

ENVIRONMENT

Yeargate Limited

Birch Business Park
Heywood

Noise Impact Assessment

MCP2350

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Heywood

Noise Impact Assessment

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EXECUTIVE SUMMARY

A noise impact assessment has been undertaken to support a planning application involving the demolition of existing Units B and G in order to erect a new B2/B8 warehouse, at Birch Business Park, off Moss Hall Road in Heywood.

Drawing upon the results of the representative baseline noise survey, noise level limits have been derived for fixed plant items and operational noise sources associated with the proposed development. The proposed limits have been derived in accordance with guidance from BS 4142:2014.

The assessment has accounted for HGV movements, car parking activity and fixed plant associated with the development. The assessment indicates that, with the implementation of appropriate barrier mitigation measures, noise from HGV movements during the proposed periods is likely to give rise to a low impact at the nearest receptor.

Based on the results of the assessment it is considered that noise need not be a determining factor in granting planning consent for the operation of the site.

1. INTRODUCTION

- 1.1 A noise impact assessment has been undertaken to support a planning application involving the demolition of existing Units B and G in order to erect a new B2/B8 warehouse, at Birch Business Park, off Moss Hall Road in Heywood.
- 1.2 The key noise sources associated with the proposed development are HGV movements, carparking activity and potential noise from fixed building services plant noise.
- 1.3 This assessment has been undertaken with due consideration to relevant national planning policy, British Standards and guidance documents.
- 1.4 This report is necessarily technical in nature, therefore, to assist the reader, a glossary of acoustic terminology is included in **Appendix A**.

Site Setting

- 1.5 The development site sits within the Rochdale Metropolitan Borough Council (RMBC) administrative area.
- 1.6 The site is currently part of the existing Birch Business Park. Industrial units B and G will be demolished and the site will be developed for storage and distribution use. The wider site is bound to the west by Moss Hall Road, to the south by Whittle Lane, and to the north and east by agricultural land.
- 1.7 The nearest existing noise sensitive receptor is the bungalow dwelling adjacent to Broom Hill Farm, located approximately 55m to the west of the proposed site, situated off Moss Hall Road/Whittle Lane.
- 1.8 An aerial view of the site location is shown in **Figure 1.1**.

Figure 1.1: Site Location



Proposed Development

- 1.9 The proposed development comprises a Class B2/B8 use facility for general industrial and storage and distribution use at Birch Business Park, Heywood.
- 1.10 **Figure 1.2** identifies the proposed scheme layout.

2. STANDARDS AND GUIDANCE

- 2.1 When selecting appropriate criteria for assessment, consideration has been given to relevant planning policy and regulations concerning the Development. Consideration has been given to advice contained within the National Planning Policy Framework (NPPF)¹, the Noise Policy Statement for England (NPSE)² and Noise Planning Practice Guidance³, although direct noise assessment criteria has not been drawn from these documents.
- 2.2 With regard to acoustic design and noise control, the NPPF provides a set of overarching aims, broadly reflecting those already contained in the NPSE. They are directed towards the avoidance of significant adverse impacts and reduction of other adverse impacts on health and quality of life; set within the context of the Government's policy on sustainable development.

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

- 2.3 The effect of industrial noise on the nearest noise sensitive residences will be assessed in accordance with BS4142:2014+A1:2019.
- 2.4 The standard describes a method of determining the level of sound of a commercial nature, together with procedures for assessing the impact of such a sound outside nearby noise sensitive areas.
- 2.5 The standard may be thought of as a procedure for comparing the sound from commercial sources with background sound levels in the absence of the commercial sound and determining the likely impact of the sound on noise sensitive residences.
- 2.6 In accordance with BS 4142 the background sound level is the typical A-weighted sound pressure level at the assessment position that is exceeded for 90% of a given time interval (L_{A90}). The specific sound level is the equivalent continuous (L_{Aeq}) sound pressure level at the assessment position produced by the commercial source over a given time interval.
- 2.7 Certain acoustic features can increase the impact over that expected from a simple comparison between the specific sound level and the background level. Where such features are present, these are taken into account by adding corrections to the specific sound level.
- 2.8 This correction is applied based on whether the following features occur or are expected to be present. The correction values can either be determined subjectively, or by various objective measurement procedures.

¹ Department for Communities and Local Government (DCLG) (2012); 'The National Planning Policy Framework', TSO.

² Department for Environment, Food and Rural Affairs (DEFRA) (2010); 'Noise Policy Statement for England', DEFRA.

³ DCLG (2014); 'Planning Practice Guidance website', DCLG. (<http://planningguidance.planningportal.gov.uk/>)

- The sound contains a distinguishable, discrete, continuous tone (*whine, hiss, screech, hum, etc.*). 0 – 6 dB penalty
- The sound contains distinct impulses (bangs, clicks, clatters, or thumps). 0 – 9 dB penalty.
- The sound is irregular enough to attract attention. 0 – 3 dB penalty.
- Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

2.9 From the addition of the above penalties where appropriate the rating level is established, this being the value that is compared with the background noise. Note that corrections for impulsivity and tonality may be added arithmetically where both are present and likely to affect perception within the same reference period. However, if any single feature is dominant to the exclusion of the others then it might be appropriate to apply a reduced or even zero correction for the minor characteristics.

2.10 According to BS 4142, an initial estimate of the impact is given based on the rating level value as follows:

- a rating level 10 dB(A) or more above the background is an indication of significant adverse impact, depending on the context.
- a rating level 5 dB(A) above the background is an indication of an adverse impact, depending on the context.
- where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on the context.

2.11 BS4142 indicates that the noise source should be evaluated over the appropriate time interval which is as follows:

- 1-h during the day (07:00 – 23:00)
- 15-min during the night (23:00 – 07:00)

2.12 The above initial assessment may then be modified depending on the context, to take into account;

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 1. Façade insulation treatment;
 2. Ventilation and / or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 3. Acoustic screening.

BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings

- 2.13 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.
- 2.14 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in Table 2.1 below:

Table 2.1: Summary of internal ambient noise levels to be achieved in habitable rooms

Activity	Location	Internal noise level criteria (L _{Aeq,T} , dB)	
		Daytime (07:00 - 23:00hrs)	Night-time (23:00 - 07:00hrs)
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30

- 2.15 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or LAFmax for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: Guidelines for Community Noise.
- 2.16 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the noise level does not exceed 50 dB L_{Aeq,T}, with an upper guideline value of 55 dB L_{Aeq,T} which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

World Health Organisation (WHO) 1999: Guidelines for Community Noise

- 2.17 As with the criteria in BS 8233, the LAFmax criterion in BS 8233 is largely concordant with the World Health Organisation (WHO) guidance: 1999: Guidelines for community noise. This document draws upon guidance from Vallet and Vernay, which states:

"For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAFmax more than 10-15 times per night."

Consultation with Rochdale Metropolitan Borough Council

- 2.18 Consultation was undertaken with the Environmental Health Department at RMBC by email on 24th August 2020, seeking opinion on the specific requirements of a noise impact assessment to agree an assessment methodology.
- 2.19 A response was received from Paul Fletcher, EHO at RMBC by email on 2nd September 2021 agreeing the use of the previous baseline noise monitoring results and confirming that the proposed methodology was acceptable.

Noise Sensitive Receptors

- 2.20 The nearest noise sensitive receptor (NSR) is detailed in **Table 2.2**.

Table 2.2: Noise Sensitive Receptor

Receptor Location	Type of Receptor	Description / Name	Approximate Distance to Red Line Site Boundary
NSR 1	Residential	Bungalow dwelling associated with Broom Hill Farm off Moss Hall Rd/Whittle Lane	~ 50m South-west

3. BASELINE NOISE SURVEY DATA

Summary

- 3.1 An environmental baseline noise survey was previously undertaken by BWB to establish and quantify the existing noise climate on, and within the vicinity of, the wider Site to support a planning application for Unit D, to the east of the proposed Unit B.
- 3.2 Monitoring was carried out over a 24-hour period between Tuesday 28th and Wednesday 29th July 2020 at one key location as illustrated in **Figure 3.1** and described below.

Figure 3.1: Baseline Noise Monitoring Location



*SOURCE: Google Earth with measurement location as described below.

Measurement Location 1 (ML1)

- 3.3 ML1 was selected to determine the prevailing background sound levels at a location representative of the closest noise sensitive receptor, the dwelling at Broom Hill Farm, located to the west of the proposed development site.
- 3.4 Monitoring at ML1 was undertaken over a 24-hour period commencing at 15:00hrs on Tuesday 28th July 2020. Measurement equipment was established in free-field conditions with the microphone positioned at a height of 1.5 m above local ground level. The prevailing noise climate at ML1 was noted as being fairly quiet with local road traffic on Moss Hall Road and Whittle Lane dominating when vehicles were passing.
- 3.5 ML1 was setback approximately 17m from the edge of Whittle Lane. Background noise levels measured at ML1 are considered representative of those experienced at the façade of the closest NSR to the proposed development site. The monitoring location was chosen as it was sheltered from any fixed plant/equipment and operational noise associated with the existing industrial site.

Measurement Equipment

- 3.6 The baseline noise survey was undertaken using the Class 1 specification noise measurement equipment detailed in **Table 3.1**. Equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed. The sound level meters, pre-amplifiers and microphones were calibrated to traceable standards within the 24 months prior to the measurements. The portable calibrators were calibrated within the 12 months preceding the date of the survey.

Table 3.1: Noise measurement equipment

Measurement Location (ML)	Item	Make & Model	Serial Number	Calibration due Date
ML1	Sound Level Meter	01dB FUSION	12080	May 2021
	Microphone	GRAS 40CE	331919	
	Preamp	01dB PRE22	1805334	
ML1	Calibrator	01dB CAL21	34675323	June 2021

Meteorological Conditions

- 3.7 Weather conditions during the survey were conducive to environmental noise measurement, it being dry, partly cloudy and negligible wind from the west. Temperatures were noted to range between 11 – 16 degrees Celsius.

Measurement Results

- 3.8 A summary of measured noise levels during the daytime and night time periods at ML1 is presented in **Table 3.2**. Full results are provided in **Appendix B**.

Table 3.2: Summary of measured sound pressure levels at ML1

Start Time and Date	Period (T)	dB LAeq,T	dB LA90,T ¹	dB LAFmax ²
28/07/2020 15:00	Daytime (07:00 – 23:00)	56	43	82
28/07/2020 23:00	Night-time (23:00 – 07:00)	51	37	74
¹ Representative LA90,1hour and LA90,15min values during daytime and night-time periods ² Typical max level measured at ML1				

4. ASSESSMENT

- 4.1 This assessment considers noise from HGV movements (i.e. arrivals, departures, loading and unloading activities), car parking activity and fixed building services plant noise likely to be generated by the proposed development.
- 4.2 In order to inform the assessment, distance attenuation calculations have been used to determine the noise propagation to the nearest noise sensitive receptor. The calculations also account for the screening attenuation afforded by the proposed industrial unit itself. The calculations do not account for local ground absorption.

Noise from Operational Activities

- 4.3 Noise emissions from the HGVs arriving to, and departing from, the site and loading and unloading of vehicles within the proposed service area have been assessed in accordance with BS 4142:2014+A1:2019.
- 4.4 It is understood that the proposed development is likely to operate continuously over 24-hours.
- 4.5 As the proposed site is not currently operational, the assessment has been based on noise data from historical measurements, which has been collected during surveys undertaken at similar developments, including HGVs arriving, departing, manoeuvring and loading/unloading operations.
- 4.6 A summary of the source noise data used within the assessment of noise from deliveries is presented in **Table 4.1**.

Table 4.1: Adopted noise emission data for sources associated with delivery operations

Noise Source	Distance (m)	L _{Aeq,T} dB(A)
HGV Arriving	5	72
General loading/unloading noise – Level Door	5	66
HGV Departure	5	67
HGV Passby	5	73

- 4.7 The data provided by Axis the transport consultant gives an hourly profile of proposed HGV trips between the hours of 07:00 and 19:00, and is presented in **Appendix C**. The worst-case daytime period has been identified as 15:00 – 16:00.
- 4.8 The following assumptions have been used in this assessment:
- As a worst-case scenario, the peak hour data for the daytime period will be assumed. The assumed number of arrivals between 15:00 - 16:00 is 4, and the assumed number of departures is 5, with a total of 9 movements in a worst-case hour. Therefore, it is

considered appropriate to assume that there would be 9 one-way HGV visits in any one hour daytime period.

– Data was not provided for the night-time period, therefore a night-time scenario of 3 movements will be assumed in a 15 minute night-time period, which is considered worst-case and robust. Therefore it is assumed that there will be 3 one-way HGV visits in any 15-minute night-time period.

- 4.9 In the calculations, HGV passbys along the service road access route with the site to the units have been represented as line sources and HGV arrival, unloading and departure activity points have been represented as point sources. Line source and point source distance attenuation has been applied accordingly.

Screening Attenuation

- 4.10 Screening attenuation has been applied separately for each of the operational activity points for the HGV deliveries which include HGV passbys along the service road access route, HGV arrival/departure movements at the turning circle and HGV unloading/loading activity at the loading bays.
- 4.11 There is some line of sight from the nearest receptor to the point of HGV passbys along the service road access route, however the site plan shows a narrow angle of view to the HGV passby, represented as a line source. Therefore an angle of view correction has been applied. The resultant correction gives a screening attenuation of -10dB.
- 4.12 Screening attenuation of -16dB has been applied for the assessment of HGV unloading/loading points, due to no line of sight, as the proposed unit itself provides full screening between the sources and the nearest receptor. Attenuation has been calculated using a Maekawa barrier calculation.
- 4.13 No screening attenuation has been applied for the HGV arrival/departure movements at the turning circle as there is line of sight from the receptor to the source.

Predicted Specific Sound Levels

- 4.14 Predicted specific sound levels have been based on the following distances from the receptor to the main activity point:
- HGV passby along the service access road: 145m
 - HGV arriving/departing movements at the turning circle: 150m
 - HGV unloading/loading activity at the loading bays: 120m
- 4.15 Based on this, the predicted specific sound levels from total HGV operational activity at the nearest receptor, Broom Hill Farm (NSR 1) would be 39 dB $L_{Aeq,1hour}$ during the daytime and 40 dB $L_{Aeq,15min}$ during the night-time period. HGV arriving/departing movements at the turning circle have the biggest influence on the overall level, due to

no screening, with an individual specific sound level of 38dB $L_{Aeq,1hour}$ during the daytime and 39 dB $L_{Aeq,15min}$ during the night-time period.

- 4.16** The total specific sound levels have then been assessed in accordance with BS 4142 as outlined in **Table 4.2**.
- 4.17** As HGV activity is located at a significant distance from the nearest receptor, and the receptor is afforded some screening as described above, it is considered that any intermittent characteristics of the delivery process, in particular HGV arriving/departing movements at the turning circle, will still be perceptible. Therefore, a 3dB correction has been applied for intermittency, in accordance with BS4142.

Table 4.2: BS 4142 Assessment of HGV operational activity at NSR 1

Description	Daytime (07:00 – 23:00) Sound Levels (dB)	Night-time (23:00 – 07:00) Sound Levels (dB)	Relevant BS 4142 Clause
Specific sound level	39 $L_{Aeq,1hour}$	40 $L_{Aeq,15mins}$	7.3.5
Acoustic feature correction ¹	+3	+3	9.2
Rating level	42 $L_{Ar,1hour}$	43 $L_{Ar,15mins}$	9.2
Background sound level	43 $L_{A90,1hour}$ ²	37 $L_{A90,15mins}$ ³	8
Excess over background	-1	+6	-
BS 4142 impact	Low impact	Adverse Impact	-
Commentary	¹ +3 dB penalty applied for intermittency. ² based on representative $L_{A90,1hr}$ levels during the daytime period ³ based on representative $L_{A90,15mins}$ levels during the night-time period		

- 4.18** The above assessment indicates that noise generated by deliveries to the proposed unit is likely to give rise to a low impact at NSR1 during the daytime, and an adverse impact at NSR1 during the night-time period, with an exceedance of 6dB.
- 4.19** The largest contribution to this exceedance is from HGV arriving/departing movements at the turning circle during the night-time period.
- 4.20** Therefore consideration will be given to mitigation in **Section 5**.

Noise from Car Parking Activity

- 4.21** A carpark with provision for 89 parking spaces is proposed as part of the development of Unit B. Noise from carpark activity has been assessed against the guidelines outlined in BS 8233:2014 at the nearest noise sensitive receptor. Detailed calculations have been carried out in order to predict the noise levels at the nearest NSR.

- 4.22** A summary of the source data used within the assessment of noise from the car park area is presented in **Table 4.3**.

Table 4.3: Adopted noise emission library source data associated with the Carpark

Noise Source	SEL (dBA)	Distance (m)
Car pass-by	63	10
Car arriving	63	10
Car door slam	65	10
Engine starting	65	10
Car manoeuvre	70	10
Car pulling away	67	10

- 4.23** Worst-case calculations were carried out to assess the impact of the proposed car park, assuming all spaces to be used within both an hourly and a 15 minute period. The predictions assume point source distance attenuation only, and do not account for any screening attenuation.
- 4.24** The car park calculations have been carried out using a set number of car parking spaces (events) at varied distances from the receptor, and calculating the resultant L_{Aeq} levels at the receptor based on the SEL (single event level) and number of events during the one-hour daytime and 15-minute night-time periods.
- 4.25** The results of the assessment of noise from the carpark activity at the nearest sensitive receptor, is included in **Table 4.4**.

Table 4.4: Predicted noise levels from car park activity

Period	Predicted external noise level from car park activity	Predicted internal level from car park activity	Internal Noise Level Criteria
Daytime (07:00 – 23:00)	38	23	35 dB $L_{Aeq,16h}$
Night-time (23:00 – 07:00)	43	28	30 dB $L_{Aeq,8hr}$

- 4.26** Assuming a 15dB loss through a partially opened window, it can be seen from **Table 4.4** that the internal noise level criteria from BS 8233 are predicted to be achieved during the daytime and night-time at NSR1 for noise associated with the car park. The external lower limit guideline value of 50 dB $L_{Aeq,16h}$ is also predicted to be achieved during the daytime, when considering noise from the car park in isolation.
- 4.27** Furthermore, noise generated by vehicles using the car park will contain similar characteristics to road traffic noise on the Moss Hall Road and Whittel Lane, which is located between the car park and NSR1. Therefore, it is considered unlikely that noise from the car park will be distinguishable at times from noise from road traffic.

4.28 Therefore no further consideration of mitigation is warranted.

Assessment of the LAFmax

4.29 Consideration has been given to the LAFmax levels during the night-time period associated with HGV unloading and car parking activity. These values have been assessed against the value of 45dB LAFmax that should not regularly be exceeded, as recommended within WHO guidelines, inside bedrooms.

4.30 To assess the potential noise impact from impulsive events associated with HGV and car parking activity, library noise data for similar sites has been used. A summary of the max level noise data used in the following assessment is summarised in **Table 4.5**.

Table 4.5: Max Level Library Source Data associated with HGV and Car park activity

Impulsive Activity	LAFmax (dBA)	Distance (m)
HGV door slam	75	10
HGV horn	85	10
Car door slam	72	10

4.31 The measured LAFmax levels shown in **Table 4.5**, have been predicted assuming point source distance attenuation. A distance of 120m has been assumed for the nearest point of impulsive HGV activity, and a distance of 65m has been assumed for the nearest point of impulsive car activity.

4.32 The resultant levels at the nearest noise sensitive receptor as a result of impulsive events from HGV/car door slams and HGV horns are shown below in **Table 4.6**, assuming a 15dB loss through a partially opened window.

Table 4.6: LAFmax level calculated at the receptors, for impulsive HGV & car events

Impulsive Activity	Predicted noise incident level at façade (LAFmax, dB)	Predicted internal LAFmax from car movements (dBA)	Excess above 45 dB Criteria
HGV door slam	51	36	-9
HGV horn	60	45	0
Car door slam	56	41	-4

4.33 Assuming a 15dB loss through a partially opened window, this would result in internal levels of 45dB LAFmax at NSR 1 due to HGV horns. Screening attenuation has not been applied, however in reality, line of sight will be broken between the NSR and HGV activity points. Therefore, it is considered that maximum levels associated with use of HGV activity meet recommendations within the WHO guidelines for HGV impulsive activity.

4.34 Therefore no further consideration of mitigation is warranted.

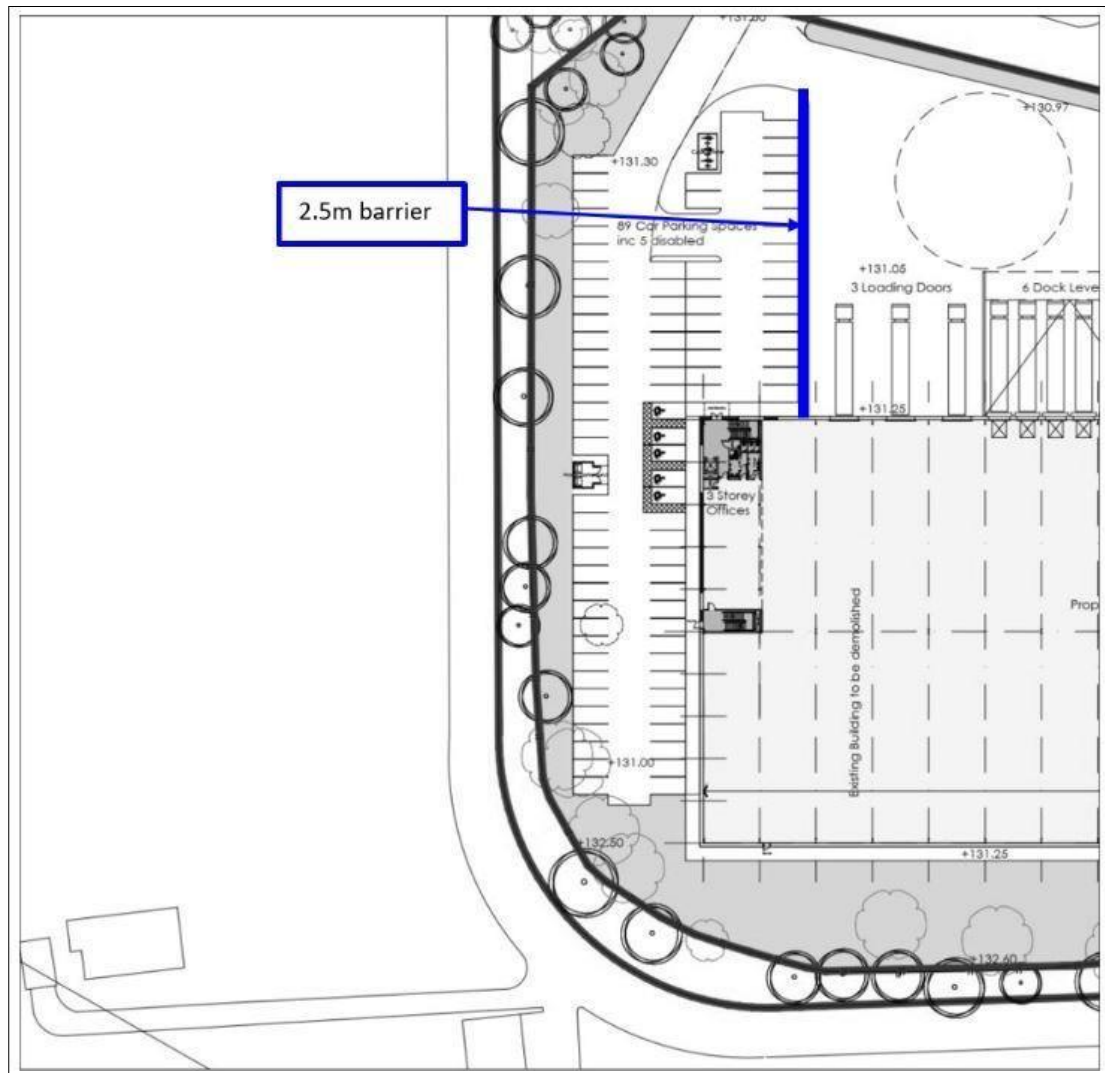
Noise from Fixed Building Services Plant and Internal Noise Breakout

- 4.35 It is anticipated that there may be fixed building services plant equipment associated with the proposed development with the potential to generate noise. However, at this stage of the scheme design, details of the proposed type, number and location of any such plant, or the nature of its operation are not available.
- 4.36 In the absence of detailed information, it is appropriate to specify suitable noise level limits to which any plant should conform. These limits should include any appropriate corrections for acoustic characteristics.
- 4.37 Given that a rating level equal to the background sound level is an indication of a 'low impact' in accordance with BS 4142+A1:2019, it is considered appropriate that the cumulative effect of all external plant should be specified so that the rating level is less than or equal to the prevailing background noise levels:
- A rating level limit of 43 dB during the daytime; and
 - A rating level limit of 37 dB during the night-time.
- 4.38 The above rating level limits should apply at least 3.5 metres from the façade of the nearest noise sensitive receptor, i.e. in free-field conditions.
- 4.39 In accordance with BS 4142+A1:2019, assessments of plant noise emissions should include appropriate rating corrections for tonal, irregular or intermittent plant where applicable, before comparison with the above limits. Once details of proposed fixed plant items are available, noise from any fixed plant can be assessed, to ensure that the above limits can be met.
- 4.40 It should be noted that the derived rating level limits would be applicable to the total noise from the simultaneous operation of all external plant serving the proposed development. As such, noise emissions from individual items of plant will need to be lower than the given limits, although the exact limit for each individual item of plant will be dependent upon its type, noise characteristics, location etc. This issue is best addressed during the detailed design stage.

5. MITIGATION

- 5.1 The assessment has shown that noise from HGV movements, in particular HGV arriving/departing movements at the turning circle, could give rise to an adverse impact during the night-time period, with an exceedance above background of 6dB at the nearest receptor.
- 5.2 To reduce any potential impact from the delivery vehicles arriving and departing, the following 'good practice' measures are recommended below:
- A 5mph speed limit should be applied when HGVs are moving around the site.
- 5.3 Barrier attenuation is required to mitigate against the exceedance described above, and has been calculated based on the following assumptions:
- HGV engine sources have been modelled at a height of 1.5m;
 - Receptors have been modelled at a height of 1.5m, as the nearest receptor is a one-storey building, to represent a ground floor receptor.
- 5.4 To reduce the impact of noise from HGV arriving/departing movements at the turning circle, calculations identify that a 2.5m high barrier is required along the boundary between the car park and the HGV service yard area can provide the attenuation required. This gives a reduction of 7.5dB at the receptor due to HGV arriving/departing movements at the turning circle, which in turn gives an overall reduction of 6dB at the NSR from HGV operational movements. The Maekawa barrier calculation demonstrating this reduction is shown in **Appendix D**.
- 5.5 **Figure 5.1** shows the proposed extent of the acoustic barrier.

Figure 5.1: Proposed Barrier Mitigation Extent



- 5.6 The barrier must extend from ground level to at least the specified height, be solid i.e. impermeate and have a minimum superficial mass of 15 kg/m². Any penetrations or junctions should be treated to maintain acoustic integrity.
- 5.7 Screening attenuation remains unchanged for HGV unloading/loading activities at the loading bays, offering a reduction of -16dB. With the barrier in place, noise from HGV arriving/departing movements at the turning circle is reduced at the NSR. The inclusion of a barrier, with extents as shown in **Figure 5.1**, subsequently creates a shallower angle of view for HGV passbys along the service access road, which increases the correction to -13.5dB.
- 5.8 Based on this, the predicted specific sound levels from total HGV operational activity at the nearest receptor, Broom Hill Farm (NSR 1) would be 38 dB LAeq,1hour during the daytime and 34 dB LAeq,15min during the night-time period.

- 5.9** Noise emissions with the acoustic barrier mitigation in place have been assessed in accordance with BS 4142:2014+A1:2019 as shown in **Table 5.1**.

Table 5.1: BS 4142 Assessment of HGV operational activity, with barrier mitigation

Description	Daytime (07:00 – 23:00) Sound Levels (dB)	Night-time (23:00 – 07:00) Sound Levels (dB)	Relevant BS 4142 Clause
Specific sound level	38 LAeq,1hour	34 LAeq,15mins	7.3.5
Acoustic feature correction ¹	+3	+3	9.2
Rating level	41 LA _r ,1hour	37 LA _r ,15mins	9.2
Background sound level	43 LA90,1hour ²	37 LA90,15mins ³	8
Excess over background	-2	0	-
BS 4142 impact	Low impact	Low Impact	-
Commentary	¹ +3 dB penalty applied for intermittency. ² based on representative LA90,1hr levels during the daytime period ³ based on representative LA90,15mins levels during the night-time period		

- 5.10** The above assessment indicates that noise generated by deliveries to the proposed unit with the described acoustic barrier mitigation in place is likely to give rise to a low impact at NSR1 during the daytime and night-time periods.

6. CONCLUSIONS

- 6.1 A noise impact assessment has been undertaken to support a planning application involving the demolition of existing Units B and G in order to erect a new B2/B8 warehouse, at Birch Business Park, off Moss Hall Road in Heywood.
- 6.2 Drawing upon the results of the representative baseline noise survey, noise level limits have been derived for fixed plant items and operational noise sources associated with the proposed development. The proposed limits have been derived in accordance with guidance from BS 4142:2014.
- 6.3 The assessment has accounted for HGV movements, car parking activity and fixed plant associated with the development. The assessment indicates that, with the implementation of appropriate barrier mitigation measures, noise from HGV movements during the proposed periods is likely to give rise to a low impact at the nearest receptor.
- 6.4 Based on the results of the assessment it is considered that noise need not be a determining factor in granting planning consent for the operation of the site.

APPENDICES

APPENDIX A: Glossary of Terms

Noise

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

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

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or LAeq, LA90 etc., according to the parameter being measured.

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

Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

APPENDIX B: Full Survey Results

Table B1: Results from ML1

Start Time & Date	Period (T)	dB L _{Aeq,T}	dB L _{A90,T}	dB L _{Afmax}
28/07/2020 15:00	1-hour	58	51	74
28/07/2020 16:00	1-hour	59	52	82
28/07/2020 17:00	1-hour	58	50	80
28/07/2020 18:00	1-hour	58	49	82
28/07/2020 19:00	1-hour	54	45	71
28/07/2020 20:00	1-hour	53	43	73
28/07/2020 21:00	1-hour	52	41	77
28/07/2020 22:00	1-hour	49	40	69
28/07/2020 23:00	15-mins	50	39	67
28/07/2020 23:15	15-mins	51	39	74
28/07/2020 23:30	15-mins	47	39	69
28/07/2020 23:45	15-mins	48	39	66
29/07/2020 00:00	15-mins	50	39	72
29/07/2020 00:15	15-mins	61	39	91
29/07/2020 00:30	15-mins	43	39	62
29/07/2020 00:45	15-mins	47	38	68
29/07/2020 01:00	15-mins	43	38	61
29/07/2020 01:15	15-mins	46	37	70
29/07/2020 01:30	15-mins	46	38	68
29/07/2020 01:45	15-mins	44	37	66
29/07/2020 02:00	15-mins	48	37	71
29/07/2020 02:15	15-mins	44	37	64
29/07/2020 02:30	15-mins	43	38	62
29/07/2020 02:45	15-mins	47	38	67
29/07/2020 03:00	15-mins	46	38	65
29/07/2020 03:15	15-mins	46	38	67
29/07/2020 03:30	15-mins	40	38	46
29/07/2020 03:45	15-mins	48	38	66
29/07/2020 04:00	15-mins	43	37	63
29/07/2020 04:15	15-mins	44	38	63
29/07/2020 04:30	15-mins	44	39	63
29/07/2020 04:45	15-mins	45	39	64
29/07/2020 05:00	15-mins	47	40	66
29/07/2020 05:15	15-mins	50	41	65
29/07/2020 05:30	15-mins	52	43	66
29/07/2020 05:45	15-mins	53	44	68

Start Time & Date	Period (T)	dB L _{Aeq,T}	dB L _{A90,T}	dB L _{Afmax}
29/07/2020 06:00	15-mins	52	44	66
29/07/2020 06:15	15-mins	53	45	70
29/07/2020 06:30	15-mins	55	46	70
29/07/2020 06:45	15-mins	54	46	72
29/07/2020 07:00	1-hour	56	46	74
29/07/2020 08:00	1-hour	56	47	73
29/07/2020 09:00	1-hour	55	45	76
29/07/2020 10:00	1-hour	55	45	78
29/07/2020 11:00	1-hour	55	46	76
29/07/2020 12:00	1-hour	56	46	75
29/07/2020 13:00	1-hour	58	46	91
29/07/2020 14:00	1-hour	55	45	74

Appendix C: Trip Generation Data – HGV Hourly Profile

Trip Generation Data: HGV Hourly Profile - provided by Axis Traffic Consultants

OGV Trip Gen (based on net floorspace uplift for Unit B) - HOURLY						
HOUR	ARR	DEP	TOT	ARR %	DEP %	TOT %
7-8	1	1	1	6.1%	4.8%	5.5%
8-9	1	1	3	9.2%	11.3%	10.2%
9-10	1	0	1	6.1%	3.2%	4.7%
10-11	0	1	1	3.1%	6.5%	4.7%
11-12	2	1	3	12.3%	8.1%	10.2%
12-13	0	1	1	3.1%	6.5%	4.7%
13-14	1	1	2	7.7%	4.8%	6.3%
14-15	2	1	3	12.3%	11.3%	11.8%
15-16	2	3	5	15.6%	21.0%	18.2%
16-17	2	1	3	13.8%	8.1%	11.0%
17-18	1	1	3	7.7%	11.3%	9.4%
18-19	0	0	1	3.1%	3.2%	3.1%
TOT	14	13	27	100%	100%	100%

Note: hour = 24 hr format, ARR = Arrivals, DEP = Departures, TOT=Total two-way movements

OGV Trip Gen (based on gross floorspace uplift for Unit B) - HOURLY						
HOUR	ARR	DEP	TOT	ARR %	DEP %	TOT %
7-8	2	1	3	6.1%	4.8%	5.5%
8-9	2	3	5	9.2%	11.3%	10.2%
9-10	2	1	2	6.1%	3.2%	4.7%
10-11	1	2	2	3.1%	6.5%	4.7%
11-12	3	2	5	12.3%	8.1%	10.2%
12-13	1	2	2	3.1%	6.5%	4.7%
13-14	2	1	3	7.7%	4.8%	6.3%
14-15	3	3	6	12.3%	11.3%	11.8%
15-16	4	5	9	15.6%	21.0%	18.2%
16-17	4	2	6	13.8%	8.1%	11.0%
17-18	2	3	5	7.7%	11.3%	9.4%
18-19	1	1	2	3.1%	3.2%	3.1%
TOT	27	25	52	100%	100%	100%

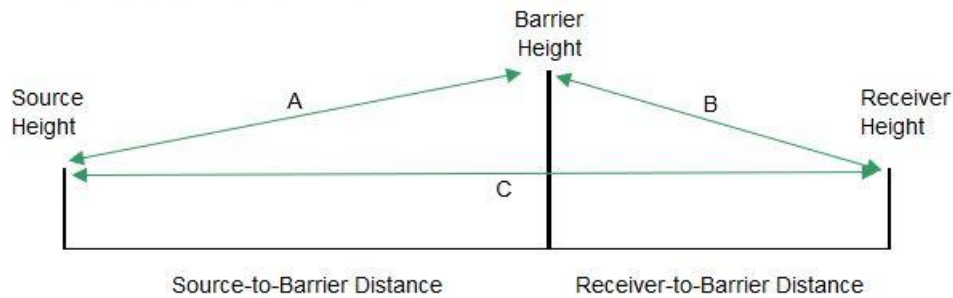
Note: hour = 24 hr format, ARR = Arrivals, DEP = Departures, TOT=Total two-way movements

Appendix D: Mitigation - Maekawa Barrier Calculation

BASIC MAEKAWA BARRIER ATTENUATION

Date:	02/09/2021
Project:	Birch B.P. Unit B - Barrier for HGV Turning Circle
Project No:	MCP2350

User input these cells



Source-to-Barrier Distance	20.0 m
Receiver-to-Barrier Distance	130.0 m

Source Height	1.5 m
Receiver Height	1.5 m
Barrier Height	2.5 m

Path difference = 0.029 m
 (a + b) - c

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	5	5	6	7	8	10	12	15	7.5 dBA

