Our ref: NIA/10150/22/10264/v3/Lindley Moor Road

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Dear Sir

NOISE IMPACT ASSESSMENT FOR PROPOSED COMMERCIAL DEVELOPMENT
LAND AT LINDLEY MOOR ROAD, LINDLEY, HUDDERSFIELD, HD3 3SX

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Ltd (ENS) has been commissioned by Martin Walsh Architectural to carry out a noise impact assessment as part of a hybrid planning application for the proposed commercial development at land at Lindley Moor Road, Lindley, Huddersfield, HD3 3SX (hereafter referred to as the application site).

1.02 The objectives for the noise impact assessment were as follows:

- Establish the ambient and background noise levels at the application site and its surrounding environs
- Establish the potential noise emissions associated with the proposed development
- Assess the potential noise impact of the proposed development on the nearest noise sensitive receptors (surrounding residential uses) in accordance with the National Planning Policy Framework (NPPF) and other pertinent guidance
- If appropriate, provide recommendations with respect to management and/or structural controls and appropriately worded planning conditions to mitigate and control the potential noise impact of the proposed development

1.03 This report details the methodology and results of the noise impact assessment. It has been prepared to accompany a hybrid planning application to be submitted to Kirklees Council for the proposed development of the application site.

1.04 This report has been prepared for Martin Walsh Architectural for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Martin Walsh Architectural and ENS as to the extent to which the findings may be appropriate for their use.

1.05 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

2.00 APPLICATION SITE SETTING AND PROPOSED COMMERCIAL DEVELOPMENT

2.01 The application site is located in a mixed-use area consisting of residential and industrial / commercial use. Roughly rectangular in shape, it is bound by (see Appendix 2):

- The A643 Lindley Moor Road to the north, with the M62 motorway further beyond
- Crosland Road to the west
- Weatherhill Road to the east
- Residential dwellings on Alderstone Rise and Haigh Road to the south

2.02 The nearest noise sensitive receptors (NSRs) are considered to be:

- Residential dwellings on Haigh Road to the south (NSR1)
- Residential dwellings on Alderstone Rise to the south (NSR2)
- Residential dwellings on Ainley Road to the east (NSR3)
- Residential dwellings on Stirling Wood Close to the east (NSR4)

2.03 Development proposals across the application site are for a mixed-use commercial development comprising 15 no. units with associated access roads, service yards, car parking and landscaping. The units are as follows:

Unit A – Class B2 warehouse (525 m^2 GIA)
Unit C – Class A3 restaurant (908 m^2 GIA)
Unit D – Class B8 trade counter (260 m^2 GIA)
Unit DA – Class B8 trade counter (330 m^2 GIA)
Unit E – Class B8 trade counter (525 m^2 GIA)
Unit F – Class B8/B1 warehouse (2572 m^2 GIA)
Unit G – Class B8/B1 warehouse (2807 m^2 GIA)
Unit H – Class B8/B2 warehouse (471 m^2 GIA)
Unit I – Class B8/B2 warehouse (471 m^2 GIA)
Unit J – Class B8/B2 warehouse (471 m^2 GIA)
Unit K – Class B8/B2 warehouse (471 m^2 GIA)
Unit L – Class B8/B2 warehouse (471 m^2 GIA)
Unit M – Class B8/B2 warehouse (846 m^2 GIA)
Unit N – Class B8/B2 warehouse (921 m^2 GIA)
Unit P – Class B8/B1/B2 warehouse (4769 m^2 GIA)

2.04 Full planning permission is sought for Unit P and the site access roads. The final occupant of unit P is currently unknown.

2.05 It is assumed that internal operations at Unit P will be 24/7, with yard activities only taking place between 07:00–18:00 hrs.

2.06 Outline planning permission is sought for the remaining units, and as a consequence, the wider layout plan is preliminary, although it should be noted that the access road forms part of the detailed proposal and that this will dictate the layout to an extent (see Appendix 3 for site layout).

2.07 Notwithstanding this, the objective of the noise impact assessment is to assess whether the ambient noise climate represents a constraint to the proposed development, and the recommendations contained within this assessment can be refined at reserved matters stage once the layout is finalised.

2.08 In relation to relevant planning history at the application site, it is noted that outline planning permission (ref: 2013/60/93433/W) for a previous B1/B2/B8 development was granted by Kirklees Council in April 2014. It is therefore evident that the principle of commercial development at the application site has been established.

3.00 BASELINE NOISE SURVEY

3.01 In order to establish the ambient and background noise levels at the application site and its surrounding environs, a baseline noise survey was undertaken on Tuesday 30th June through to Wednesday 1st July 2020.

3.02 For the purpose of the assessment, the following noise monitoring positions were adopted (see Appendix 2 for approximate monitoring positions):

- MP1 was located in the vicinity of residential dwellings on Haigh Road (NSR1)
- MP2 was located in the vicinity of residential dwellings on Alderstone Rise (NSR2)
- MP3 was located in the vicinity of residential dwellings on Ainley Road (NSR3)
- MP4 was located in the vicinity of residential dwellings on Stirling Wood Close (NSR4)

3.03 Noise measurements were undertaken in free field conditions, at a height of 1.5 metres above local ground level, using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the survey were appropriate for monitoring.

3.04 Measurements consisted of A–weighted broadband parameters, together with linear octave band L_{eq} levels. The following table contains a summary of the measurement data for each measurement session, at each monitoring position, rounded to the nearest decibel.

Table 3.1 – Summary of Noise Measurement Data at Application site

Position	Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	Comments
MP1	30/06/20	1221–1237	57	53	Road traffic on Crosland Road and M62 motorway
MP1	30/06/20	1358–1413	56	52	
MP1	01/07/20	0008–0023	47	43	
MP1	01/07/20	0132–0150	45	38	
Daytime ambient and background noise level 56–57 dB L_{Aeq} and 52–53 dB L_{A90}, respectively Night-time ambient and background noise level of 45–47 dB L_{Aeq} and 38–43 dB L_{A90}, respectively					
MP2	30/06/20	1240–1310	57	52	Road traffic on A643 Lindley Moor Road and M62 motorway
MP2	30/06/20	1415–1430	56	52	
MP2	01/07/20	0026–0040	43	40	
Daytime ambient and background noise level 56–57 dB L_{Aeq} and 52 dB L_{A90}, respectively Night-time ambient and background noise level of 43 dB L_{Aeq} and 40 dB L_{A90}, respectively					
MP3	30/06/20	1314–1329	54	51	Road traffic on Weatherhill Road and M62 motorway
MP3	30/06/20	1434–1504	54	50	
MP3	01/07/20	0045–0101	42	38	
MP3	01/07/20	0156–0212	43	38	
Daytime ambient and background noise level 54 dB L_{Aeq} and 50–51 dB L_{A90}, respectively Night-time ambient and background noise level of 42–43 dB L_{Aeq} and 38 dB L_{A90}, respectively					
MP4	30/06/20	1507–1522	65	57	Road traffic on A643 Lindley Moor Road and M62 motorway
MP4	30/06/20	0104–0115	53	38	
Daytime ambient and background noise level 65 dB L_{Aeq} and 57 dB L_{A90}, respectively Night-time ambient and background noise level of 53 dB L_{Aeq} and 38 dB L_{A90}, respectively					

3.05 The noise climate in the vicinity of the nearest dwellings was characterised by local traffic on surrounding roads and distant traffic on the M62 motorway.

3.06 Background noise levels adjacent to the southern boundary of the application site (MP1, MP2 and MP3) were broadly comparable during the daytime, whereas background noise levels at MP4 were slightly higher due to the influence of the A643 Lindley Moor Road. Night-time background noise levels were consistent across all monitoring positions, and were wholly due to distant M62 traffic.

3.07 Worst case (lowest) daytime and night-time background noise levels at the nearest receptors are **50 dB $L_{A90,\,T}$** and **38 dB $L_{A90,\,T}$** respectively.

4.00 NOISE IMPACT ASSESSMENT CRITERIA

National Planning Policy Framework

4.01 The National Planning Policy Framework (NPPF) was updated in December 2023 and sets out the Government's planning policies for England and how these are expected to be applied.

4.02 Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 180 where it states that planning policies and decisions should contribute to and enhance the natural and local environment by:

'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of…..noise pollution'.

4.03 Paragraph 191 advises that:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should…..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 the quality of life'.

4.04 The NPPF also refers to the 2010 DEFRA publication, the Noise Policy Statement for England (NPSE) which reinforces and supplements the NPPF.

Noise Policy Statement for England

4.05 The Noise Policy Statement for England (NPSE) sets out the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This long-term vision 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.
- Where possible, contribute to the improvement of health and quality of life.

4.06 NPSE describes the following levels at which noise impacts may be identified:

- NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.

Planning Practice Guidance – Noise

4.07 Planning Practice Guidance on Noise (PPG) is an online resource (as updated October 2019) which provides additional guidance and elaboration on the NPPF. It advises that the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur.
- Whether or not an adverse effect is occurring or likely to occur.
- Whether or not a good standard of amenity can be achieved.

4.08 In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome.

4.09 Table 4.1 summarises the noise exposure hierarchy, based on the likely average response.

Table 4.1 – Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level (NOEL)			
Not Noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level (NOAEL)			
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

4.10 However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

'…the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation'.

4.11 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

'Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed'.

4.12 With cognisance to this, further useful contextual guidance is taken from British Standard BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142).

BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound

4.13 BS 4142 describes methods for determining, at the outside of a building, noise levels from factories or industrial premises and a method for assessing whether the noise is likely to give rise to adverse impacts, and states:

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. Typically, the greater this difference, the greater the magnitude of the impact. For example:

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context*

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the absolute level of sound.

4.14 The reference time interval of the specific sound is 1 hour during the daytime and 15 minutes during the night-time.

4.15 The background sound level is the A-weighted sound pressure level of the residual sound at the assessment position that is exceeded for 90 percent of a given time interval, T, measured using time weighting 'F' and quoted to the nearest whole number of decibels. The residual sound is described as the ambient sound remaining in a given position in a given situation when the specific sound source is suppressed to a degree such that it does not contribute to the ambient sound.

4.16 The rating level is described as the specific sound level (the equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific sound source over the given reference time interval) plus any adjustment for the characteristic features of the sound. The character correction relates to whether and to what degree the specific sound is assessed to have an element of tonality, impulsivity and/or characteristics that are readily distinctive against the residual acoustic environment

5.00 NOISE IMPACT ASSESSMENT FOR UNIT P (DETAILED)

5.01 The principal noise sources potentially associated with Unit P are considered to be:

- Noise break-out from internal activities
- Noise associated with service yard activity

5.02 The following sections of the noise impact assessment discuss the potential noise impacts of the above activities on the amenity of the nearest residential dwellings.

Noise Break-Out from Internal Activities

5.03 Detailed drawings show the gable end of Unit P is south facing and circa 25 metres from Alderstone Rise (NSR2). In relation to Use Class B2 (general industrial) units, ENS has previously measured internal reverberant noise levels of **80 dB $L_{Aeq\ (15\ min)}$** within steel fabricators (due to fork lift movements, fabrication works such as welding, grinding etc).

5.04 For assessment purposes it is assumed that this level is maintained constantly for the duration of the assessment.

5.05 It is recommended that the southern façade of Unit P (i.e. the façade facing the nearest noise sensitive receptor) is upgraded with an additional internal plasterboard lining. Standard insulated cladding with an additional internal lining has a weighted sound reduction index of circa **45 dB R_w**.

5.06 In order to predict noise emissions associated with internal operations within Unit P, the following relationship may be employed:

$SPL_{EXT} = SPL_{REV} – R_w – DA – 6$

where:

SPL_{EXT} is the free field sound pressure level at the nearest noise sensitive receptor (dB L_{Aeq})
SPL_{REV} is the reverberant sound pressure level inside the proposed development (dB L_{Aeq})
R_w is the composite sound reduction index (SRI) of the of the façade facing the receptor
DA is the distance attenuation of noise
'– 6' relates to a transition from an internal reverberant sound field to an external sound field

5.07 For the purpose of the calculations,

- The indoor reverberant noise level within a B2 Use Class warehouse has been taken as 80 dB $L_{Aeq\ (15\ min)}$
- The SRI of the warehouse is taken as 45 dB R_w, based on the sound reduction performance of insulated panels with an additional lining
- Distance attenuation to the nearest receptor is calculated using the Rathé Method at 12 decibels

5.08 Processing the above, the resultant sound pressure level at the nearest noise sensitive receptor due to internal operations within the unit is calculated at **17 dB $L_{Aeq\ (15\ min)}$**.

5.09 Such external noise levels are significantly below night-time background levels and very low in absolute terms[1].

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1 The World Health Organisation's Night Noise Guidelines for Europe considers that below 40 dB LAeq (2300–0700) outside represents the Lowest Observed Adverse Effect Level.

5.10 BS 4142 requires that an adjustment can be made for the characteristic features of the sound, however, the predicted specific level is significantly (at least 21 dB) below existing night-time background noise levels and therefore likely to be subjectively inaudible. In this instance a BS4142 'acoustic feature' correction is not warranted.

5.11 On the basis of the above, Table 5.1 contains daytime and night-time BS 4142 assessment for internal operations at the nearest noise sensitive receptors.

Table 5.1: BS 4142 Assessment for Internal Operations

Results	Daytime	Night-Time	Comments
Specific noise level	17 dB $L_{Aeq\ (1\ hour)}$	17 dB $L_{Aeq\ (15\ min)}$	Breakout noise level at nearest receptor
Acoustic feature correction	0 dB	0 dB	Noise breakout is likely to be subjectively inaudible
Rating level	17 dB $L_{Ar\ (1\ hour)}$	17 dB $L_{Ar\ (15\ min)}$	-
Background sound level	50 dB $L_{A90\ (15\ min)}$	38 dB $L_{A90\ (15\ min)}$	Typical background sound level at NSRs
Excess of rating over background noise level	–33 dB	–21 dB	Indication of a low impact, depending on the context

5.12 The calculated rating noise level is 21 dB below the existing night-time background noise level. In accordance with BS 4142, this is an indication of a **low impact**, subject to context.

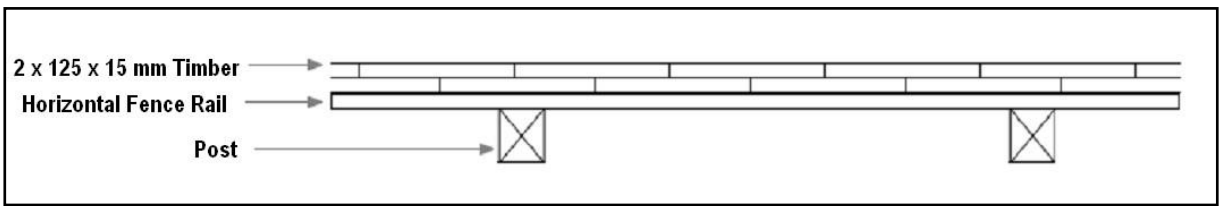
5.13 On the basis of the above, with the provision of an internal lining to the cladding on the southern elevation, the noise impact of internal operations within Unit P is considered to be negligible.

Noise Associated with External Operations

5.14 Topography data provided by the client indicates that the ground level of the service yard of Unit P is circa 4 metres above the ground level of the nearest residential dwellings to the south on Alderstone Rise.

5.15 In order to screen the Unit P service yard from the nearest NSRs, it is recommended that a 2-metre-high close-boarded acoustic fence is installed along the southern boundary of the service yard, returning north along the eastern boundary for circa 30 metres (see Appendix 2 for location of fence).

5.16 The acoustic fence should be built in double-thickness solid timber construction as illustrated below. The fence should have no gaps or holes and should be fully sealed at the ground (i.e. include a gravel board).



5.17 It is understood that service yard activities will take place during daytime hours only between 07:00–18:00 hrs. It is assumed that the unit would operate a single HGV for daily deliveries from the site utilising a forklift truck for loading.

5.18 ENS has previously measured the noise levels associated with FLT loading operations at up to **60 dB $L_{Aeq\ (15\ min)}$** at 10 metres.

5.19 In order to predict the resultant FLT loading noise levels at the nearest noise sensitive receptor, the following relationship may be employed:

$SPL_{NSR} = SPL_{REF} – DA – SA$ where

SPL_{NSR} is the resultant sound pressure level at the nearest noise sensitive receptor (dB)
SPL_{REF} is the sound pressure level at 10 metres (dB)
DA is the distance attenuation of noise
SA is the screening attenuation of noise

5.20 Distance attenuation (DA) is calculated as follows:

$DA = 20 \times \log (D_{source} / D_{rec})$ where,

D_{SOURCE} = distance to source (10 metres in this case)
D_{REC} = distance to receiver

5.21 Screening attenuation (SA) is calculated using the Maekawa barrier calculation in conjunction with the measured FLT loading noise data and the following barrier model inputs:

- Ground level at the NSRs is taken as a zero datum
- Receiver height is taken as 4.0 metres above datum (upper floor window)
- Source height is taken as 5.0 metres above datum (4.0 metres ground level difference plus 1.0 metre loading height)
- Barrier height is taken as 6.0 metres above datum (4.0 metres ground level difference plus 2-metre-high fence)

5.22 As shown in the Maekawa barrier calculation spreadsheet below, the screening attenuation afforded by the barrier will be circa **11 dB** to the nearest noise sensitive receptors.

Maekawa Barrier Calculation Spreadsheet – FLT Loading Operations

Calculation of Approximate Attenuation of a Thin Rigid Barrier

Octave band centre frequencies (Hz)	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**LAeq**	
Source octave analysis (dB)	69.8	67.6	60.0	56.0	55.8	54.2	53.6	49.4	44.5	**59.9**	
Wavelength (m)	10.8	5.4	2.7	1.4	0.7	0.3	0.2	0.1	0.0		
Path difference (m)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10		
Fresnel No. (40.δ/λ)	0.35	0.71	1.40	2.80	5.61	11.21	22.42	44.85	89.70		
Attenuation (dB) (Maekawa*)	5.3	5.7	6.4	7.6	9.3	11.5	14.1	16.8	19.7		
Distance attenuation (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Angle of view attenuation (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Level at receptor position (dB)	64.5	62.0	53.5	48.4	46.4	42.7	39.6	32.6	24.8		
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1		
Level at receptor position (dB LAeq)	25.1	35.8	37.4	39.8	43.2	42.7	40.8	33.6	23.7		
Broadband level at receptor (dB LAeq)										**48.7**	**11.2** **Barrier Attenuation**

5.23 Processing the above, the resultant FLT loading noise level at the nearest noise sensitive receptor is calculated at **35 dB $L_{Aeq\ (1\ hour)}$**. Such levels are at least 15 dB below existing daytime background noise levels at the nearest receptors and are very low in absolute terms. The noise impact of FLT operations within the service yard is therefore considered negligible.

5.24 In order to assess the impact of HGV movements associated with Unit P, the Sound Exposure Level (SEL) is used. The SEL of a single discrete noise event is the level which if maintained constant for a period of one second would contain as much A-weighted sound energy as is contained in the actual noise event.

5.25 The SEL of HGV movements at low speed has previously been measured by ENS at circa **78 dB(A)** at 10 metres.

5.26 Assuming point source propagation (–6 dB per doubling of distance), and 11 decibels screening attenuation afforded by the acoustic boundary fence, this equates to an SEL of **53 dB(A)** at the nearest receptors.

5.27 As a worst-case scenario, it is assumed that the turning circle is used twice in a single 1-hour period during the daytime (1 no. HGV arriving and departing).

5.28 The following formula may be used for calculating the L_{Aeq} level from the SEL:

$L_{Aeq, T} = 10 * \log_{10} [(n \times 10^{SEL/10}) / T]$ where:

SEL is the Single Event Level (53 dB(A))
n is the number of occurrences (2 no.)
T is the time period in seconds (3600)

5.29 Processing the above formula, the resultant sound pressure level is **20 dB $L_{Aeq\ (1\ hour)}$** at the nearest noise sensitive receptor.

5.30 Such levels are circa 30 dB below existing daytime background noise levels at the nearest noise sensitive receptors, and are very low in absolute terms.

5.31 It is further considered that noise associated with HGV movements within the service yard will not be readily distinguishable against the residual acoustic climate, which is formed of road traffic on the M62 motorway. The noise impact of HGV movements within the service yard is therefore considered negligible.

Assessment of the Impacts

5.32 With mitigation measures as described above (additional lining to the cladding to the southern façade of Unit P and a 2-metre-high acoustic fence along the southern boundary of Unit P), the predicted noise levels associated with internal and external operations at the proposed development are negligible.

5.33 In terms of the NPPF, noise associated with Unit P is considered to represent a No Observed Adverse Effect Level (NOAEL) in that such noise is noticeable and not intrusive i.e. noise may be heard, but does not cause any change in behaviour or attitude and such noise may slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life. The noise impact is therefore considered to be negligible.

6.00 NOISE IMPACT ASSESSMENT FOR UNITS A-N (OUTLINE)

6.01 The principal noise sources potentially associated with the remaining units are considered to be:

- Noise break-out from activities within Use Class B2/B8 buildings
- Noise associated with fixed external plant
- Noise associated with service yard activity

6.02 The following sections of the noise impact assessment discuss the potential noise impacts of the above activities on the amenity of the nearest residential dwellings.

Noise Break-Out from Activities within the Use Class B2/B8 Buildings

6.03 At the time of writing, the exact occupancy of the warehouse buildings is not known (other than being Use Class B1/B2/B8).

6.04 In relation to Use Class B2 (general industrial) units, ENS has previously measured internal reverberant noise levels of **80 dB $L_{Aeq\ (15\ min)}$** within steel fabricators (due to fork lift movements, fabrication works such as welding, grinding etc).

6.05 In order to facilitate general industrial use of the proposed unit, it is recommended that the southern, eastern and western external façades of Units H–K are upgraded with an additional internal plasterboard lining.

6.06 Unit K is set back circa **28 metres** from the nearest residential dwellings, with remaining warehouses set further back. In order to predict noise emissions associated with internal operations at Unit K, the following relationship may be employed:

$SPL_{EXT} = SPL_{REV} – R_w – DA – 6$

where:

SPL_{EXT} is the free field sound pressure level at the nearest noise sensitive receptor (dB L_{Aeq})
SPL_{REV} is the reverberant sound pressure level inside the proposed development (dB L_{Aeq})
R_w is the composite sound reduction index (SRI) of the of the façade facing the receptor
DA is the distance attenuation of noise
'– 6' relates to a transition from an internal reverberant sound field to an external sound field

6.07 For the purpose of the calculations,

- The indoor reverberant noise level within a B2 Use Class warehouse has been taken as 80 dB $L_{Aeq\ (15\ min)}$
- The SRI of the warehouse is taken as 45 dB R_w, based on the sound reduction performance of insulated panels with an additional lining
- Distance attenuation to the nearest receptor is calculated using the Rathé Method at 14 decibels

6.08 Processing the above, the resultant sound pressure level at the nearest noise sensitive receptor due to internal operations within the unit is calculated at **15 dB $L_{Aeq\ (15\ min)}$**. Such external noise levels are significantly below night-time background levels and very low in absolute terms.

6.09 On the basis of the above, with the provision of an internal lining to the cladding, the noise impact of internal operations within Unit K is considered to be negligible.

6.10 For reference, the remaining Use Class B2 units are set further back, resulting in greater distance attenuation.

6.11 Use Class B8 (storage and distribution) units are generally subject to much lower internal reverberant noise levels compared with general industrial units. For reference, ENS has previously measured reverberant internal noise levels of 68–72 dB $L_{Aeq\ (15\ min)}$ within distribution centres of comparable size to those proposed. On this basis, an additional internal cladding lining is not required at the southern façades of Units F and G.

6.12 No significant noise breakout is anticipated from the Use Class A3 restaurant in the northern portion of the application site.

Noise Associated with Fixed External Plant

6.13 Detailed information regarding fixed installations at the units was not available at the time of writing and therefore this report should be used to aid in the specification of any plant.

6.14 Should fixed installations be proposed in the future, based upon the principles of BS 4142, it is considered appropriate that sound rating levels from fixed installations do not exceed the background sound levels detailed below in a free field position at the location of the nearest NSRs:

- **50 dB $L_{Ar\ (1\ hour)}$** during the daytime period (0700-2300 hours)
- **38 dB $L_{Ar\ (15\ min)}$** during the night-time period (2300-0700 hours)

6.15 It is considered that this is amenable to suitably worded planning condition, and that appropriate noise control can be achieved by the judicious selection and siting of plant and/or standard noise mitigation techniques.

Noise Associated with External Operations

Use Class B1/B2/B8 Units

6.16 The majority of service yards at the application site will be significantly screened by the units themselves, with the exception of Unit F and Units D, Da and E (trade counters).

Unit F

6.17 The service yard of unit F is adjacent to residential dwellings on Haigh Road, which cannot be screened by the unit due to the presence of overhead power lines. The nearest NSRs on Haigh Road (NSR1) are set back circa **50 metres** from the Unit F service yard. Topography data provided by the client indicates that the ground level of the service yard of Unit F is circa 3.5 metres above the ground level of the nearest residential dwellings to the south on Haigh Road.

6.18 In order to screen the Unit F service yard from the nearest NSRs, it is recommended that a 3-metre-high close-boarded acoustic fence is installed along the southern boundary of the service yard (see Appendix 2 for location of fence).

6.19 It is assumed that activity within the service yards of the Use Class B2/B8 warehouses may consist of intermittent HGV movements and forklift truck (FLT) movements associated with loading operations (it should however be noted that many modern distribution centres employ dock-levellers, meaning that loading is carried out internally).

6.20 Screening attenuation is calculated using the Maekawa barrier calculation in conjunction with measured FLT loading noise data and the following barrier model inputs:

- Ground level at the NSRs is taken as a zero datum
- Receiver height is taken as 4.0 metres above datum (upper floor window)
- Source height is taken as 4.5 metres above datum (3.5 metres ground level difference plus 1.0 metre loading height)
- Barrier height is taken as 6.5 metres above datum (3.5 metres ground level difference plus 3-metre-high fence)

6.21 As shown in the Maekawa barrier calculation spreadsheet below, the screening attenuation afforded by the barrier will be circa **14 dB** to the nearest noise sensitive receptors.

Maekawa Barrier Calculation Spreadsheet – FLT Loading Operations

Calculation of Approximate Attenuation of a Thin Rigid Barrier												
Octave band centre frequencies (Hz)	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**LAeq**		
Source octave analysis (dB)	69.8	67.6	60.0	56.0	55.8	54.2	53.6	49.4	44.5	**59.9**		
Wavelength (m)	10.8	5.4	2.7	1.4	0.7	0.3	0.2	0.1	0.0			
Path difference (m)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			
Fresnel No. (40.δ/λ)	0.91	1.82	3.61	7.21	14.42	28.84	57.69	115.38	230.75			
Attenuation (dB) (Maekawa*)	5.9	6.8	8.2	10.1	12.4	15.0	17.8	20.7	23.7			
Distance attenuation (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Angle of view attenuation (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Level at receptor position (dB)	63.8	60.8	51.8	45.9	43.4	39.2	35.8	28.7	20.8			
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1			
Level at receptor position (dB LAeq)	24.4	34.6	35.7	37.3	40.2	39.2	37.0	29.7	19.7			
Broadband level at receptor (dB LAeq)										**45.7**	**14.2**	**Barrier Attenuation**

6.22 Taking into account distance and screening attenuation, the resultant FLT loading noise level at the nearest noise sensitive receptor is calculated at **32 dB $L_{Aeq\ (15\ min)}$**. Such levels are at least 6 dB below existing night-time background noise levels at the nearest receptors and are very low in absolute terms. The noise impact of FLT operations within the service yard is therefore considered negligible.

6.23 Notwithstanding this, it is recommended that any FLTs in use at Unit F should be fitted with white noise (broadband) reverse alarms, rather than tonal reverse alarms.

6.24 The SEL of HGV movements at low speed has previously been measured by ENS at circa **78 dB(A)** at 10 metres. Assuming point source propagation (–6 dB per doubling of distance), and 14 decibels screening attenuation afforded by the acoustic boundary fence, this equates to an SEL of **50 dB(A)** at the nearest receptors.

6.25 As a worst-case scenario, it is assumed that the turning circle is used 5 times in a single 15-minute period during the night-time (1 no. HGV movement every 3 minutes).

6.26 The following formula may be used for calculating the L_{Aeq} level from the SEL:

$L_{Aeq,\ T} = 10 * \log_{10} [\ (n \times 10^{SEL/10}) / T\ ]$ where:

SEL is the Single Event Level (50 dB(A))
n is the number of occurrences (5 no.)
T is the time period in seconds (900)

6.27 Processing the above formula, the resultant sound pressure level is **27 dB $L_{Aeq\ (15\ min)}$** at the nearest noise sensitive receptor.

6.28 Such levels are 11 dB below existing night-time background noise levels at the nearest noise sensitive receptors, and are very low in absolute terms.

6.29 It is further considered that noise associated with HGV movements within the service yard will not be readily distinguishable against the residual night-time acoustic climate, which is formed of road traffic on the M62 motorway. The noise impact of HGV movements within the service yard is therefore considered negligible.

Unit D, Da and E

6.30 Units D, Da and E are proposed B8 trade counters with a shared service yard located circa 60 metres from the nearest noise sensitive receptors on Stirling Wood Close. It is understood the trade counters will operate during daytime hours only.

6.31 It is assumed that activity within the shared service yard for the B8 trade counters may occasionally consist of forklift truck (FLT) movements associated with loading operations.

6.32 Taking into account distance attenuation only, the resultant FLT loading noise level at the nearest noise sensitive receptor is calculated at **44 dB $L_{Aeq\ (15\ min)}$**. Such levels are at least 6 dB below existing day-time background noise levels at the nearest receptors.

6.33 Notwithstanding this, it is recommended that any FLTs in use at Units D, Da and E should be fitted with white noise (broadband) reverse alarms, rather than tonal reverse alarms.

Unit C - Use Class A3 Restaurant

6.34 The Use Class A3 restaurant will require a much smaller vehicle service point, on a much lower frequency, and therefore servicing for this unit is likely to be undertaken within the customer car park, outside of customer opening hours.

6.35 Assuming delivery vehicles would utilise parking spaces closest to the unit, the nearest noise sensitive receptors (on Stirling Wood Close) are set back at least **150 metres** away from Unit C.

6.36 It is assumed that deliveries are to be made via a rigid bodied vehicle with a tail lift to allow plastic trays on trolleys to be wheeled into the store. Based on experience at comparable units, the principal noise associated with deliveries is trolleys being wheeled into the store. Noise levels from similar deliveries have previously been measured by ENS at **62 dB $L_{Aeq\ (15\ min)}$** at a distance of 3 metres.

6.37 Assuming point source propagation, this equates to a delivery noise level of **28 dB $L_{Aeq\ (15\ min)}$** at the nearest receptors. Such levels are at least 10 dB below existing night-time background noise levels at the nearest receptors and are very low in absolute terms.

6.38 On the basis of the above, it is considered that 24/7 servicing of Unit C would not give rise to any loss of residential amenity.

Assessment of the Impacts

6.39 With mitigation measures as described above (additional lining to the cladding of B2 Use Class warehouses and an acoustic fence along the southern boundary of Unit F), the predicted noise levels associated with internal and external operations at the proposed development are negligible.

6.40 The control of noise from external fixed plant is amenable to a suitably-worded condition.

6.41 It is considered that the proposed development will not change the acoustic character of the area, which is mixed-use in nature, with existing B2/B8 Use class premises in the immediate vicinity.

6.42 In terms of the NPPF, noise associated with the proposed development is considered to represent a No Observed Adverse Effect Level (NOAEL) in that such noise is noticeable and not intrusive i.e. noise may be heard, but does not cause any change in behaviour or attitude and such noise may slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life. The noise impact is therefore considered to be negligible.

7.00 CONCLUSIONS

7.01 A noise impact assessment has been undertaken for a proposed industrial development at land at Lindley Moor Road, Lindley, Huddersfield, HD3 3SX.

7.02 It is concluded that the control of noise associated with any fixed external plant can be achieved with the judicious selection of refrigeration plant and/or standard noise mitigation techniques.

7.03 Provided the recommendations contained within this noise impact assessment are implemented, noise associated with internal and external operations are not considered to represent a constraint to the development.

7.04 It is considered that the proposed development will not change the acoustic character of the area, which is mixed-use in nature, with existing B2/B8 Use class premises in the immediate vicinity.

7.05 It is concluded that the proposed development represents a No Observed Adverse Effect Level (NOAEL) in that such noise is noticeable and not intrusive i.e. noise can be heard, but does not cause any change in behaviour or attitude and such noise can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely

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cc File

Appendix 1
Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 µPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 µPa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night-time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\ max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_W)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix 2
Annotated Site Layout Plan / Noise Monitoring Positions

Appendix 3
Site Layout Plan