



Armstrong House
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PROPOSED RESIDENTIAL DEVELOPMENT

**LAND AT WINGS NURSERY
WOODGATE**

NOISE IMPACT ASSESSMENT

Technical Report: R9214-1 Rev 0

Date: 24th March 2022

For: Thakeham
Thakeham House
Summers Place
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24 Acoustics Document Control Sheet

Project Title: Land at Wings Nursery, Woodgate - Noise Impact Assessment

Report Ref: R9214-1 Rev 0

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Thakeham to undertake an environmental noise assessment for Land at Wings Nursery, Woodgate, in connection with an approved residential development and noise related planning condition.
- 1.2 The following assessment has considered:
- Environmental noise monitoring;
 - Consideration of the noise arising from nearby sources affecting the site;
 - Assessment of internal noise levels within the dwellings;
 - Assessment of external noise levels within garden areas.
- 1.3 This report presents the results of the assessment, following site visits and ambient noise surveys undertaken between 1st and 7th February 2022.
- 1.4 An explanation of acoustical terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20 μ Pa.

2.0 SITE DESCRIPTION

- 2.1 Planning permission has been granted, subject to conditions, by Arun District Council (planning reference: AL/20/21/PL) to redevelop the site known as Land at Wings Nursery for 71 residential dwellings, comprising bungalows and two storey houses.
- 2.2 The site is currently open land with a single disused two-story residential dwelling to the eastern boundary. Lidsey Road (A29) follows the eastern boundary with residential properties to the south. a disused plant nursery lies to the west and south-west with road access along the north boundary of the site. A rail line lies approximately 100m to the north. Road traffic from Lidsey Road is the dominant source of ambient noise in the area.
- 2.3 The public house, The Prince of Wales, lies directly north of the site and comprises a car park to the west and external seating area to the north which is well screened from the proposed development. Licencing information for the premises has been obtained from the online register and is summarised below:

- Live and amplified music between the hours of 19:00 to 23:00 hours Monday to Sunday and;
 - Usually solo or duo once or twice weekly. Xmas Eve, Xmas Day, Boxing Day, New Years Eve & Day, Good Friday, Easter Saturday, Sunday & Monday and all other bank holidays from 19:00 until 01:00.
 - Disco as alternative for live music. Xmas Eve, Xmas Day, Boxing Day, New Years Eve & Day, Good Friday, Easter Saturday, Sunday & Monday and all other bank holidays from 19:00 until 01:00

2.4 With reference to the Prince of Wales' social media sites and online adverts, live and amplified music events occur relatively infrequently (approximately once a month) and have previously comprised low key live music events.

2.5 A site location plan is provided in Figure 1 with the proposed site layout shown in Figure 2.

3.0 ASSESSMENT CRITERIA

Planning Condition 18

3.1 The noise related pre-commencement planning condition (18) is reproduced below:

"Prior to the commencement of the development hereby approved, a scheme shall be submitted to:

(a) demonstrate that the internal noise levels within the residential units will conform to the "Indoor ambient noise levels for dwellings" guideline values specified within Table 4 under section 7.7.2 of BS 8233:2014.

(b) demonstrate that the external noise levels within the curtilage of residential units will conform to the "Design criteria for external noise" upper guideline value of 55 dB $L_{Aeq,T}$ as specified within section 7.7.3.2 of BS 8233:2014.

Details shall be compiled by a competent acoustician on sound insulation and noise reduction for buildings and shall be submitted to and approved in writing by the Local Planning Authority. The scheme should take into account the correct number of air changes required for noise affected rooms. The scheme shall also take account of PL_PCC_LTR_801 (ODB) road noise from the A29 and railway noise from the nearby railway line. The works specified in the approved scheme shall then be carried out in accordance with the approved details prior to occupation of the premises and be retained thereafter.

Reason: To protect the amenity of local residents in accordance with Policy QE DM1 of the Arun Local Plan. This is required to be a pre-commencement condition because the approved measures may need to be built into the fabric of the buildings."

Local Plan

- 3.2 The condition refers to PL_PCC_LTR_801 (ODB), which is the Arun local plan [Reference 1]. The document refers to the National Planning Policy Framework and Noise Exposure Categories. Policy QE DM1-1 also comments on noise from industrial and commercial sources:

"To safeguard the continued use of existing industrial and commercial uses and to protect amenity, noise sensitive development should not normally be permitted where:

- c. High levels of noise will continue throughout the night, especially during the hours when people are normally sleeping.*
- d. There is a likelihood of complaints about noise from industrial development."*

- 3.3 Based on the above, consideration will be given to noise from the public house and the disused nursery, if it were bought back into use.

BS 8233: 2014

- 3.4 BS 8233:2014 [Reference 2] provides design guidance for dwelling houses, flats and rooms in residential use and recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16\text{ hour}}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq,16\text{ hour}}$ in dining rooms during the day and 30 dB $L_{Aeq,8\text{ hour}}$ in bedrooms at night.

- 3.5 The standard states that the above limits apply to steady external noise sources without specific character, and also states the following:

"Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."

- 3.6 BS 8233 also notes that "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."
- 3.7 The World Health Organisation (WHO) [Reference 3] provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO guidelines suggest internal noise levels not exceeding 30 dB $L_{Aeq,8hr}$ or regularly exceeding 45 dB $L_{Amax,f}$ for 'a good night's sleep'.

BS 4142:2014+A1:2019

- 3.8 BS 4142:2014 [Reference 4] provides a method for rating the effects of industrial and commercial sound on residential areas. The standard advocates a comparison between the typical measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction of up to 15 dBA is applied.
- 3.9 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact again depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

Noise from Vehicles Associated with the Nursery

- 3.10 The Department of Transport assessment methodology, 'Calculation of Road Traffic Noise', HMSO, 1988 [Reference 7] provides a method for determining noise from road traffic use but does not cover this type of situation where there are very low traffic flows travelling at slow speeds. Therefore, the results of noise measurements of vehicles from 24 Acoustics library data (i.e. as would be moving within the car park) have been used as the basis for the calculations and assessment of the noise from vehicle movements associated with the nursery upon existing properties.
- 3.11 A practical method that has been used successfully at planning and appeals for car parks, is to examine the predicted noise level (L_{eq}) arising from the proposed activities against the prevailing ambient noise level (L_{eq})

Entertainment Noise

- 3.12 The Institute of Acoustics' document Good Practice Guide on the Control of Noise from Pubs and Clubs considers the audibility of noise and refers to the Code of Practice on Environmental Noise Control at Concerts.
- 3.13 The code considers suitable music noise levels for up to 30 events per year. The Prince of Wales licence allows for predominantly daytime live and amplified music with a limited number of permitted events during night-time periods. The pub advertises music events approximately once per month and resulting noise levels would be expected to vary considerably. The type of event, equipment used and location of the musicians (inside or outside) will greatly affect levels of break-out noise.
- 3.14 The following assessment therefore considers the licensing restrictions in light of the proximity of existing residential properties. Consideration is given to the predicted music noise levels and the resulting noise levels at the proposed residential properties.

Noise from Outdoor Seating Areas

- 3.15 There is no published objective method of assessing the potential for noise impact arising from customers using outdoor seating or leaving the licensed premises.

- 3.16 The approach adopted in this assessment has been to assess the impact of noise from people sitting in the pub garden. The measured existing ambient $L_{Aeq, 1 \text{ hour}}$ noise levels have been compared with the predicted noise level from people in the outdoor space. For this type of noise source, an increase of more than 2 or 3 dB is considered likely to represent the threshold of acceptability.

Summary of Noise Criteria

- 3.17 The impact of noise upon the site has been assessed using the following methodology:
- Road and rail traffic noise
 - An upper internal daytime level of 35 dB $L_{Aeq, 16 \text{ hour}}$ for bedrooms/living rooms and a night-time level of 30 dB $L_{Aeq, 8 \text{ hour}}$ for bedrooms should apply
 - A maximum night-time internal level of 45 dB $L_{Amax, fast}$ should also apply for regular events within bedrooms.
 - Vehicles and deliveries associated with nursery
 - Comparison with the existing ambient noise levels
 - Noise from the pub garden and pub music events
 - Assessment of predicted music noise levels against existing ambient noise levels during relevant periods (19:00 to 23:00 hours) as well as consideration to internal music noise levels within the proposed dwellings.
 - External Amenity
 - Target noise level in external amenity areas of 55 dB $L_{Aeq, 16 \text{ hour}}$.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

- 4.1 An ambient noise survey was undertaken on site between 1st and 7th February 2022. The following instrumentation was used during the surveys:

- | | |
|---|-------------|
| • 2 x Rion Type 1 sound level meters: | Type NL-52; |
| • Brüel and Kjær Class 1 acoustic calibrator: | Type 4231. |

- 4.2 The instrumentation was configured to monitor in 1 and 5 minute sample periods and was set up to measure and store overall A-weighted and linear octave band statistical parameters including the L_{eq} , L_{90} , and $L_{max,f}$ sound pressure levels. Audio recording was utilised to enable discrete event identification. Noise measurements were made in accordance with BS 7445: 1991 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use' [Reference 5].
- 4.3 Measurements were undertaken over two locations in free field conditions at a height of approximately 2m. Measurement locations are described below and shown in Figure 1:
- Location 1 –North east corner of the site. 26m from the centre of Lidsey Road. Closest boundary point to the rail line and The Prince of Wales Pub.
 - Location 2 – To the western site boundary, overlooking the nursery site with clear line of sight to the rail line.
- 4.4 Calibration of all instrumentation was checked before and on completion of the measurements and no drift was found. The calibration of all 24 Acoustics' equipment is traceable to National Standards.
- 4.5 Weather conditions during the measurements were variable with periods of wind and rain. Measurements affected by meteorological conditions have been removed from the assessment.

Noise Survey Results

- 4.6 The measurements results at Location 1 are presented graphically in Appendix B and summarised in Table 1 below.

Measurement Results: Location 1			
Date February 2022	Daytime 07:00 – 23:00	Night-time 23:00 – 07:00	
	dB L _{Aeq} , 16 hr	dB L _{Aeq} , 8 hr	Typical dB L _{Amax,f}
Tuesday 1st	58	53	70
Wednesday 2nd	59	53	71
Thursday 3rd	59	52	69
Friday 4th	59	52	70
Saturday 5th	59	55*	74*
Sunday 6th	59	54*	72*
Monday 7th	60	-	-
Design Level	59	52	70

Table 1: Location 1 Measurement Results *measurement affected by adverse weather conditions

- 4.7 The measurement results at Location 2 are presented graphically in Appendix B and are summarised in Table 2.

Measurement Results: Location 2			
Date February 2022	Daytime 07:00 – 23:00	Night-time 23:00 – 07:00	
	dB L _{Aeq} , 16 hr	dB L _{Aeq} , 8 hr	Typical dB L _{Amax,f}
Tuesday 1st	48	42	60
Wednesday 2nd	48	42	57
Thursday 3rd	47	44	59
Friday 4th	49	44	63
Saturday 5th	50	50*	68*
Sunday 6th	51	46*	63*
Monday 7th	49	-	-
Design Level	48	43	60

Table 2: Location 2 Measurement Results *measurement affected by adverse weather conditions

- 4.8 24 Acoustics determines the typical L_{Amax} to be the 10th highest L_{Amax} level over the measurement period.

- 4.9 Noise from road traffic on Lidsey Road was the primary source of ambient noise at both measurement locations. Maximum noise events were controlled by road traffic and occasional rail movements.
- 4.10 During the site visits and through analysis of audio recordings and spectral noise data at measurement location 1, no plant or entertainment noise was noted on the site from The Prince of Wales pub.
- 4.11 Measurement results from location 2 and observations on site indicate that there is no current activity or noise coming from the nursery site. Should the nursery be re-occupied, as a horticultural use the activities are not considered to be any more significant than might be found from farming on agricultural land, which are in most cases widely accepted to be insignificant in noise terms. Further consideration to potential nursery noise is provided in the below section.

5.0 CALCULATIONS AND NOISE IMPACT ASSESSMENT

Entertainment Noise

- 5.1 To determine noise levels from potential entertainment sources from the Prince of Wales, incident at the proposed development, 24 Acoustics' library database for amplified music noise has been referenced and is shown in Table 3.

Minimum SRI (dB) per Octave Band Centre Frequency (Hz)									
Noise Source	63	125	250	500	1k	2k	4k	8k	dBA
Amplified Music	100	100	95	90	90	85	85	75	95

Table 3: Music Source Noise Data

- 5.2 Assuming the door to the pub's southern facade remains closed during events, the following music noise levels would be anticipated outside the closest habitable room windows of the proposed development:
- Overall external music noise levels in the region of 33 dB L_{Aeq} .
 - Low frequency external music noise levels in the region of 38 dB $L_{eq, 63Hz}$ and 38 dB $L_{eq, 125 Hz}$.

- 5.3 The predicted overall external music noise levels outside the closest proposed dwelling are described alongside the measured ambient noise levels during the evening period (19:00 to 23:00 hours at measurement location 2) in Table 4.

Predicted External Music Noise Level	Typical External Ambient Noise Level
33 dB $L_{Aeq, T}$	44 dB $L_{Aeq, T}$
38 dB $L_{eq, 63Hz}$	51 dB $L_{eq, 63Hz}$
38 dB $L_{eq, 125 Hz}$	42 dB $L_{eq, 125 Hz}$

Table 4: Assessment of External Noise Levels from Pub Music Events.

- 5.4 Music noise levels within the proposed properties would be significantly lower than the values in Table 4.
- 5.5 Based on the measurements and social media, Music events at the Prince of Wales pub appear to be relatively infrequent, and low key. The proximity of existing residential properties on Lidsey Road to the pub (in the order of 20m), will also serve to protect the proposed residential properties from live/amplified music events. The risk of unreasonable disturbance to future residents is therefore considered low.

Assessment – Patron Noise

- 5.6 Calculations have been undertaken to determine noise levels from patron use of the northern external area of the Prince of Wales.
- 5.7 24 Acoustics' in-house database has been referenced (67 dBA at 1m for a single raised voice) and high occupancy of the external seating area (66 patrons) has been assumed, with one in three speaking with raised voices at any one time. This is considered a reasonable worst-case assumption for when the premises would be at full capacity.
- 5.8 Results indicate that vocal noise from external patrons will be in the order of 32 dB $L_{Aeq, 30 min}$ outside the closest proposed windows. This is a low noise level and considerably lower than the external road traffic noise levels during the evening at the quietest measurement location (44 dB $L_{Aeq, T}$).
- 5.9 On the above basis, noise from patron use, incident at the proposed development, is low and unlikely to cause disturbance at the proposed residential properties.

Nursery - Vehicle Noise

- 5.10 The access road to the nursery is a single track with overhanging trees and limited turning space. Therefore, it is considered that large HGV movements through the nursery access road would not be practical. The following assessment assumes that Transit-sized vehicles would be the largest capable of accessing the nursery on a regular basis.
- 5.11 Assuming standard daytime operating hours for the nursery (07:00 to 18:00 hours), it is relevant to consider noise from staff/trade vehicle movements to ground floor living room receptor locations during peak hourly periods (07:00 to 08:00 and 17:00 to 18:00 hours).
- 5.12 From analysis of historic satellite imagery, the now discussed nursery once contained a car park with an approximate maximum capacity of 18 vehicles. It is assumed that a car park of this size would generate in the region of 9 vehicle movements during peak morning and evening hours.
- 5.13 Calculations have been undertaken to properties closest to the nursery access road (approximately 7m), using a worse case source noise level of 67 dB L_{Aeq} at 4m from a slow-moving transit sized vehicle (taken from 24 Acoustics' library database).
- 5.14 The results of the calculations for relevant periods are shown in Table 5 which also presents existing ambient noise levels from measurement data (average levels from measurement location 2) for the relevant assessment periods.

Time Period	Number of Vehicle Movements	Noise Level from Vehicle Movements	Existing Ambient Noise Level	Increase in Noise Level
Morning Peak (07:00 – 08:00)	9	36 dB L_{Aeq} 1 hour	53 dB L_{Aeq} 1 hour	0.1 dB
Rush Hour Peak (17:00 – 18:00)	9	36 dB L_{Aeq} 1 hour	48 dB L_{Aeq} 1 hour	0.3 dB

Table 5: Predicted Noise Levels at Closest Proposed Property

- 5.15 The predicted noise levels from the vehicle movements associated with the use of the nursery are low and significantly lower than the prevailing ambient noise levels. The increase in ambient noise would be negligible and the risk of disturbance is considered low.

- 5.16 Assuming a 15 dB loss from an open window, vehicle noise levels within the nearest proposed properties would be significantly lower than the guideline internal noise levels in BS 8233: 2014 (i.e. lower than 35 dB $L_{Aeq,1 \text{ hour}}$).

Nursery - Delivery Noise

- 5.17 The car park to the nursery is considered the nearest location to the proposed development that deliveries could take place. This location is approximately 40 metres to the nearest dwelling and acoustically screened by existing buildings and future garden fences.
- 5.18 24 Acoustics library noise data for deliveries within a service yard has been referenced, comprising large delivery vehicle and cage trolley movements, with a sound power level of 93 dBA assumed and corrected for % on-time (10-minutes activity over an hourly period).
- 5.19 On this basis, resultant noise levels from potential delivery activities would be in the order of 30 dB $L_{Aeq, 1 \text{ hour}}$ outside the nearest residential properties. With typical daytime background noise levels in the region of 41 dB $L_{A90, 1 \text{ hour}}$ at measurement location 2, the risk of disturbance from well managed deliveries is considered low.

Road Traffic and Rail Noise

- 5.20 The following assessment has been undertaken based on the latest drawings available (March 2022). If there are any changes to the site layout, dwelling layouts or elevations, this assessment should be revised accordingly.
- 5.21 Detailed calculations have been undertaken to determine acoustic requirements for windows and ventilators, which will ensure that noise levels do not exceed the criteria outlined in Section 3.
- 5.22 The calculations have assumed that external wall build-ups will comprise a cavity masonry construction that would be expected to achieve a minimum sound insulation performance of 52 dB R_w .
- 5.23 Standard thermal glazing and trickle vents will be acceptable to the majority of dwelling across the site.

5.24 Dwellings that overlook Lidsey Road will require a slight enhancement to the acoustic performance of glazing and ventilation. The affected properties are identified as Zone 1 in Figure 2.

5.25 The minimum acoustic performance requirement for windows in Zone 1 is described in Table 8.

Window	Minimum SRI (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Zone 1	24	20	25	35	38	35

Table 8: Window/Glazing Minimum Acoustic Performance (Zone 1)

5.26 In making a comparison with the values in Table 8, it is important that the window figures used are the result of tests in accordance with ISO 10140, Part 2: 2010 and that the quoted minimum sound reduction specifications are met by the entire window system as a whole, including frames, seals, any insulated panels and not just the glass. The requirements also apply to any external glazed doors to habitable rooms.

5.27 The following window configurations, if installed properly, would be capable of achieving the required sound reduction performance to all proposed dwellings:

- Zone 1 glazing: 4 mm glass: 12 mm cavity (minimum): 4 mm (31 dB R_w).

5.28 The minimum acoustic performance requirements for ventilation performances in Zone 1 are shown in Table 9.

Ventilation	Minimum $D_{n,ew}$ (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Zone 1	40	36	35	31	32	37

Table 9: Recommended Ventilator Performance (Zone 1)

5.29 The ventilation acoustic specification in Table 9 relates to the following minimum sound insulation performance ratings:

- Zone 1 ventilator: 33 dB $D_{n,e,w}$, acoustically attenuated trickle ventilator

- 5.30 Alternatively, a whole house MVHR system would also be suitable.
- 5.31 In making a comparison with the above ventilator specifications, it is important that the figures used are the result of laboratory tests with the vent in the open position. Note that the stated minimum performance value assumes one ventilator per habitable room. The specific ventilation requirements (e.g. equivalent free area etc.) should be confirmed by others.
- 5.32 Note, ventilation systems should be specified to allow for adequate ventilation to meet background ventilation requirements as per Part F of the Building Regulations [Reference 7].
- 5.33 The above assessment demonstrates that the internal noise level criteria (outlined in Section 3) would be readily achievable, subject to the appropriate specification and design of the external façade elements.

Road Traffic Noise levels in External Amenity Areas

- 5.34 The majority of properties facing Lidsey Road have gardens to the rear that are acoustically screened from the road and noise levels in these properties would fall below 55 dB $L_{Aeq, 16 \text{ hours}}$.
- 5.35 With a close boarded fence at least 1.8 m high, the gardens of plots 5 and 6 would also be expected to achieve the aspirational target of 55 dB $L_{Aeq, 16 \text{ hours}}$.
- 5.36 On this basis, noise levels in all gardens are considered acceptable.

6.0 CONCLUSIONS

- 6.1 24 Acoustics Ltd has been instructed by Thakeham to undertake a noise impact assessment for proposed residential development at Land at Woodgate Nursery, Woodgate, Chichester.
- 6.2 The assessment has considered the noise impact upon proposed new residential properties from road traffic using Lidsey Road. Additional assessments have considered entertainment noise from the Prince of Wales Pub and potential commercial noise associated with a disused nursery.
- 6.3 An ambient noise survey has been carried out at the site to determine existing noise levels during daytime and night-time periods.
- 6.4 Recommendations have been provided for acoustically rated windows and ventilation to habitable rooms facing Lidsey Road.
- 6.5 Calculations have been undertaken which show that daytime external noise levels in gardens fall below 55 $L_{Aeq, 16 \text{ hour}}$ in line with the aspirational target set out in planning condition 18.
- 6.6 It is concluded that, with the recommended measures, noise within habitable rooms would comply with internal levels of 35 dB $L_{Aeq, 16hr}$ during the daytime and 30 dB $L_{Aeq, 8hr}$ and 45 dB $L_{Amax, f}$ at night which is in accordance with the Arun District Council Local Plan and planning condition 18.
- 6.7 Additionally, predicted noise levels from the disused plant nursery (if bought back into use) and music noise from the Prince of Wales pub were found to present a low risk of disturbance at the proposed development.

REFERENCES

1. Arun Local Plan 2011-2031, July 2018.
2. British Standards Institution. British Standard 8233: Guidance on sound insulation and noise reduction for buildings, 2014.
3. World Health Organisation. Guidelines for Community Noise, 2000.
4. British Standards Institution. British Standard 4142: Methods for rating and assessing commercial and industrial sound, 2014. BS 4142:2014+A1:2019
5. Calculation of Road Traffic Noise, 1988.
6. British Standards Institution. BS 7445: 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use' 1991.
7. Building Regulations. Approved Document F - Ventilation, 2010.

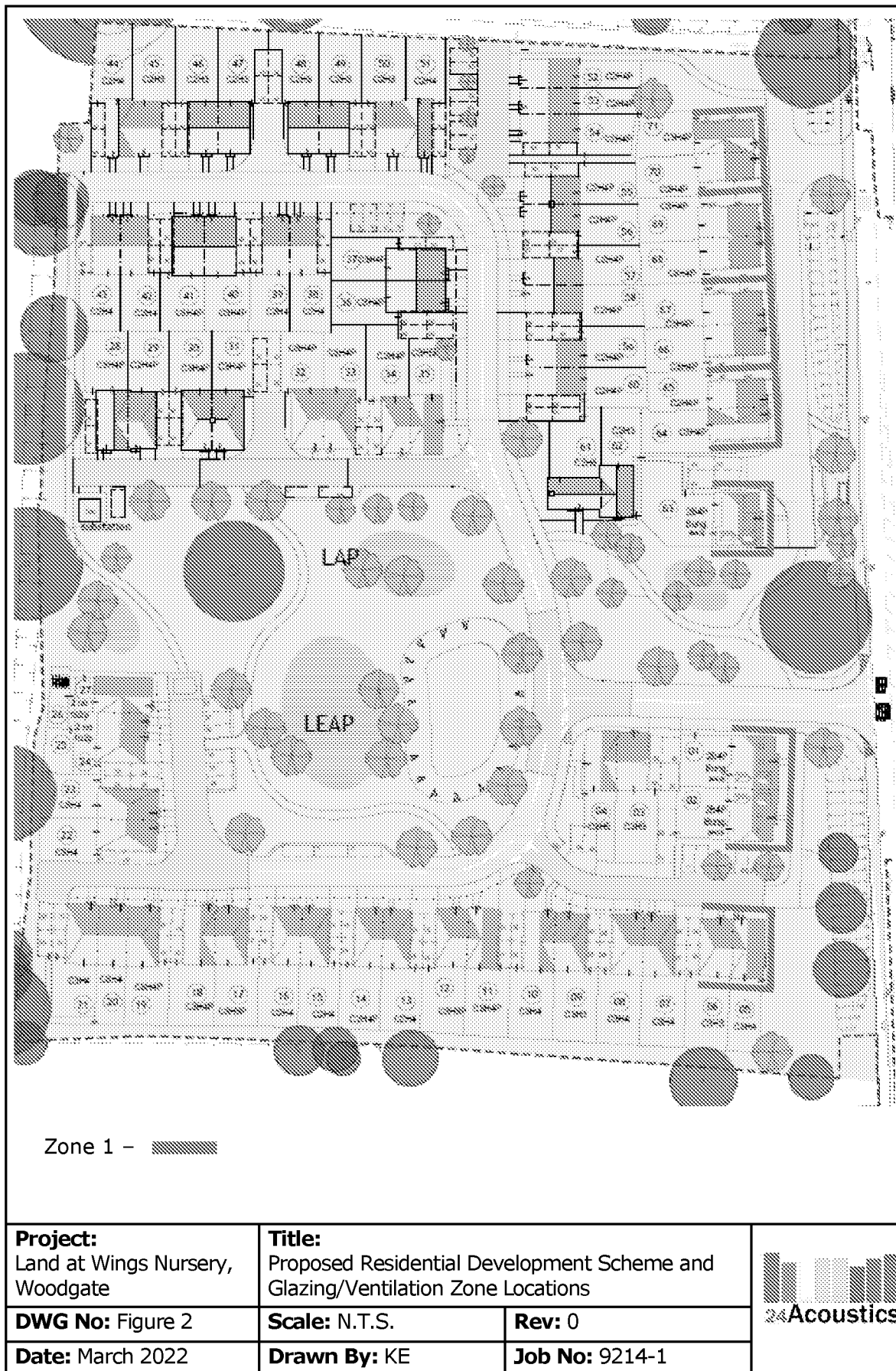


Measurement Location 1



Measurement Location 2

Project: Land at Wings Nursery, Woodgate	Title: Site & Survey Location		
DWG No: Figure 1	Scale: N.T.S.	Rev: 0	
Date: March 2022	Drawn By: KE	Job No: 9214-1	



APPENDIX A: ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

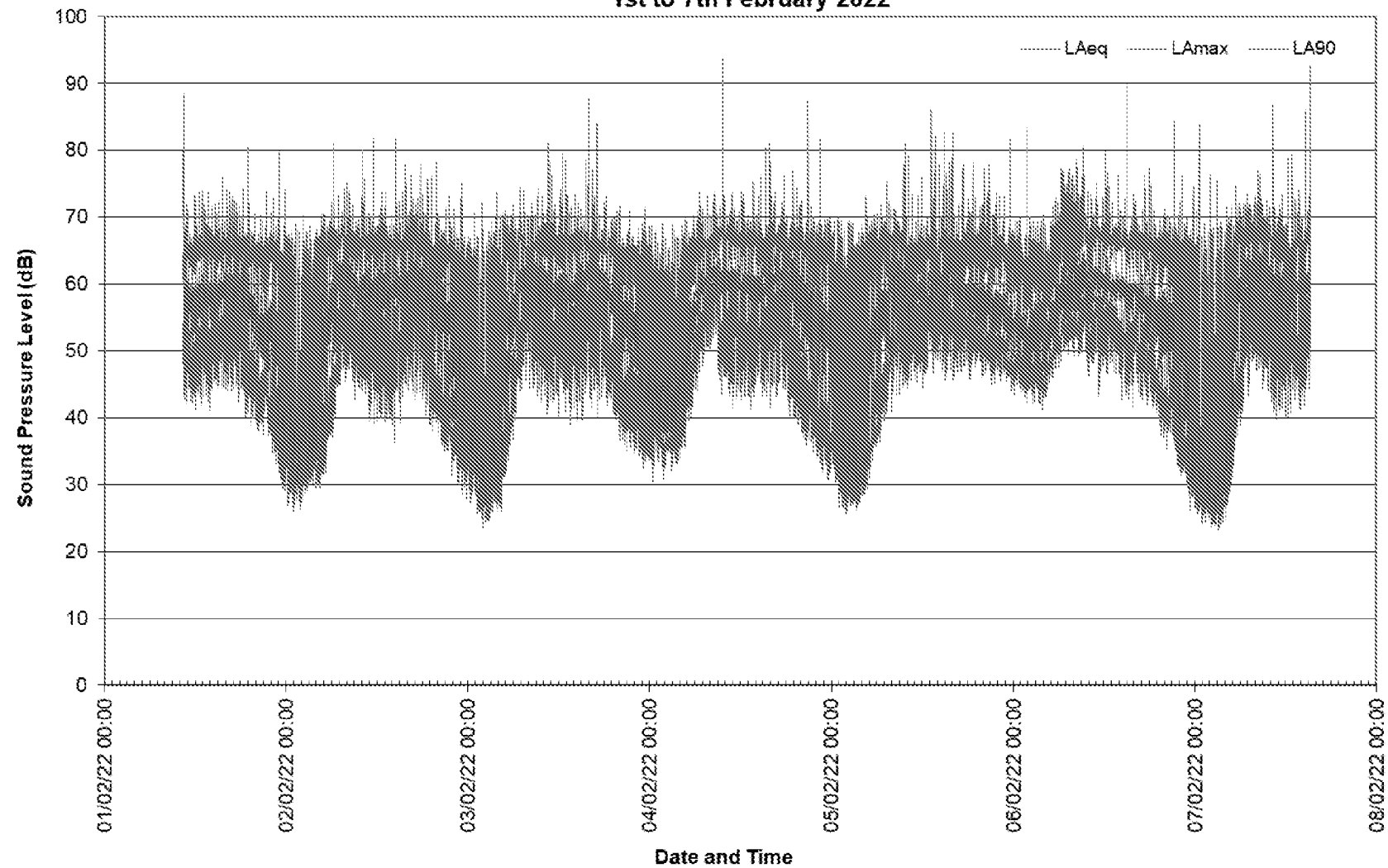
It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B: ENVIRONMENTAL NOISE SURVEY RESULTS**Location 1: Land at Wings Nursery
Measurement Results
1st to 7th February 2022**

Location 2: Land at Wings Nursery
Measurement Results
1st to 7th February 2022

