

784-B040115: BASSETLAW HOSPITAL, SUBSTATION NOISE TECHNICAL NOTE

1.0 INTRODUCTION

This technical note has been prepared to assess the substation noise at Bassetlaw Hospital, in accordance with Planning Condition 4. Planning Condition 4 states:

“Before the use of the substation hereby permitted first commences, a report from a specialist noise consultant or suitably qualified person, shall be carried be submitted to and approved in writing by the Local Planning Authority. The report shall be in accordance with BS4142 and include any measures necessary to mitigate adverse impacts of the substation on nearby residential properties. The development shall be carried out in accordance with the agreed details and scheme of mitigation. Reason: To safeguard the amenities of local residents living in the vicinity of the site.”

Noise survey data and modelling results from a previous Tetra tech report have been used (report reference: ‘784-B040115 Bassetlaw Hospital NOISE 26Sep22’).

2.0 CRITERIA

2.1 BS4142:201+A1:2019, ‘METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND’

A comparison of noise from the substation with existing background noise levels has been undertaken with reference given to the guidance provided within BS 4142:2014+A1:2019, ‘Methods for rating and assessing industrial and commercial sound’.

This standard sets down the following guidelines for assessing the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes, based upon the difference between the measured background noise level and the rating level of the source under consideration. In particular, the standard states:

- a) Typically, the greater the difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) 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 addition to noise levels the significance of the impact depends on the individuals affected and to the acoustic features present which may be assessed subjectively or objectively as appropriate. Section 9 of BS

4142:2014+A1:2019 recommends that correction factors be applied to the specific noise level if the noise contains certain acoustic features such as:

- tonality
- impulsivity
- other sound characteristics which are readily distinctive
- intermittency

It should be noted that the significance of an industrial sound source depends upon both the margin by which the rating level exceeds the background sound level and the overall context in which the sound occurs.

2.2 HTM08-01: ACOUSTICS

Health Technical Memorandum 08-01 (HTM08-01) sets out the noise criteria for hospitals and other public health buildings. The emergency generators for Bassetlaw Hospital are located directly adjacent to the substation building and within the same development area. HTM08-01 section 2.03 sets out criteria for emergency plant:

An increase in internal and external noise levels of up to 10 dB(A) over the noise criteria is normally considered acceptable, provided regular testing only takes place during the daytime on a weekday.

Although Planning Condition 4 does not involve the assessment of emergency generators, the assessment is presented due to the close proximity to the substation and being located within the same red line boundary.

3.0 NOISE SURVEY

A noise survey has been undertaken by Tetra tech at the site from Thursday 25th August 2022 to Wednesday 31st August 2022. Attended short-term measurements were undertaken at five locations during day, evening and night-time periods with one additional location being measured unattended over a 144-hour period. The raw data collected from the long-term monitoring is available upon request.

The monitoring locations relevant to this assessment of substation noise are LT1 and ST1, as described in Table 3-1 below:

Table 3-1 - Noise Monitoring Locations

Ref	Description
LT1	On the roof of the hospital building overlooking Blyth Road
ST1	West of the site, adjacent 25 Blyth Road

3.1 NOISE SURVEY RESULTS

The ambient noise climate is characterised by road traffic noise from Blyth Road, Gloucester Road and Kilton Hill and activity associated with the hospital car park.

Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively. Road traffic noise is generally described using the L_{A10} index (i.e. the level exceeded for 10% of the measurement period). For the long-term (LT) locations, the presented $L_{Aeq,T}$ and $L_{A10,T}$ are average noise levels whilst the L_{A90} is the modal noise level of each 5 minute measurement over the stated survey period. The survey results are presented in Table 3-2 below.

Table 3-2 - Noise Monitoring Results

Period	Duration (T)	Monitoring Date and Times	Location	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekday Daytime 07:00 - 23:00	64 Hours	25/08/2022 – 31/08/2022 11:40 – 11:20	LT1	59.7	88.5	40.9	62.6	54
Weekday Night-time 23:00 – 07:00	32 hours	25/08/2022 – 31/08/2022 23:00 - 07:00		52.7	78.6	39.3	53.3	42
Weekend Daytime 07:00 - 23:00	32 Hours	27/08/2022 – 28/08/2022 07:00 - 23:00		57.9	84.4	40.7	61.4	48

Period	Duration (T)	Monitoring Date and Times	Location	L _{Aeq,T} (dB)	L _{Amax,T} (dB)	L _{Amin,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
Weekend Night-time 23:00 – 07:00	16 hours	27/08/2022 – 28/08/2022 23:00 - 07:00		51.2	73.6	39.6	52.6	42
Daytime 07:00 - 19:00	15 Mins	31/08/2022 10:17	ST1	71.2	87.9	45.0	75.2	52.4
Evening 19:00 - 23:00	15 Mins	30/08/2022 22:05	ST1	66.0	83.5	36.7	69.5	42.3
Night-time 23:00 - 07:00	15 Mins	31/08/2022 00:04	ST1	60.7	81.8	35.3	59.6	38.1

3.2 REPRESENTATIVE BACKGROUND NOISE LEVELS

Using the data collected during the baseline survey and presented in Table 3-2, representative background noise levels have been derived for nearby existing sensitive receptors. Table 3-3 presents the representative background noise levels considered appropriate for the nearest existing residential receptors within the area (the lower of the respective daytime and evening measurements have been used to represent daytime noise levels, where appropriate).

Table 3-3 - Representative Background Noise Levels (All Receptors)

Receptors	Monitoring Location	Time Period	Representative Background Noise Level (L _{A90,T} dB)*
17 – 25 Wessex Road	ST1	Daytime (07:00 – 23:00)	52.4
		Night-time (23:00 – 07:00)	38.1

*Lowest L_{A90,T} value selected from either Weekday or Weekend.

The representative noise levels presented in Table 3-3 have been used to inform the assessment presented in Section 4.0.

4.0 SUBSTATION NOISE ASSESSMENT

4.1 SUBSTATION NOISE DATA

As no detailed noise information is currently available for the transformers, noise data from previous Tetra tech assessments have been used. The noise data used in the assessment is considered typical for this type of substation and is detailed in Table 4-1 below.

Table 4-1 - Plant Noise Data

Plant Type	Reverberant Noise Level ($L_{Aeq,T}$ dB)
Transformer within Substation Building	85

4.2 SUBSTATION BS4142:2014 ASSESSMENT

This BS4142 assessment has been carried out using the following assumptions:

- The substation will operate 24hours a day
- The substation building external walls consist of a minimum of single leaf brick, giving a minimum reduction of 35 dB R_w

A character correction of +4 dB has been applied to account for potential acoustic feature corrections, such as tonal characteristics, associated with the specific noise generating events. The assessment is presented in Table 4-2 below.

Table 4-2 - Substation BS4142 Assessment

Location	Existing Measured Background $L_{A90,T}$		Specific Sound Level $L_{Aeq,T}$		Noise Rating Level $L_{A,Tr}$ (With +4 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
17 – 25 Wessex Road	52	39	19	19	23	23	-29	-15

The result of the BS 4142 assessment above indicates that the predicted noise levels at the closest existing sensitive receptors from the operations of the proposed development are below the existing background noise levels by up to 29 dB during the daytime period and up to 15 dB during the night-time period.

The impact is therefore considered to be low, and no additional mitigation is required.

5.0 EMERGENCY GENERATOR ASSESSMENT

5.1 EMERGENCY GENERATOR NOISE DATA

Plant noise information has been provided for the emergency generators, as is detailed in Table 5-1 below. It is understood the generators will be for emergency use only but will be tested on a regular basis i.e. once per week

Table 5-1 Plant Noise Data

Plant Type	Manufacturer	Model	Parameter	Sound Level (dBA)
2No. Generators	Kohler	KD1100-F	L _p at 7m	73

5.2 EMERGENCY GENERATOR ASSESSMENT

It is understood the emergency generators will be located within a louvred compound, and the louvres will have 30% free area, giving a minimum reduction of 10dB. Based on this information, the following noise levels are predicted at the nearest residential receptors approximately 40m away.

Table 5-2 Emergency Generator Predicted Noise Levels

Receptor	Time Period	Criteria (L _{Aeq,T} dB)	Predicted Level (L _{Aeq,T} dB)
17 - 25 Wessex Road	Daytime (07:00 - 23:00)	62.4	47.9
	Night-time (23:00 - 07:00)	48.1	47.9

Table 5-2 shows that the emergency generator noise is predicted to be within the emergency plant criteria set out in HTM08-01, and therefore no mitigation is required.

6.0 CONCLUSION

This technical note details the plant noise and BS4142 assessment of the substation and emergency generator located at Bassetlaw Hospital, in accordance with Planning Condition 4.

The results of both assessments of the predicted substation noise and emergency generator noise is within criteria, and therefore no mitigation is required.

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