Suite 24
Doncaster Business Innovation Centre
Ten Pound Walk
Doncaster
DN4 5HX

Proposed Warehouse Extension
Naylor Drainage Ltd, Clough Green, Cawthorne, Barnsley, S75 4AD

Noise Impact Assessment

For:
Naylor Drainage Ltd

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Author: C. Parker BSc (Hons) MIOA

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1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by Naylor Drainage Ltd to undertake a noise impact assessment to inform a planning application for a proposed extension to an existing plastic extrusion warehouse at Naylor Drainage Ltd, Clough Green, Cawthorne, Barnsley, S75 4AD.

This report details:

- The methodology and results of a baseline noise survey conducted in the vicinity of the site
- The impact assessment of noise sources, associated with the proposals, upon existing neighbouring noise sensitive receptors

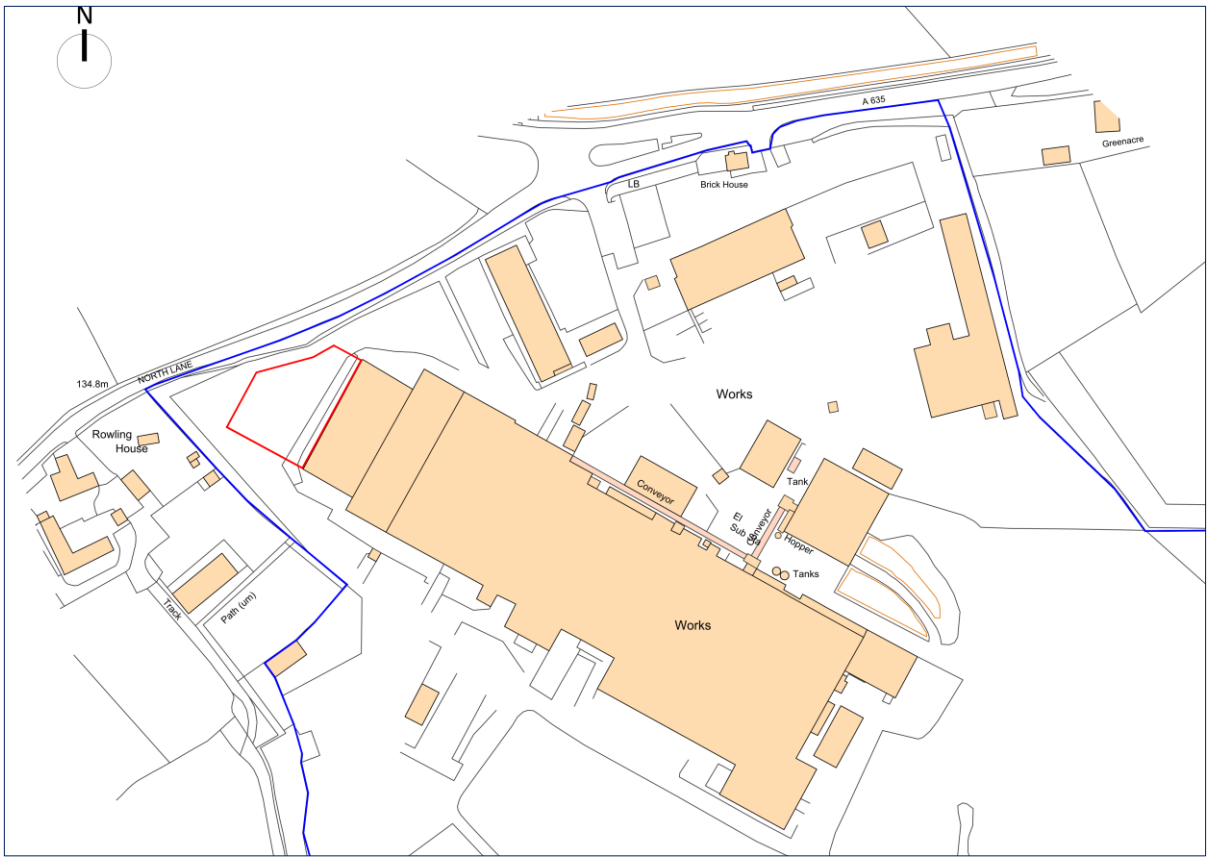
The report has been prepared for Naylor Drainage Ltd for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to the report should consult Naylor Drainage Ltd and ENS as to the extent to which the findings may be appropriate for their use.

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

1.2 Site Description

The proposed extension is to be located at the north-west end of the existing facility, as shown (highlighted in red) in Figure 1.1.

Figure 1.1: Location of Proposed Extension



The proposals comprise the extension of an existing extrusion area in a north-west direction. The operations within the proposed extension are understood to be similar to those undertaken in Factory 1.

The insulated cladding materials used to construct the proposed extension are understood to be as per those installed at Factory 2.

The nearest Noise Sensitive Receptor (NSR) to the site is a dwelling 'Rowling House' (see Figure 1.1.) to the west of the site.

2 Policy Context and Assessment Guidance

2.1 Planning Policy

National Planning Policy Framework

The National Planning Policy Framework (NPPF)[1] was updated in 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 170 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'.

Paragraph 180 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'.

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

The Noise Policy Statement for England[2] (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

The 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

According to the explanatory notes in the statement, where a noise level falls between the lowest observable adverse effect level (LOAEL) and a level which represents a significant observable adverse effect level (SOAEL):

[1] National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2019)
[2] Noise Policy Statement for England. Government Department for Environment, Food and Rural Affairs (2010)

'…all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.'

Planning Practice Guidance on Noise

Planning Practice Guidance[3] (PPG) is an online resource (last updated in 2019) to provide additional guidance and elaboration on the NPPF. It advises that:

'Plan making and decision making need to take into account the acoustic environment and in doing so consider:

- *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; and*
- *whether or not a good standard of amenity can be achieved.'*

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. 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'.

Table 2.1 summarises the PPG noise exposure hierarchy.

Table 2.1: PPG Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not Noticeable	No Effect	No Observed Effect	No specific measures required
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			
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			
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

[3] Planning Practice Guidance on Noise (http://planningguidance.planningportal.gov.uk/blog/guidance/noise/). Ministry of Housing, Communities and Local Government (2019)

With regard to planning policies and noise standards, the PPG advises that:

'Plans may include specific standards to apply to various forms of proposed development and locations in their area. Care should be taken, however, to avoid these being applied as rigid thresholds, as specific circumstances may justify some variation being allowed.'

2.2 Assessment Guidance

British Standard 4142

BS 4142[4] presents methods for rating and assessing the potential impact of commercial and industrial sound upon noise sensitive receptors.

In order to assess noise impact using BS 4142, the 'Rating level' of the new noise source is compared with the existing 'Background level' and the following analysis made:

- Typically, the greater this difference, the greater the magnitude of the impact
- 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

In order to establish the 'rating level':

- The 'specific level' of the industrial / commercial noise source is determined by measurement or calculation with regard to the appropriate reference time interval (for day or night periods).
- Where appropriate, a rating penalty can then be applied to the specific noise level to account for the character of the noise (namely tonality, impulsivity and intermittency). Such 'acoustic feature corrections' can be added together in linear fashion where appropriate.

Tonality can be determined objectively (using adjacent third octave band analysis / the Joint Nordic method) or subjectively as listed below:

- +2 dB penalty: Just perceptible
- +4 dB penalty: Clearly perceptible
- +6 dB penalty: Highly perceptible

Impulsivity (the rapidity of the change in sound level) can be determined objectively (using Fast Fourier Transform analysis) or subjectively as listed below:

- +3 dB penalty: Just perceptible
- +6 dB penalty: Clearly perceptible
- +9 dB penalty: Highly perceptible

Where intermittency is present (i.e. when the specific noise has identifiable on/off conditions) a +3 dB penalty can be applied.

[4] British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. British Standards Institution (2019)

Where the acoustic feature characteristics are neither tonal nor impulsive, but are clearly distinguishable against the residual noise, a +3 dB penalty can be applied.

BS 4142 requires separate analysis for day and night time periods, evaluating the Rating level over an appropriate reference time interval (T_r) of:

- 1 hr during the day (between 07:00 - 23:00 hrs)
- 15 min during the night (between 23:00 - 07:00 hrs)

3 Baseline Noise Survey and Results

3.1 Overview

Baseline noise monitoring was carried out between Monday 24th and Tuesday 25th May 2021 to determine prevailing ambient and background noise levels at a position representative of the nearest noise sensitive receptor (NSR) to the proposals.

The adopted noise monitoring position (shown as 'B1' in Appendix B) was at the western site boundary, representative of the NSR to the west.

Noise measurements were undertaken using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. The meter was connected to a windshield covered microphone positioned in free-field conditions (> 3.5 metres from a vertical reflective surface) at a height of 4 metres above ground.

The measurement system calibration was verified immediately before and after the survey period using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration levels greater than 0.5 dB was noted.

Measurements consisted of A–weighted broadband parameters including L_{Aeq} and L_{A90} together with linear octave and third octave band data.

3.2 Results

Table 3.1 presents a summary of the noise data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1: Summary of Baseline Noise Measurement Data – Position 1

Date (Period)	Time (hh:mm)	L_{Aeq} (dB)	$L_{A90,15min}$ Range (dB)
24/05/2021 (Day)	12:48 – 23:00	57	47 – 54
24/05/2021 – 25/05/2021 (Night)	23:00 – 07:00	53	47 – 52

Noted sources of background noise during the baseline survey commissioning and decommissioning included continuous noise from the existing warehouse and external plant plus distant road traffic noise.

Typical[5] daytime background noise levels were around 48 dB $L_{A90,15min}$ during the day and night periods.

[5] The 'typical' value is either the 'modal' (i.e. most occurring) value or the mean value, whichever is the lowest of the two average data sets

4 Source Noise Levels

4.1 Overview

In order to assist with the noise impact assessment detailed in Section 5, additional noise measurements were obtained on site on Monday 24th May 2021 to determine typical noise levels, associated with key existing plant and operations, that are representative of the proposals.

Noise measurements were undertaken using the same equipment and methodology outlined in Section 3 of this report.

4.2 Results

The measured noise levels at the various noise monitoring positions (shown in Appendix B) are presented in Table 4.1.

Table 4.1: Summary of Measured On-Site Noise Levels – 24/05/2021

Position	Location	Time (hh:mm)	L_{Aeq} (dB)	Description
S1	Factory 1 (Internal)	10:48 – 11:15	86	Internal reverberant measurement within existing Factory 1 building, representative of anticipated activities within proposed extension (4 – 5 no. extrusion lines operating)
S2	Factory 2 (Internal)	12:00 – 12:23	85	Internal reverberant measurement within existing Factory 2 building, selected (along with Position S3) to determine sound insulation performance of insulated cladding that will be used for proposed extension
S3	Factory 2 (External)	12:07 – 12:12	54	External measurement 5m from insulated cladding of Factory 2

5 Noise Assessment

5.1 Overview

Since the proposals are not anticipated to utilise additional external plant (fixed or mobile), the primary source of noise associated with the proposals is considered to be internal noise break-out from the proposed extension.

The distance between the NSR and the nearest façades (mid-point) of the proposed extension are 39 metres to the north-west elevation and 45 metres to the south-west elevation.

Based on a measurement (Table 4.1) acquired on site, within an existing area of the site operating in a similar manner to the proposals (Factory 1), an internal reverberant noise level of 86 dB $L_{Aeq,T}$ has been adopted for use in noise break-out calculations.

Noise propagation from the nearest façades of the proposed extension to the NSR has been calculated using the following equation:

$SPL_2 = SPL_1 - R + 10 \log S - 20 \log r - 14$

Where:

SPL_2 = Sound pressure level at the NSR, dB(A)
SPL_1 = Assumed internal sound pressure level in the unit, dB(A)
R = Composite sound reduction performance of building façade, dB R_w
S = Surface area of nearest façade of building, m^2
r = Distance from NSR to nearest façade of building, m

With regard to façade surface area, the façade length/width has been determined using the proposed plan drawing. The proposed height of the extension is understood to be circa 7 metres.

For the purpose of the calculations, the sound reduction performance of the building envelope is taken to be 25 dB R_w based on the simultaneous measurements[6] acquired either side of the existing insulated cladding at Factory 2 (see Table 4.1). It is understood that the same specification of insulated cladding is to be used for the proposed extension.

Calculations assume that the sound insulation of the building façades will not be compromised by weaker elements (e.g. rooflights) or penetrations such as louvres or doors. Where any louvres, roof lights or doors are proposed for the building, they should therefore be designed with a sound insulation performance of ≥ 25 dB R_w.

Noise break-out levels, associated with internal operations within the despatch building, have been determined at the nearest NSRs using a basic propagation calculation incorporating a distance attenuation correction. For a robust assessment, no barrier attenuation due to screening has been assumed.

The calculated extension noise break-out levels are presented in Table 5.1.

Table 5.1: Calculated Noise Break-Out Levels to NSR

Source	Noise Break-Out Level (dB $L_{Aeq,T}$) to NSR
North-West Elevation	38
South-West Elevation	38
Cumulative	**41**

[6] $SPL_{INT} - SPL_{EXT} - 6$ dB

5.2 Impact Assessment

The calculated noise break-out levels have been assessed in accordance with BS4142.

It is considered that the proposals would not be different in acoustic character to prevailing emissions from the site; therefore, no acoustic feature correction is deemed necessary in this instance.

The results of the BS4142 assessment are presented in Tables 5.2 and 5.3 for day and night periods, respectively.

Table 5.2: BS4142 Assessment of Noise Break Out – Daytime

Parameter	Level at Receptor
Typical daytime background sound level ($L_{A90,15min}$)	48 dB
Specific noise level ($L_{Aeq,1hr}$) (See Table 5.1 – no corrections for % on time deemed necessary)	41 dB
Acoustic feature correction	0 dB
Rating level ($L_{Ar,1hr}$)	41 dB
Excess of rating level over background sound level	- 7 dB
Assessment (depending on context)	Low impact

Table 5.3: BS4142 Assessment of Noise Break Out – Night

Parameter	Level at Receptor
Typical night background sound level ($L_{A90,15min}$)	48 dB
Specific noise level ($L_{Aeq,15min}$) (See Table 5.1 – no corrections for % on time deemed necessary)	41 dB
Acoustic feature correction	0 dB
Rating level ($L_{Ar,15min}$)	41 dB
Excess of rating level over background sound level	- 7 dB
Assessment (depending on context)	Low impact

The BS4142 assessment of noise break-out from the proposed extension indicates that low impacts would be expected at the nearest NSR during day or night periods.

6 Summary and Conclusions

A noise impact assessment has been performed for a proposed extension to an existing plastic extrusion warehouse at Naylor Drainage Ltd, Clough Green, Cawthorne, Barnsley, S75 4AD.

Baseline noise monitoring was carried out between Monday 24th and Tuesday 25th May 2021 to determine prevailing ambient and background noise levels at a position representative of the nearest noise sensitive receptor (NSR) to the proposals.

Additional noise measurements were obtained on site on Monday 24th May 2021 to determine typical noise levels, associated with existing operations, that are representative of the proposals.

Noise levels associated with internal operations within the proposed extension have been determined at the nearest NSR and assessed using BS4142. The assessment has determined that low impacts are expected during the day or night at the nearest NSR.

Appendix A – Abbreviations and Definitions

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:

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

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

A-weighting
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.

Single Event Level / Sound Exposure Level (SEL or L_{AE})
The energy produced by a discrete noise event averaged over one second, regardless of event duration. 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 B – Noise Measurement Positions

