NOISE IMPACT ASSESSMENT

MARSH QUARRY
BURNLEY ROAD, SOWERBY BRIDGE

JH CONSULTING LTD

MARCH 2019

Prepared By:

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1 INTRODUCTION

Surface Property has been commissioned by JH Consulting Ltd ('the Client') to undertake a noise assessment in relation to the proposed development of 25 residential dwellings ('the Development') on land off Burnley Road, Sowerby Bridge.

The aim of this assessment is to determine the existing noise climate, to assess the noise levels against relevant guidance and to recommend mitigation measures as necessary to ensure the amenity of future residents of the Development is not adversely impacted.

A glossary of terms is included at the end of this report.

2 DEVELOPMENT OVERVIEW

The Development is located within a mixed residential/commercial area, within an urban environment.

The land upon which the Development is proposed is currently an operational quarry. Should the Development progress, the quarry operations will cease and the land will be made suitable for Development.

The site is bound to the south by Burnley Road, while to the east is a modern industrial unit along with a small number of residential dwellings. To the west and north of the site are open fields.

The primary noise source is traffic on Burnley Road along with lesser contributions from the adjacent industrial unit. It should be noted that noise from the industrial unit was limited to cars arriving/departing, and that there was no external plant associated with the unit.

The proposed Development Layout is provided in Appendix 1.

3 RELEVANT GUIDANCE

The following guidance and standards are pertinent to the assessment:

- The National Planning Policy Framework (NPPF);
- The Noise Policy Statement for England (NPSE);
- BS 8233:2014 Sound Insulation and Noise Reduction for Buildings[1]; and
- Guidelines for Community Noise[2].

3.1 The National Planning Policy Framework

The NPPF sets out the Government's planning policies for England, providing a framework within which local policies can be developed. The key principle of the NPPF is a presumption in favour of sustainable development. With regards to noise, the NPPF states that sustainable development can be achieved by:

- Avoiding noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigating and reducing to a minimum potential adverse impacts resulting from noise from new development, including through the use of conditions; and

[1] BS 8233 Sound Insulation and Noise Reduction for Buildings, BSI, 2014
[2] Guidelines for Community Noise, World Health Organisation, 1999

- Identifying and protecting areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The Noise Policy Statement for England

The NPSE sets out the role and purpose of noise policy, together with the Government's Noise Policy Vision and Aims, consistent with the NPPF.

The aims of the NPSE require that:

- Significant adverse effects on health and quality of life are avoided, while taking into account the guiding principles of sustainable development;
- Adverse impacts on health and quality of life are mitigated or minimised; and
- Where possible, noise management should seek to improve health and quality of life within the context of Government policy on sustainable development.

Paragraph 2.24 of the NPSE states that in relation to minimising and mitigating adverse impacts:

"…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."

3.3 BS 8233:2014 Sound Insulation and Noise Reduction for Buildings

BS 8233:2014 deals with the control of internal noise. It provides information on the design of buildings and gives recommended internal noise levels, ensuring that buildings have acoustic environments appropriate to their use.

The standard defines indoor ambient noise levels for a range of building functions. In relation to dwellings, BS 8233 makes the following recommendations, as detailed in Table 1.

Table 1: BS 8233 Recommended Internal Noise Levels

Activity	Location	Noise Level, dB, $L_{Aeq,t}$	
		07:00-23:00	23:00-07:00
Resting	Living Room	35	-
Dining	Dining Room	40	-
Sleeping (daytime resting)	Bedroom	35	30

In addition to the noise levels presented above, BS 8233:2014 also recommends that *"regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{Amax} depending on the character and number of events per night."*

BS 8223 allows for a relaxation in the above recommended levels of up to 5 dB where the development is considered *"necessary or desirable"*.

BS 8223 also provides guidance on recommended external noise levels. It recommends that for traditional amenity areas (such as gardens or patios), noise levels should not typically exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$. The standard recognises that these levels may not be achievable in all circumstances where development is desirable, and that in higher noise environments a compromise may be appropriate.

Where this occurs, the development should be designed to achieve the lowest practicable external amenity noise levels, but should not be prohibited.

3.4 Guidelines for Community Noise

The WHO Guidelines for Community Noise provides guidance to environmental health authorities and those involved with protecting people from the harmful effects of noise. It outlines the health risks of exposure to environmental noise and offers guidelines to minimise exposure. The Guidelines advise that noise impacts include annoyance, speech interference and sleep disturbance.

With regards to individual noise events at night, the guidelines state that:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB,L_{Amax} more than 10-15 times per night".

4 ASSESSMENT CRITERIA

The following assessment criteria have been adopted for the purposes of this assessment, in line with BS 8233 and WHO Guidelines:

- Daytime internal noise level (bedrooms and living rooms) = 35 dB $L_{Aeq,\ 16hr}$;
- Daytime external noise level for garden areas = 55 dB $L_{Aeq,\ 16hr}$;
- Night-time internal noise level (bedrooms and living rooms) = 30 dB $L_{Aeq,\ 8hr}$; and
- Night-time internal noise levels (bedrooms) not to exceed 45 dB, L_{Amax} more than 10 times per night.

5 NOISE SURVEY

In order to establish the ambient noise environment, a noise survey was undertaken between Friday 1st and Tuesday 5th March to determine noise levels at two locations on site.

As the quarry is operational, monitoring was undertaken over a weekend period, when the quarry does not operate, to ensure the measured levels were not impacted by noise sources which would not be present when the Development is built. Consultation with the project manager of the quarry confirmed that the site would be fully closed over the weekend.

A site walkover was undertaken prior to deploying the survey equipment to determine the main sources of noise around the site. The acoustic environment was found to be dominated by noise from Burnley Road, with occasional noise from car movements associated with the industrial unit. As such, monitoring was undertaken toward the southern boundary approximately 10 m north of Burnley Road (Location 1), and at the eastern boundary, adjacent to the existing industrial unit (Location 2). Location 1 was situated on top of an existing bund with a direct line of sight to Burnley Road.

Monitoring equipment consisted of two Class 1 sound level meters housed in environmental enclosures with enhanced windshields, and calibrated to traceable standards. The meters were field calibrated at the start and end of the survey period; no significant calibration drift was found (<0.2 dB). Audio was set to record at Location 2 when noise levels exceeded a trigger level of 70 dB(A) L_{Amax} to allow any elevated noise events to be investigated. A logging weather station was installed to enable any unrepresentative weather conditions to be excluded from the subsequent analysis.

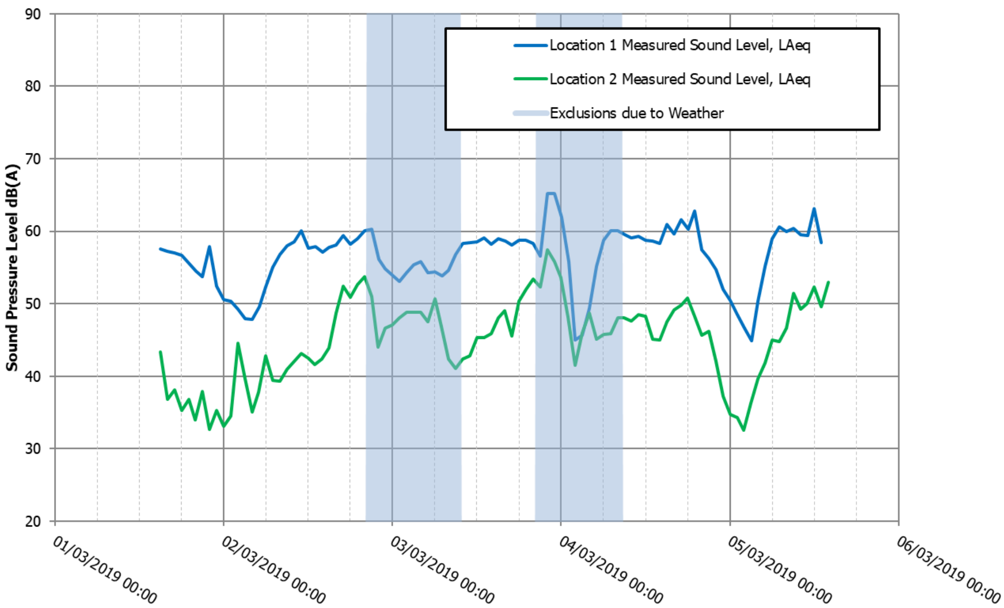
Figure 1 shows the monitoring locations along with the approximate Development boundary. Further details of the monitoring locations, including photographs of the equipment in situ are presented in Appendix 2: Survey Record Sheets.

Figure 1: Noise Monitoring Locations

6 SURVEY RESULTS

Chart 1 presents a time-history of the L_{Aeq} noise levels measured during the survey period for Locations 1 and 2.

Chart 1: Noise Survey Time-History



Through correlation of the weather and noise data, it was found that noise levels have been impacted by rainfall during the survey. Periods of rainfall were recorded during the night of the 2nd – 3rd, and the night of the 4th – 5th. In addition, audio recordings during this time confirmed that the elevated noise levels during night-time periods was due to rainfall. Given the above, these night-time periods at both locations have not been included further as part of the assessment.

In order to enable direct comparison with the noise assessment criteria for daytime and night-time periods, the measurement results have been converted into $L_{Aeq,16hour}$ and $L_{Aeq,8hour}$ measurements, for Locations 1 and 2, as seen in Tables 2 and 3 respectively. It should be noted that measurements made during the afternoon of Friday 1st and Tuesday 5th do not constitute as full 16-hour periods, but remain of sufficient duration for the purposes of the assessment.

Table 2: Noise Survey Summary – Location 1

Date	**Daytime** dB, $L_{Aeq,16hour}$	**Night-time** dB, $L_{Aeq,8hour}$
Friday 1st March	57	50
Saturday 2nd March	58	-
Sunday 3nd March	59	-
Monday 4th March	**60**	**53**
Tuesday 5th March	60	-

Table 3: Noise Survey Summary – Location 2

Date	**Daytime** dB, $L_{Aeq,16hour}$	**Night-time** dB, $L_{Aeq,8hour}$
Friday 1st March	37	40
Saturday 2nd March	48	-
Sunday 3nd March	**50**	-
Monday 4th March	48	**40**
Tuesday 5th March	50	-

In the interest of providing a worst-case assessment, the highest measured daytime and night-time levels have been taken as the basis of this assessment, highlighted in bold in the above tables.

6.1 Night-Time L_{Amax} Events

Table 4 (overleaf) presents the 10 highest individual noise events measured during worst case night-time periods for each location. From these, the tenth highest value for each location can then be taken as the appropriate baseline noise levels for L_{Amax} night-time noise events. The ranking process assumes that any measurements within 10 seconds of the presented values constitute the same noise event, and have therefore been excluded.

Table 4: Individual Noise Events

Location 1		Location 2	
Time	**L_{Amax}**	**Time**	**L_{Amax}**
05/03/2019 06:56:46	73	05/03/2019 06:01:28	61
05/03/2019 06:58:33	73	05/03/2019 06:03:24	57
05/03/2019 01:58:32	73	05/03/2019 06:09:26	57
05/03/2019 05:34:49	71	05/03/2019 06:53:55	57
05/03/2019 06:56:33	69	05/03/2019 06:17:03	55
05/03/2019 02:07:05	69	05/03/2019 03:56:36	54
05/03/2019 06:51:15	69	05/03/2019 05:08:23	54
05/03/2019 00:58:57	68	05/03/2019 01:17:01	54
04/03/2019 23:03:15	68	04/03/2019 23:31:11	54
05/03/2019 02:32:51	**68**	05/03/2019 04:33:23	**54**

As can be seen, the 10th highest measured value has been found to be 68 dB L_{Amax} to the nearest 1 dB for Location 1, and 54 dB L_{Amax} for Location 2. These are the baseline levels against which individual noise events are to be assessed for bedroom windows, in order to determine compliance with the assessment criteria.

7 ASSESSMENT OF NOISE IMPACT

Tables 5 and 6 detail the measured noise levels discussed in Section 6 along with the assessment criteria detailed in Section 4. The attenuation required by the building envelope in order to meet the applicable noise criteria within bedrooms and living areas is also shown.

Table 5: Impact Assessment – Location 1

	Daytime	Night-time (within bedrooms)	
	dB, $L_{Aeq,16hour}$	**dB, $L_{Aeq,8hour}$**	**10th Highest L_{Amax}**
Noise Level	60	53	68
Noise Criteria	35	30	45
Attenuation Required	**25**	**23**	**23**

Table 6: Impact Assessment – Location 2

	Daytime	Night-time (within bedrooms)	
	dB, $L_{Aeq,16hour}$	dB, $L_{Aeq,8hour}$	10th Highest L_{Amax}
Noise Level	50	40	54
Noise Criteria	35	30	45
Attenuation Required	**15**	**10**	**9**

8 DISCUSSION AND RECOMMENDED MITIGATION MEASURES

8.1 Glazing

As windows provide the primary noise transmission path in the typical building envelope, it is considered that mitigating noise ingress through the windows would ensure noise levels are acceptable without modification to other structural elements.

A typical double-glazed unit of 6/16/6[3] achieves a reduction of 31 dB R_{w+Ctr}[4] which exceeds the minimum attenuation required. On this basis, standard double-glazed window units would be acceptable for all windows of the Development.

All window frames should be fitted as tightly as possible to the external structure, and any gaps fully sealed with suitable mastic.

The glazing example provided above is for guidance only; a number of alternative glazing specifications are available of equivalent or better performance. In the event that an alternative glazing specification is selected for installation, it is recommended that this is reviewed by an appropriately qualified acoustics consultant to ensure that internal noise levels will be compliant with the identified noise criteria.

8.2 Ventilation

As can be seen in Table 6, external noise levels measured towards the northern part of the site are equal to 50 dB, L_{Aeq} during daytime periods and 40 dB, L_{Aeq} during night time periods, and would therefore comply with the assessment criteria with open windows.

For dwellings facing Burnley Road, windows are required to be closed in order to meet the identified internal noise criteria, therefore appropriate ventilation is required within all habitable rooms on the southern façade of these dwellings. This will ensure windows do not have to be opened, thereby maximising the acoustic performance of the façade. However, windows should remain openable to allow for purge ventilation at the occupant's discretion.

A range of ventilation operations are available, from in-frame trickle vents, to whole building HVAC systems. Irrespective of the system chosen for installation, any external vents/louvres should offer at least the same level of noise attenuation as the windows to the rooms fed by the ventilation system i.e. 31 dB R_{w+Ctr}.

[3] E.g. Guardian float glass 6/16/6 double glazing
[4] +Ctr indicates a correction to account for the increased low-frequency noise produced by road traffic.

8.3 External Amenity Spaces

8.3.1 Southern Boundary

As discussed in Section 3.3, BS 8233 recommends that for traditional amenity areas, noise levels should not exceed the upper guideline value of 55 dB, $L_{Aeq,T}$, but recognises this may not be achievable in all circumstances. As seen in Table 2, measured daytime external noise levels exceed the external criterion in gardens along the southern boundary overlooking Burnley Road by 5 dB. It should be noted however that monitoring was undertaken on top of an existing bund, with a direct line of sight to Burnley Road.

The bund is anticipated to be retained and as such, there will be no line of sight from amenity spaces to Burnley Road. Shielding from the bund will result in noise in garden areas being approximately 5 -10 dB lower than measured (i.e. 50 - 55 dB) and will therefore be acceptable.

8.3.2 Eastern Boundary

Due to the low levels of noise measured from the adjacent industrial unit during the site visit, and as evidenced by the results of the noise monitoring at Location 2, external amenity areas facing the factory will be compliant with the external amenity criterion.

9 CONCLUSION

Surface Property has been commissioned by JH Consulting Ltd to undertake a noise assessment in relation to the proposed development of 25 residential dwellings on land off Burnley Road, Sowerby Bridge.

It has been found that typical double-glazed units (with appropriate ventilation for dwellings facing Burnley Road) achieving a reduction of 31 dB R_{w+Ctr}, will be suitable for all habitable rooms.

Noise levels within external amenity spaces have been found to be acceptable in terms of BS 8233.

10 GLOSSARY OF TERMS

Decibel (dB): The decibel is the basic unit of noise measurement. It relates to the cyclical changes in pressure created by the sound and operates on a logarithmic scale, ranging upwards from 0 dB. 0 dB is equivalent to the normal threshold of hearing at a frequency of 1000 Hertz (Hz). Each increase of 3 dB on the scale represents a doubling of the Sound Pressure, and is typically the minimum noticeable change in sound level under typical listening conditions.

dB(A): Environmental noise levels are usually discussed in terms of dB(A). This is known as the A-weighted sound pressure level, and indicates that a correction factor has been applied, which corresponds to the human ear's response to sound across the range of audible frequencies. The ear is most sensitive in the middle range of frequencies (around 1000-3000 Hz), and less sensitive at lower and higher frequencies. The A weighted noise level is derived by analysing the level of a sound at a range of frequencies and applying a specific correction factor for each frequency before calculating the overall level. In practice this is carried out automatically within noise measuring equipment by the use of electronic filters, which adjust the frequency response of the instrument to mimic that of the ear.

$L_{Aeq,t}$: This term is known as the A-weighted equivalent continuous sound pressure level for a period of time, t. It is similar to an average, and represents the sound pressure level of a steady sound that has, over a given period, the same energy as the fluctuating sound in question.

L_{Amax}: The maximum A-weighted sound pressure level measured over a given period.

Sound pressure (P): The fluctuations in pressure relative to atmospheric pressure, measured in Pascals (Pa).

Sound pressure level (L_p): Sound pressure measured on the decibel scale, relative to a sound pressure of 2 x 10-5 Pa.

Time Weighting: Time weightings determine how quickly the sound level meter responds to changes in noise level, and is generally set to 'Fast' or 'Slow'. A fast time weighting resulting in in the sound level meter sampling every 1/8th second: a slow time weighting results in a sample measurement being taken by the sound level meter every 1 second.

Appendix 1

Proposed Layout

Project	Marsh Quarry, Sowerby Bridge		
Client	Mr P Edgar		
Drawing	Proposed Block Plan 3	Scale	1:500 @ A3
Drawing no.	245/02	Revision	-
Date	January 2019		

Do not scale from drawings.
All dimensions to be verified on site.

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Rev

d a r k s k i e s d e s i g n

Appendix 2

Survey Record Sheets

Noise Survey Record Sheet – Page 1: Location and Equipment Details

Project No.	50760	**Project Name:**	Burnley Rd
Location (x of y)	Location 1	**Installed By:**	SW
Lat/Long	53.71479, -1.91064	**Location Name**	Burnley Road
Start Date	01/03/2019	**Start Time**	1500

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-52	510114
Calibrator:	Rion NC-74	35105087
Source of Equipment:		Surface
Meter Timestamp (Start/End, GMT/BST):		Start GMT

Description of Location/Sound Source:	Elavated, approximately 10 m from road, main source is traffic
Distance from façade:	0
Noise sources observed:	Traffic, no quarrying during installation
Weather conditions	Dry, overcast
Additional notes:	0

Surface

Noise Survey Record Sheet – Page 2: Visit Record

Project No.	50760	**Location (x of y)**	Location 1

Installation (Visit 1)

Date:	01/03/2019	**Time:**	1500
Filename:	0101	**Calibration level:**	94.0
Range setting:	20-130	**Meas. Period**	1hour
Freq weighting:	A	**Weather Station?**	No
Lp Logging	Yes (1 sec)	**Audio/ 8ve bands?**	No
Notes:	0		

Visit 2

Date:	05/03/2019	**Time:**	1300
Visited by:	SW	**Calibration level:**	94.0
Level pre-calibraiton	94.0	**Batts replaced?**	N/A
Equipment Removed?			Yes
Notes:	0		

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Surface

Noise Survey Record Sheet – Page 3: Photographs

Project No.	50760	Location (x of y)	Location 1

Surface

Noise Survey Record Sheet – Page 1: Location and Equipment Details

Project No.	50760	**Project Name:**	Burnley Rd
Location (x of y)	Location 2	**Installed By:**	SW
Lat/Long	53.71533, -1.91092	**Location Name**	Factory
Start Date	01/03/2019	**Start Time**	1500

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-52	510131
Calibrator:	Rion NC-74	35105087
Source of Equipment:		Surface
Meter Timestamp (Start/End, GMT/BST):		Start GMT

Description of Location/Sound Source:	Northern area of Quarry, adjacent to factory
Distance from façade::	3 m from factory
Noise sources observed:	Traffic from Burnley Road and few car movements in factory car park. No industrial
Weather conditions	Dry and sunny, no rainfall
Additional notes:	0

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Surface

Noise Survey Record Sheet – Page 2: Visit Record

Project No.	50760	**Location (x of y)**	Location 2

Installation (Visit 1)

Date:	01/03/2019	**Time:**	1500
Filename:	102	**Calibration level:**	94.0
Range setting:	20-130	**Meas. Period**	15min
Freq weighting:	A	**Weather Station?**	No
Lp Logging	Yes (1 sec)	**Audio/ 8ve bands?**	Yes (Audio)
Notes:	0		

Visit 2

Date:	05/03/2019	**Time:**	1400
Visited by:	SW	**Calibration level:**	94.0
Level pre-calibraiton	93.9	**Batts replaced?**	0
Equipment Removed?			Yes
Notes:	0		

Surface

Noise Survey Record Sheet – Page 3: Photographs

Project No.	50760	**Location (x of y)**	Location 2