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Development Technical
Consultants

ACOUSTIC AIR



Wood Lane, Higham on the Hill
Acoustics Assessment
April 2023

Report Ref: 26227-ENV-0401

Wood Lane, Higham on the Hill

Acoustics Assessment

April 2023

REPORT REF: 26227-ENV-0401

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REGISTRATION OF AMENDMENTS

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1.0 INTRODUCTION

- 1.1 Mewies Engineering Consultants Limited (M-EC), has been commissioned by Owl Homes Limited (hereafter referred to as ‘the Client’) to undertake an Acoustics Assessment for a proposed residential development at Wood Lane, Higham on the Hill (hereafter referred to as ‘the Site’).

Assessment Scope

- 1.2 The site has been granted outline planning permission (ref: 21/00147/OUT) by Hinckley and Bosworth Borough Council (hereafter referred to as ‘the Local Authority’) with condition 15 relating to noise:

“Development shall not begin until a scheme for protecting proposed dwellings from noise from existing sources and from sources associated with the development and existing dwellings from noise associated with the development has been submitted to and approved by the Local Planning Authority.”

- 1.3 This assessment seeks to establish existing sound levels at the Site, and using acoustic calculations, determine the risk of potential impacts from noise on the future occupants and, where necessary, propose suitable mitigation measures in order to discharge planning condition 15. The following scope of works has been undertaken:

- An Environmental Sound Survey has been undertaken within the Site in order to determine the prevailing acoustic conditions;
- An acoustic model has been created in order to predict sound levels across the Site based upon the measured sound level data;
- Where required, embedded façade mitigation measures in the form of glazing and whole-dwelling ventilation specifications have been provided to demonstrate compliance with the guidance contained within ProPG¹ and BS 8233² and condition 15;
- Following the assessment of typical conditions, an indicative overheating assessment has been undertaken to determine the number of dwellings that can achieve internal sound levels outlined in AVOG³.
- Consideration has also been given to the potential impact on proposed, and existing receptors, as a result of the proposed shop highlighted in the available masterplan.

Disclaimer

- 1.4 M-EC has completed this report for the benefit of the individuals referred to in Paragraph 1.1 and any relevant statutory authority which may require reference in relation to approvals for the proposed development. Other third parties should not use or rely upon the contents of this report unless explicit written approval has been gained from M-EC.
- 1.5 M-EC accepts no responsibility or liability for the consequence of this documentation being used for any purpose or project other than that for which it was commissioned; or the issue of this document to any third party with whom approval for use has not been agreed.

¹ Professional Practice Guidance on Planning and Noise, May 2017.

² BS 8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’

³ Acoustics Ventilation and Overheating, Residential Design Guide, V1.1. January 2020.

2.0 SITE DESCRIPTION

Existing Site

- 2.1 The Site comprises arable land use, and lies immediately to the west of Higham on the Hill. The Site is bounded to the north by Wood Lane; to the east by existing residential receptors and to the south and west by farmland.
- 2.2 An approximate red line boundary is presented in Figure 2.1.

Figure 2.1: Approximate Redline Boundary



Development Proposals

- 2.3 Development proposals for the Site consists of the erection of approximately 61 dwellings with associated access and infrastructure along with a single community shop.
- 2.4 The proposed development plan is provided in **Appendix A**.

3.0 STANDARDS AND GUIDANCE

General

3.1 An acoustic glossary is provided in **Appendix B** to assist the reader.

Summary of Guidance and Standards

3.2 The guidance and standards relevant to the assessment are presented below:

- National Planning Policy Framework (NPPF) 2021;
- Noise Policy Statement for England (NPSE) 2010;
- Professional Practice Guidance on Planning and Noise (ProPG) 2017;
- BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*'; and
- Acoustics Overheating and Ventilation Guide (AVOG) 2020.

3.3 For conciseness, the guidance and standards most appropriate to this assessment are summarised in this section.

ProPG

3.4 ProPG seeks to secure good acoustic design for new residential developments. The guidance includes a framework to enable situations where noise is not an issue but to help identify the extent of risk at noisier sites. The guidance does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.

3.5 The guidance is restricted to sites that are exposed predominantly to noise from transportation sources. Where industrial or commercial noise is present on the site but is "not dominant", its contribution may be included in the noise level used to establish the degree of risk. However, if the industrial/commercial source is dominant, an assessment in accordance with BS 4142 should be conducted.

3.6 A two-stage approach is considered whereby:

- Stage 1 – an initial noise risk assessment of the proposed development site is undertaken;
- Stage 2 – a systematic consideration of internal and external noise levels is considered ensuring good acoustic design and consideration of other relevant issues is recognised.

3.7 ProPG also references the World Health Organisation (WHO) guidance on maximum noise levels at night. Guidance from the WHO states that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night. ProPG indicates that individual noise events do not exceed 45 dB L_{AFmax} more than 10 times a night and therefore this is considered as criteria in addition to that outlined in Table 3.1.

3.8 Whilst ProPG does not define a measurement interval for the assessment of L_{AFmax} levels, research⁴ has been undertaken which indicates that, for Maximum Event Level assessments, a sampling interval of

⁴ Paxton et al., Assessing L_{max} for residential development: The AVO Guide Approach, Institute of Acoustics, 2019

between 1 and 3 minutes relates most closely to how awakening events are experienced by people in reality when compared to longer sampling periods.

- 3.9 For brevity, within the study, the majority of people (circa 75-85%) under test returned to a sleep state by approximately 2.5 minutes after the initial awakening event.
- 3.10 In summary, a longer sampling period can result in the under assessment of the 10th highest maximum level, therefore, based upon research and the recommendation of the Institute of Acoustics (IOA), a sample measurement of 2 minutes has been used to inform this assessment.
- 3.11 Upon completion of the ProPG's Stage 1 and 2 assessments, the findings should enable one of four possible recommendations to be presented to the decision maker, namely to grant permission without conditions, grant with conditions, 'avoid' or 'prevent'.

BS 8233

- 3.12 BS 8233 provides recommendations for the control of noise in and around buildings.
- 3.13 The guidance provided includes appropriate internal and external noise level criteria which are applicable to residential buildings exposed to steady external noise sources. It is stated in the British Standard that it is desirable for internal ambient noise levels to not exceed the criteria set out in Table 3.1.

Table 3.1: BS 8233: 2014 Table 4 – Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 – 23:00 L _{Aeq, 16hr} dB	23:00 – 07:00 L _{Aeq, 8hr} dB
Resting	Living Room	35	-
Dining	Dining Room/Area	40	-
Sleeping (daytime resting)	Bedroom	35	30

- 3.14 Additional guidance in BS 8233 indicates that appropriate ventilation should be provided, if relying on closed windows to meet the guide values, and that such ventilation should not compromise the façade insulation and resulting noise levels.
- 3.15 BS 8233 additionally includes guidance on external amenity areas whereby it states that external noise levels should not exceed 50 dB L_{Aeq, T} with an upper guideline of 55 dB L_{Aeq, T} which would be acceptable in noisier environments.
- 3.16 The guidance also indicates that where developments are considered necessary or especially desirable, the internal targets may be relaxed by up to 5 dB with reasonable conditions still achieved.

AVOG

- 3.17 AVOG outlines a methodology for the assessment of airborne sound during overheating conditions, and emphasises the co-dependency of acoustics, ventilation and overheating design.

- 3.18 Many developments require closed windows to provide good internal acoustic conditions which is in direct contrast to residents opening windows to keep a building cool. These opposing requirements are becoming a significant issue in residential building design as only one environmental comfort is then possible: either comfortable noise levels with windows closed or thermal comfort with windows open.
- 3.19 AVOG prescribes a two-level assessment procedure, the first stage is based upon external sound levels and provides a risk of adverse acoustic conditions during periods of overheating. The second stage is a formal assessment which considers both internal acoustic conditions and increased ventilation during overheating concurrently.
- 3.20 It should be noted, that whilst AVOG is typically applicable at planning stage, with the introduction of AD-O⁵ for Building Control purposes, which contains acoustic criteria for bedrooms during the night-time, a detailed AVOG assessment is likely to be required at some point in the project cycle.
- 3.21 However, as AD-O is required at Building Control stage and not necessarily for planning, an AVOG assessment for night-time is also presented in this report, to give context to the environment and the potential risk of internal acoustic conditions during periods of overheating. It should however be noted that the requirement to provide a suitable Overheating strategy that considers internal acoustic conditions is a Building Control matter or something that can be considered in more detail at reserved matters stage.
- 3.22 This report considers an AVOG Level 1 assessment only.

⁵ The Building Regulations 2010, Overheating, Approved Document 'O'.

4.0 ENVIRONMENTAL SOUND SURVEY

Methodology

- 4.1 Existing sound levels at the Site have been established by undertaking an Environmental Sound Survey. The survey has been undertaken in full accordance with the guidance set out in BS 7445⁶.
- 4.2 A Sound Level Meter (SLM) was installed at one location within the Site area as follows:
- Continuous Measurement 1 (CM1): positioned approximately 5m from Wood Lane.
- 4.3 The continuous measurement was undertaken between 12:00 on Tuesday 21st March and 11:00 on Friday 24th March 2023.
- 4.4 The measurement position is identified in Figure 4.1.

Figure 4.1: Measurement Position



Equipment

- 4.5 Measurements were taken using a Class 1 integrating/averaging SLM housed in an environmental protection apparatus. The SLM was field calibrated before and after the survey using a Class 1 calibrator, with no significant drift in calibration noted.

⁶ BS 7445-1:2003 'Description and measurement of environmental noise, Part 1: Guide to quantities and procedures.'

4.6 The SLM was installed in a free field position at a height of 1.5m above local ground level and was set up to capture the following parameters at a minimum: L_{Aeq} , L_{A10} , L_{A90} and L_{AFmax} values.

4.7 Full details of the equipment used to undertake the survey is presented in Table 4.1.

Table 4.1: Equipment and Calibration Details

Measurement Position	Description	Manufacturer & Type No.	Serial No.	Calibration Due Date
CM1	Sound Level Meter	Type NOR140	1407599	04/09/2024
	Pre-Amplifier	Type 1209	22646	
	Microphone	Type 1225	384571	
	Calibrator	Norsonic 1255	125525494	04/09/2023

Meteorological Conditions

4.8 During equipment setup on Tuesday 21st March, weather conditions were cool, dry and cloudy with a north-easterly wind measured at 4.6 m/s. During equipment collection on Friday 24th March, weather conditions were cool, dry and cloudy with a north-easterly wind measured at 3.9 m/s.

4.9 It can therefore be concluded that there were no adverse meteorological conditions that could influence the survey outcome.

Observations

4.10 Site observations indicated that at CM1, the dominant source of noise was road traffic using Wood Lane with the A5 still audible to the south-west.

4.11 No other significant sources of noise were noted during site visits and walkovers.

Results

Ambient Sound Levels

4.12 The measured survey results are presented in Table 4.2 for CM1.

Table 4.2: Summary of Measured Sound Levels, CM1

Date	Daytime 07:00 – 23:00 $L_{Aeq, 16hr}$ dB	Night-time 23:00 – 07:00 $L_{Aeq, 8hr}$ dB	Typical Maximum Event Level ^(a) $L_{AFmax, 2min}$ dB
21 st March	54 ^(b)	52	71
22 nd March	55	49	72
23 rd March	55	47	72
24 th March	54 ^(c)	-	-
^(a) Maximum noise level not exceeded more than ten times per night. ^(b) T = 5hr ^(c) T = 4hr			

4.13 Based on the measured levels at CM1, presented in Table 4.2, the following levels have been considered representative for assessment and will be used to calibrate the 3D acoustic model.

- Daytime, $L_{Aeq, 16hr}$ – 55 dB;
- Night-time, $L_{Aeq, 8hr}$ – 52 dB; and
- Night-time, $L_{AFmax, 2min}$ – 72 dB.

4.14 A copy of the measured survey data is provided in **Appendix C**.

Background Sound Levels

4.15 In order to consider the potential impact from the proposed shop, the background sound levels for CM1 are presented in Figure 4.2 and Figure 4.3.

Figure 4.2: Statistical Analysis of Background Sound Levels, CM1 – Daytime

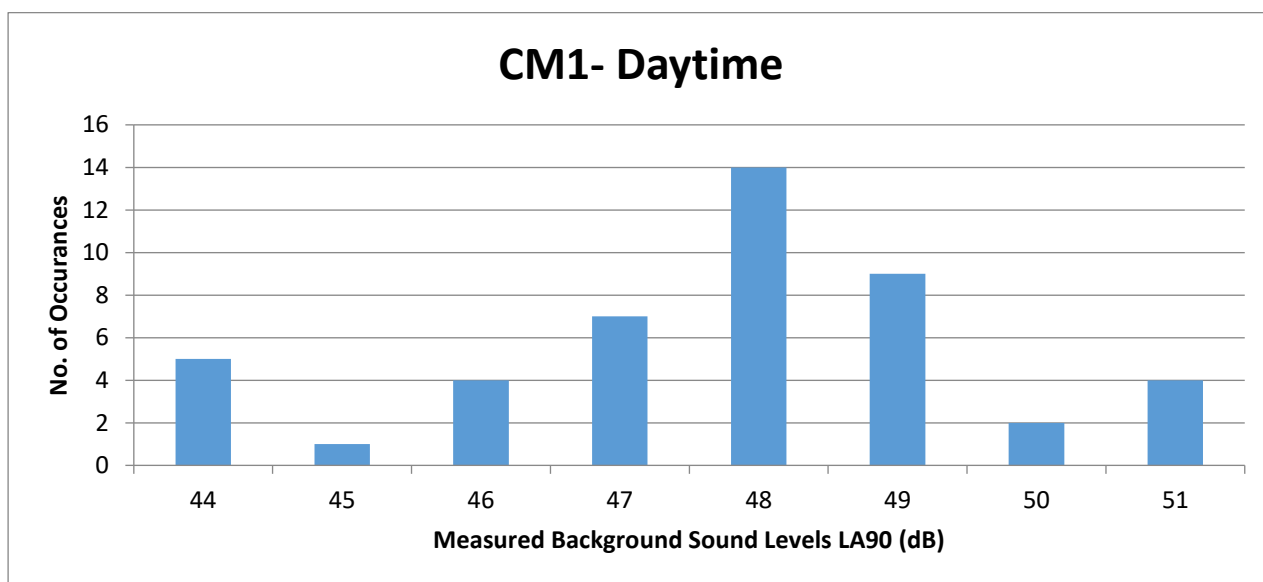
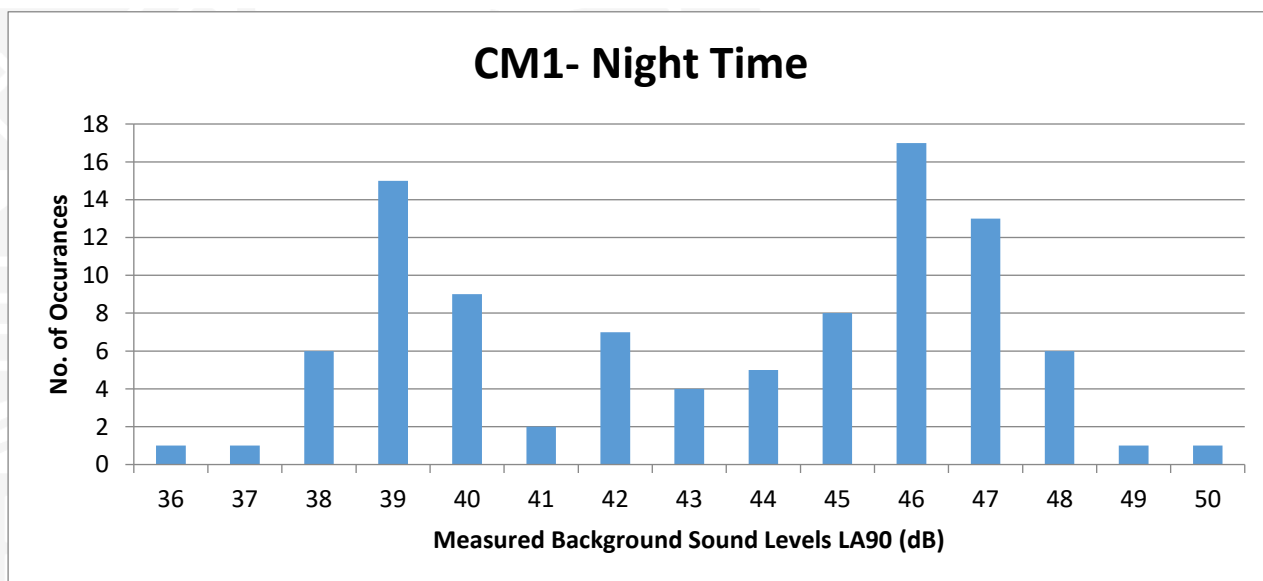


Figure 4.3: Statistical Analysis of Background Sound Levels, CM1 – Night-time



5.0 METHODOLOGY

Acoustic Modelling

- 5.1 An acoustic model of the Site and environs has been generated in Datakustik CadnaA® modelling software. The model was generated to determine noise levels across the Site and noise source emissions have been informed by survey data.
- 5.2 CadnaA® considers various inputs, including topography, buildings and road noise sources, and calculates sound levels in accordance with national and international standards; in this case, the relevant UK standards are the procedures set out within ISO 9613-2⁷.
- 5.3 The modelling assumptions and input information for the acoustic model are as follows:
- Digital Terrain Model – Lidar 1m (Environment Agency, downloaded on 23rd March 2023);
 - Open Street Map data (publicly available);
 - Ground absorption for the Site = 0.5 (mixed ground);
 - Building heights estimated following site observations or based upon masterplan;
 - First order reflections included in the modelling;
 - Temperature set to 10°C; and
 - Relative humidity set to 70%.
- 5.4 With reference to the noise criteria outlined in Section 3.0 the acoustic model has been used to predict sound levels across the Site in the following scenarios:
- Daytime $L_{Aeq,16hr}$ external sound levels at ground floor (1.5m) height;
 - Night-time $L_{Aeq,8hr}$ external sound levels at first floor (4m) height;
 - Night-time $L_{AFmax, 2min}$ external sound levels at first floor (4m) height.

Assessment Methodology

- 5.5 For conciseness, this report tabulates the most exposed receptor to give context to the most stringent mitigation measures. All other receptors are assessed through the various sound level contour and mitigation reference drawings presented in the various appendices to this report.
- 5.6 Using the Site layout, the most exposed proposed receptor for the Site is Plot 61 (adjacent to Wood Lane).
- 5.7 Sound level contour maps are presented in **Appendix D**.

⁷ ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.

6.0 ACOUSTICS ASSESSMENT

ProPG Initial Noise Risk Assessment

6.1 An Initial Noise Risk Assessment (INRA) as required by the ProPG, for Plot 61 is presented in Table 6.1.

Table 6.1: Initial Site Noise Risk Assessment

Risk	Negligible		Low		Medium		High	
Period	Day	Night	Day	Night	Day	Night	Day	Night
Pro PG Threshold ^(a)	< 50	< 40	50 – 60	40 – 50	60 – 70	50 – 60	> 70	> 60
Plot 61 ^(a)			51	48				
Risk Assessment			Low					
^(a) L _{Aeq} , 16hr dB for daytime assessment purposes and L _{Aeq} , 8hr dB for night-time assessment purposes.								

6.2 Based on the predicted sound levels at the most exposed receptor to Wood Lane (Plot 61) the dwellings fall within the risk category of ‘Low’ for both daytime and night-time conditions, for which the guidance states the Site is generally acceptable from a noise perspective and should follow a good acoustic design process.

BS 8233 External Amenity Areas

6.3 For traditional dwellings, BS 8233 recommends an external amenity area guideline sound level of between 50 – 55 dB L_{Aeq}, 16hr.

6.4 The Site follows a good acoustic design process, whereby all of the dwellings are orientated such that the external amenity area is located behind the associated dwelling, thus screening the area from sound emanating from the dominant source of noise.

6.5 A review of the daytime sound level contour drawing (26227_04_120_01), presented in **Appendix D**, demonstrates that all of the private external amenity areas achieve below the lower 50 dB guidance value outlined in BS 8233 and therefore, no mitigation will be necessary.

Detailed Internal Assessment

6.6 Historically, acoustics assessments have typically relied upon closed window mitigation strategies to achieve criteria outlined in BS 8233 and ProPG.

6.7 This strategy is still typically required across many residential developments in the UK, however, as whole-dwelling ventilation can be provided through window mounted trickle ventilators with windows closed, ventilation required outlined in AD-F⁸ can still be satisfied as there are no acoustic considerations during brief periods of ‘purge’ ventilation.

⁸ The Building Regulations 2010, Ventilation, Approved Document ‘F’.

- 6.8 However, with the introduction of AVOG, consideration is still required for internal acoustic conditions when increased ventilation is required to combat overheating. In this instance, increased acoustic criteria is permitted, as outlined in Section 3.0, due to the limited period of the year where overheating occurs.
- 6.9 Initially, the required external to internal reduction provided by the façade to achieve BS 8233 and ProPG criteria should be determined.
- 6.10 Table 6.2 presents the required external to internal reduction requirements for the most exposed plot at the Site.

Table 6.2: Required Façade Performance

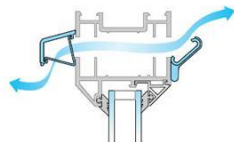
Receptor	Parameter	External Level (dB)	Internal Criteria (dB)	Required Reduction ^(a) (dB)
Plot 61	Daytime Ambient $L_{Aeq,16hr}$	51	35	16
	Night-time Ambient $L_{Aeq,8hr}$	48	30	18
	Night-time Maximum $L_{AFmax,2min}$	68	45	23
(a) External to internal reduction to achieve BS 8233 and ProPG criteria.				

- 6.11 To summarise Table 6.2, it can be seen that for habitable bedrooms, night-time maximum levels drive the acoustic design and an external to internal reduction of 23 dB is required to achieve internal criteria. For all other habitable rooms, a reduction of 18 dB is required.
- 6.12 These reductions can be typically found in standard thermal double glazing with direct airpath window mounted trickle ventilators.

7.0 MITIGATION SUMMARY

- 7.1 Acoustic modelling has demonstrated potential façade sound levels and, in accordance with BS 8233 and ProPG, sound reduction performance requirements of the façade have been determined.
- 7.2 In terms of acoustics, windows and ventilation strategies are the ‘weakest’ acoustic point in any façade and subsequently, the composite sound reduction performance, of the façade, is typically dominated by these elements. Therefore, minimum performance requirements to be provided by the glazing and ventilation elements at all dwellings are presented herein.
- 7.3 Table 7.1 provides typical solutions across the Site in order to provide the required external to internal reduction to achieve sound level criteria in accordance with BS 8233, ProPG and the whole-dwelling ventilation rates outlined in AD-F.
- 7.4 Table 7.1 should be read in conjunction with the mitigation reference drawings in **Appendix E**, which show corresponding colour coded mitigation references.
- 7.5 All bedrooms should follow the mitigation specifications in drawing reference 26227_04_120_04 and all other habitable rooms should follow the mitigation specifications in drawing reference 26227_04_120_05.

Table 7.1: Suggested Internal Mitigation Measures

Mitigation Ref.	Example Glazing Solution	Example Whole Dwelling Ventilation Solution (AD-F)
Ref. A-1	4mm pane 12mm air space 4mm pane	<u>Standard Non-Acoustic Trickle Vent</u> Slots typically located in the window frame.  Approx. $D_{n,e,w} + C_{tr} = 32$ dB
Ref. A-2	Approx. $R_w + C_{tr} = 27$ dB	

8.0 OVERHEATING CONSIDERATIONS

- 8.1 The mitigation measures are based upon typical conditions, i.e., where increased ventilation to combat overheating is not required. However, an AVOG Level 1 assessment, for the most exposed plots, is presented below to give context as to whether an open windows acoustics strategy is likely permissible to satisfy the planning requirements of AVOG.

Table 8.1: AVOG Level 1 Assessment

Plot	Parameter	External Level	Level 1 Risk Grading	Level 2 Advised?
61	Daytime L _{Aeq} , 16hr dB	51	Low	Optional
	Night-time L _{Aeq} , 8hr dB	48	Low	Optional
	Night-time Maximum L _{AFmax} , 2min dB	68	Will be required for AD-O purposes	

- 8.2 The results of the AVOG Level 1 assessment demonstrate that for the most exposed receptors that an AVOG Level 2 assessment is optional for ambient sound levels.
- 8.3 However, for maximum sound levels, the predicted sound level would result in internal AD-O criteria being exceeded by 4 dB when considering the reduction provided by an open window⁹ and as such, further investigation will be required at Building Control stage and the simplified method to satisfy Requirement O1 of AD-O will not be permissible. This is true for Plots 1 – 5 and 59 – 61; all remaining plots will benefit from an open window acoustics strategy and can satisfy AD-O through the simplified method.
- 8.4 However, it should be noted that the requirements to demonstrate a suitable overheating strategy fall under the Building Regulations and should not influence the planning decision making process.
- 8.5 Furthermore, to give confidence to the Local Authority that pragmatic measures could be included within the affected dwellings, without a material change to any granted permission, M-EC has reviewed the acoustic model and, based upon experience of undertaking Thermal Analysis assessments for AD-O purposes, can confirm that typical mitigation measures to achieve the required internal sound levels, and combat overheating in accordance with CIBSE TM59¹⁰, would typically include either a single chevron acoustic louvre; several 'air brick' style vents to provide cross-ventilation; or a latched window system.

⁹ When using the simplified method to satisfy AD-O, the external to internal reduction provided by an open window is 9 dB to satisfy the free area requirements for bedrooms.

¹⁰ Design Methodology for the Assessment of Overheating Risk in Homes, TM59:2017.

9.0 ADDITIONAL ACOUSTIC CONSIDERATIONS

9.1 Condition 15 states that a scheme for protecting existing dwellings from noise associated with the development should be submitted to the Local Authority. Therefore, in addition to the impact from road traffic noise on future residential receptors, consideration is given to the following with regards to an impact on nearby existing receptors:

- Sound emanating from fixed mechanical services at the Proposed Shop; and
- Development Generated Road Traffic Noise.

Sound from Proposed Shop

9.2 As part of the proposed development, a community shop is to be included within the design, located adjacent to Plots 4 and 5.

9.3 The orientation of the shop footprint follows good acoustic design whereby the indicative loading/unloading area is screened from residential amenity areas. As such, and given that it is unreasonable to formally assess a delivery for a local convenience store, the assessment here is to prescribe target sound levels for any fixed mechanical services (such as ventilation or chiller units) such that a 'Low' impact, in accordance with BS 4142¹¹ is not exceeded.

9.4 BS 4142 states that a 'Low' impact is experienced when sound from commercial sources is either below the existing background sound level, or exceeds the background sound level by up to, and including, 4 dB.

9.5 Therefore, based upon the statistical analysis of the background sound levels presented in Figure 4.2 and Figure 4.3, the following target sound levels for the cumulative impact of any fixed mechanical services is recommended. The targets should account for any acoustic features such as tonality, intermittency, impulsivity or other acoustic features.

Table 9.1: Target Noise Levels for Fixed Mechanical Services

Period	Target Noise Level
Daytime (07:00 – 23:00)	52 dB LAeq, T
Night-time (23:00 -07:00)	43 dB LAeq, T

9.6 Separate levels are prescribed as it may be that the shop is not open during the night-time hours and as such, mechanical services are unlikely to be running at such a time. Such limits could be secured through a routine planning condition attributed to any future application for the proposed shop.

9.7 Through the inclusion of such limits, sound emanating from fixed mechanical services associated with the proposed shop will not have an adverse impact on existing or future residential receptors.

¹¹ BS 4142:2014 +A1:2019 'Methods for rating and assessing industrial and commercial sound.'

Development Generated Road Traffic Noise

- 9.8 A Transport Statement was produced in support of the outline planning application for the Site by DLP Planning Limited in October 2021.
- 9.9 The results of the Transport Statement showed that development generated road traffic would have a negligible impact on the local road network.
- 9.10 Typically, noise impacts associated with road traffic noise are undertaken in accordance with DMRB LA111¹², however, for any significant impact to be experienced at residential receptors situated along the impacted road network, a change of 3 dB is required in road traffic noise level. This would require a doubling of road traffic along any single road link in order to materialise.
- 9.11 The notion that a residential development for up to 61 dwellings would cause a doubling of road traffic along the identified road links in the aforementioned Transport Statement is unfounded. As such, the Local Authority can seek confidence that there would be no significant impact on any existing residential receptor as a result of noise generated by vehicular movements associated with the Site.

¹² Design Manual for Road and Bridges, LA 111, Noise and Vibration, Rev 2, May 2020.

10.0 CONCLUSIONS

- 10.1 Mewies Engineering Consultants Limited, has been commissioned by Owl Homes Limited to undertake an Acoustics Assessment for a proposed development at Wood Lane, Higham on the Hill.
- 10.2 Detailed assessments of the Site, during typical conditions, have been undertaken in accordance with BS 8233 and ProPG criteria whilst giving consideration to typical condition ventilation requirements in AD-F.
- 10.3 The Site follows a good acoustic design and all external amenity areas will satisfy the lower criteria outlined in BS 8233.
- 10.4 Embedded façade mitigation measures have been suggested in order to achieve internal criteria in line with BS 8233 and ProPG. Measures include standard thermal double glazing for all habitable rooms across the Site with direct airpath trickle vents to achieve whole-dwelling ventilation outlined in AD-F.
- 10.5 Initial considerations have been given to internal acoustic conditions during periods of overheating which, in accordance with AVOG, shows a low risk across the most exposed proposed dwellings for the purposes of granting planning permission and any further considerations will fall under the scope of Building Control.
- 10.6 Finally, the impact from the proposed shop and development generated road traffic has been considered in order to demonstrate that sound from sources associated with the Site will not have an impact on existing receptors.
- 10.7 Therefore, in summary, based upon the assessment presented within this report, the Site is suitable for residential development.



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APPENDICES



APPENDIX A



Private Dwellings		
Type Ref	No. Beds	No. Units
Upton	4	4
Leamington	4	4
Twycross	4	5
Sibson	4	1
Cadeby	3	12
Essington	3	1
Heather	3	3
Brinklow	2	6
		36

Affordable Dwellings		
Type Ref	No. Beds	No. Units
Heath	3	7
Barnes	3	3
Hutton	2	11
Hobbs	1	2
Willis	1	2
		25

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- NOTES
- Affordable Rent
 - Shared Ownership

Revision		
A	Grasscrete areas increased following tracking.	14/03/23 DC

Wood Lane
Higham on the Hill

Site Layout

DATE: Feb 2023
SCALE: 1:500 @ A1
DRAWN: DC
CHECKED: -

OWL HOMES

OWL HOMES LIMITED
WIA, Aley Drive, Birch Coppice Business Park, Tamworth,
Staffordshire, B78 1SA
TELEPHONE: 01827 317700 EMAIL: info@owlhomes.co.uk

Drawing No. 999-AD-002A

Wood Lane, Higham on the Hill



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APPENDICES



APPENDIX B

GLOSSARY OF TECHNICAL TERMS

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurements, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc, according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Typical sound levels found in the environment

Sound Level	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside a factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft taking off
140 dB(A)	Threshold of pain

Descriptor	Terminology
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20µPa (20x10 ⁻⁶ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log ₁₀ (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting (db(A))	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L _{eq, T}	A noise level index called the equivalent continuous noise level over the time period, <i>T</i> . This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
L _{AFmax, T}	A noise level index defined as the maximum noise level during the measurement period. <i>L_{Max}</i> is sometimes used for the assessment of discrete loud noises, which may have little effect on the overall <i>L_{eq}</i> noise level but will still affect the noise environment. It is typically measured using the 'fast' sound level meter response.
L _{90, T}	A noise level index. The noise level exceeded for 90% of the time over the period, <i>T</i> . <i>L₉₀</i> can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L _{10, T}	A noise level index. The noise level exceeded for 10% of the time over the period, <i>T</i> . <i>L₁₀</i> can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building facade.
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit
One-third Octave Band	A frequency band in which the upper limit is 2 ^{1/3} times the frequency of the lower limit.
Rating Level	The specific sound level, plus any adjustment for characteristic feature of sound in BS 4142.
Specific Sound Level	The A-weighted <i>L_{eq}</i> sound level produced by a sound source during a specified period of time. Commonly known as the sound source under investigation as defined in BS 4142.
Typical Maximum Level	The 90 th percentile maximum event level (<i>L_{AFmax}</i>) measured during a period. Used for assessing night-time maximum levels under typical and overheating conditions.



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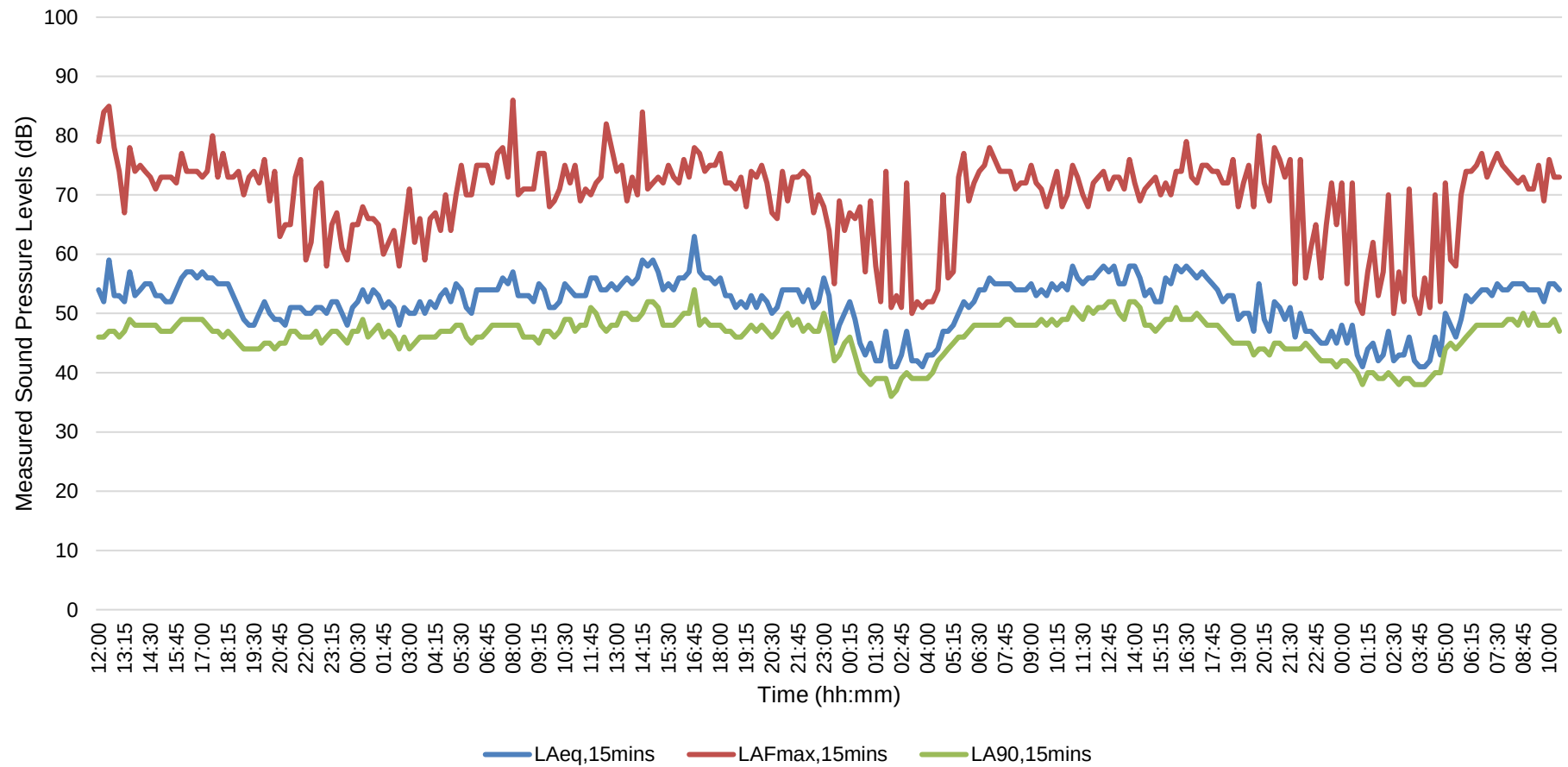
APPENDICES



APPENDIX C

Wood Lane, Higham on the Hill - CM1
Environmental Sound Monitoring Survey Results

$L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ Measured Sound Pressure Levels - 21st - 24th March
2023





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APPENDICES



APPENDIX D



NOTES:
1. DO NOT SCALE THIS DRAWING.

KEY	
	0–50dB(A)
	50–55dB(A)
	55–60dB(A)
	60–65dB(A)
	65–70dB(A)
	70–75dB(A)
	75–80dB(A)
	>80dB(A)

REV:	AMENDMENTS:	EW	HJ	AB	20.03.23
PROJECT:	WOOD LANE, HIGHAM ON THE HILL				
DRAWING TITLE:	DAYTIME AMBIENT SOUND LEVELS, LAeq,16hour				
CLIENT:	OWL HOMES LIMITED				
DRAWING NUMBER:	26227_04_120_01				
REVISION:	SHEET SIZE:	SCALE:			
-	A3	NTS			
STATUS:	FOR INFORMATION				
M-EC ACOUSTIC AIR		Telephone: 01530 264 753 Email: group@m-ec.co.uk Website: www.m-ec.co.uk ORDNANCE SURVEY © CROWN COPYRIGHT 2015. ALL RIGHTS RESERVED. LICENCE NUMBER 100055865.			

File Location: T:\M-EC_30 Book\2627\calculations\Acoustic\05 DWG\2627_04_120_01 Day.dwg
Printed: 20.03.2023



NOTES:
1. DO NOT SCALE THIS DRAWING.

KEY	
	0–50dB(A)
	50–55dB(A)
	55–60dB(A)
	60–65dB(A)
	65–70dB(A)
	70–75dB(A)
	75–80dB(A)
	>80dB(A)

REV:	AMENDMENTS:	EW	HJ	AB	20.03.23
PROJECT:	WOOD LANE, HIGHAM ON THE HILL				
DRAWING TITLE:	NIGHT-TIME AMBIENT SOUND LEVELS, LAeq,8hour				
CLIENT:	OWL HOMES LIMITED				
DRAWING NUMBER:	26227_04_120_02				
REVISION:	SHEET SIZE:	SCALE:			
-	A3	NTS			
STATUS:	FOR INFORMATION				
M-EC ACOUSTIC AIR		Telephone: 01530 264 753 Email: group@m-ec.co.uk Website: www.m-ec.co.uk ORDNANCE SURVEY © CROWN COPYRIGHT 2015. ALL RIGHTS RESERVED. LICENCE NUMBER 100055865.			

File Location: T:\M-EC_30 Book\2627\calculations\Acoustics\05 ENV\2627_04_120_02 Night Long



NOTES:

1. DO NOT SCALE THIS DRAWING.

KEY

	0-50dB(A)
	50-55dB(A)
	55-60dB(A)
	60-65dB(A)
	65-70dB(A)
	70-75dB(A)
	75-80dB(A)
	>80dB(A)

REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
					20.03.23
PROJECT: WOOD LANE, HIGHAM ON THE HILL					
DRAWING TITLE: NIGHT-TIME MAXIMUM SOUND LEVELS LAFmax,T					
CLIENT: OWL HOMES LIMITED					
DRAWING NUMBER: 26227_04_120_03					
REVISION: -		SHEET SIZE: A3		SCALE: NTS	
STATUS: FOR INFORMATION					
			Telephone: 01530 264 753 Email: group@m-ec.co.uk Website: www.m-ec.co.uk		
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File Location: T:\M-EC_26227\calculations\Acoustic\05_DWG\26227_04_120_03_NightMax.dwg
Printed: 20.03.2023



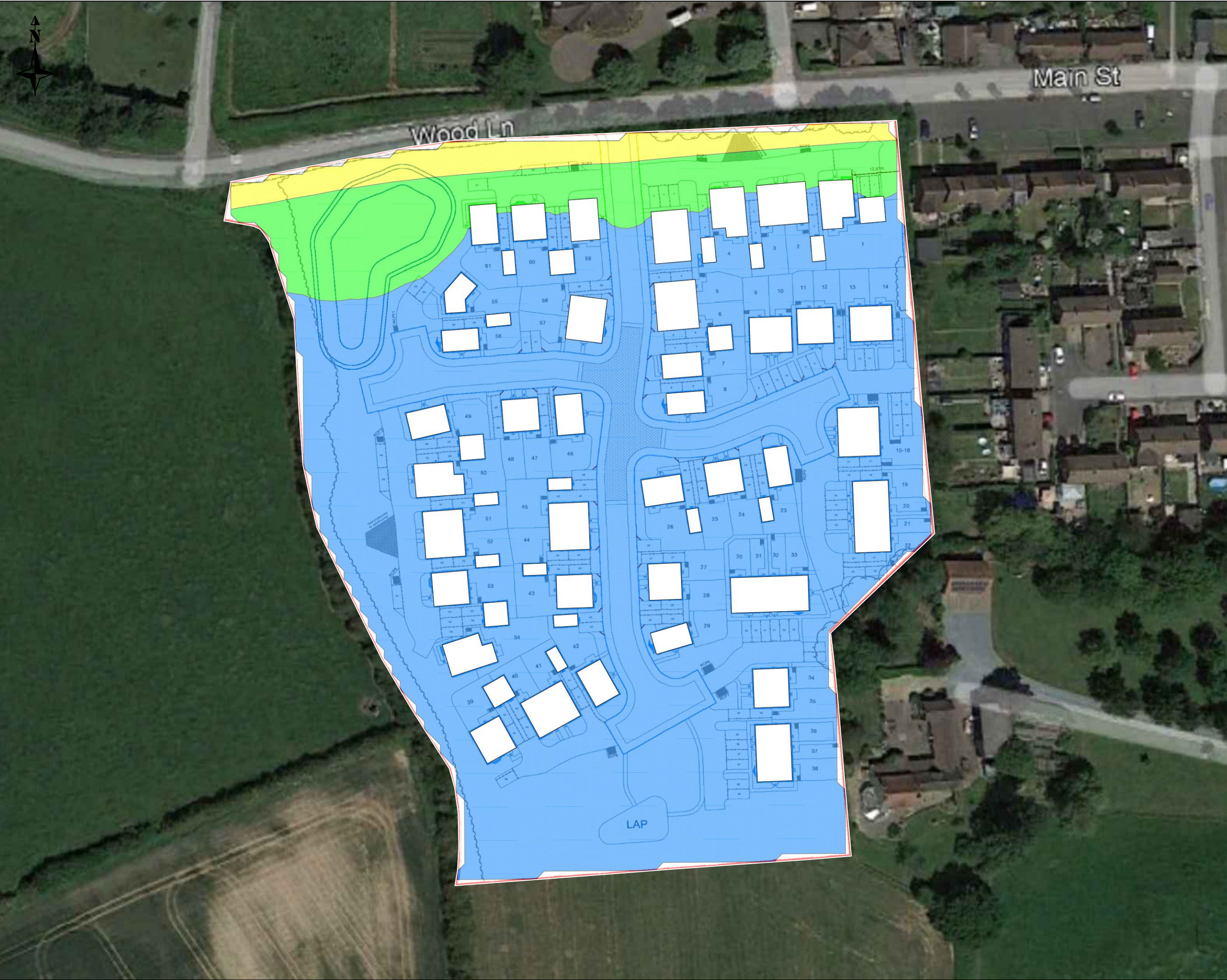
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APPENDICES



APPENDIX E



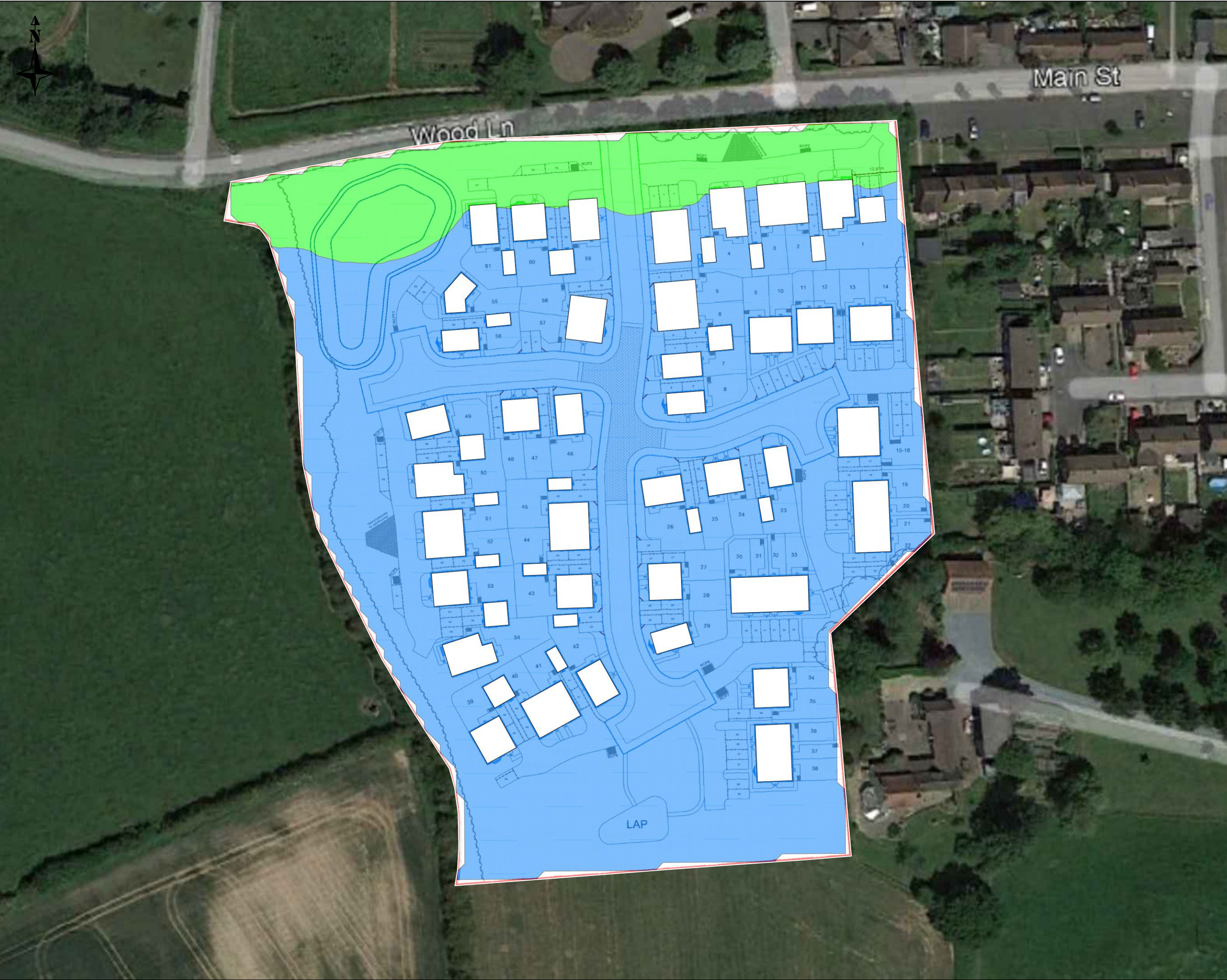
- NOTES:
- DO NOT SCALE THIS DRAWING.
 - Please refer to report reference 26227-ENV-0401 for the details on the proposed glazing and ventilation references.

KEY

Ref. A-1

Ref. A-2

REV:	AMENDMENTS:	EW	HJ	AB	28.03.23
DRN	CHK	APP:	DATE:		
PROJECT: WOOD LANE, HIGHAM ON THE HILL					
DRAWING TITLE: MITIGATION REFERENCE FOR HABITABLE BEDROOMS					
CLIENT: OWL HOMES LIMITED					
DRAWING NUMBER: 26227_04_120_04					
REVISION: -	SHEET SIZE: A3		SCALE: NTS		
STATUS: FOR INFORMATION					
			Telephone: 01530 264 753 Email: group@m-ec.co.uk Website: www.m-ec.co.uk ORDNANCE SURVEY © CROWN COPYRIGHT 2015. ALL RIGHTS RESERVED. LICENCE NUMBER 100055865.		



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 - Please refer to report reference 26227-ENV-0401 for the details on the proposed glazing and ventilation references.

KEY

Ref. A-1

Ref. A-2

REV:	AMENDMENTS:	EW	HJ	AB	28.03.23
PROJECT:		DRN:	CHK:	APP:	DAT:
WOOD LANE, HIGHAM ON THE HILL					
DRAWING TITLE:					
MITIGATION REFERENCE FOR ALL OTHER HABITABLE ROOMS (NON-BEDROOMS)					
CLIENT:					
OWL HOMES LIMITED					
DRAWING NUMBER:					
26227_04_120_05					
REVISION:	SHEET SIZE:		SCALE:		
-	A3		NTS		
STATUS:					
FOR INFORMATION					
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