



# Brocklesby Waste Processing, North Cave

## Noise Impact Assessment

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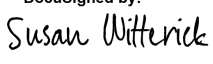
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## Revision History

Revision	Date	Revision Details	Author	Checked
<b>R01</b>	17/03/2021	Original Issue	Susan Witterick BSc MIOA	Ben Tomlin BSc MIOA
<b>R01A</b>	26/03/2021	Amended boiler stack height and tanker movement information.	DocuSigned by:  3E69257DCFC14C6... Susan Witterick BSc MIOA	

## Executive Summary

This report presents an operational noise impact assessment for the Brocklesby Waste Processing Site at North Cave, Brough, HU15 2PG, to assess the potential noise impact of new plant and buildings at the site following a catastrophic fire in late 2019.

Prior to the fire, to determine noise emissions from the waste processing and adjacent anaerobic digestion site, a noise survey was carried out within the local community, which confirmed that noise emissions from the site were in accordance with the relevant Environment Agency permits and requirements. These noise measurements have therefore been used as a baseline against which to assess noise impact from new plant items, using the noise modelling exercise detailed within this report.

It is demonstrated that the proposed reconstruction and future operation of the site will not have an adverse noise impact at the surrounding residential receptors.

## Introduction

dBx Acoustics Ltd has been appointed by H&C Consultancy Ltd to assess the potential noise impact of reconstructed buildings and equipment at the Brocklesby Waste Processing Plant, North Cave.

Following a fire in late 2019, the southern part of the site is understood to have been destroyed. It is proposed to construct a new main building, boiler building and tank farm with associated external plant. Throughput is expected to increase from 560 tonnes to 900 tonnes daily. The fundamental nature of operations, and the character of the associated noise generated, would not be expected to change.

The intent of this report is to review the proposed redevelopment of the site, to identify aspects of noise generating operations which will not change from the previous site layout, and to calculate and assess noise impact from new noise generating plant and increased vehicle activities. Noise impacts are assessed against the comprehensive noise survey carried out by dBx Acoustics Ltd in 2018 when both the waste processing and adjacent anaerobic digestion site were fully operational.

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

## Assessment Criteria

### Environment Agency Requirements

Based on the Environment Agency's requirements for assessment of noise from the adjacent anaerobic digestion plant, it is understood that the following requirements apply;

- A detailed assessment of noise shall be carried out at the facility during normal operations in accordance with BS 4142:2014 (Rating industrial noise affecting mixed residential and industrial areas) and BS 7445:2003 (Description and measurement of environmental noise), or other methodology as agreed with the Environment Agency, in order to validate the assessment provided within the permit application.
- The assessment shall consider all noise sources at the facility, including static plant and on-site vehicle movements. Where any noise sources are identified as exhibiting tonal contributions, they shall be quantified by means of frequency analysis.
- The results of the assessment together with conclusions and recommendations shall be submitted to the Environment Agency for approval in writing.
- If the assessment finds that emissions of noise and vibration are likely to cause annoyance outside of the site boundary, the operator shall submit to the Environment Agency a report detailing proposals and timescales for the implementation of appropriate noise mitigation measures to ensure that site noise levels are below the background levels.

## Site Description

### The Site

The site is located at Crosslands Lane, North Cave, East Riding of Yorkshire, HU15 2PG. Crosslands Lane, which runs adjacent to the site, is primarily used for residential access and works access to Brocklesby Ltd and the quarry to the north. There is a sawmill directly to the east of the site and a quarry directly to the west of the site which runs north adjacent to Crosslands Lane. Although residential buildings surround the site in all directions, the northern receptors are significantly further from the proposed development than the southern receptors.

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

### Nearby Noise Sensitive Receptors

There are several residential buildings surrounding the site, although most receptors are a significant distance from the proposed development. The closest and most likely to be affected by noise from the site are shown in Appendix B. The table below presents the nearest sensitive receptor in each direction from the site along with the location and approximate distance from the site boundary. As the full address for some receptors is not known, the site plan in Appendix B may also be used to identify each receptor.

**Table 1 – Nearby noise sensitive receptors**

Reference	Receptor	Location	Approximate Distance from Site Boundary
R1	Haggertons	South-west of the site	255m
R2	46 Newport Road	Directly South of the site	170m
R3	Dwelling set back from Newport Road	South-east of the site	210m
R4	Dwelling on Breck Lane	Directly West of the site	360m
R5	Common Farm / dwellings on Crosslands Lane	North-west of the site	615m
R6	The Mews / 3 Hotham Road	North-east of the site	810m
R7	Bungalow Farm	East of the site	365m
R8	Dwelling on Townend Lane	East of the site	585m

### Noise Sources

During daytime hours, the dominant noise sources affecting all receptors were observed to be road traffic from the M62 and local roads, with road traffic from the M62 dominating background levels. Vehicle movements within the nearby quarry were audible at Receptors R1, R4 and R5 during daytime hours. Crosslands Lane had intermittent vehicle movement from HGVs which was audible at R1 and R4. Wildlife from the wetlands conservation area also contributed to ambient noise levels at R5.

During night-time hours, plant from the quarry site was intermittently audible. All receptors were mainly affected by road traffic from the M62 and local roads during night-time hours.

## Environmental Noise Survey

A comprehensive noise survey was carried out at the site and surrounding area on July 24-26th 2018. At the time of the noise survey both the waste processing plant and adjacent anaerobic digestion plant were operating normally, and in compliance with the requirements of the Environment Agency for noise emissions. This noise survey can therefore be used as a baseline against which to assess the potential noise impact of the redeveloped site.

## Methodology

A series of 15 minute long attended measurements was made at the five locations considered representative of the noise levels at all the nearest noise-sensitive properties. The measurement locations are shown on the site plan in Appendix B and further details are provided below.

**Table 2 – Measurement positions**

Measurement Position	Description	Comments
MP1	Attended free-field measurement taken at a height of 1.5m in the north-west corner of the field bound by Crosslands Lane and Breck Lane.	Representative of background noise levels at R1, R2 and R3.
MP2	Attended free-field measurement taken at a height of 1.5m on the southern boundary of the field bound by Crosslands Lane and Breck Lane.	Representative of background noise levels at R4.
MP3	Attended free-field measurement taken at a height of 1.5m to the south of Geenix Sawmill.	Representative of background noise levels at R7, R8.
MP4	Attended free-field measurement taken at a height of 1.5m on Dryham Lane.	Representative of background noise levels at R5.
MP5	Attended free-field measurement taken at a height of 1.5m on Cliffe Road.	Representative of background noise levels at R6.

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 good, reaching temperatures of 27°C during the day, and not falling below 10°C during the night. 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 below.

Table 3 – Equipment used in the environmental noise survey

Equipment	Manufacturer & Part No.	Serial Number
Sound Level Meter	Casella C633C	3921025
Microphone	CEL 251	000847
Pre-amplifier	CEL 495	001773
Calibrator	CEL 120/1	2045151



Measured Background Sound Levels

The post-development sound levels measured at each receptor during the survey were presented in full in a spreadsheet accompanying the original report. This spreadsheet also included third-octave band sound pressure levels measured in close proximity to the equipment on site. This information can be made available if required.

For the purposes of this assessment, the potential worst-case impact from new items of plant would occur during the night-time (23:00h-07:00h) period (see discussion on following page). The typical night-time A-weighted background sound levels measured at each location are therefore summarised in the table below;

Table 4: Background Noise Levels, 2018

Measurement Position	Associated Receptor Reference	Night time LA90,T
MP1	R1, R2, R3	35 dB
MP2	R4	40 dB
MP3	R7, R8	39 dB
MP4	R5	32 dB
MP5	R6	31 dB

## Assessment of Redeveloped Site

### Proposals

The proposed reconstruction of the site involves;

- New tank farm. Passive venting with no noise generating components;
- New boiler building and boilers; two boiler stacks. Only one boiler will be operational at a time;
- New odour scrubber;
- Reconstruction of southern end of waste processing building.

The northern end of the site is unaffected by the fire and redevelopment. The new buildings are located similarly to those which they replace.

Vehicle movements within the site itself are understood to be similar in nature and location to those recorded previously. Tanker movements during normal operations usually occur between 06:00h-18:00h Monday-Friday, with sporadic out of hours movements when necessary. As a result of the redevelopment, daily throughput will increase from 560 tonnes (24 trucks per day / 2 in, 2 out per hour on average) to 900 tonnes (36 trucks per day / 3 in, 3 out per hour on average).

### Noise Sources

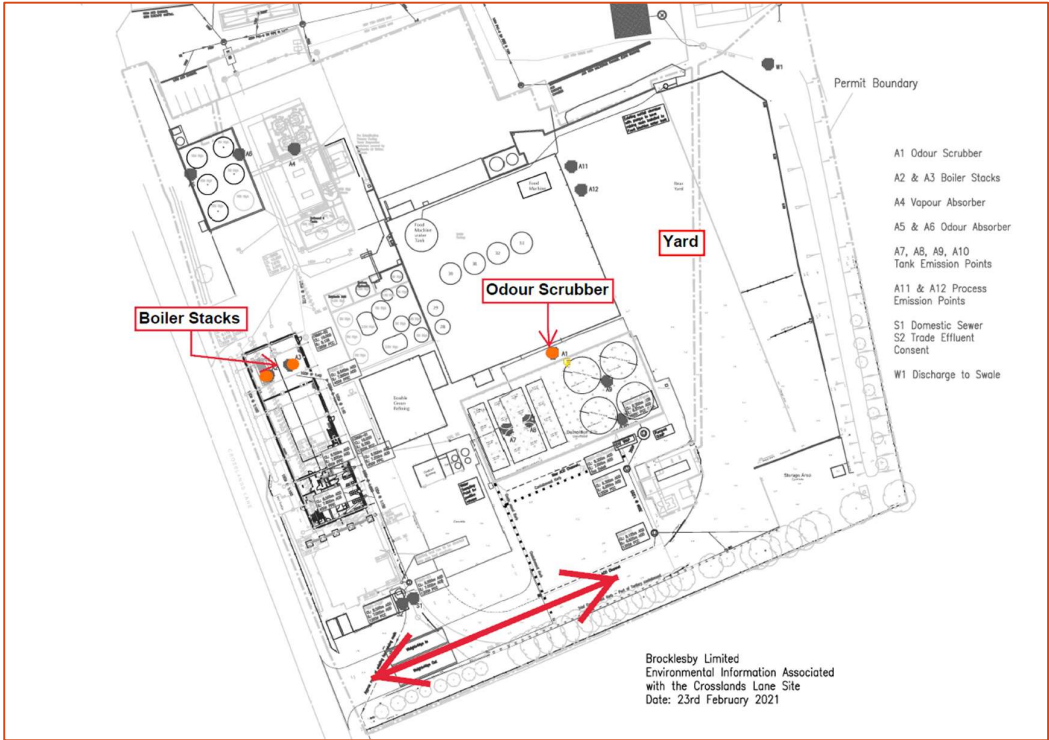
The primary new noise sources introduced as a result of the redevelopment are therefore identified as;

- New odour scrubber – Forbes quoted as 67dBA at 1m;
- 2no. boiler exhaust stacks, 85dBA at 1m (only one operational at a time). 10m above ground level;
- Increased tanker movements.

It can reasonably be assumed that noise emissions arising from vehicle movements within the site and operations within the waste processing building will be unchanged. The reconstructed tank farm has no noise generating equipment associated with it. Therefore, if it can be demonstrated that the three noise sources listed above will not increase noise levels at the nearby residential receptors, it can be concluded that the redevelopment of the site overall will have no adverse noise impact.

The proposed site layout is presented in Figure 1, below, with the location of the odour scrubber, boiler stacks, and site haulage road highlighted.

Figure 1: Proposed Site Layout



## Noise Model

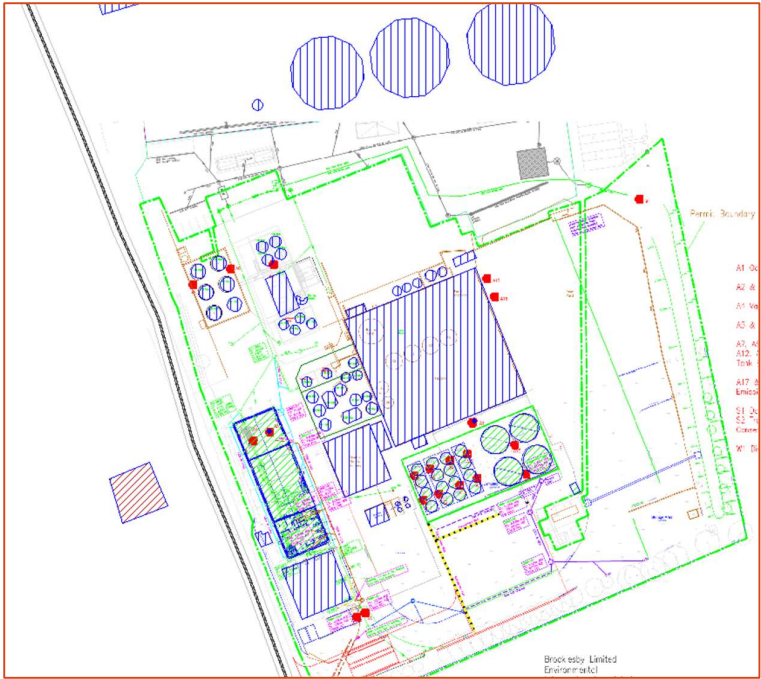
A noise model of the site has been constructed using the Soundplan 8.2 software package. This package allows the site topography and height of the proposed and existing buildings and noise sources to be accurately modelled, as well as the surrounding environment and noise sensitive receptors.

Screen shots from the model are presented below.

**Figure 2: Screenshot from Noise Model (Overview)**



Figure 3: Screenshot from Noise Model (zoomed in on Brocklesby site)



## Model Results

As discussed above, only noise from the boiler stack and odour scrubber arising at the nearest noise sensitive receptors has been calculated using the model. Tanker movements are assessed outside of the model, and discussed below.

All other noise sources, including activity on the site and within the waste processing building, are considered equivalent to those measured during the noise survey, and are therefore accounted for within the original noise impact assessment.

The specific noise level arising due to the new plant items at each receptor has been calculated as shown in Table 5, below, along with the measured night-time background noise level at each location. Where residences are 2 storeys in height, the noise level has been calculated at first floor level.

**Table 5: Plant Specific Sound Level vs Background Noise Level**

Reference	Receptor	Calculated Specific Noise Level, $L_{Aeq,T}$	Night-Time Background Sound Level, $L_{A90,T}$
R1	Haggertons	34 dB	35 dB
R2	46 Newport Road	35 dB	35 dB
R3	Dwelling set back from Newport Road	33 dB	35 dB
R4	Dwelling on Breck Lane	34 dB	40 dB
R5	Common Farm / dwellings on Crosslands Lane	25 dB	32 dB
R6	The Mews / 3 Hotham Road	24 dB	31 dB
R7	Bungalow Farm	34 dB	39 dB
R8	Dwelling on Townend Lane	29 dB	39 dB

It can be seen that the worst-case potential noise impact occurs at receptor R1 where the calculated specific noise level is equivalent to the night-time background sound level. This receptor is therefore considered in the BS4142 assessment presented below.

## Assessment of Noise Emissions per BS 4142:2014

The following BS4141:2014 assessment has been carried out to assess the cumulative impact of the replacement odour scrubber and boiler flue on the most affected residential receptor, identified as R1 R2 (46 Newport Road). The assessment is based on the lowest night-time background noise levels (i.e. the worst-case).

**Table 6: BS4142 Assessment (R2)**

Results	Calculation	Relevant Clause	Commentary
Measured background sound level	35 dB $L_{A90, 15 \text{ mins}}$	8.3	The typical background sound level measured during the night time period. Consistent throughout survey period.
Specific sound level	35 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 daytime period, so reference period is 15 minutes		7.2	-
Acoustic feature correction	0 dB	9.2	No acoustically distinct characteristics anticipated from new plant items
Rating level	35 dB $L_{Ar,Tr}$	9.2	The predicted Rating Level during the night time period.
Background sound level – night time	35 dB $L_{A90, 15 \text{ mins}}$	8	The typical background sound level measured.
Excess of rating over background sound level	0 dB	11	-
<b>Assessment indicates low likelihood of adverse impact</b>		11	Predicted Rating Level does not exceed the lowest measured background level. This is an indication of the development having a low impact. The plant assessed is a replacement for similar items and as such the character of the noise environment does not change.
Uncertainty of the assessment	Minor	10	Background sound level based on repeatable measurements. The predicted Rating Level is based on established prediction methodologies.

It can be seen that the BS4142 rating level for the new plant items does not exceed the night-time background sound level at the worst-affected residential receptor. The noise sources being assessed are like-for-like replacements and as such the character of the noise arising from the Brocklesby Site will not change.

***Therefore, no adverse noise impact due to replacement plant is predicted.***

## Vehicle Noise

As a result of the redevelopment, daily throughput will increase from 560 tonnes (24 trucks per day / 2 in, 2 out per hour on average) to 900 tonnes (36 trucks per day / 3 in, 3 out per hour on average). This increase in vehicle movements would be expected to have no perceptible noise impact (less than 2dB) at the nearest residential receptors.

During normal site operations, tanker movements usually occur between 06:00h-18:00h Monday-Friday, with sporadic out of hours movements when necessary. This is identical to previous operations at the site.

## Conclusions

Following a significant fire at the Brocklesby Waste Processing Plant, a new boiler house is to be constructed. The southern end of the waste processing building and odour scrubber will also be replaced.

Manufacturers' noise data for the proposed new plant has been input into the site noise model to calculate the specific sound level arising from these items, which has been assessed in accordance with BS4142, and based on night-time background sound levels measured at the noise sensitive receptors in 2018 when the site was fully operational.

It is demonstrated that there is a low likelihood of adverse noise impact due to the replacement plant.

The proposed increase in daily vehicular movements has been assessed and found to have no significant noise impact.

Therefore there are considered to be no reasons relating to noise preventing the grant of planning permission or environmental permitting for the redeveloped site.



## 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

Figure 4 – Map showing proposed development and surrounding area, highlighting sensitive receptors and noise survey measurement position

