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**Greatledge Printers
Gorebrook Works
Pink Bank Lane
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**Environmental Assessment
at above**

**AB acoustics
4 Cumbrian Close
High Crompton
Shaw
Oldham**

January 2021

ing the above for *Building B* – at a distance of 44 m from th
Introduction

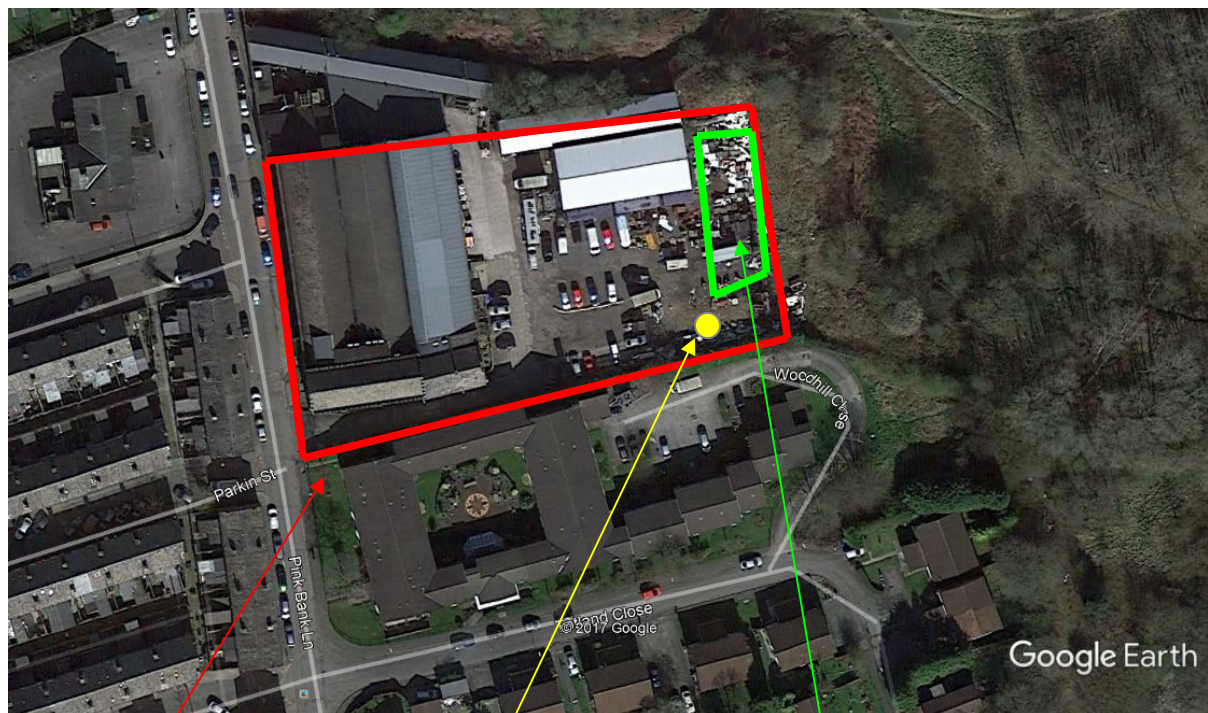
AB acoustics were commissioned by Greatledge Printers to undertake an environmental assessment of a proposed warehouse extension at the rear of the present site which was detailed in our report dated December 2017 and amended in February 2020.

The survey was undertaken in order to accompany the planning application.

Planning permission was granted for one of the buildings to operate with B1,B2 or B8 usage – the building nearest to the existing residential property was granted permission for B1 – B8 usage.

The hours of operation were granted for 08.30 to 16.30 – it is now hoped to extend the times of operation from 08.30 to 18.00 hrs – the following report details the calculations undertaken with respect to this extended operating time.

Below is a photograph of the site – with the measurement location detailed



Approximate Site Location

Approximate site of proposed warehouse

Measurement Location

As can be seen the proposed site is located on the edge of an existing commercial area and is to be built in the rear yard area of the existing premises – at the rear of the report is a plan of the two units.

It is understood that the proposed buildings will be of Portal frame construction that will be clad with metal insulated trapizodial panels .

The new buildings will be used solely for the purposes detailed - a sketch of which is enclosed at the end of the report – as can be seen the proposal is for two buildings separated by a 5m corridor with access to the buildings through two of the Roller Shutter doors – there is an additional door on the Western facade.

The size of the buildings are 16m x 28m x 5m high – on the enclosed drawings two roller shutter doors are shown in each of the units – this is to be increase to three.

The units will be separated by 8m.

It is understood that at the present time the print works has planning permission to operate until 19.00 hrs.

The system of paper deliveries will not change and they will be unloaded at the same place as is presently used by the same method – Folk Lift Trucks (FLT's) – the paper etc being taken into the existing building in order to be easily available for processing.

Vehicle access to the proposed warehouse will be with the FLT and only then for infrequent movement of stored items – when no access is required then the Roller Shutter doors will be shut.

There will be no fans , Chillers or compressors used in the warehouse nor will there be any new equipment purchased for use on site.

There is no working on Sunday or Bank Holidays.

No complaints have been received by Greatledge regarding the present operation of the site.

Noise Assessment Criteria

The likelihood of complaints about noise from industrial plant can be assessed where the standard is appropriate using BS 4142 – 2014 – this has replaced the earlier standard BS 4142 : 1997

This standard describes methods for rating and assessing sound of an industrial / commercial nature. The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside / outside residential premises.

The significance of sound of an industrial / commercial nature depends upon the margin by which the rating level of the source exceeds the background sound level and the context in which the sound occurs.

The Standard is intended to be used for :

Investigating complaints regarding noise.

Assessing sound from proposed / new / modified or additional noise sources of an industrial / commercial nature.

Assessing sound at proposed new dwellings or premises used for residential purposes.

The sound level from a source when determined as a discrete entity distinct and free of other influences contributing to the ambient sound is referred to as the 'specific sound level'.

The specific sound level is evaluated at an identified location over the appropriate reference time interval which are : 1 hours during the daytime – 07.00 to 23.00 hrs and 15 minutes during the night time – 23.00 to 07.00 hrs.

The specific noise may be subject to acoustic feature correction if the noise level at the measurement location is subjectively considered to contain certain acoustic features that may increase the significance of the impact of the noise over the background level.

If these features are present at the measurement location then the character correction is added to the specific sound level to arrive at the rating level.

The Standard requires the assessor to consider the subjective prominence of the character of the specific noise source at the measurement location / noise sensitive receptors and the extent to which the character of the noise will attract attention to it – such features are taken into account by applying the following corrections :

	Tonality	Impulsivity	Other Characteristics
Just Perceptible	+ 2 dB	+ 3dB	-
Clearly Perceptible	+ 4dB	+ 6 dB	-
Highly Perceptible	+ 6dB	+9 dB	-
Readily Distinctive against Residual Environment			+ 3 dB

If both tonal and impulsive characteristics are both present then two corrections can be made – however if only one is dominant then only one correction need to applied.

If no corrections are deemed appropriate then the Rating Level equals the Specific Noise Level.

An initial estimate of the impact of the specific sound is obtained by subtracting the measured background level from the rating level and considering the following :

- A) Typically the greater the difference the greater the impact.
- B) A difference of around + 10 dB or more is likely to be an indication of a significant adverse impact – depending on context.

C) A difference of around + 5 dB or more is likely to be an indication of a significant adverse impact – depending on context.

1.0 The lower the rating level is to the measured background level the less likely it is that the sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the measured background level this is an indication that the sound source will have a low impact depending upon context.

Where the initial estimate of the impact needs to be modified due to the context then all pertinent factors need to be taken into consideration – these include the following :

The absolute level of the sound.

The character and level of the residual sound compared to the character and level of the specific sound.

The sensitivity of the receptor and whether residential dwellings already incorporate design measures that secure good internal and outdoor conditions eg facade insulation – ventilation / cooling that reduces the need to open windows – acoustic screening.

The standard recognises that the response to sound can be subjective as well as to the local attitudes to the source of the sound and the character of the neighbourhood.

Also relevant are the World Health Organisation (WHO) Guidelines for Community Noise – these identify that sleep may be disturbed by short term noise events and the level associated with this is 45 dB L_{Amax} inside the bedroom – this relates to 60 dB L_{Amax} external to the bedroom.

In brief an 'Outdoor Living Area' should be subject to a noise level less than 55 dBA in order to prevent serious annoyance during the daytime and evening - a level less than 50 dBA is desirable to prevent moderate annoyance : reference World Health Organisation.

BS 4142 : 2014

Regarding the residential properties the survey was undertaken – as stated above - with respect to BS 4142 : 2014 .

It is now a requirement of BS 4142 to consider the potential uncertainty of the assessment – the steps taken to reduce uncertainty as far as practical included :

All the measurements were made with a Type 1 sound level meter with certificates of calibration and field calibration checks were undertaken after each series of measurements with a minimal drift (0.1 dB) recorded.

The weather conditions were considered ideal for environmental noise measurements with no rain – dry / damp surfaces - low wind speeds (< 5.0 m /sec).

Variations in ground cover between the proposed site and the receivers could affect the ground absorption and therefore the calculated levels at the various receivers – in order to reduce this problem it has been assumed that there is acoustically reflective ground cover over the various distances.

Inaccuracies that could result from estimates of the intervening ground cover – meteorological conditions etc. will not be significant.

238 The measurements were undertaken over a number of days / times in order to obtain – what is considered to be – a representative measurement of the existing noise climate at this location.

Therefore taking the above into account it is considered that the uncertainty has been controlled as far as practically possible with the results being over predicted rather than under predicted and therefore the above represents a robust assessment.

Equipment Used and Procedure

The noise levels were measured using a :

The measurements were made with a Bruel & Kjaer Type 2238 Sound Level Meter (Type 1 instrument) – at a height of 1.5m and at least 1.5m away from any reflecting surfaces.

The system was calibrated prior to the series of measurements and checked afterwards using a B & K Type 4231 Calibrator – no deviation was found.

The measurements were undertaken at the times stated in the results.

Results

Measurements were made at different times in order to more fully reflect the noise character of the proposed development.

Tuesday 12 December 2017

Measurement Period	LA eq	LA 90	LA 10
08.30 – 09.00	47.1	42.5	-
09.00 – 10.00	46.7	40.5	-

During the period 08.30 – 09.00 five cars arrived at the site and parked

During the period 09.00 – 10.00 one 3.5T lorry arrived at site and was unloaded with the FLT – the operation taking 12 minutes – during this time frame the printing presses were operative.

Wednesday 13 December 2017.

Measurement Period	LA eq	LA 90	LA 10
10.10 – 11.10	45.1	39.6	-
14.15 – 15.15	49.5	43.4	

During the first measurement period two lorries arrived and were unloaded with the FLT.

In the second period there was movement of cars in the yard – distant trains and children at a nearby school.

Date	Wind Speed M/sec	Wind Direction	Temperature C	Rain	Cloud Cover %	Road Conditions
12/12/17	0	-	-2	No	20	Dry
13/12/17						
10.15	4	S	4	No	100	Damp
14.15	4.1	SW	3	Light Rain	100	Wet

The nearest property on Woodhill Close is scaled at approximately 25m from the side facade of the proposed warehouse.

Due to the current Lockdown restrictions it is not possible to undertake any meaningful noise level measurements therefore it is considered that the previous measurements will still valid.

The external noise levels used are those measured and recorded above .

As can be seen from the enclosed drawings there are to be two Units constructed on site therefore the following considers the use of unit B as B2 and one the nearest to the residential property – unit A - as Warehousing B! - B8.

As can be seen the Unit wall that faces the residential property on Woodhill Close is scaled at 28m long and is understood to be 5.0m high.

The internal noise level in the Unit – Classed at B2 – is determined by the activity that is likely to be undertaken within the Unit and varies with the activity.

Below are detailed measurements undertaken at similar Units (from library figures).

Brake Engineering – Wrexham – 88 dBA
Delta – Stockport – 79 / 86 dBA
Avanti Blue – 84 dBA
Canterbury MOT Centre – Blackburn – 78 dBA
Shaw Tyre & Exhaust – Shaw – 80 dBA

In the following the highest recorded LA eq of 88 dBA is used.

However it is proposed to use Building A as a Warehouse facility and allowing B2 use in Building B – see below :

Building A – Warehouse.

Obviously no measurements could be undertaken in the warehouse – nor in the storage area within the present site as the printing machines were running – therefore library figures as detailed below are used.

Thumbs Up – Bury - Warehouse – 1 hour – FLT movements = 72 dBA

Brake Engineering – Wrexham – Warehouse – 1 hour – FLT movement = 74 dBA

Therefore the noise level at the Woodhill Close can be calculated from :

$$L_2 = L_1 - 6 - R + 10 \log S - 11 - 20 \log r + DI$$

Where

L_2 = Calculated level at distance r metres

L_1 = Internal Level within building – as the overall level this could be regarded as the *worst case situation* as it is unlikely that this level will be the noise level within the whole of the building – and the use of the FLT will be low within the warehouse = **74 dBA**

R = the sound reduction index of the building element **Rw = 25** (60mm panel)

S = surface Area of building facing the residential property – 28 x 5 = **140Sq m**

.r= distance to houses = **20 m**

DI= Directivity Index = **3** .

Therefore $L_2 = 74 - 6 - 25 + 10 \log 140 - 11 - 20 \log 20 + 3$

$L_2 = 30$ (30.4) dBA.

If the noise radiated by the roof is included in the above assessment the following level is calculated ;

$$L_2 = L_1 - 6 - R + 10 \log S - 11 - 20 \log r + DI$$

Where

L_2 = Calculated level at distance r metres

L_1 = Internal Level within building – as the overall level this could be regarded as the *worst case situation* as it is unlikely that this level will be the noise level within the whole of the building – and the use of the FLT will be low within the warehouse = **74 dBA**

R = the sound reduction index of the building element **Rw = 25**

S = surface Area of building facing the residential property – $28 \times 10 =$ **280 Sq m**

.r= distance to houses = **30 m** – estimated average distance

DI= Directivity Index = **3** the directivity factor is changed to – **3 dB** for a plane radiator at $60^\circ < X < 90^\circ$ incidence.

Therefore $L_2 = 74 - 6 - 25 + 10 \log 280 - 11 - 20 \log 30 - 3$

$L_2 = 25$ dBA.

It is understood that there are no roof lights in the roof.

Building B – B2 usage

Repeating the above for *Building B* – at a distance of 44 m from the residential property then ;

Therefore the noise level at the Woodhill Close can be calculated from :

$$L_2 = L_1 - 6 - R + 10 \log S - 11 - 20 \log r + DI$$

Where

L_2 = Calculated level at distance r metres

L_1 = Internal Level within building – as the overall level this could be regarded as the *worst case situation* as it is unlikely that this level will be the noise level within the whole of the building – and the use of the FLT will be low within the warehouse = **88dBA**

R = the sound reduction index of the building element **Rw = 25** (60mm panel)

S = surface Area of building facing the residential property – $28 \times 5 =$ **140 Sq m**

.r= distance to houses = **44 m**

DI= Directivity Index = **3** .

Therefore $L_2 = 88 - 6 - 25 + 10 \log 140 - 11 - 20 \log 44 + 3$

$$L_2 = 38 \text{ (37.5) dBA}$$

However this Building is screened from the residential properties by the location of the Building A – according to **BS 5228 : Part1 : 2009 Section F.2.2.2.1 Section C** an attenuation to the noise from this source of the order of 5 to 10 dBA expected – as the units are not actually visible then an attenuation of 10 dBA is assumed – if this is the case then the noise level at the residential properties could be of the order of **28 dBA**.

Roof

$$L_2 = L_1 - 6 - R + 10 \log S - 11 - 20 \log r + DI$$

Where

L_2 = Calculated level at distance r metres

L_1 = Internal Level within building – as the overall level this could be regarded as the *worst case situation* as it is unlikely that this level will be the noise level within the whole of the building – and the use of the FLT will be low within the warehouse = **88 dBA**

R = the sound reduction index of the building element **R_w = 25**

S = surface Area of building facing the residential property – $28 \times 10 = \mathbf{280 \text{ Sq m}}$

r = distance to houses = **54 m** – estimated average distance

DI = Directivity Index = **3** the directivity factor is changed to – **3 dB** for a plane radiator at $60^\circ < X < 90^\circ$ incidence.

Therefore $L_2 = 88 - 6 - 25 + 10 \log 280 - 11 - 20 \log 54 - 3$

$$L_2 = 30 \text{ dBA.}$$

Again there are no roof lights proposed.

In order to determine the overall noise level at the residential properties the two noise sources need to be summed : $30 \text{ (Building A)} + 25 \text{ (Building A)} + 28 \text{ (Building B)} + 30 \text{ (Building B)} = \mathbf{35 \text{ (34.6) dBA}}$.

As Impact Noise is likely from the above then a +3 dB correction has been added in accordance with BS 4142 : 2014 as this is could be 'Just Perceptible' resulting in a Rating Level of **38 dBA**

The following is an assessment of the above operation with respect to BS 4142 : 2014

Results		Clause	Comment
Calculated ambient sound level	LA eq (60 mins.) = 35 dB	7.1 7.3.1	Specific sound sources active
Residual Sound Level	LA eq (15 mins.) = 45.1 dBA	07/03/03	Specific sound sources not active
Background Sound Level	LA 90 (20 mins.) = 39.6	8.1.3 8.3	Measured at time of no activity
Assessment made during day time – reference time interval 15 minutes			
Specific Sound Level	LA eq(60 minutes) = 35	7.3.4 7.3.5	
Acoustic feature correction	+3 dB	9.2	Impulsive character 'Just Perceptable'
Rating Level	35 + 3 = 38 dBA	9.2	
Background Sound Level	LA 90 (1 hr) = 39.6dBA	8	Sound Level steady
Excess of Rating Level over Background	38 – 39.6 = -1.6 dBA		
Assessment indicates no adverse impact		11	
Uncertainty of the assessment	Not Significant	11	

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that :

Perception	Examples of Outcome	Increasing Effect Level	Action
Not Noticeable	No effect	No observed Effect	No Specific Measures required
Noticeable and not Intrusive	Noise can be heard – does not cause any change in behaviour or attitude	No Observed Adverse Impact	No Specific Measures required
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and / or attitude – affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Impact	Mitigate and reduce to a minimum.

Recommendations

- That both proposed buildings are constructed from Trapizodial sheet panels having a thickness of 60mm and a steel inner liner.
- That Building A (nearest the residential property) is used for Warehousing.
- That Building B is classed for B2 usage.
- There are no roof lights fitted
- The the opening hours are 08.30 to 18.00 thus avoiding the most critical times of the day.

Conclusions

If the site is laid out as detailed – the Building designated A on the attached plan being used for Warehousing then the Building designated B can be used for B2 use.

The calculated combined noise from the operation of these units indicates that there will be no significant adverse impact on the nearest residential receptors should planning be granted for the hours of operation to be 08.30 to 18.00.

Roger Leach AMIOA

January 2021

Acoustic Test Results Appendix A - Wall/Facade Panel Construction

Octave Band Sound Reduction Index (R) and Weighted Sound Reduction Index (R_w)

Wall	Panel and Lining	Octave Band Sound Reduction Index R								R _w	C _v	Surface Weight Kg/m ²
		63	125	250	500	1k	2k	4k	8k			
1W	AWP/60 + no lining	15	16	19	23	26	22	39	-	25	-3	18
2W	AWP/60 + F	12	19	32	42	50	52	60	-	43	-10	30
3W	AWP/60 + W15	14	17	31	40	48	46	56	-	41	-10	28
4W	AWP/60 + W15 + F	17	24	37	45	52	54	64	-	47	-9	40
5W	AWP/60 + P + W12	16	22	37	45	51	50	63	-	46	-10	41
6W	AWP/60 + P + W12	18	23	35	44	49	50	61	-	45	-8	41
7W	AWP/60 + I + P + W	18	24	37	48	53	55	63	-	48	-10	4
8W	KS1000 RW/40 + I + L	13	14	29	38	40	45	55	-	38	-9	20
9W	KS1000 RW/40 + I + L	12	16	30	40	44	51	64	-	40	-9	20
10W	AWP/70 + no lining	20	15	17	23	18	25	40	46	24	-4	12.5

Key

AWP = Architectural Wall Panel with various profiles (Optimo, MR, EB, FL, MM, CX, WJ, Longspan)
F = 10mm dense particle board (11.7kg/m²)
W15 = 15mm plasterboard (10kg/m²)
W12 = 12.5mm wetboard (7.5kg/m²)
P = 10mm dense plasterboard plank (15.2kg/m²)
I = Insulation (see construction description for details)
L = 0.7mm profiled steel liner sheet
The figures after the forward slash refers to the panel thickness in mm (ie AWP/60 = panel thickness of 60mm)

Acoustic Test Results Appendix B - Roof Panel Construction

Octave Band Sound Reduction Index (R) and Weighted Sound Reduction Index (R_w)

Roof	Panel and Lining	Octave Band Sound Reduction Index R								R _w	C _v	Surface Weight Kg/m ²
		63	125	250	500	1k	2k	4k	8k			
1R	KS1000 LP/45 + I + 2 x SB	27	32	47	61	69	69	75	-	58	-11	-
2R	KS1000 RW/40 + I + L	8	17	32	43	48	54	60	-	43	-	2
3R	KS1000 RW/40 + I + L	11	19	36	48	54	61	73	-	46	-	19
4R	KS1000 RW/40 + I + Py	17	27	39	44	49	57	67	-	48	-	31
5R	KS1000 RW/30 + no lining	-	17	20	23	23	23	41	-	25	-3	-
6R	KS1000 RW/30 + I + L	-	18	35	50	55	59	60	-	44	-11	-
7R	KS1000 RW/50 + I + L	-	19	34	48	52	56	63	-	44	-10	-
8R	KS1000 RW/80 + I + L	-	20	36	48	50	66	70	-	46	-11	-
9R	KS1000 RW/80 + no lining	-	18	21	23	20	38	42	-	26	-4	-
10R	KS1000 RW/80 + no lining	20	18	20	24	20	29	39	47	25	-3	-
11R	KS1000 RW/80 + I + PL	18	19	22	29	31	40	58	49	32	-4	-
12R	KS1000 ZIP/90 + no lining	19	18	19	20	17	35	38	44	23	-4	-
13R	KS1000 LP/80 + no lining	19	19	19	22	19	35	39	46	24	-4	-
14R	KS1000 RT + no lining	20	19	21	22	22	32	38	44	25	-2	-
15R	KS1000 TS + no lining	20	16	15	23	29	39	45	53	27	-4	27

Key

I = Insulation (see construction description for details)
2 x SB = 2 x 12.5mm dense plasterboard (15.2kg/m²)
L = Profiled Steel Liner Sheet
Py = 10mm thick dense particle board (11.7kg/m²)
PL = Profiled Perforated Steel Liner Sheet
The figures after the forward slash refers to the panel thickness in mm (ie LP/45 = panel thickness of 45mm)

