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

Proposed Pyrolysis Plant Duncombe Road, Bradford, BD8 9TB

Noise Impact Assessment

For:
The End Journey 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 The End Journey Ltd to undertake a noise impact assessment for proposed pyrolysis plant at Duncombe Road, Bradford, BD8 9TB (hereafter referred to as 'the site').

The report has been prepared for The End Journey 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 The End Journey 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 plant is to be located on industrial land to the north of Duncombe Road in Bradford, as shown (highlighted in red) in Figure 1.1.

Figure 1.1: Location of Proposed Plant

The site location is predominantly industrial in nature with industrial premises, commercial premises and warehouses surrounding the site.

The nearest Noise Sensitive Receptors (NSRs) to the site are:

- Dwellings on Nicholas Close, approximately 175 metres to the south-west of the proposed plant (NSR1)
- St. William's Catholic Primary School on Young Street, approximately 195 metres to the north-east of the proposed plant (NSR2)

2 Planning Policy 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] Government Department for Environment, Food and Rural Affairs. Noise Policy Statement for England (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)

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

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

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. The Standard is appropriate for the consideration of industrial and manufacturing processes, fixed installations which comprise mechanical and electrical plant and equipment and mobile plant / vehicles that form an intrinsic part of the industrial/commercial including the loading and unloading of goods and materials at the premises.

The noise impact magnitude is derived from the numerical subtraction of the representative[5] background noise level from the measured/calculated rating level of the specific sound under consideration. 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

The impact magnitudes detailed above align with the noise exposure hierarchy set out in the foregoing subsection, as shown in Table 2.2.

Table 2.2: BS4142 Impact Magnitude and PPG Effect Level

PPG Effect Threshold	BS4142 Impact Assessment
NOAEL	Indication of a low impact
LOAEL	Indication of an adverse impact
SOAEL	Indication of a significant adverse impact

The 'rating level' must be determined by applying 'character corrections' to the specific industrial/commercial noise level to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency. This can be done using a subjective, objective or reference methods. Where multiple features are present the corrections should be added in a linear fashion to the specific level.

The subjective method is based on the corrections presented in Table 2.3.

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

[5] 'Representative' is generally considered to be 'typical' (e.g. formed by analysis of modal / mean average values) rather than the lowest measured

Table 2.3: BS4142 Subjective Method 'Acoustic Feature' / Rating Corrections

Level of Perceptibility	Tonal Correction	Impulsivity Correction	Intermittency Correction	Other
None	0 dB	0 dB	+3 dB Where intermittency is readily identifiable	+3 dB Where neither tonal nor impulsive but clearly identifiable against prevailing soundscape
Just Perceptible	+ 2 dB	+ 3 dB		
Clearly Perceptible	+ 4 dB	+ 6 dB		
Highly Perceptible	+ 6 dB	+ 9 dB		

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)

Section 11 of BS 4142 introduces the concept of 'context' to the process of identifying noise impact and explains 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 (my emphasis). *An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.'*

3 Baseline Noise Levels

3.1 Noise Survey (By Others)

In March 2017, a baseline noise monitoring survey was performed by Enzygo Ltd in order to determine prevailing ambient and background noise levels in the immediate vicinity.

The survey was performed for a noise impact assessment prepared to inform a planning application submitted for similar scheme immediately adjacent (east) to the site. For that scheme, baseline noise monitoring was undertaken at the following locations:

- Position 1 – Nicholas Close (NSR1)
- Position 2 – St Williams Catholic Primary School (NSR2)
- Position 3 – Duncombe Road

Table 3.1 replicates the baseline noise data presented in report ref: Report No: CRM.336.002.NO.R.001 dated March 2017 by Enzygo Ltd.

Table 3.1: Summary of Baseline Noise Measurement Data

Position	Period	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A90} (dB)	L_{A10} (dB)
1	Day	75	104	61	77
	Night	66	81	50	70
2	Day	65	84	56	68
3	Day	66	91	59	67

Due to the close proximity of the two sites, it is considered that the above baseline noise data is appropriate for use in this assessment.

4 Noise Assessment

4.1 Proposals

The proposals are understood[6] to be as follows:

- Pyrolysis plant is to be housed in a new lightweight metal cladding unit – dimensions 14m x 6m x 9m
- A report[7] detailing measured noise levels of the proposed pyrolysis plant (installed at another site) suggests semi-reverberant plant noise levels of 73 dB L_{Aeq} at a distance of 5 metres
- The unit will accommodate an extraction system comprising:

  - Extraction fan rated at 54 dB(A) at 10 metres distance
  - Air velocity: 8.7 m/s
  - Flue diameter: 600mm at widest point
  - Flue terminal height: 11.5 metres above ground

4.2 Propagation

For the purpose of the calculations, the sound reduction performance of the building envelope is assumed to be ≥ 25 dB R_w based on the sound reduction performance of standard single-skin insulated cladding.

Calculations assume that the sound insulation of the façade 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 any of the units, they should therefore be designed with a sound insulation performance of ≥ 25 dB R_w.

Noise propagation to each NSR, from the nearest façade of the unit, has been calculated using the following equation:

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

Where:

SPL2 = Sound pressure level at the NSR, dB(A)
SPL1 = Assumed internal sound pressure level in each unit, dB(A)
R = Composite sound reduction performance of unit façade, dB R_w
S = Surface area of nearest façade of each unit, m^2
r = Distance from NSR to nearest façade of each unit, m

Noise propagation from the flue terminal has been calculated using a simple distance attenuation calculation.

Calculated Noise Levels

For a robust assessment, it is assumed that the NSR will have direct line of sight to the flue terminal and the nearest façade of the proposed unit. The calculated plant noise levels are presented in Table 4.1.

[6] As advised by Tedge Sagoo, The End Journey Ltd via telephone and email communications (23rd - 30th July 2020)
[7] Report ref: N-180220 dated 18/02/2020 by Alkom Synergy PVT Ltd

Table 4.1: Calculated Plant Noise Levels at NSRs

Receptor	Plant Noise Level ($L_{Aeq,T}$)		
	Unit	Chimney	Cumulative
NSR1	10 dB	29 dB	29 dB
NSR2	9 dB	28 dB	28 dB

4.3 Impact Assessment

With regard to potential 'acoustic feature' corrections, the following is considered:

- Nothing in the supplied information suggests impulsivity or intermittent operation
- No third octave band noise data has been made available to determine whether the proposed plant exhibits noise that could be considered tonal

Notwithstanding the above, a 3 dB correction has been applied to account for the possibility that the plant could be (in BS4142 terms) 'distinguishable against the residual noise'.

It is assumed that the plant will run continuously at any point during the day or night. The calculated plant noise levels have been assessed in accordance with BS4142.

It is assumed that NSR2 (primary school) would not be occupied at night; therefore, only NSR1 is considered for the night-time assessment.

The results of the BS4142 assessment are presented in Tables 4.2 and 4.3 for day and night periods, respectively.

Table 4.2: BS4142 Assessment - Day

Parameter	NSR1	NSR2
Daytime background sound level	61 dB L_{A90}	56 dB L_{A90}
Specific noise level (See Table 4.1 – plant assumed to operate for 100% of assessment period)	29 dB L_{Aeq}	28 dB L_{Aeq}
Acoustic feature correction	+ 3 dB	+ 3 dB
Rating level	32 dB $L_{Ar,Day}$	31 dB $L_{Ar,Day}$
Excess of rating over background sound level	- 29 dB	- 25 dB
Assessment	Low impact	Low impact

Table 4.3: BS4142 Assessment - Night

Parameter	NSR1
Night-time background sound level	50 dB L_{A90}
Specific noise level (See Table 4.1 – plant assumed to operate for 100% of assessment period)	29 dB L_{Aeq}
Acoustic feature correction	+ 3 dB
Rating level	32 dB $L_{Ar,Night}$
Excess of rating over background sound level	- 18 dB
Assessment	Low impact

It can be seen that low impacts are expected at the nearest NSRs during day or night periods.

With reference to the PPG noise hierarchy of effects, a low impact would equate to a 'No Observed Adverse Effect (NOAEL) with no specific measures required.

It can also be seen that daytime plant noise levels of circa 28 dB L_{Aeq} are expected at NSR2 (Primary School). Such levels are significantly below the prevailing ambient noise levels (65 dB L_{Aeq}); therefore, this would not result in a cumulative increase in prevailing ambient noise level externally or internally at the school.

5 Summary and Conclusions

A noise assessment has been performed for proposed pyrolysis plant at Duncombe Road, Bradford, BD8 9TB.

Plant noise associated with the proposals has been assessed using BS4142 guidance. The assessment has determined that low impacts are expected at the nearest NSRs during day or night periods.

With reference to the national planning guidance regarding noise effects, a low impact would equate to a 'No Observed Adverse Effect' with no specific measures required.

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

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