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LAND NORTH-EAST OF HUMBER DOUCY LANE, IPSWICH

NOISE & VIBRATION ASSESSMENT

Technical Report: R10268-3 Rev 0

Date: 20th February 2024

For: BDW Eastern Counties & Hopkins Homes
c/o Phase 2 Planning & Development
270 Avenue West, Skyline 120
Great Notley, Braintree
CM77 7AA

24 Acoustics Document Control Sheet

Project Title: Land North-East of Humber Doucy Lane, Ipswich: Noise and Vibration Assessment

Report Ref: R10268-3 Rev 0

Date: 20th February 2024

	Name	Position	Signature	Date
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For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

Revision	Description	Prepared By	Reviewed By	Approved By
0	Approved for issue	Aileen Reed	Stephen Gosling	Stephen Gosling

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by BDW Eastern Counties and Hopkins Homes Ltd to undertake an assessment of environmental noise and vibration levels at a proposed development site at land north-east of Humber Doucy Lane, Ipswich. The assessment has included:

- Ambient noise monitoring on the proposed site;
- Railway vibration monitoring on the proposed site;
- Assessment of the noise arising from Humber Doucy Lane, Tuddenham Road and the nearby railway;
- Production of noise contour maps of transportation sources including the framework masterplan;
- Consideration of noise from Ipswich Rugby Club;
- Proposed noise mitigation measures.

1.2 All sound pressure levels quoted in this report are in dB relative to 20 µPa.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 The site comprises three parcels of land located north-east of Ipswich to the north-east of Humber Doucy Lane and east of Tuddenham Road. The site lies to the south of the adjacent Ipswich to Lowestoft railway with Ipswich Rugby Club towards the east of the site. The site, which can be seen in Figure 1, is currently open agricultural land and also covers two existing rugby pitches.

2.2 The railway line runs along the northern boundary of the most northerly parcel of the site. Train movement data shows 2 to 3 passenger trains per hour with only occasional freight movements. Noise from road traffic adjacent to the site was observed to control noise levels across the site.

2.3 Residential properties lie to the south of the site, with a mixture of agricultural land and more isolated properties in other directions. Westerfield House Care home is located to the west of the site. The former outbuildings for Westerfield House now contain small businesses in Tuddenham Road Business Centre, with a veterinarian practice in situ at the time of the survey.

2.4 An outline application is to be submitted for residential development comprising up to 660 homes and associated infrastructure along with green spaces and community facilities. The land has been allocated for residential use by Ipswich Borough Council and East Suffolk Council.

2.5 The site location can be seen in Figure 1 with the Framework Plan for the development shown in Figure 2.

3.0 CRITERIA

3.1 The National Planning Policy Framework (NPPF) states that planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development and avoid noise giving rise to significant adverse impacts on health and quality of life;
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The NPPF states that where the operation of an existing business could have a significant adverse effect on new development in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed. Paragraph 187 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."*

3.3 The NPPF also refers to the Noise Policy Statement for England (NPSE, 2010) which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life.

3.4 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

> *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

Professional Practice Guidance on Planning & Noise (ProPG)

3.5 The Professional Practice Guidance on Planning and Noise (ProPG) was published jointly by the Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health in May 2017. The guidance relates to the consideration of existing sources of transportation noise upon proposed new residential development and strives to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage 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;
- Improve understanding of how to determine the extent of potential noise impact and effect; and
- Assist the delivery of sustainable development.

British Standard 8233: 2014

3.6 BS 8233: 2014 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 $L_{Aeq,16\ hour}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq,\ 16\ hour}$ in dining rooms during the day and 30 dB $L_{Aeq,\ 8\ hour}$ in bedrooms at night.

3.7 BS 8233:2014 suggests an upper guideline value of 55 dB $L_{Aeq,16\ hour}$ for noise levels in external amenity spaces such as gardens. This is considered an aspirational limit and BS 8233 also states that development should not be prohibited on the basis of noise levels within external amenity areas.

LPA Guidance & Consultation

3.8 Ipswich Borough Council Planning and Noise Note 1 provides guidance notes for residential developments. It states that dwellings should aim to meet the internal noise levels set out in BS 8233 and that during the day, noise levels in external amenity areas should not exceed 50 dB L_{Aeq} with an upper limit of 55 dB acceptable where the lower guideline value is not achievable provided justification is given.

3.9 It notes that in general, an assessment under BS 4142 for industrial or commercial noise, the rating level should not exceed the background noise level.

3.10 It notes that residential development close to entertainment venues will require noise assessment and provides internal noise levels to be achieved.

3.11 East Suffolk Council have confirmed that for industrial or commercial noise, a rating level of 5 dB below the background noise levels is required to prevent noise creep in rural areas. They also request that the cumulative effects of proposed and existing development are considered. In particular, they refer to the potential increase in rail movements due to the Sizewell C development.

Summary

3.12 The impact of noise upon the proposed development has been assessed using the following recommended maximum internal noise levels, due to road/ rail traffic:

- 35 dB $L_{Aeq,16hr}$ daytime noise level for living rooms;
- 30 dB $L_{Aeq,8hr}$ night-time noise level for bedrooms;
- 45 dB $L_{Amax,f}$ night-time noise levels in bedrooms for regular events.

3.13 In addition, Ipswich guidance for residential properties near to licensed premises will be considered.

British Standard BS 6472: 2008

3.14 The assessment of human response to vibration within buildings is currently guided by British Standard BS 6472:2008. The relevant criteria from the standard are summarised below.

3.15 Where vibration occurs as a series of events, as in the case of train pass-bys, BS 6472 indicates that Vibration Dose Values (VDVs) should be used. Human response to vibration in buildings is assessed in terms of VDVs defined over daytime and night-time periods.

3.16 The human body is most sensitive to vibration in the vertical direction (head to foot). The standard defines values of VDV which are likely to cause varying degrees of adverse comment and these are summarised in Table 1.

Place and Time	Vibration Dose Value, $m/s^{1.75}$		
	Low Probability Of Adverse Comment	**Adverse Comment Possible**	**Adverse Comment Probable**
Residential 16 hr day (07:00 to 23:00)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential 8 hr night (23:00 to 07:00)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Table 1: Vibration Dose Values and Subjective Response

Calculation of Road Traffic Noise and Design Manual for Roads and Bridges

3.17 The Department of Transport Publication 'Calculation of Road Traffic Noise (CRTN, 1988) provides guidance and methodology for the assessment and prediction of noise levels from road traffic.

3.18 The Design Manual for Roads and Bridges (LA111 May 2020) Noise and Vibration (DMRB) provides a method for the assessment of road traffic effects by assessing the change in the $L_{A10,18hr}$.

3.19 In relation to traffic noise, the DMRB rates impacts through consideration of the change in $L_{A10,18hr}$ for the short and long-term as reproduced in Tables 2 and 3 below.

Predicted Change in $L_{A10,18hr}$, dB	**Magnitude of Impact**
Greater than or equal to 5.0	Major
3.0 – 4.9	Moderate
1.0 – 2.9	Minor
Less than 1.0	Negligible

Table 2: Classification of Magnitude of Noise Impacts in the Short-term

Predicted Change in $L_{A10,18hr}$, dB	**Magnitude of Impact**
Greater than or equal to 10.0	Major
5.0 – 9.9	Moderate
3.0 – 4.9	Minor
Less than 3.0	Negligible

Table 3: Classification of Magnitude of Noise Impacts in the Long-term

4.0 NOISE & VIBRATION MEASUREMENT PROCEDURE

Noise Instrumentation

4.1 Noise levels were measured using the following equipment:

- Rion (Class 1) precision sound level meter x 2 Type NL52;
- Svantek (Class 1) precision sound level meter x 2 Type 958;
- Brüel and Kjær acoustic calibrator Type 4231.

Noise Measurement Procedure

4.2 The noise measurement locations used (shown in Figure 1 and described below) were chosen to establish how noise from Humber Doucy Lane, Tuddenham Road and the railway line to the north affects the proposed site. Subjective observations confirm there is no sustained nor significant contribution to noise levels from activity in the commercial units adjacent to Westerfield House to the west of the site.

- Location 1: On the southern site boundary adjacent to Humber Doucy Lane;
- Location 2: To the east of site near to the clubhouse for Ipswich Rugby Club;
- Location 3: To the north-west of the site adjacent to both Tuddenham Road and the railway line;
- Location 4: On the northern site boundary adjacent to the railway line.

4.3 In order to assess typical ambient noise levels, the sound level meters were configured to continuously monitor in one minute sample periods. The meters were set up to measure and store overall A-weighted statistical parameters including the L_{Amax} and L_{Aeq} parameters (measured on fast response). 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'.

4.4 The instrumentation was powered by an external battery and stored in a weatherproof case. Throughout the course of the survey, an outdoor microphone windshield was used. The microphone height was 1.5m above local grade. The weather was generally dry with wind speeds less than 5 m/s, however, where weather conditions were unsuitable for noise measurement, data has been removed prior to analysis.

4.5 Calibration was checked before and on completion of the measurements and no drift was found. The calibration of 24 Acoustics' instrumentation is traceable to National Standards.

Vibration Instrumentation

4.6 Vibration levels were measured using the following equipment:

- Svantek (Class 1) precision sound level meter x 2 Type 958;
- Dynatron tri-axial accelerometer x 2 Type 3233A;
- Bruel and Kjaer vibration calibrator Type 4294.

Vibration Measurement Procedure

4.7 Long-term vibration measurements were obtained at Locations 3 and 4 at a distance of approximately 10 m and 16 m respectively from the southern site boundary. Vibration measurements were undertaken over the period on 7th – 15th November 2023. Measurements were undertaken in terms of the Vibration Dose Value (as defined in BS 6472) in $m/s^{1.75}$ in three axes of motion (defined as X (longitudinal), Y (lateral) and Z (vertical), all relative to the surroundings). The axes were orientated as follows:

- x-axis - parallel to the railway line;
- y-axis - perpendicular to the railway line;
- z-axis – vertical.

5.0 NOISE & VIBRATION SURVEY RESULTS

5.1 The measured noise levels at Locations 1 - 4 (expressed as L_{Aeq} and L_{Amax}) are shown graphically in Appendix B. The measured average (L_{eq}) data values have been combined to generate the overall 16 hour daytime and 8 hour night-time free field levels; these are shown in Tables 4 - 7 below. 24 Acoustics take the typical L_{Amax} value to be the 10th highest value.

Date and Time	Daytime	Night-time	
	dB $L_{Aeq, 16\ hour}$	**dB $L_{Aeq, 8\ hour}$**	**dB $L_{Amax,f}$**
Tuesday 7/11/2023	68	57	82
Wednesday 8/11/2023	68	57	82
Thursday 9/11/2023	69	57	84
Friday 10/11/2023	69	56	82
Saturday 11/11/2023	68	57	83
Sunday 12/11/2023	66	53	78
Monday 13/11/2023	-	57	83
Tuesday 14/11/2023	68	59	84
Wednesday 15/11/2023	70	-	-
Representative	**68**	**57**	**84**

Table 4: Noise Survey Results, Location 1 * partial measurement

Date and Time	Daytime	Night-time	
	dB $L_{Aeq, 16\ hour}$	**dB $L_{Aeq, 8\ hour}$**	**dB $L_{Amax,f}$**
Tuesday 7/11/2023	48	40	55
Wednesday 8/11/2023	46	39	53
Thursday 9/11/2023	49	40	55
Friday 10/11/2023	50	38	55
Saturday 11/11/2023	49	38	58
Sunday 12/11/2023	49	32	49
Monday 13/11/2023	-	47	60
Tuesday 14/11/2023	50	40	54
Wednesday 15/11/2023	51	-	-
Representative	**50**	**39**	**60**

Table 5: Noise Survey Results, Location 2 * partial measurement

Date and Time	Daytime	Night-time	
	dB $L_{Aeq, 16\ hour}$	dB $L_{Aeq, 8\ hour}$	dB $L_{Amax,f}$
Tuesday 7/11/2023	61	53	77
Wednesday 8/11/2023	61	53	77
Thursday 9/11/2023	62	53	77
Friday 10/11/2023	62	52	77
Saturday 11/11/2023	62	51	77
Sunday 12/11/2023	60	46	74
Monday 13/11/2023	-	54	77
Tuesday 14/11/2023	62	51	73
Representative	**61**	**51**	**77**

Table 6: Noise Survey Results, Location 3 * partial measurement

Date and Time	Daytime	Night-time	
	dB $L_{Aeq, 16\ hour}$	dB $L_{Aeq, 8\ hour}$	dB $L_{Amax,f}$
Tuesday 7/11/2023	50	50	57
Wednesday 8/11/2023	51	49	54
Thursday 9/11/2023	50	54	67
Friday 10/11/2023	50	50	59
Saturday 11/11/2023	50	34	53
Sunday 12/11/2023	49	48	43
Monday 13/11/2023	-	52	68
Tuesday 14/11/2023	53	-	-
Representative	**50**	**47**	**67**

Table 7: Noise Survey Results, Location 4 * partial measurement

Vibration

5.2 Measured Vibration Dose Values at Locations 3 and 4 are shown graphically in Appendix C and are summarised in Tables 8 and 9 for Locations 3 and 4 respectively.

Date	Period	Direction of Motion and Vibration Dose Value, $m.s^{-1.75}$		
		X	Y	Z
Tuesday 7/11/2023	Day	0.0059	0.0060	0.0333
	Night	0.0048	0.0043	0.0282
Wednesday 8/11/2023	Day	0.0066	0.0055	0.0347
	Night	0.0394	0.0043	0.0275
Thursday 9/11/2023	Day	0.0071	0.0063	0.0380
	Night	0.0048	0.0045	0.0271
Friday 10/11/2023	Day	0.0065	0.0052	0.0317
	Night	0.0042	0.0043	0.0191
Saturday 11/11/2023	Day	0.0068	0.0057	0.0348
	Night	0.0019	0.0014	0.0069
Sunday 12/11/2023	Day	0.0056	0.0046	0.0289
	Night	0.0041	0.0035	0.0231
Monday 13/11/2023	Day	0.0070	0.0059	0.0393
	Night	0.0047	0.0047	0.0302
Tuesday 14/11/2023	Day	0.0064	0.0051	0.0331
	Night	0.0018	0.0014	0.0067

Table 8: Daytime and Night-time Vibration Survey Results – Location 3

Date	Period	Direction of Motion and Vibration Dose Value, $m.s^{-1.75}$		
		X	Y	Z
Tuesday 7/11/2023	Day	0.0056	0.0061	0.0351
	Night	0.0039	0.0049	0.0251
Wednesday 8/11/2023	Day	0.0063	0.0069	0.0424
	Night	0.0042	0.0051	0.0269
Thursday 9/11/2023	Day	0.0067	0.0081	0.0489
	Night	0.0046	0.0059	0.0291
Friday 10/11/2023	Day	0.0053	0.0061	0.0386
	Night	0.0028	0.0039	0.0167
Saturday 11/11/2023	Day	0.0059	0.0075	0.0476
	Night	0.0010	0.0052	0.0012
Sunday 12/11/2023	Day	0.0050	0.0058	0.0364
	Night	0.0035	0.0045	0.0235
Monday 13/11/2023	Day	0.0059	0.0070	0.0501
	Night	0.0077	0.0104	0.0558
Tuesday 14/11/2023	Day	0.0047	0.0055	0.0333

Table 9: Daytime and Night-time Vibration Survey Results – Location 4

6.0 NOISE ASSESSMENT AND OUTLINE MITIGATION

Road Traffic Noise

6.1 Noise has been taken into account in development of the masterplan, with residential properties set back from Humber Doucy Lane and Tuddenham Road with properties facing towards the road. This will allow dwellings to screen rear gardens from road traffic noise.

6.2 An acoustic model of the site has been developed to determine the noise levels across the site from road traffic and railway noise.

6.3 Figures 2 and 3 show the predicted L_{Aeq} noise contours across the proposed development site for the daytime, at a height of 1.5 m above local grade, and night-time at a height of 4 m above local grade.

6.4 Measured noise levels immediately adjacent to Humber Doucy Lane and to a lesser extent Tuddenham Road are moderately high but fall off with distance from the road. Noise mitigation measures in the form of acoustic glazing and alternative means of ventilation may be required for proposed residential dwellings adjacent to the road network to allow acceptable internal noise levels to be achieved. Full acoustic specifications for any noise mitigation required will be provided at the detailed design stage.

6.5 The increase in noise level from road traffic, as a result of the projected future traffic flows has been assessed in accordance with the guidance of CRTN and the DMRB. The calculations have been based upon the baseline and projected flows provided by the project transportation consultants (RSK) for the following scenarios:

- Baseline year (2023) – The baseline prior to the commencement of the development;
- 2026 Baseline without the development – The future baseline including committed developments, without the development;
- 2032 Future with the development - The future 2032 baseline including committed developments, with the whole of the development.

6.6 The above scenarios have been selected in order to assess the increase in noise level from road traffic due to the development, compared to the current (2023) baseline. The 2032 scenario has been selected to show a worst-case scenario for 2032, with the whole of the development completed. The future scenarios include other committed developments, to allow cumulative effects to be assessed.

6.7 Calculations of the change in road traffic noise level from the 2023 baseline case, as a result of the additional vehicle movements projected for the future scenarios with the development are shown in Table 10.

Road Section	Predicted Change in $L_{A10,18hr}$ From 2023 Baseline, dB	
	2026 without development	2032 with the development
Tuddenham Road North of HDL	0.1	0.5
Tuddenham Road South of HDL	0.1	1.0
HDL west of Sidegate Lane	0.2	2.1
HDL east of Sidegate Lane	0.1	1.6
Sidegate Lane	0.1	0.4

Table 10: Classification of Magnitude of Noise Impacts in the Long-term

6.8 The maximum anticipated increase in traffic noise levels due to the development along with the 2032 baseline, which includes cumulative developments, is 2.1 dB $L_{A10,18hr}$. As assessed in accordance with Table 3, this is considered a negligible impact in the long term.

Railway Noise

6.9 Proposed properties adjacent to the railway line are set back from it and will face towards the railway line, allowing dwellings to screen rear gardens. Measured noise levels from the railway are such that no noise mitigation measures are likely to be required in this area.

6.10 As requested by East Suffolk Council, consideration has been given to the potential for increased train movements associated with the consented Sizewell C power station. It is understood that Sizewell B is due to be decommissioned in 2035 and that Sizewell C is unlikely to be operational before that date. The existing Sizewell B power station comprises a single reactor with two reactors planned for Sizewell C.

6.11 A summary of all train movements during the noise survey period is provided in Appendix D. There are currently up to five freight train movements and up to 38 train movements in total per day. Freight trains associated with the operation of Sizewell B power station comprise no more than one freight train movement per weekday at 17:07. Assuming that the future Sizewell C power station generates twice the number of freight train movements as Sizewell B, given the low number of movements relative to the total number of movements, noise levels are unlikely to increase to the level where noise mitigation measures would be required. However, at the detailed design stage, any updated information available in relation to Sizewell C shall be taken into account when noise mitigation measures are finalised.

Rugby Club

6.12 Training and matches take place on weekday evenings until approximately 21:00 with training and matches on both Saturdays and Sundays between approximately 09:00 and 15:00.

6.13 Audio recording at Location 2 indicates noise from training and match activity at the rugby club including cheering and use of whistles with noise levels up to 62 dB $L_{Aeq,\ 5\ min}$.

6.14 The clubhouse houses a bar and is available for event bookings. No amplified music events from the clubhouse were evident during the survey period.

6.15 The site masterplan includes a buffer zone between the club house, pitches and proposed properties. Dwellings will face towards the rugby club and rear gardens will therefore be screened from any potential noise.

6.16 For properties adjacent to the rugby clubhouse, it will be necessary to provide noise mitigation measures to ensure acceptable internal noise levels are achieved. This is likely to include acoustic glazing and enhanced ventilation systems. Full acoustic specifications for any noise mitigation required will be provided during the detailed design of the development.

Westerfield House Care Home

6.17 During the noise survey, roof construction works were underway at the extension to Westerfield House to the west of the site. On-site observations indicate no significant noise from extract or ventilation plant associated with the care home use.

6.18 Planning consent has been granted for development of a 147 unit care home with two associated staff dwellings within the boundary of Westerfield House (22/00054/REM). The extent of this can be seen in the parameter plan shown in Figure 2.

Tuddenham Business Centre

6.19 Former outbuildings to Westerfield House are in use as small commercial units as Tuddenham Business Centre. The only business observed to be operational at the time of the survey was a veterinary practice, Christchurch Veterinary Referrals. No significant noise sources were evident.

6.20 It is understood that the original planning consent for the business centre permits former Class B1 and storage use only. Former B1 use includes offices or light industrial use which can be carried out in any residential area without detriment by reason of noise.

6.21 There are existing residential properties to the south and west of the business centre and for these reasons, it is considered that this business centre is unlikely to result in any significant noise impact for the proposed development.

7.0 VIBRATION ASSESSMENT

Railway Vibration

7.1 As a representative screening tool, VDV levels measured on the internal ground floor of a building can be up to twice the measured free field level, in the vertical axis and up to four times on the first floor. This is as a result of the floors within the building amplifying the forcing vibration, although this will depend upon the housing construction type and forcing frequency. To provide a robust scenario, these multiplying factors have been applied to the derived daytime and night-time VDV values for Locations 3 and 4.

7.2 Daytime and night-time internal VDVs at Locations 3 and 4 are summarised in Table 11. The probability of adverse comment is also presented for reference.

Location	**Indicative Worst Case Internal VDV ($ms^{-1.75}$)**	
	Daytime – Ground Floor (07:00 To 23:00 Hours)	**Night-Time – First Floor (23:00 To 07:00 Hours)**
Location 3 Internal Floor	0.08 – Less than Low Probability of Adverse Comment	0.16 - Low Probability of Adverse Comment
Location 4 Internal Floor	0.10 – Less than Low Probability of Adverse Comment	0.12 - Low Probability of Adverse Comment

Table 11: Internal Daytime and Night-Time VDVs

7.3 The results presented in Table 11 indicate that at both measurement locations, there would be a low probability of adverse comment when assessed in accordance with BS 6472. On this basis, a low probability of adverse comment is anticipated, and no building isolation is anticipated.

8.0 CONCLUSIONS

8.1 24 Acoustics Ltd has been instructed by BDW Eastern Counties and Hopkins Homes Limited to obtain ambient noise and vibration levels at a proposed development site at land north-east of Humber Doucy Lane, Ipswich.

8.2 An environmental noise and vibration survey has been undertaken to determine the existing ambient noise levels due to road traffic and a nearby railway line and Ipswich Rugby Club.

8.3 Based on the measured noise levels, outline mitigation recommendations have been provided to ensure that suitable noise criteria are achieved within the new development.

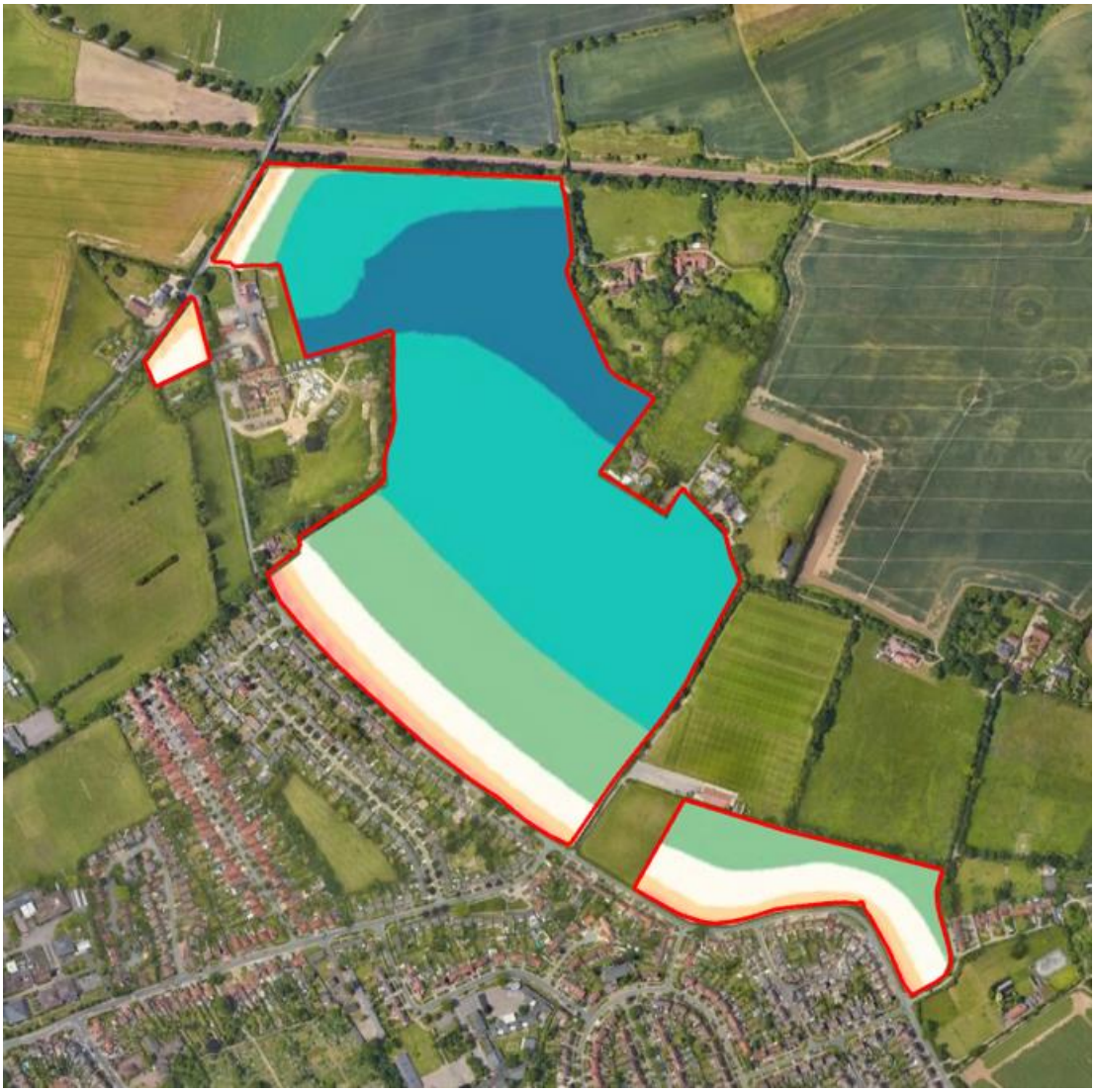
8.4 Subject to appropriate mitigation, it is considered that an appropriate acoustic environment can be provided at the proposed residential properties.

Project: Land North-East of Humber Doucy Lane, Ipswich	**Title**: Site Boundary and Noise Measurement Locations	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev**: -
Date: January 2024	**Drawn By:** AR	**Job No**: 10268-1

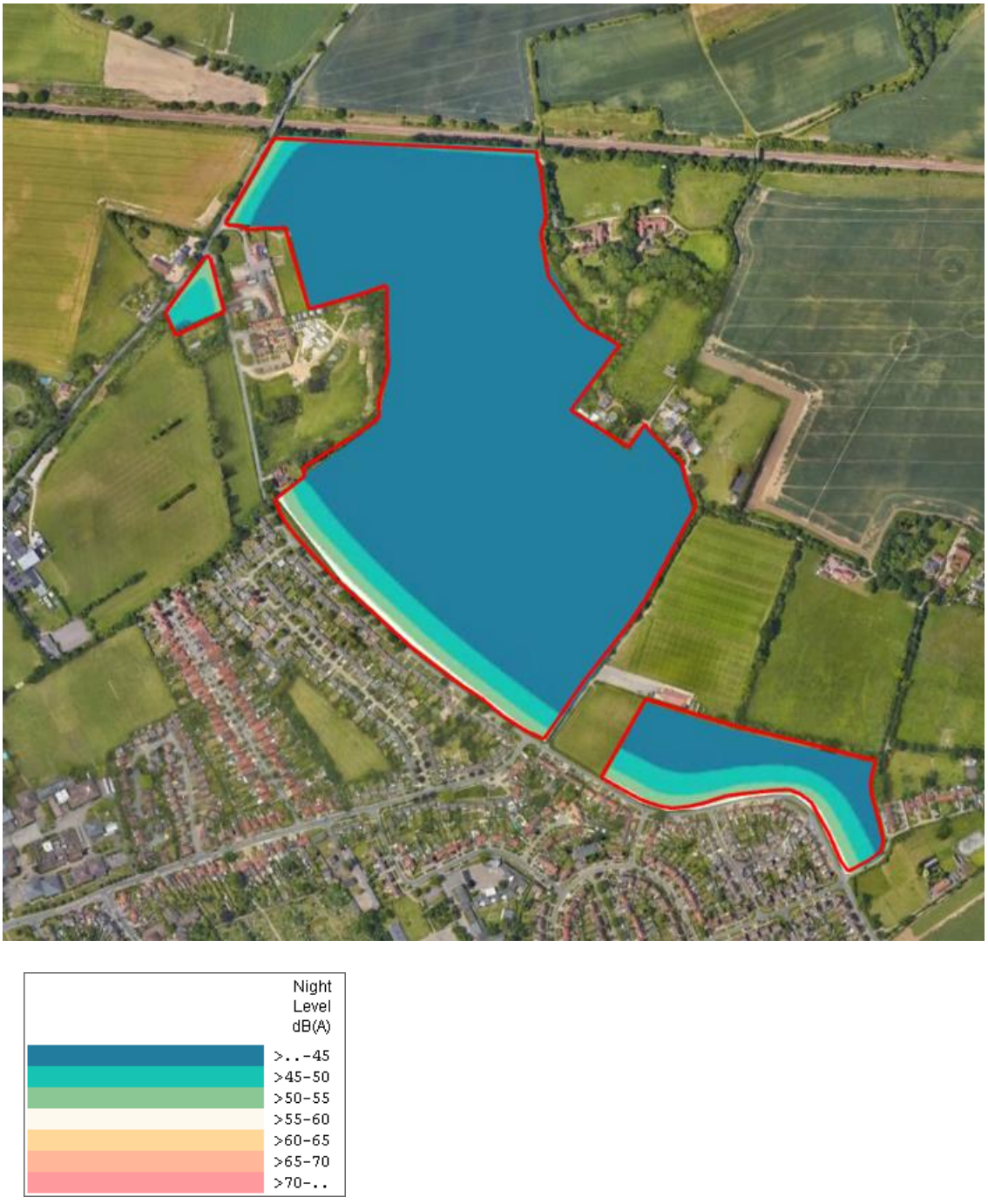
Key

- Outline application boundary
- Development parcel for residential uses* (2)
- Mixed use development parcel* (2)
- Public open space inclusive of existing vegetation and ancillary infrastructure (i.e., drainage, access roads, pedestrian and cycle routes, local green spaces, play and recreation spaces)

Project: Land North-East of Humber Doucy Lane, Ipswich	**Title**: Site Parameter Plan	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev**: -
Date: February 2024	**Drawn By:** AR	**Job No**: 10268-1



Project: Land North-East of Humber Doucy Lane, Ipswich	**Title**: Daytime (07:00–23:00) Noise Contours, dB $L_{Aeq,\ 16\ hr}$	
DWG No: Figure 3	**Scale:** N.T.S.	**Rev**: -
Date: January 2024	**Drawn By:** AR	**Job No**: 10268-1



Project: Land North-East of Humber Doucy Lane, Ipswich	**Title**: Night time (23:00–07:00) Noise Contours, dB $L_{Aeq, 8\ hr}$	
DWG No: Figure 4	**Scale:** N.T.S.	**Rev**: -
Date: January 2024	**Drawn By:** AR	**Job No**: 10268-1

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 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB 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 internal, 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 – NOISE MEASUREMENT RESULTS

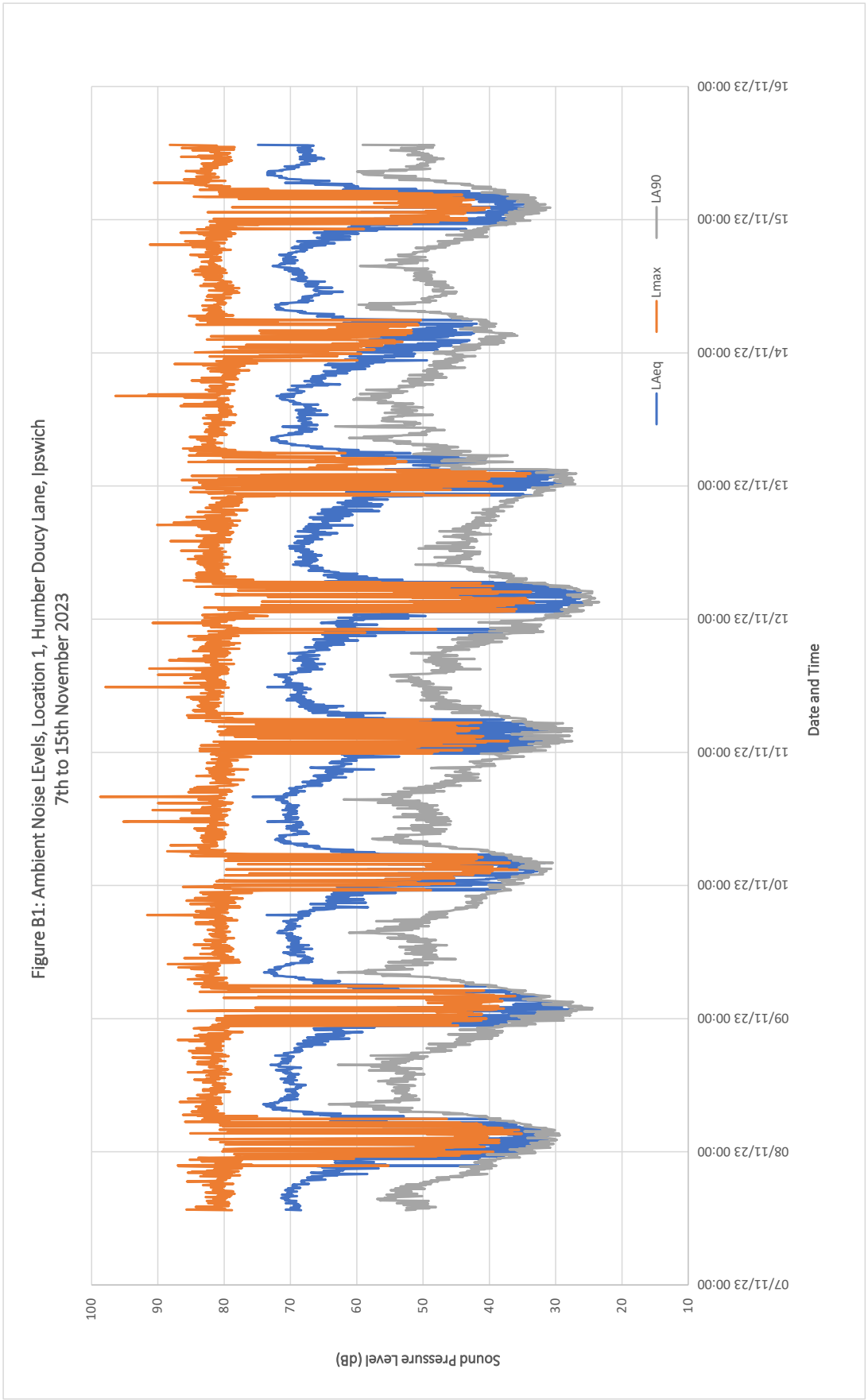


Figure B1: Ambient Noise LEvels, Location 1, Humber Doucy Lane, Ipswich
7th to 15th November 2023

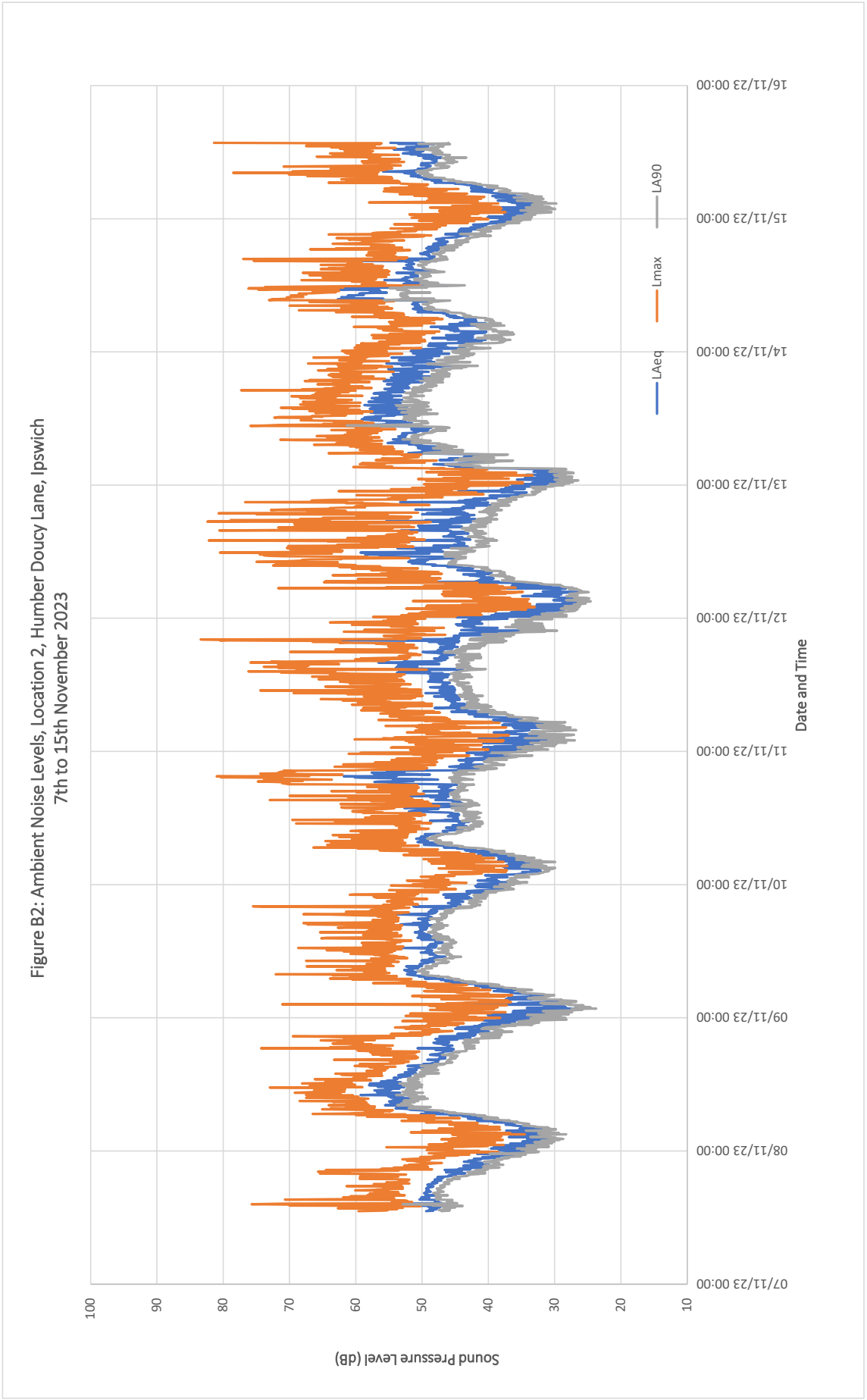


Figure B2: Ambient Noise Levels, Location 2, Humber Doucy Lane, Ipswich
7th to 15th November 2023
LAeq
Lmax
LA90
Sound Pressure Level (dB)
100
90
80
70
60
50
40
30
20
10
Date and Time
07/11/23 00:00
08/11/23 00:00
09/11/23 00:00
10/11/23 00:00
11/11/23 00:00
12/11/23 00:00
13/11/23 00:00
14/11/23 00:00
15/11/23 00:00
16/11/23 00:00

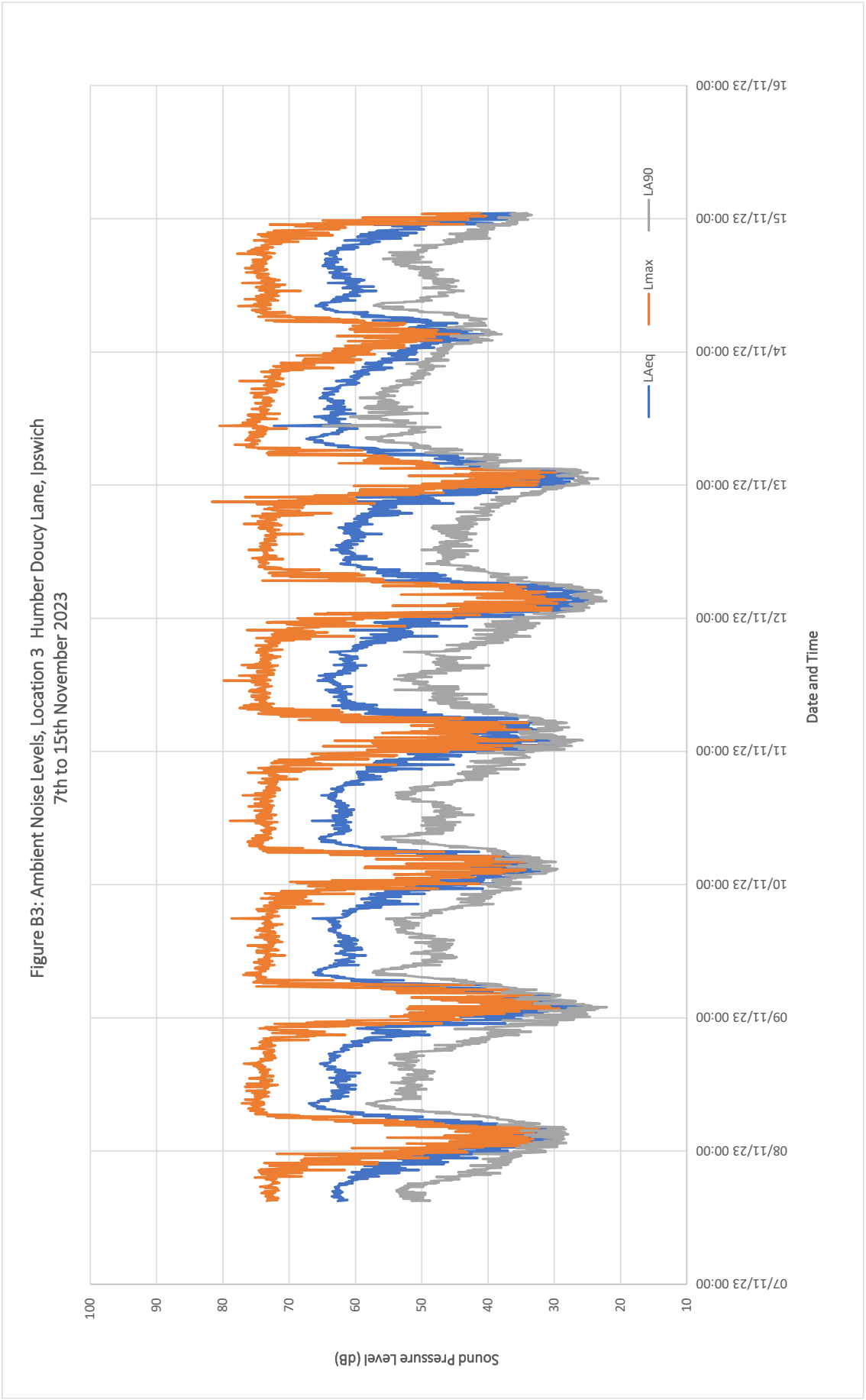


Figure B3: Ambient Noise Levels, Location 3 Humber Doucy Lane, Ipswich
7th to 15th November 2023
LA90
Lmax
LAeq
Sound Pressure Level (dB)
100
90
80
70
60
50
40
30
20
10
Date and Time
07/11/23 00:00
08/11/23 00:00
09/11/23 00:00
10/11/23 00:00
11/11/23 00:00
12/11/23 00:00
13/11/23 00:00
14/11/23 00:00
15/11/23 00:00
16/11/23 00:00

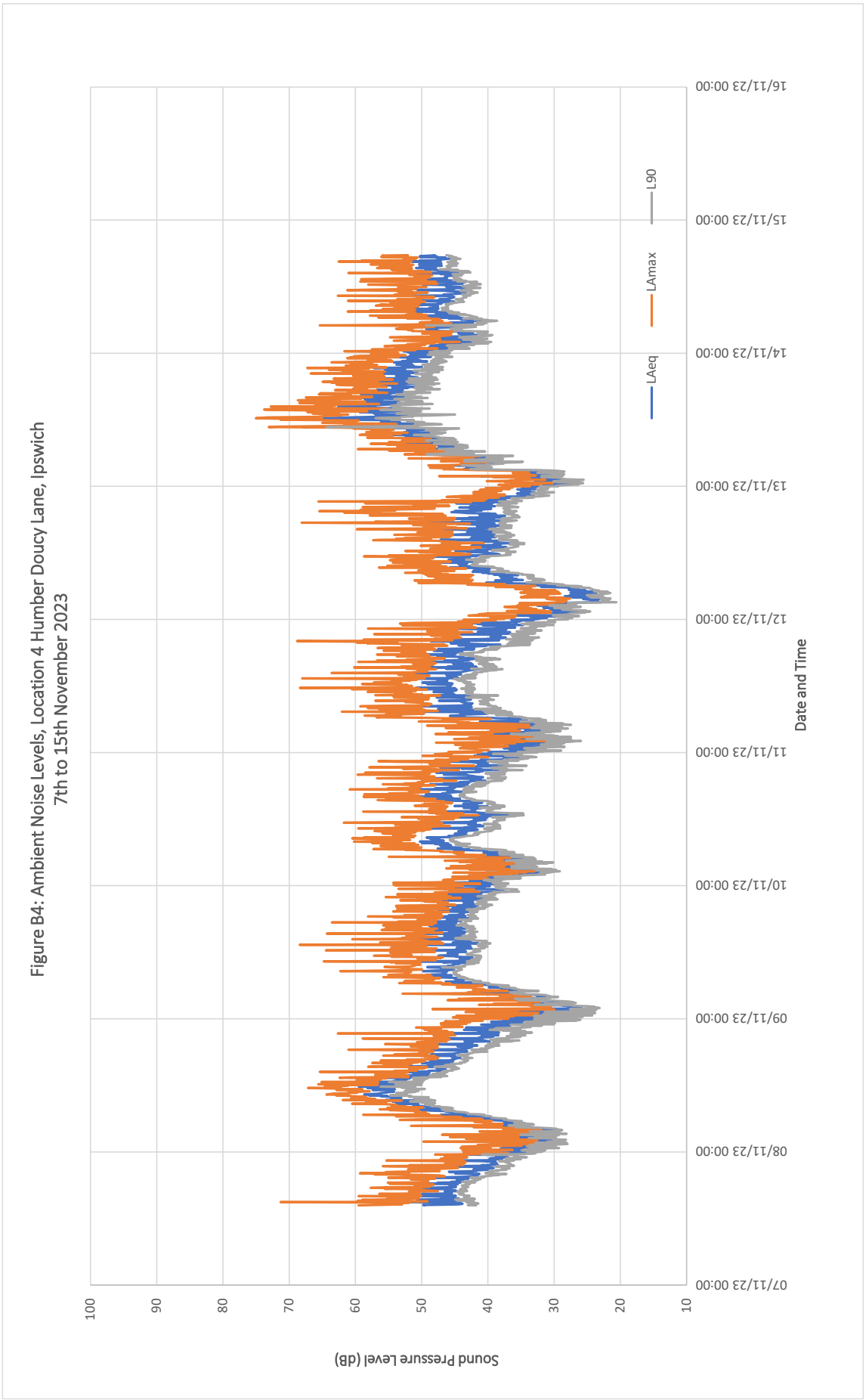


Figure B4: Ambient Noise Levels, Location 4 Humber Doucy Lane, Ipswich
7th to 15th November 2023
L90
LAmax
LAeq
Sound Pressure Level (dB)
100
90
80
70
60
50
40
30
20
10
Date and Time
07/11/23 00:00
08/11/23 00:00
09/11/23 00:00
10/11/23 00:00
11/11/23 00:00
12/11/23 00:00
13/11/23 00:00
14/11/23 00:00
15/11/23 00:00
16/11/23 00:00

APPENDIX C – VIBRATION SURVEY RESULTS

**Figure C1: Measured Vibration Levels, Location 3,
Land North of Humber Doucy Lane, Ipswich 7th - 15th November 2023**

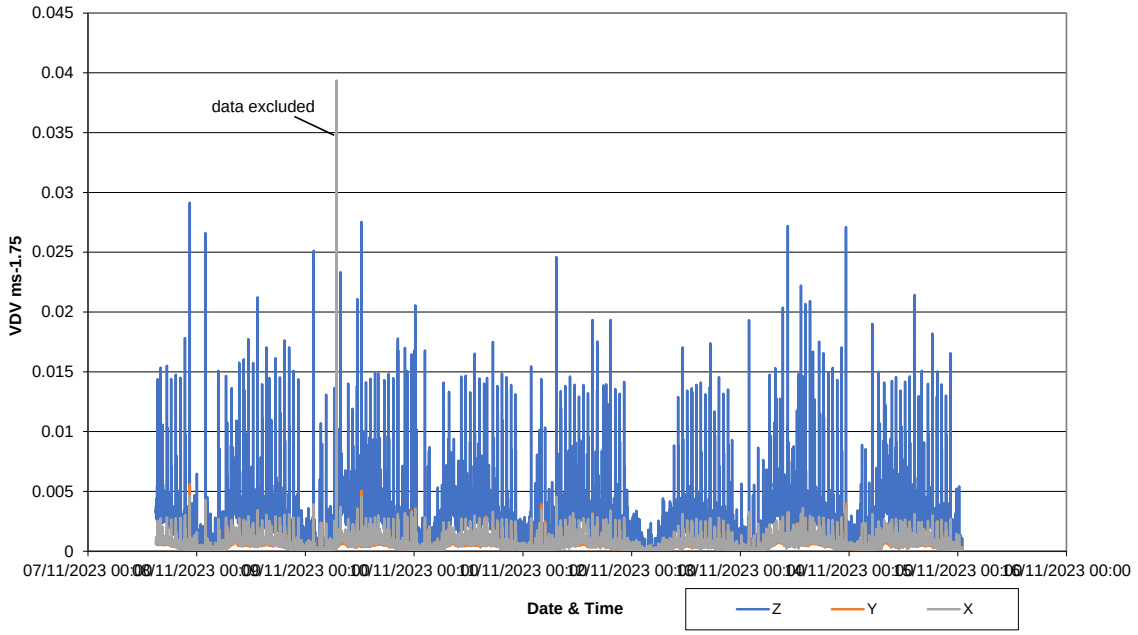
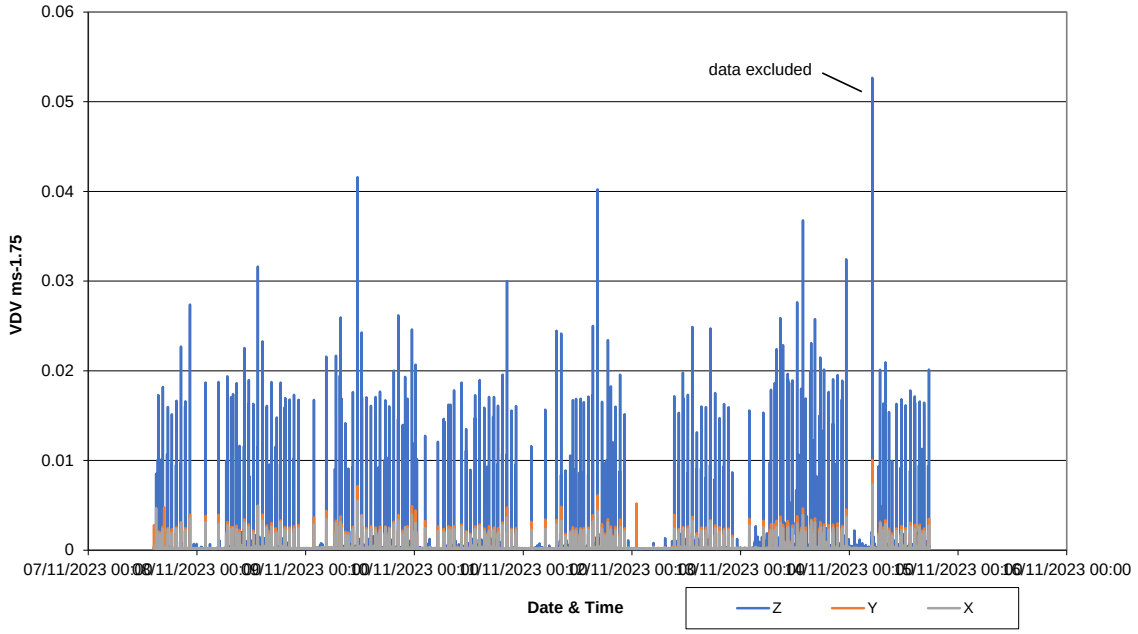


**Figure C2: Measured Vibration Levels, Location 4,
Land North of Humber Doucy Lane, Ipswich, 7th - 15th November 2023**



APPENDIX D – SUMMARY OF TRAIN MOVEMENTS

		All Trains	Freight	Sizewell
Tues	07-Nov-23	37	4	1
Wed	08-Nov-23	37	4	1
Thu	09-Nov-23	38	5	1
Fri	10-Nov-23	37	4	1
Sat	11-Nov-23	34	2	0
Sun	12-Nov-23	26	0	0
Mon	13-Nov-23	36	3	0
Tues	14-Nov-23	33	0	0
Wed	15-Nov-23	37	4	1