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ACOUSTIC CONSULTANTS

NOISE IMPACT ASSESSMENT

WASTE TRANSFER STATION - BLACKROD

REPORT NO. J004530-7224-RDC-01

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Details of Assessment	
Client	J. Dickinson & Sons (Horwich) Ltd
Document Title	Noise Impact Assessment – Waste Transfer Station - Blackrod
Report Reference	J004530-7224-RDC-01

Client Address:	Company Address:
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Issue	Date	Author	Remark	Status
01	31/07/2023	Richard Cookson	Initial Issue	
02				

	Name	Position
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Checked By	Chris Lalley MSc, BSc(Hons) MIOA	Senior Consultant

This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.

Contents

1.0 SUMMARY

At the request of J. Dickinson & Son Ltd, PDA has carried out a noise impact assessment for the proposed extended operating hours of the existing Waste Transfer Station at the Blackrod site.

A survey was conducted of the background sound levels at the nearest noise sensitive properties to the waste transfer station. Typical daytime background sound levels were found to be 49 dB L_{A90}. Typical night-time background sound levels were found to be 41 dB L_{A90}.

Measurements were also taken of the sound levels within, and external to, the waste transfer building.

Sound propagation from the waste transfer building to the nearest noise sensitive properties was calculated and compared to the pre-existing background sound level during the proposed extended operating hours. The rating level of the sound was compared with the background sound level in accordance with the procedure of BS 4142:2014+A1:2019.

The Rating Sound Level due to the operation of the waste transfer building overnight was found to be 27 dB(A) and hence is well below the night time Background Level of 41 dB(A). Considering the context of the existing noise sources and levels in the area, there are no contextual considerations which are likely to modify the result of the BS4142 preliminary assessment and therefore the impact of the proposed extension in operating hours at the nearest noise sensitive residences is predicted to be low.

2.0 BRIEF FOR CONSULTANCY

PDA Ltd. was engaged to carry out the following:

A. Noise Survey - Background survey / validation

We will travel to the site and carry out a noise survey to assess the level of noise incident upon the nearest noise sensitive properties. The measurement and assessment will include for noise from the adjacent road network, and other local industrial noise sources.

We would propose to undertake measurements overnight over the proposed extended operating period of the waste transfer operations. Measurements will be made by either attended measurements over representative periods of the night, or by securing a meter close to the noise sensitive properties and taking unattended measurements over the full night-time period.

We will carry out all noise surveys in accordance with the provisions of BS7445 “Description and Measurement of Environmental Noise”. The measurements made will include both dBA and octave band noise levels including L_{eq}, L_{max}, and L_{90} parameters. During the survey duration, we will require unrestricted access to the site.

B. Noise Survey - Operations on-site

We will travel to the Transfer Station site and undertake measurements of noise levels within and external to the buildings housing the proposed extended waste transfer operations. During the visit we will also take measurements of typical vehicle movements on-site.

We will also estimate the sound insulation of the waste transfer buildings by visual inspection of the construction.

C. Survey Processing and Report

Using the internal sound levels measured in part B) above and the estimated sound insulation of the industrial buildings we will estimate the noise egress from the extended operation of the site. We will construct a noise propagation model using Soundplan software and the methods of ISO 9613 part 2 "Acousitcs - Attenuation of sound during propagation outdoors - general method of calculation". The propagation model will be used to determine the sound propagation from the proposed extended use to the nearest noise sensitive properties.

The calculated sound due to the proposed extended use will be compared to the pre-existing background sound level measured in part A). The measurements will be assessed in accordance with the National Planning Policy Statement, Planning Practice guidance on Noise and BS4142:2014 + A1:2019 "Methods for rating and assessing industrial and commercial sound."

Where an adverse impact is predicted we will provide remedial advice to minimise the noise impact of the proposed development on the nearby noise sensitive residences.

The results of our measurements, assessment and any proposed remedial measures will be presented in a full technical report suitable for submission to the Local Planning Authority in support of your planning application.

3.0 SITE DESCRIPTION

It is proposed to extend the operating hours of the existing waste transfer station on the Blackrod site. The current operating hours are Monday to Friday: 07:00 – 17:30, Saturday: 07:00 – 12:30. It is proposed to increase the operating hours to Monday – Friday 24 hours, Saturday: 07:00 – 19:00. We would note that the increased operating hours apply to the indoor processing of materials only, and that deliveries and collections will remain within the current daytime operating hours.

The closest noise sensitive properties are the houses on Junction Close approximately 100m southeast of the waste transfer building.

4.0 ASSESSMENT CRITERIA

4.1 National Planning Policy Framework

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in July 2021. With regard to Noise the Framework states the following;

> *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 soil, air, water or noise pollution or land instability.*
>
> *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;*
> - *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

The terms '*significant adverse impact*' and '*adverse impact*' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE) which states;

> *There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:*
>
> *<u>NOEL – No Observed Effect Level</u>*
>
> *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.*
>
> *<u>LOAEL – Lowest Observed Adverse Effect Level</u>*
>
> *This is the level above which adverse effects on health and quality of life can be detected.*
>
> *Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The notes also offer an explanation of the term 'adverse impacts' as follows;

… refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

Although no specific noise limits for LOAEL and SOAEL have been defined, in 2014 the UK Government published a planning practice guidance document for noise which indicates where these limits fall with relation to the perception of noise. A summary is reproduced in Section 4.2 below, and the full document is published at https://www.gov.uk/guidance/noise--2. It is considered that guidance from other acoustic standards may be employed to determine suitable levels within the overall principle of the National Planning Policy Framework.

The National Planning Policy Framework also 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.

The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.

4.2 Planning Practice Guidance – Noise

In March 2014 (updated July 2019) the UK Government published further guidance on the assessment of noise for planning purposes in the form of the on-line publication, Planning Practice Guidance on noise (http://www.gov.uk/guidance/noise--2). This document offers further guidance on the typical levels which constitute the NOEL, LOAEL and SOAEL. The relevant section is reproduced in the table below;

Table 1. Planning Practice noise level guidance

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. 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			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

It is notable from the above planning guidance that development should not normally be permitted above Significant Observed Adverse Effect Levels, and should aim to minimise Other Adverse Effect Levels (below SOAEL but above LOAEL). However, it is clear that noise is permitted to approach and/or exceed the Lowest Observed Adverse Effect Level, providing that noise is mitigated and reduced to a minimum.

4.3 BS 4142:2014 + A1:2019

The effect of industrial noise on the nearest noise sensitive residences will be assessed in accordance with BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'. This will include sound break-out from the mechanical services and deliveries to the proposed convenience store.

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.

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 comercial sound and determining the likely impact of the sound on noise sensitive residences.

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.

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.

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.

- 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.

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 charcteristics.

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.

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

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

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:
    - Façade insulation treatment
    - Ventilation and / or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
    - Acoustic screening

5.0 SURVEY DETAILS

The assessment method of BS 4142:2014+A1:2019 requires an environmental noise survey to be carried out to establish the Background Sound Level at the nearest noise sensitive residences prior to the operation of the new sound source.

An environmental noise survey was carried out immediately to the north-west of the houses on Junction Close, in the direction of the waste transfer station between 15:00 hours on 18/07/2023 and 19:15 hours on 19/07/2023, thereby encompassing the whole of the proposed extended evening / night time operating period of the waste transfer station.

5.1 Site Description

The survey of Background Sound Levels at the nearest noise sensitive residences was carried out to the north west of the nearest noise sensitive properties to the proposed development on Junction Close. See Figure 1 below.

Figure 1 – Survey measurement location adjacent to nearest house. Waste transfer building outlined in red

5.2 Survey Times and Personnel

The survey was conducted between 15:00 hours on 18/07/2023 and 19:15 hours on 19/07/2023. All measurements were made and partially attended by Mr Richard Cookson of PDA Ltd.

5.3 Equipment

The survey was conducted with a NTi XL2 sound level meter. In accordance with IEC 61672-1:2002 the meter has a Class 1 frequency response and can operate as an integrating sound level meter with

statistical functions. The meter was set to measure 'A' weighted, broadband sound pressure levels, octave band sound pressure levels and various statistical parameters. The meter was field calibrated to 1kHz at 94dB both before and after the measurement, during which time no significant deviation from the calibrated level was observed. In addition to this a valid calibration certificate is held for the meter and the calibrator. The sound level meter was fitted with an all weather windshield and housed in a weatherproof enclosure for the duration of the survey period.

5.4 Weather

During the survey period the weather was observed to be mainly dry with occasional short showers on 18/07 and further showers between 02:00 and 03:00 hours on 19/07. The temperature was between 13 - 15 °C, and wind speeds from 0 to 4 m/s initially from the south east, shifting around to the north-west between 03:00 and 04:00 hours. The remainder of the survey was dry and conditions were generally suitable for a determination of typical background sound levels. Weather observations have been taken from the nearby Weather Underground Blackrod - IBOLTO44 weather station.

5.5 Measured Noise Results

The results of the survey are reproduced in Figure 2 below;

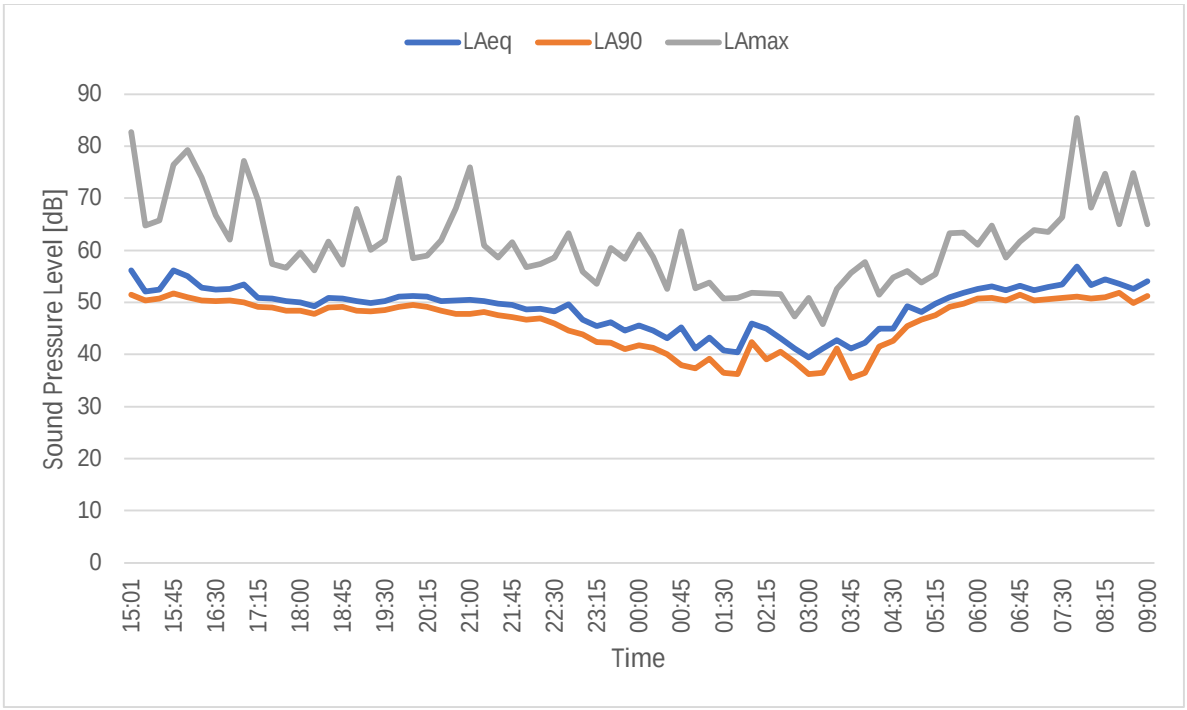

Figure 2 – Survey results

Typical background sound levels for daytime and night-time periods have been taken. For the day-time period the median of the 15 minute L_{A90} measurements was 49 dB(A). For the night-time period the median of the 15 minute L_{A90} measurements was 41 dB(A).

For the purposes of the assessment, as the waste transfer station is proposed to operate over a 24 hour period, we have taken the 41 dB(A) typical night-time value as the typical Background Sound Level.

6.0 WASTE TRANSFER NOISE SOURCE

The waste transfer operations are carried out in an enclosed industrial building. It is proposed that the materials for the proposed night time operation will be delivered during the day, and the delivery doors to the building will remain closed throughout the extended operating period.

It is not possible to measure the sound from the facility directly at the receiver due to the relatively high environmental sound from other sources (such as the nearby motorway, railway and A6). In order to predict the noise level we have modelled the sound egress through the building envelope and propagation to the noise sensitive property.

Sound levels inside the waste transfer facility were measured close to the internal walls during operation of the facility. It was noted that the activities within the waste transfer facility are fairly constant with continuously running picking and processing lines.

Measured internal levels close to the external wall were as follows:

Table 2 – Sound pressure levels inside waste transfer station building

	L_{Zeq} dB							
L_{Aeq} dB	63	125	250	500	1000	2000	4000	8000
82.7	87.3	87.2	84.5	78.4	76.6	74.7	72.3	65.9

It was noted that the waste transfer building was a metal / mineral wool sandwich construction and hence the sound insulation of the building envelope has been determined from test data for similar sandwich construction portal-frame buildings.

Table 3 – Sound reduction of metal / mineral wool sandwich panels

	Sound Reduction Index [dB] R							
Element	63	125	250	500	1000	2000	4000	8000
Wall (e.g. Euroclad Elite 51.30 Kn)	18.9	29.6	37.9	40.5	45.1	48.6	59.2	61.1
Roof (e.g. Euroclad Elite 2.2Kn)	12.1	16.6	31.4	39.2	44.5	50.1	53.1	62.3

7.0 IMPACT ASSESSMENT

Using the internal sound level and the sound insulation of the cladding, and a further -6dB correction to allow for the internal reverberant sound field, we have calculated the intensity of the walls and roof of the industrial building. These have been modelled using Soundplan software and the methods of ISO 9613 part 2 "Acoustics – Attenuation of sound during propagation outdoors – General method of calculation" to determine the sound propagation to the nearest noise sensitive house on Junction Close.

The results of the propagation model are shown in Figure 3 below:

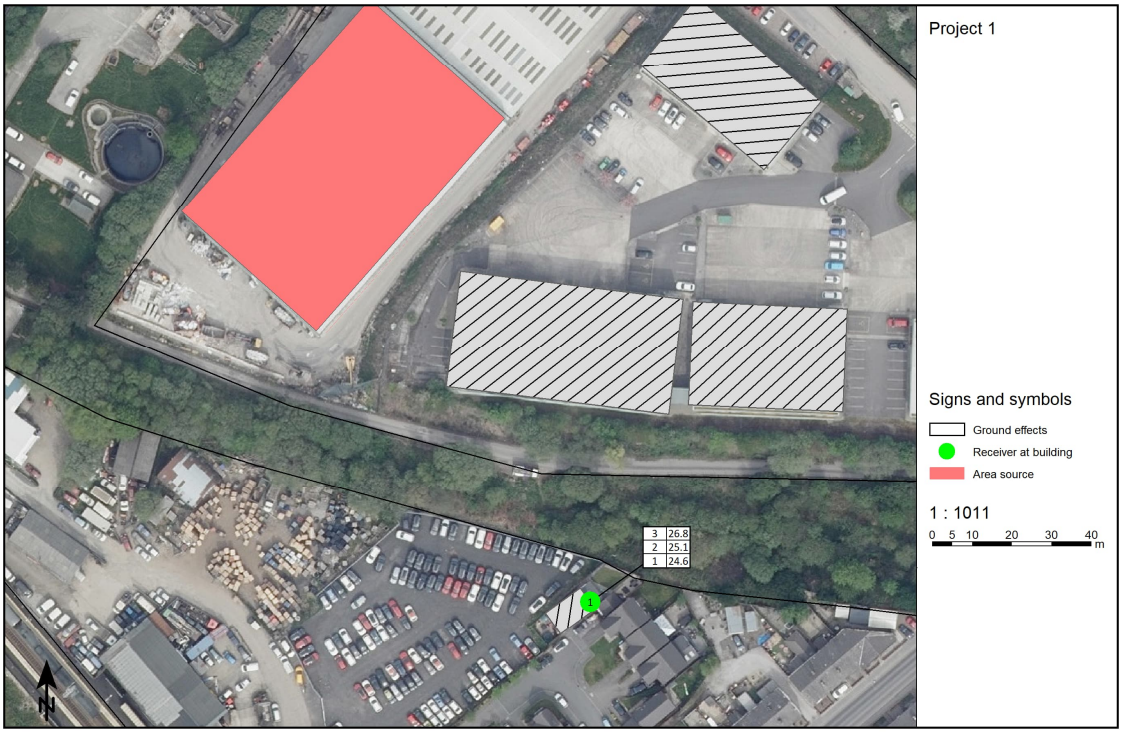

Figure 3 – Sound propagation from waste transfer building to nearest house

7.1 BS 4142 Assessment

The Specific Sound due to the operation is shown in Figure 3 to be 27 dB(A) at the worst case 2nd floor of the houses on Junction Close. The operation is continuous within the waste transfer building and attenuated by the building envelope, the character outside the building was observed to be a low rumbling sound, as such the sound is not tonal, impulsive or intermittent and therefore no corrections for acoustic character are deemed appropriate. The rating level is therefore 27 dB(A) and is well below the typical night-time background sound level of 41 dB. BS4142:2014+A1:2019 states, *"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."* As such the impact of the extended hours of the waste transfer operation is predicted to be low, depending on context.

BS4142 indicates that this initial estimate of impact needs to be modified for context. With reference to the context BS4142 indicates that 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.

BS4142 indicates that pertinent factors that could modify context would include: the absolute level of 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 purpose already incorporate design measurements that secure good internal and/or outdoor acoustic conditions.

With reference to context, we would make the following comments:

The absolute sound level due to the proposal is predicted to be 27 dB L_{Aeq} and therefore, is well below the 45 dB outside bedroom windows of WHO Guidelines for Community noise. In addition, BS8233 suggests that an internal noise level of 30 dB L_{Aeq} during the night-time provides appropriate internal conditions bedrooms. We would note that the sound from the proposed development would be much below this level internally as it is below the level before any attenuation is applied for a partially opened window.

The existing residual noise climate which was around 45 dB L_{Aeq} overnight and was dominated by both road traffic noise and contributions from the existing commercial/industrial uses in the area. We would expect this existing sound to mask noise emissions from the site for the majority of the time.

We would consider that the context described above would further reduce the impact of the proposed development and suggests that the noise emissions from the site are likely to have a low impact.

8.0 CONCLUSION

At the request of J. Dickinson & Son Ltd, PDA has carried out a noise impact assessment for the proposed extended operating hours of the existing Waste Transfer Station at the Blackrod site.

A survey was conducted of the background sound levels at the nearest noise sensitive properties to the waste transfer station. Typical daytime background sound levels were found to be 49 dB L_{A90}. Typical night-time background sound levels were found to be 41 dB L_{A90}.

Measurements were also taken of the sound levels within, and external to, the waste transfer building.

Sound propagation from the waste transfer building to the nearest noise sensitive properties was calculated and compared to the pre-existing background sound level during the proposed extended operating hours. The rating level of the sound was compared with the background sound level in accordance with the procedure of BS 4142:2014+A1:2019.

The Rating Sound Level due to the operation of the waste transfer building overnight was found to be 27 dB(A) and hence is well below the night time Background Level of 41 dB(A). Considering the context of the existing noise sources and levels in the area, there are no contextual considerations which are likely to modify the result of the BS4142 preliminary assessment and therefore the impact of the proposed extension in operating hours at the nearest noise sensitive residences is predicted to be low.

APPENDIX A – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB $L_{Aeq.}$ Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq}. It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB $L_{An.}$ It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) $L_{max,}$ dB $L_{Amax,}$ etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq}, L_{90}, L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.