: 5 Courtland Road (residential)	50	Total noise level (dB(A))	64	64	60	57	56
R3: 211d Eastbourne Road (residential)	63		64	64	61	58	56

With Mitigation

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	Site Preparation				
			15	35	55	75	100
R1: 32 Spurway Park (residential)	45	Specific construction noise level	64	58	54	51	49
R2: 5 Courtland Road (residential)	50	Total noise level (dB(A))	64	59	55	52	51
R3: 211d Eastbourne Road (residential)	63		64	59	56	54	53

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	Earthworks				
			15	35	55	75	100
R1: 32 Spurway Park (residential)	45	Specific construction noise level	65	63	59	56	54
R2: 5 Courtland Road (residential)	50	Total noise level (dB(A))	66	63	59	57	55
R3: 211d Eastbourne Road (residential)	63		67	66	64	64	63

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	Construction				
			15	35	55	75	100
R1: 32 Spurway Park (residential)	45	Specific construction noise level	70	63	59	56	54
R2: 5 Courtland Road (residential)	50	Total noise level (dB(A))	70	64	60	57	56
R3: 211d Eastbourne Road (residential)	63		71	66	64	64	63

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	Landscaping				
			15	35	55	75	100
R1: 32 Spurway Park (residential)	45	Specific construction noise level	54	54	50	47	45
R2: 5 Courtland Road (residential)	50	Total noise level (dB(A))	55	55	51	49	48
R3: 211d Eastbourne Road (residential)	63		56	56	53	52	51



Appendix 3 Development Façade Noise Levels

Name	Floor	Façade Direction	Lday	Lnight
			dB(A)	
1	GF	NW	52.5	45.2
1	F 1	NW	60.4	52.6
1	GF	NE	54.1	46.7
1	F 1	NE	56.3	48.8
1	GF	SW	67	58.9
1	F 1	SW	69.1	60.9
1	GF	SE	63.8	55.9
1	F 1	SE	65.9	57.8
6	GF	NE	51	43.7
6	F 1	NE	53.1	45.8
6	GF	NW	58.4	50.7
6	F 1	NW	60.5	52.7
6	GF	SW	55.7	48.2
6	F 1	SW	57.9	50.2
6	GF	SE	47.1	40
6	F 1	SE	51	43.8
8 & 9	GF	SE	55.5	48.1
8 & 9	F 1	SE	63.4	55.4
8 & 9	GF	NE	52.1	44.8
8 & 9	F 1	NE	56.7	49.1
8 & 9	GF	SW	66.4	58.3
8 & 9	F 1	SW	68.6	60.4
8 & 9	GF	NW	63.3	55.4
8 & 9	F 1	NW	65.4	57.4
26 to 37	GF	NW	54.4	47
26 to 37	F 1	NW	56.5	49
26 to 37	GF	NE	47.1	40.1
26 to 37	F 1	NE	49.1	42
26 to 37	GF	SE	44.6	37.7
26 to 37	F 1	SE	46.8	39.8
26 to 37	GF	SW	53.2	45.8
26 to 37	F 1	SW	56.3	48.8
45 & 46	GF	SW	50.8	43.6
45 & 46	F 1	SW	52.4	45.3
45 & 46	GF	NE	39.8	33.2
45 & 46	F 1	NE	42.8	36
51 to 59	GF	SE	53.3	45.9
51 to 59	F 1	SE	55.2	47.7
51 to 59	GF	SW	50.5	43.3
51 to 59	F 1	SW	52.5	45.1
51 to 59	GF	NE	40.5	33.8
51 to 59	F 1	NE	43.4	36.6
Notes: GF = ground floor; F 1 = firstly floor; N = North; S = South; E = East and W = West				



Name	Floor	Façade Direction	Lday	Lnight
			dB(A)	
60 to 69	GF	NW	51.6	44.3
60 to 69	F 1	NW	53.7	46.3
60 to 69	GF	SE	54.6	47.1
60 to 69	F 1	SE	56.7	49.1
60 to 69	GF	SW	60	52.3
60 to 69	F 1	SW	62.1	54.3
85 to 93	GF	S	46.9	39.9
85 to 93	F 1	S	48.8	41.7
85 to 93	GF	E	39.9	33.3
85 to 93	F 1	E	42.7	36
85 to 93	GF	N	45.6	38.7
85 to 93	F 1	N	47.5	40.4
85 to 93	GF	W	48.7	41.6
85 to 93	F 1	W	50.4	43.2
97	GF	NW	43.9	37.1
97	F 1	NW	45.8	38.9
97	GF	SE	49.4	42.2
97	F 1	SE	51.5	44.3
97	GF	NE	40.8	34.1
97	F 1	NE	43.1	36.3
108	GF	NW	41.7	34.9
108	F 1	NW	43.9	37
108	GF	SE	47.4	40.4
108	F 1	SE	49.6	42.5
113	GF	NW	44.2	37.3
113	F 1	NW	45.8	38.8
113	GF	SW	45.9	39
113	F 1	SW	47.6	40.6
113	GF	NE	37.7	31.2
113	F 1	NE	40.6	34
124	GF	NE	40.5	33.8
124	F 1	NE	42.7	35.9
124	GF	SW	44	37.2
124	F 1	SW	45.8	38.9
124	GF	SE	41.3	34.6
124	F 1	SE	43.3	36.5
129 to 137	GF	SW	49.3	42.2
129 to 137	F 1	SW	51.1	43.9
129 to 137	GF	SE	43.2	36.4
129 to 137	F 1	SE	45	38.1
129 to 137	GF	NE	39.3	32.7
129 to 137	F 1	NE	42.1	35.4
Notes: GF = ground floor; F 1 = first floor; N = North; S = South; E = East and W = West				



Name	Floor	Façade Direction	Lday	Lnight
			dB(A)	
139 & 140	GF	SW	51.2	43.9
139 & 140	F 1	SW	53.1	45.8
139 & 140	GF	SE	43.6	36.8
139 & 140	F 1	SE	45.3	38.4
139 & 140	GF	NW	50.8	43.6
139 & 140	F 1	NW	52.8	45.5
145 & 146	GF	SE	42.3	35.5
145 & 146	F 1	SE	44.1	37.2
145 & 146	GF	SW	46.6	39.7
145 & 146	F 1	SW	48.8	41.7
145 & 146	GF	NE	40.3	33.6
145 & 146	F 1	NE	42.9	36.1
145 & 146	GF	NW	47.1	40.1
145 & 146	F 1	NW	49.3	42.1
158	GF	SW	39.9	33.2
158	F 1	SW	42.4	35.7
158	GF	SE	41.1	34.4
158	F 1	SE	43.1	36.3
158	GF	NW	45.2	38.2
158	F 1	NW	47.2	40.2
158	GF	NE	40	33.4
158	F 1	NE	42.5	35.8
165	GF	W	43.2	36.4
165	F 1	W	45.1	38.2
165	GF	SW	43.2	36.4
165	F 1	SW	45.4	38.4
165	GF	N	40	33.4
165	F 1	N	42.3	35.6
165	GF	SE	39.5	32.9
165	F 1	SE	42.5	35.8
168	GF	SW	43.7	36.9
168	F 1	SW	45.6	38.7
168	GF	NW	42.8	36
168	F 1	NW	44.6	37.7
168	GF	SE	41.1	34.4
168	F 1	SE	43	36.2
168	GF	NE	38.4	31.8
168	F 1	NE	41	34.3
172 & 173	GF	SW	43.9	37
172 & 173	F 1	SW	45.8	38.8
172 & 173	GF	SE	40.1	33.4
172 & 173	F 1	SE	42.5	35.8
172 & 173	GF	NW	43.6	36.8
172 & 173	F 1	NW	45.4	38.5
Notes: GF = ground floor; F 1 = first floor; N = North; S = South; E = East and W = West				



Name	Floor	Façade Direction	Lday	Lnight
			dB(A)	
177	GF	SE	46.2	39.2
177	F 1	SE	48.3	41.2
177	GF	SW	47.2	40.1
177	F 1	SW	49.2	42.1
177	GF	NW	42.9	36.2
177	F 1	NW	44.7	37.8
179	GF	N	40.5	33.8
179	F 1	N	42.6	35.9
179	GF	E	44.8	37.9
179	F 1	E	47	40
179	GF	W	43	36.2
179	F 1	W	45.1	38.2
179	GF	S	41.1	34.4
179	F 1	S	43.4	36.5
Notes: GF = ground floor; F 1 = first floor; N = North; S = South; E = East and W = West				