



# GLW Feeds Shepshed

Noise Impact Assessment for New CHP Plant

dBx Acoustics Ltd  
Beehive Mill, Jersey Street  
Manchester M4 6JG

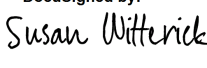
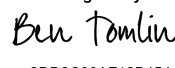
20048 GLW Feeds R01c

Client: Iona Capital

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<b>R01A</b>	10/08/2020	Updated for reselected silencers	Susan Witterick BSc MIOA	Susan Witterick BSc MIOA
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## Introduction

dBx Acoustics Ltd has been appointed by H&C Consultancy to carry out a noise survey and noise impact assessment for the proposed Combined Heat and Power (CHP) plant at GLW Feeds, Shepshed. This report supports the application for planning permission for the equipment as well as being intended to inform the Environmental Permit for the new plant.

A glossary of acoustic terminology has been supplied in Appendix A in order to assist the reader.

## Basis of Noise Assessment

The principal aims of the noise assessment are summarised below:

- Carry out noise measurements at nearby noise sensitive locations to establish the typical background sound levels against which assessment can be made;
- Assess noise emissions from the CHP plant in relation to existing site limits on noise emissions;
- Determine the likelihood of adverse impact on nearby noise sensitive properties.

The noise impact assessment has been undertaken based on BS 4142:2014 '*Methods for Rating and Assessing Industrial and Commercial Sound*' as required by the Environment Agency<sup>1</sup>.

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<sup>1</sup> <https://www.gov.uk/guidance/noise-impact-assessments-involving-calculations-or-modelling>

## Site Description

### The Site

The proposed CHP plant will be located close to the northern boundary of the GLW Feeds site at Shepshed, Leicestershire. The site is a feed mill operating 24/7, with existing noise sources including high level air intake and extract fans, vehicle movements, and machinery noise. The nature of the sound from the GLW Feeds site is reasonably steady in nature.

The site is immediately adjacent to BOAL Extrusion, which has fans mounted externally on the façade immediately facing the GLW Feeds site. These fans operate intermittently.

Other noise sources include traffic movements on the M1 and the A512 Ashby Road East. Noise from the Lorry Park to the west of GLW Feeds was not audible at the site or at the noise monitoring location.

A site map showing the site and surrounding area is presented in Appendix B.

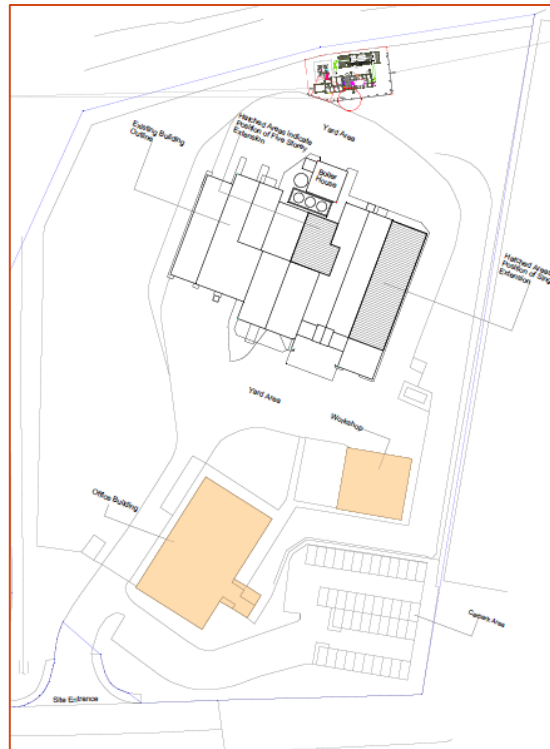
### Proposal

It is proposed to locate one containerised CHP unit and a waste steam boiler at the northern boundary of the GLW feeds site as indicated in the figure below. The manufacturer (Edina) states that, without additional noise control measures, the unit will produce a sound pressure level of 75dBA at 1m in all directions, including from the inlet and outlet ducts, container body, dry air cooler, and exhaust stack.

The unit will be either a 1.2kW or 1.5kW unit; Edina has stated that the noise level from the unit will be the same in both cases.

Octave band data for the equipment has not been provided by the manufacturer.

Figure 1: Proposed CHP Plant



## Nearby Noise Sensitive Receptors

The nearest noise sensitive receptor to the CHP location is a farmhouse approximately 75m to the North, which is surrounded by a number of commercial/workshop buildings. The Charnwood Forest Railway route runs along the northern boundary of the GLW site, beyond which the ground level drops steeply.

There is also housing at Fairway Road in Shepshed, approximately 200m to the West.

## Guidance

### Charnwood Borough Council

The GLW Feeds site operates under planning permission reference P/83/0699/2 granted in 1983. Condition 8 of the above permission states *'The location and design of noise generating processes within the food mill complex shall be such that background ( $L_{A90}$ ) noise levels shall not exceed 76 dBA (day-time) and 68 dBA (night-time) at the northern site boundary. Levels shall be measured in accordance with the provisions of BS 4142 as now drafted or subsequently amended'*.

### Environment Agency

It has been assumed that, whilst taking the above criterion into account, this site should generally be assessed in line with guidance from the Environment Agency, as follows;

**Figure 2: Environment Agency Requirements for Noise Impact Assessment**

#### Noise impact assessment /risk assessment

Where the proposal has a potential to impact nearby sensitive receptors, a noise impact assessment (NIA) should be provided. This will normally be based on BS 4142. Noise modelling requirements can be found at the following link: <https://www.gov.uk/government/publications/noise-impact-assessment-information-requirements>

The noise assessment needs to consider all on site noise sources including on-site vehicle movements but not off-site vehicle movements.

Link to noise guidance:

<https://www.gov.uk/government/publications/environmental-permitting-h3-part-2-noise-assessment-and-control>

<https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit#emissions-that-do-not-have-set-limits>

Where the risk and impact assessment shows that there is a potential for the facility to have noise impacts on nearby sensitive receptors, a Noise Management Plan (NMP) should be provided.

### Environment Agency Guidance on Noise Impact Assessments Involving Calculations or Modelling

The document referenced in the link in Figure 2: Environment Agency Requirements above, has been superseded by a new document published in October 2018. This can be accessed at <https://www.gov.uk/guidance/noise-impact-assessments-involving-calculations-or-modelling>.

The following required information is presented within this report;

- Site location and Layout;
- Proposed activities and noise sources;
- Local receptors and reasons for selection;
- Noise remediation approach.

This report provides the following receptor information;

- Measured background sound level, dB  $L_{A90}$ ;
- Specific and rating noise levels for site activities;
- Rationale for applying or not applying acoustic penalties;
- Numerical impacts.

### **BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'**

This standard provides a methodology for rating and assessing sound of an industrial or commercial nature, including sound from industrial and manufacturing processes, fixed plant installations, loading and unloading of goods, and sound from mobile plant.

The standard can be used both to assess sound from proposed new industrial and commercial sources, and sound from these sources affecting proposed new dwellings, as well as to investigate complaints. It does not, however, determine whether noise amounts to a nuisance.

The standard leads to derivation of a 'rating level' for the industrial sound which is weighted for acoustically significant characteristics including tonality, impulsivity and intermittency. This is compared against the background noise level in the absence of the specific noise (the noise source arising from the industrial/commercial use), the difference between the two being used to give an indication of impact.

Typically, the greater the 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 noise source will have an adverse impact or 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.

It should be noted that not all adverse impacts will lead to complaints, and not every complaint is proof of an adverse impact.

## Environmental Noise Survey

### Methodology

Continuous noise measurements were made at a location representative of the nearest noise sensitive receptor between Monday 22<sup>nd</sup> and Thursday 25<sup>th</sup> June 2020. The location is shown in Appendix B. The location was selected due to being at a similar distance from the GLW Feeds site as the residential property, and experiencing a similar level of screening due to the intervening landscape.

Spot measurements were also made at the northern boundary of the site on Thursday 25<sup>th</sup> June to allow existing noise levels at this location to be confirmed.

Measurements were undertaken in accordance with BS 7445-1:2003 '*Description and Measurement of Environmental Noise*'.

### Weather Conditions

Weather conditions during the measurement period were generally warm and dry, with scattered clouds and wind speeds were within suitable parameters for the measurement of environmental noise (i.e. generally under 5 ms<sup>-1</sup>). All microphones were protected with a windshield for the duration of the survey.

### Equipment

The sound level meter was calibrated before and after measurements, with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrator which had been calibrated not more than one year prior to the survey.

The equipment used during the environmental noise survey is detailed in Table 1, below.

**Table 1 – Equipment used in the environmental noise survey**

Equipment	Manufacturer & Part No.	Serial Number
Sound Level Meter	Cirrus CR171:C	G300656
Microphone	Cirrus MK:224	211733D
Pre-amplifier	Cirrus	9136F
Calibrator	CEL 120/1	2045151



## Environmental Noise Levels Summary

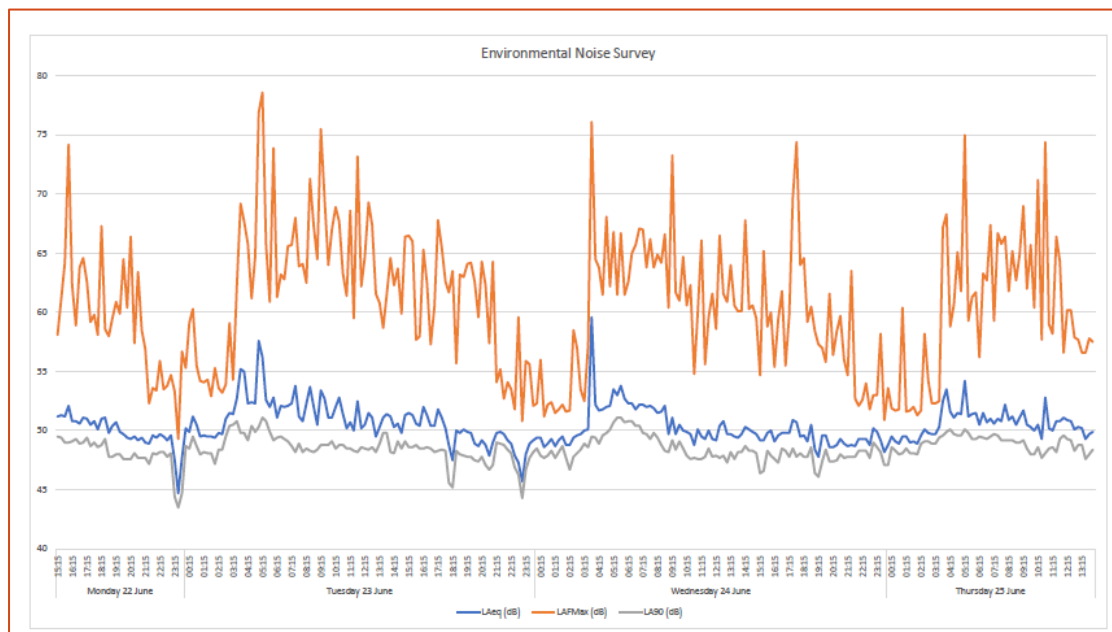
A summary of the free-field noise levels used in the following assessment is presented in Table 2, below.

**Table 2 – Results of the environmental noise survey – Free-field levels.**

Date	Daytime 07:00-23:00		Night Time 2300-07:00	
	L <sub>Aeq,16hr</sub> dB	L <sub>A90</sub> dB	L <sub>Aeq,8hr</sub> dB	L <sub>A90</sub> dB
Monday 22 June	50	48	52	49
Tuesday 23 June	51	48	52	49
Wednesday 24 June	50	48	51	49
Thursday 25 June	51	49	--	--

The graph below shows the variation in noise levels over the survey period. It is understood that the BOAL fans were in operation sporadically throughout the survey period. These are described as being very cyclical in nature, with 'ramp up' and 'ramp down' stages being audible.

**Figure 3: Measured Noise Levels**



The measured levels are fairly consistent across the survey period, a positive indication that they can be considered representative. The lack of significant variation between the daytime and night time period is indicative of the continuous nature of industrial noise audible at the measurement location and NSR.

Two spot measurements each of 15 minutes duration were also made at the northern boundary of the site on Thursday 25<sup>th</sup> June 2020. The measured sound level at the boundary for both measurements was 55dB<sub>L<sub>Aeq,15min</sub></sub> and 53dB<sub>L<sub>A90,15min</sub></sub>. These levels are consistent with those measured at the same location by Charnwood Borough Council in May 2016.

## Prediction Methodology

### Source Data

Manufacturers' noise data for all items of plant to be used at the site have been provided by the Client. The noise data is summarised in the appendices which accompany this report.

Where data has been provided as a sound pressure level, this has been converted to a sound power level, considering the approximate size of the equipment, for use within the model.

### SoundPlan 8.2 Prediction Model

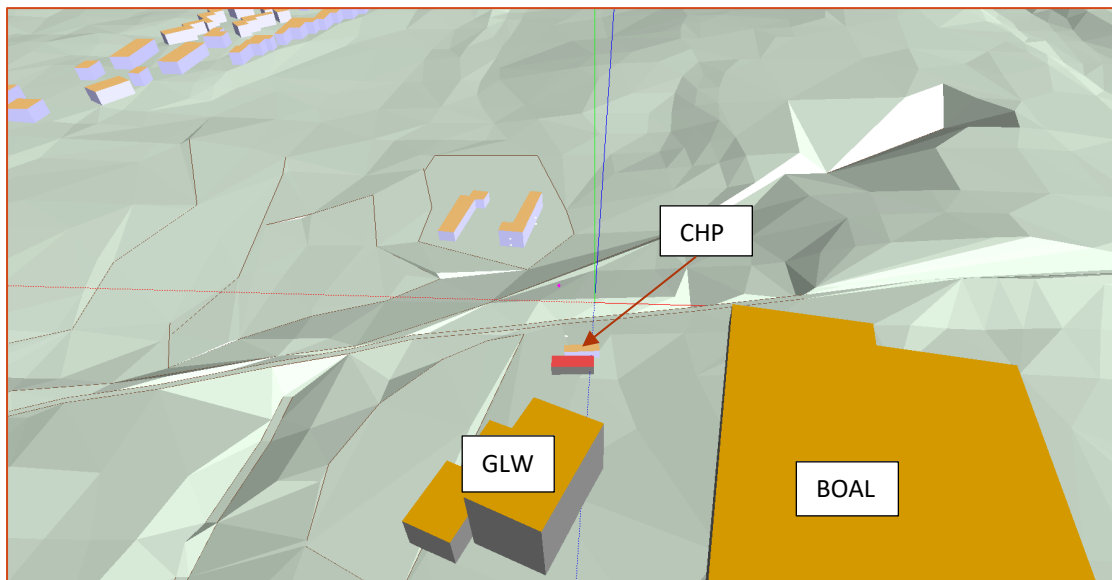
To accurately assess noise propagation from the proposed development, and to predict the noise levels at each noise sensitive receptor, a computer model of the site has been constructed using SoundPlan 8.2 software. This software uses the methodology detailed in ISO 9613-2:1996 '*Attenuation of Sound During Propagation Outdoors*' in order to predict noise propagation, considering screening and reflections due to buildings and barriers, as well as the site topography.

The noise model has been populated with building and topographic data from the Ordnance Survey Mastermap, and includes buildings and other features in the area (including areas of hard and soft ground).

The CHP engine unit has been modelled as an area source, with sound radiating from the enclosure walls and roof. The exhaust stack opening has been modelled as a point source at a height of 30m above ground.

The figure below shows a screen shot from the noise model. A figure showing the predicted propagation of noise from the proposed development is appended to this report (Appendix G).

Figure 4: Screen Shot from Noise Model



## Assessment of Noise Impact per P/83/0699/2

The predicted noise level at the northern boundary of the site with the CHP plant in operation, at a location approximately 7m to the north of the CHP units, is  $67\text{dB}_{\text{Leq,T}}$ . Due to the proximity to plant there will be little variation between the  $L_{\text{Aeq}}$  ambient sound level and the  $L_{\text{A90}}$  background sound level. We therefore anticipate that the background noise level at this location would be 64-66dB  $L_{\text{A90}}$ , which is compliant with the noise emission limits set by Charnwood Borough Council.

Given the proximity of the CHP plant to the site boundary, and the difficulty in accessing a monitoring location at the boundary fence, it would be appropriate to agree a monitoring location with the Local Authority which allows repeatable and comparable measurements – for example, on the railway line immediately north of the site, or on the site boundary due south of the NSR which is more easily accessible (approximately 25m west of the CHP plant).

We would also recommend that the assessment criterion should be in terms of the ambient sound level  $L_{\text{Aeq}}$  rather than background sound level  $L_{\text{A90}}$  due to the intention for noise emission limits from plant to be assessed.

## Assessment of Noise Impact per BS 4142:2014

### Criteria

The following section will assess the potential impact of the proposed CHP plant at the nearest noise sensitive receptor, based on the methodology set out in BS 4142:2014.

### Assessment

The following BS 4142:2014 assessment has been carried out to examine the effect of the proposed CHP unit on the nearest noise sensitive property, and is based on the plant selections and layout presented by Iona Capital. It is understood that the plant will operate 24 hours a day, 7 days a week; all assessments have therefore been made during the night-time period, when the lowest background sound levels, and hence greatest potential noise impact, occur.

If additional plant is added in the future, this must be designed to achieve a Rating Level of 10 dB below the current background sound level at the nearest sensitive receptor.

The BS 4142:2014 assessment of the cumulative noise from the proposed plant is presented below. As noted above, Edina has not provided octave band data for the unit. It has been conservatively assumed that there may be a tonal component to the noise from the CHP and this has been accounted for in the assessment.

The context of the noise environment at the residential receptor is that the noise climate is already dominated by plant noise from both GLW Feeds and BOAL. The plant noise arising from BOAL in particular has distinctive acoustic characteristics.

Table 3 –BS 4142:2014 assessment at NSR (night time)

Results		Relevant Clause	Comments
Measured background sound level	49 dB $L_{A90, 15min}$	8.3	The typical background sound level measured during the night-time period.
Specific sound level	55 dB $L_{Aeq,T}$	7.3.3	A prediction made using the methodology outlined above, includes all sources, screening and distance corrections.
Assessment made during the night-time period so reference period is 15 minutes		7.2	-
Acoustic feature correction	+4 dB	9.2	Potential tonality
Rating Level	59 dB $L_{Ar,Tr}$	9.2	The predicted Rating Level during the night-time period.
Background sound level	49 dB $L_{A90, 15min}$	8	The typical background sound level measured during the night-time period.
Excess of Rating Level over background sound level	+10 dB	11	-
<b>Assessment potential adverse impact due to plant noise at the receptor</b>		11	Predicted Rating Level is 10dB higher than the existing background sound level. This is an indication of potential adverse impact.
Uncertainty of the assessment	Moderate	10	Background sound level based on repeatable measurements. The predicted Rating Level is based on established prediction methodologies. Only single figure data for plant noise emissions is available from the manufacturer.

## Mitigation Measures

It can be seen that, in order to control noise emissions such that the BS4142 rating level does not exceed the night time background sound level at the nearest noise sensitive receptor, a reduction in noise levels of at least 10dB is required.

The noise model has been used to examine the potential use of a close-boarded timber fence along the northern site boundary in the vicinity of the CHP plant. Although this would provide a good reduction in noise levels immediately on the other side of the fence, and therefore ensure compliance with the planning condition noise limits, the model indicates that due to the site topography, such a fence would be ineffective in reducing sound levels received at the residential receptor.

Therefore it will be necessary for noise emissions from the CHP plant (container body, inlet and outlet attenuator, dry air cooler and exhaust stack) by 10dB to give an overall noise level of no more than 65dBA at 1m from the unit. It is understood that this option can be provided by the manufacturer.

## Environmental Permit

The draft environmental permit for the development states the following;

Figure 5: Extract from Draft Environmental Permit

### 3.4 Noise and vibration

- 3.4.1 Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved noise and vibration management plan to prevent or where that is not practicable to minimise the noise and vibration.

With regard to assessing noise arising from the CHP unit, given the contribution to the noise climate at the NSR from the existing GLW Feeds plant and fans at BOAL, a more objective criterion which can be used to assess noise specifically from the CHP units should be used– for example, ‘when assessed at the nearest residential façade, the specific sound level arising from the CHP units in normal operation shall not exceed  $50\text{dB}_{\text{L}_{\text{Aeq,T}}}$  and shall not exhibit any acoustically distinctive characteristics’.

## Summary and Conclusions

An environmental noise survey has been undertaken to establish the existing noise levels affecting the surrounding sensitive receptors of the proposed CHP plant at GLW Feeds, Shepshed, Leicestershire.

A noise impact assessment has been carried out to determine the potential noise impact at the nearest noise sensitive receptors, using measured background sound levels, and noise levels predicted using manufacturer plant noise data.

The BS 4142:2014 assessment indicates that there is a likelihood of adverse impact to nearby sensitive receptors, unless mitigation can be applied to the plant. It is understood that the noise emissions can be reduced to 65dB at 1m from the plant; this would be appropriate to ensure a low likelihood of adverse impact to nearby noise sensitive receptors given the context of the existing noise climate being dominated by existing industrial noise sources.

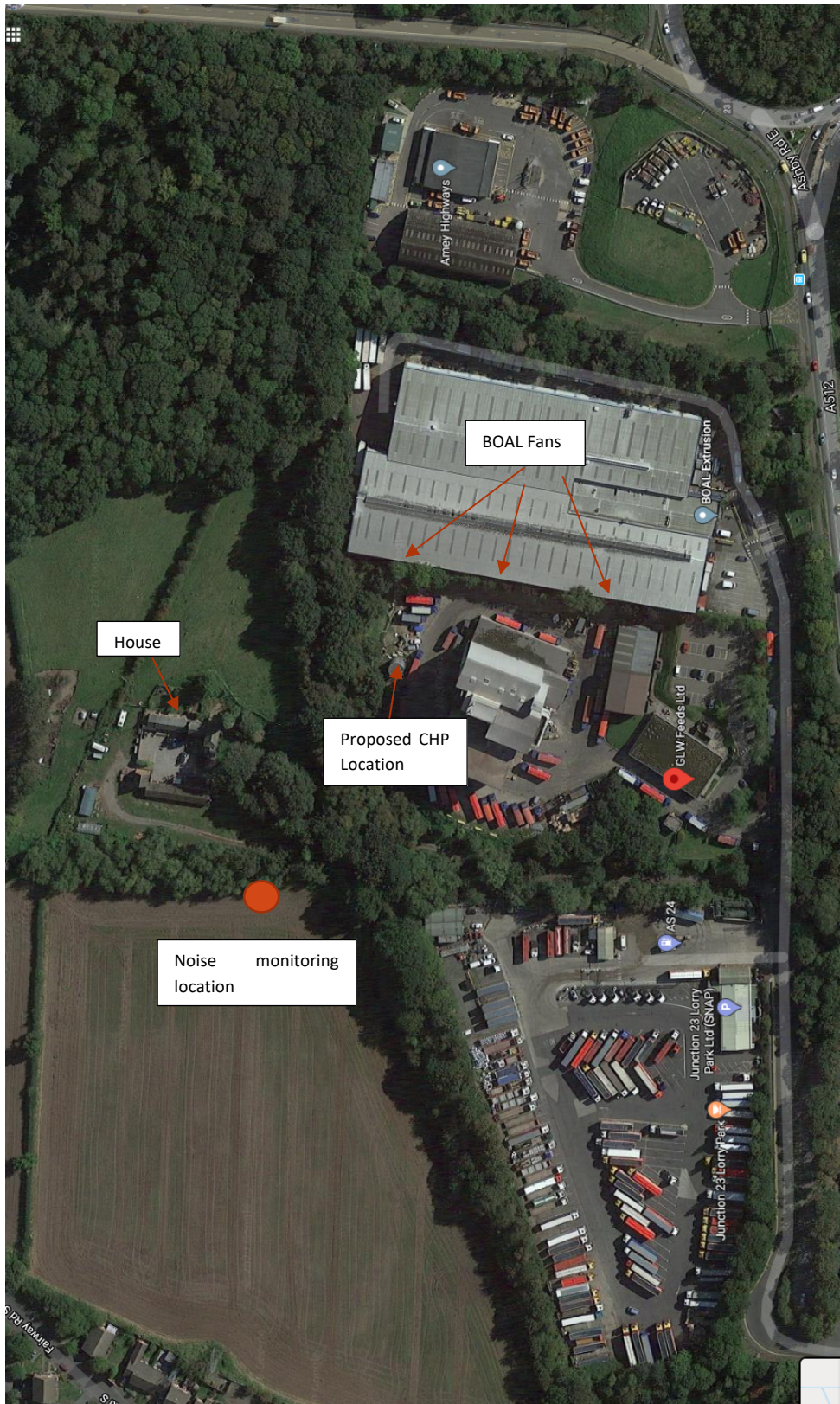
The noise levels at the northern site boundary are anticipated to meet the requirements of Charnwood Borough Council and the site’s planning conditions; however, it is recommended that a set assessment/monitoring location is agreed with the Local Authority for any future measurements and it is suggested that measurement of  $L_{\text{Aeq}}$  may be more appropriate. Noise levels at the site boundary can be reduced by use of a solid screen in the area of the CHP plant, however given the site topography, this offers no significant benefit at the NSR.

Subject to a reduction in noise levels overall from the plant to no more than 65dBA at 1m, there would be no additional mitigation measures recommended or deemed necessary based on the findings of this assessment; Best Available Techniques for noise control have been used throughout the design and installation processes. On this basis, there are no reasons relating to noise impact why planning and environmental permitting should not be granted for the GLW Feeds CHP plant.

## Appendix A – Glossary of Acoustic Terminology

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level ( $L_p$ ) the reference quantity is $2 \times 10^{-5}$ N/m <sup>2</sup> . The sound pressure level existing when microphone measured pressure is $2 \times 10^{-5}$ N/m <sup>2</sup> is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level ( $L_p$ ) or Sound Power Level ( $L_w$ ).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A weighting	Arithmetic corrections applied to values of $L_p$ according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of $L_p$ actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of $L_p$ actually measured.
$L_{n,T}$	$L_p$ which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.

## Appendix B – Site Map





## Appendix C – Propagation of Sound, 1.5m above ground level

