



Beeston WWTW

Noise Assessment





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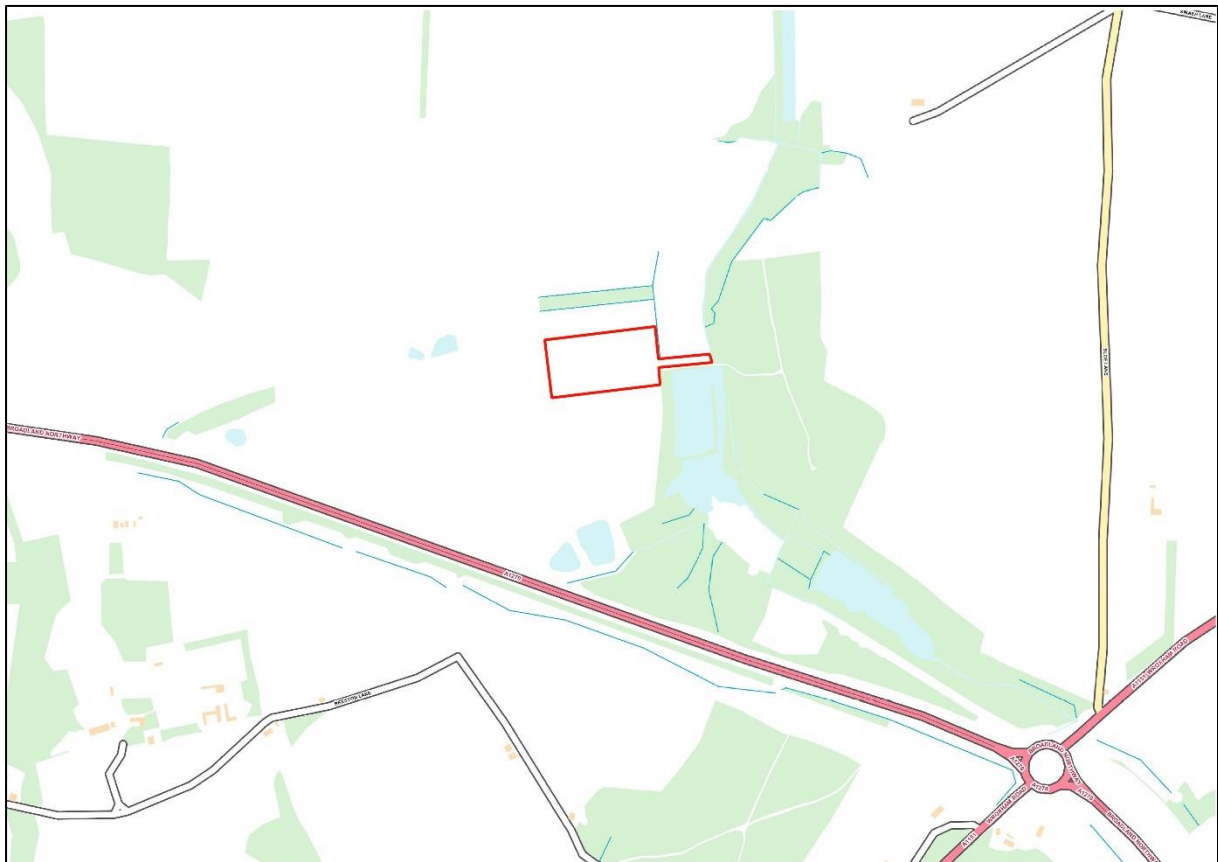
1 INTRODUCTION

- 1.1 Entran Ltd has been commissioned to identify noise limits for the proposed wastewater treatment works (WWTW) in Beeston.
- 1.2 The exact specification of the proposed WWTW has not yet been finalised and therefore this report has been prepared to identify the requirements for the related plant items. Limits have been identified in accordance with the most relevant national standards and guidelines and will be used to inform the progression of the detailed design.
- 1.3 This report is necessarily technical in nature and contains terminology relating to acoustics and noise. Therefore, a glossary together with a brief introduction to the subject of noise has been provided in Appendix A.

2 SITE DESCRIPTION

- 2.1 The site is situated in Beeston, approximately 300m north of the A1270. The surrounding area is predominantly open land with sporadic residential receptors. The nearest residential receptors are situated at least 600m to the south of the site, beyond the A1270 and off Beeston Lane.
- 2.2 The proposed development location and boundary are presented in Figure 1 below.

Figure 1 – Indicative Site Location Plan





3 ASSESSMENT METHODOLOGY

National Planning Policy Framework (NPPF) (Dec 2023)

3.1 The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England. It attempts to summarise in a single document all previous national planning policy advice. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

3.2 Under Section 15; Conserving and enhancing the natural environment, the following is stated in paragraph 180:

“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...”

3.3 The NPPF goes on to state in paragraph 191 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 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”

Noise Policy Statement for England NPSE (March 2010)

3.4 The Government is committed to sustainable development and the Department for Environment Food and Rural Affairs (Defra) plays an important role in this by working to secure a healthy environment in which current and future generations can prosper. One



aspect of meeting these objectives is the need to manage noise for which Defra has the overall responsibility in England.

3.5 In March 2010, the Noise Policy Statement for England (NPSE) set out the long-term vision of Government noise policy as to:

'Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.'

3.6 The long-term vision is supported by the following aims:

'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life: and,*
- *Where possible, contribute to the improvement of health and quality of life.'*

3.7 The explanatory note to the policy statement emphasises that sustainable development is a core principle underpinning all government policy. In this respect, there is a need to integrate consideration of the economic and social benefit of the activity under examination with proper consideration of the adverse environmental effects.

3.8 To achieve these objectives the NPSE sets out three noise conditions to be determined by the assessor:

NOEL - No Observed Effect Level

3.9 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

3.10 This is the level above which adverse effects on health and quality of life can be detected.

SOAEL - Significant Observed Adverse Effect Level



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

3.12 The NPSE considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable.

3.13 Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the NPSE 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.... This does not mean that such adverse effects cannot occur.'

3.14 No objective values are offered within the NPSE, as the document does indicate that each site should be considered on its own merits. Consequently, consideration of the observed effects is made through an assessment methodology as detailed below.

The Institute of Environmental Management & Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)

3.15 The Institute of Environmental Management and Assessment (IEMA) have published the '*Guidelines for Environmental Noise Impact Assessment*'. The guidelines are applicable to noise impact assessment for any scale of development proposal, including core principles to achieve effectively integration with the EIA, and provide advice on the issues that need to be considered in a noise impact assessment and whether the appropriate conclusions are being reached. The factors include:

- The appropriateness of the noise parameters used for the situation;
- The reference time period used in making the assessment;
- The level, character and frequency content of the noise sources under investigation; and,
- How the predicted noise levels relate to relevant Standards and guidelines.

3.16 The guidelines also recommend that the assessor should determine the degree of impact based on evidence derived from the assessment.



The Professional Practice Guidance on Planning and Noise (2017)

3.17 The '*Professional Practice Guidance on Planning and Noise*' (ProPG) was produced by a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) to provide acoustical practitioners with guidance on the management of noise within the planning system in England.

3.18 The reparation of the ProPG acknowledges and reflects the Government's overarching NPSE, the NPPF and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance. It provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:

- advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of good acoustic design in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- promote appropriate noise exposure standards; and,
- assist the delivery of sustainable development.

British Standard BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

3.19 British Standard BS 4142: 2014 *Methods for Rating and Assessing Industrial and Commercial Sound* is intended to be used for the assessment of whether sound of industrial and/or commercial nature is likely to give rise to complaints from people residing in nearby dwellings. The Standard, which was updated in 2014, states that such sound can include:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and,



- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

3.20 The procedure contained in BS 4142 for assessing the likelihood of complaints is to compare the measured or predicted sound level from the source in question, the '*specific sound level*', at the assessment position with the background sound level. Where sound contains acoustic features, such as tonality, impulsivity or other noticeable characteristics then a correction is added to the specific sound to obtain the '*rating level*' that reflects the contextual setting of the Site.

3.21 To assess the likelihood of complaints, the measured background sound level is subtracted from the rating level. BS 4142 states:

'Typically, the greater this difference, the greater the magnitude of the impact;

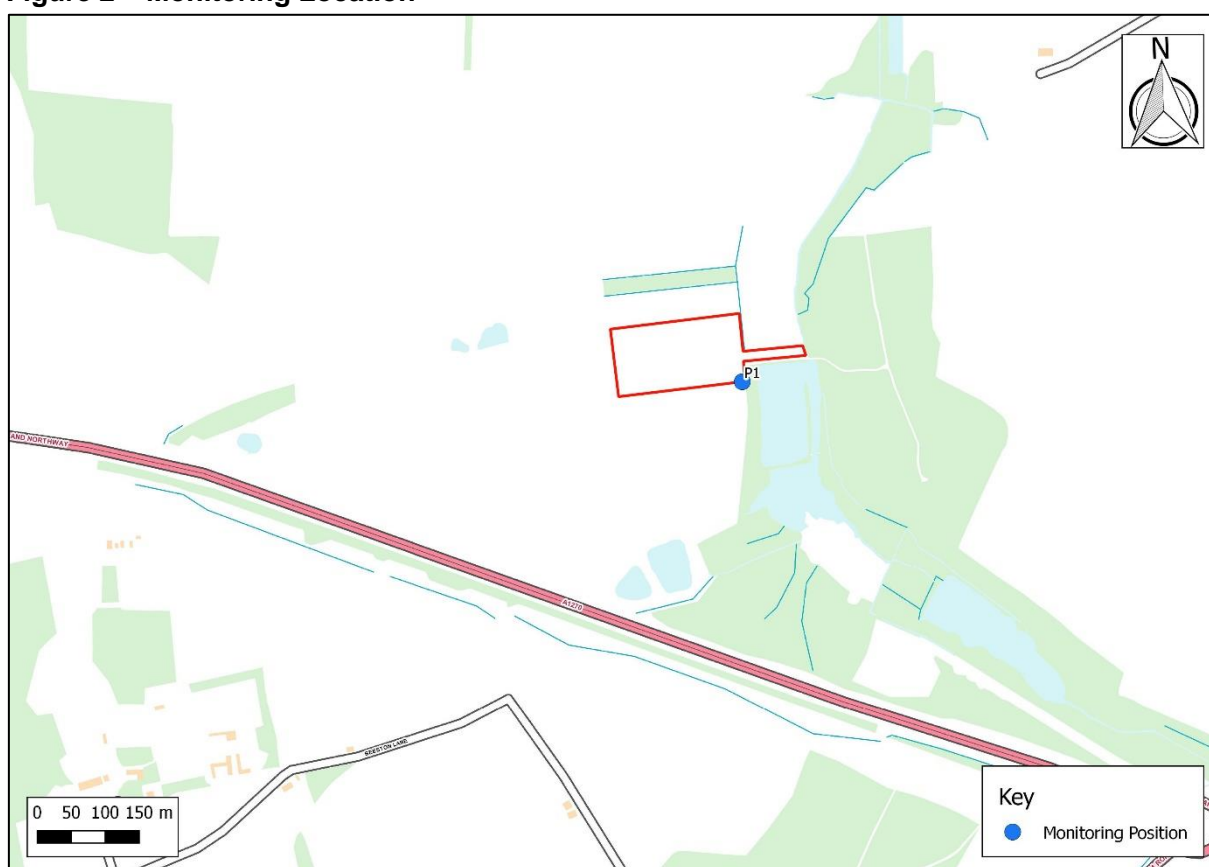
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,*
- *The lower the rating level is relative to the measured 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.*

3.22 BS 4142 also states that "*where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation.*"

4 ENVIRONMENTAL NOISE MEASUREMENTS

- 4.1 Existing noise conditions in the vicinity of the proposed development have been determined by an environmental noise survey conducted between 26th February and 4th March 2024. The monitor was positioned approximately 380m from the A1270 and provides a cautious representation of the minimum existing sound levels at the nearest residential receptors, which are situated between 120 and 270m from the road.
- 4.2 The site outline and monitoring position, P1, are presented in Figure 2.

Figure 2 – Monitoring Location



- 4.3 A summary of the survey is provided in Table 1.

**Table 1: Summary of Noise Survey**

Monitoring Position	Measured Sound Pressure Level, dB re. 2×10^{-5} Pa.					
	Day Time (07:00 - 23:00)			Night-time (23:00 - 07:00)		
	$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$	$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$
26/02/2024	80.7	48.5	38.7	78.0	41.3	30.8
27/02/2024	90.1	51.5	44.1	72.8	42.5	31.8
28/02/2024	79.8	51.6	46.3	72.7	46.4	38.5
29/02/2024	77.2	52.0	43.8	85.0	46.7	34.1
01/03/2024	85.8	54.9	47.8	80.5	45.3	33.7
02/03/2024	79.7	51.7	46.2	72.5	42.8	33.5
03/03/2024	83.9	46.2	37.3	74.5	47.5	35.0
04/03/2024	80.7	52.3	45.0	-	-	-

Maximum levels represent the highest $L_{Amax,F}$ sound level during the given period.

The period $L_{Aeq,T}$ is obtained from the logarithmic average of measured sound levels.

The period $L_{A90,T}$ is obtained from the arithmetic average of the measured sound levels.

4.4 Background sound levels have been obtained by statistical analysis during daytime and night-time periods. Derived background sound levels are presented in Table 2 and statistical analysis is presented graphically in Appendix B.

Table 2: Background Sound Levels, Façade, During Assessment Periods

Position	Time Period	Background Sound Level, $L_{A90,T}$, dB re. 2×10^{-5} Pa.
P1	Daytime 07:00 - 23:00	37
	Night-time 23:00 – 07:00	29

4.5 All noise measurements were undertaken by competent individuals with experience in environmental noise monitoring. Measurements were obtained in accordance with the principles of BS 7445: 2003: '*Description and measurement of environmental noise*'. All acoustic measurement equipment used during the noise surveys conformed to Type 1 specification of British Standard 61672: 2003. The sound level meter was calibrated before and after the unattended survey. There was no significant drift in calibration measurements observed during the survey period.

4.6 The microphone was positioned at approximately 2m above local ground and in free-field position. The microphone was fitted with a protective windshield and the sound level meter situated in a weatherproof case.



5 DERIVATION OF COMMERCIAL SOUND LIMITS

Fixed Plant Items

- 5.1 The proposed WWTW will be specified to ensure compliance with the relevant design standards. Resultant specific sound levels associated with proposed plant items will fall below the identified background sound levels at the nearest residential receptors.
- 5.2 The proposed plant items have not yet been specified and detailed data is not yet available. Limits have therefore been identified to inform the choice/design of the plant/WWTW during the detailed design stage.
- 5.3 Plant items will be specified and sufficiently mitigated, where required, such that suitable conditions are maintained at the nearby residential dwellings. In accordance with BS 4142, the rating level of any plant (inclusive of penalties accounting for acoustic features) should remain below the background sound level during all periods of operation.
- 5.4 BS 4142 provides assessment periods of:
- Daytime, 07:00 – 23:00
 - Night-time, 23:00 – 07:00
- 5.5 The criterion sound levels for the above periods have been identified using statistical analysis of the measured background sound levels obtained during the unattended monitoring. Graphical representation of the statistical analysis is presented in Appendix B.
- 5.6 Plant associated with the proposed development would be specified such that the calculated combined rating level attributed to the proposed sources does not exceed the identified background sound levels at the nearest residential dwellings. The fixed limits are identified in Table 2.
- 5.7 The identified limits at P1 are 37 and 29 dB $L_{A90,T}$ for day and night-time periods, respectively. Daytime sound levels will be assessed over a 1-hour period, with night-time operation assessed during 15-minute periods.



6 MITIGATION

- 6.1 The proposed WWTW will be specified such that sound levels remain below the limits specified in Section 5.

- 6.2 Mitigation options will be specified during the detailed design stage, as appropriate. Impacts from fixed plant would be negligible following specification and assessment of proposed commercial activity.



7 CONCLUSIONS

- 7.1 Limits for the potential noise impacts have been identified for the proposed WWTW in Beeston.
- 7.2 Unattended sound measurements were undertaken to obtain sound levels representative of the existing environment for assessment in accordance with BS 4142:2014.
- 7.3 The WWTW will be specified such that rating levels fall below the identified background sound levels at the nearby residential receptors. Where required, plant will be suitably mitigated to ensure sound levels remain below the identified sound limits.



APPENDIX A – INTRODUCTION TO NOISE

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB.

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs. For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest.

In the UK, traffic noise is measured as the L_{A10} , the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq} . This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 5 minutes during the night. The noise levels are commonly symbolised as $L_{A90(1hour)}$ and $L_{A90(5mins)}$. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.



Table A1: Glossary of Terms

Term	Definition
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,F}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, 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.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the 'average minimum' noise level and is often used to describe the background noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Residual Noise Level	The ambient noise remaining at a given position in a given situation when specified sources are suppressed to a degree such that they do not contribute to the ambient noise level ($L_{Aeq,T}$)
Specific Noise Level	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ($L_{Aeq,T}$)
Rating Noise Level	The specific noise level plus any adjustment for the characteristic features of the noise ($L_{Ar,Tr}$).



APPENDIX B – GRAPHICAL REPRESENTATION OF NOISE MEASUREMENT RESULTS

Figure B1: Statistical Analysis of Background Sound Levels at P1

