

ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 2814

17 August 2020

Barnsley MBC
Finance and Property Directorate
Commercial Services Payments Team
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ST MICHAEL'S AVENUE, MONK BRETTON
SUPPLEMENTARY ENVIRONMENTAL NOISE IMPACT ASSESSMENT
ACOUSTIC CONSULTANCY REPORT ADT 2814/ENIA2

Revision	Date	Issued By	Revision Notes
-	7 July 2020	Chris Middleton	draft issue
A	9 July 2020	Chris Middleton	revised following team comments
B	10 July 2020	Chris Middleton	edited colouring on site plan
C	17 August 2020	Chris Middleton	revised acoustic screening proposals

1.0 SUMMARY

Planning permission is being sought for a new residential development, as shown on the planning application drawings.

This latest assessment is supplementary to the environmental noise impact assessment ADT 2814/ENIA dated 20 December 2018, in response to feedback from and discussions with Barnsley Metropolitan Borough Council Public Health Directorate.

The various industrial premises near the site have been identified, and the operators have been contacted.

A supplementary environmental noise survey has been undertaken on the site to measure noise emissions from the nearby industrial premises (primarily Haywood and Padgett, the nearest and largest operation) over a sample of night time and day time conditions. Separate noise measurements have been undertaken at the Apollo Cradles premises in Shafton, to provide data representative of the occasional operations on their Shawfield Road site.

The data from these surveys has been used to assess the environmental noise impact of the adjoining industrial operations on the proposed dwellings, indicating a potential adverse impact without mitigation.

To mitigate the impact, acoustic screening is proposed to the north-west boundary, extending onto the adjoining land, along with alternative ventilation to bedrooms in the most affected areas.

2.0 BASIS OF ASSESSMENT

2.1 Site Location

The site is currently a grazing field located at the end of St Michael's Avenue, Monk Bretton. The land slopes down from the south-east to the north-west boundary.

There are existing houses to the north, east and south, while to the south-west is another area of grazing land. To the north-west is Haywood and Padgett, a scone manufacturer, the nearest of a number of industrial premises on the Shawfield Road estate as marked on the attached plan 2814/SP1.

Other industrial premises in close proximity to the site are as follows:

- i. XPO Logistics, 135 metres away to the south-west
- ii. Red Dog Linings, 330 metres away to the west, a metal works
- iii. Herby Designs, 108 metres away to the south-west, a textiles supplier
- iv. a yard owned and operated by Apollo Cradles, 55 metres away to the west, used occasionally for the assembly of scaffolding cradles for bridge repairs and similar applications
- v. Go Plant, 100 metres away to the north, a plant hire depot

The Ardagh Glass industrial complex is approximately 240 metres away to the south-east, beyond the existing housing estate.

The nearest notable roads include Industry Road and West Green Way to the north, Fish Dam Lane to the east and Carlton Road to the west. The larger urban area and associated transport infrastructure of Barnsley is located to the south-west of the site.

2.2 Proposed Development

Planning permission is being sought for a new residential development on land situated at the end of St Michael's Avenue.

2.3 Assessment Criteria

The standard for assessing the environmental noise impact of industrial operations on residential properties is BS 4142:2014. General environmental noise criteria are provided in BS 8233:2014, and the World Health Organisation has published similar criteria, along with recommended L_{Amax} limits to protect against sleep disturbance.

2.4 Strategy for Noise Impact Assessment

Based on the information in Sections 2.1 to 2.3 above, the strategy for the noise impact assessment has been broken down into the following stages:

- i. undertake an environmental noise survey to obtain supplementary baseline noise data, as described in Section 3.0 below. This includes measurements at the Apollo Cradles site in Shafton, to provide representative data for their Shawfield Road site.
- ii. assess the impact of noise emissions from the nearby industrial operations as described in Section 4.0 below, and describe the noise control measures required.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Purpose

The purpose of the survey was to measure the noise levels on the site over a sample of night time and day time operations, and to measure noise levels at the Apollo Cradles site in Shafton.

3.2 Scope of Survey

A fully attended environmental noise survey was undertaken on the site between 05:00 hours and 09:00 hours on Thursday 25 June 2020, thereby covering a sample of night time and day time operations. Discussions with the various industrial operators indicated that none carried out significant operations during the night.

Short term spot measurements of activities at the Apollo Cradles site in Shafton were undertaken on Tuesday 23 June 2020.

3.3 Instrumentation

The instrumentation used, and the field calibration values before and after the survey are detailed in Appendix A of this report.

3.4 Procedure

3.4.1 Site Survey (25 June 2020)

Two measurement positions were selected as described below and indicated on the attached site plan 2814/SP1:

- i. on the site, approximately 5 metres from the western corner
- ii. on the site, approximately 5 metres from the eastern corner

Measurements were taken alternating between the two positions, between 05:00 hours and 09:00 hours on Thursday 25 June 2020.

At both positions the microphone was mounted on a tripod approximately 1.2 metres above the ground and least 3.5 metres from any other acoustically reflective surfaces.

Measurements were taken using the 01dB Blue Solo sound level meter set to store the octave band and A-weighted 100ms short-term L_{eq} levels over a series of samples of up to 15 minutes for subsequent post processing.

3.4.2 Apollo Cradles, Shafton Survey (23 June 2020)

A series of spot measurements were taken at 5 metres from the assembly of scaffolding frames using a bolt gun, and the dropping of the frame onto concrete hardstanding using a fork lift truck, using the 01dB Blue Solo sound level meter set to store the octave band and A-weighted 100ms short-term L_{eq} levels for subsequent post processing.

The microphone was mounted on a tripod approximately 1.2 metres above the ground and least 3.5 metres from any other acoustically reflective surfaces.

3.5 Results

The logged data from the site survey has been post processed to determine $L_{Aeq,T}$, $L_{A90,T}$ and L_{Amax} levels for each measurement period, and these are set out in the attached tables 2814/T1 and T3.

The logged $L_{eq,T}$ octave-band levels for the loudest period during the night and the day at measurement position 1 are set out in the attached table 2814/T2. There was no particularly strong tonality audible.

A plot of the $L_{Amax(F)}$ levels measured at the Apollo Shafton site is provided on the attached graph 2814/G1.

Please refer to Appendix B for explanation of the noise units and the A-weighting term used in this report.

3.6 Weather Conditions

During both site visits the weather conditions were generally dry with no more than a light breeze, and had no significant effect on the measured levels.

3.7 Description of Existing Acoustic Environment

During the site survey on 25 June 2020 the noise levels at the outset were controlled by a combination of birdsong, occasional service yard activity at Haywood & Padgett, lorries on Shawfield Road and residual low level plant noise from H&P. This remained the case until around 06:30 hours when distant road traffic became more noticeable.

From around 07:20 hours there was more activity in the H&P service yard, including lorries being loaded, and from around 07:55 a tanker was unloaded to one of the external silos at the factory. This unloading culminated in a noticeable series of 'bangs' at around 08:22.

There was no noticeable noise from the direction of XPO Logistics, Red Dog Linings or Herby Designs to the west. Noise from road sweepers in the direction of Go Plant to the north was noticeable at 07:35 and 07:53, in each case for not more than about 10 to 20 seconds.

During the measurements at the Apollo Cradles site on 23 June 2020 there were two distinct operations as labelled on the attached graph, that is, the assembly of a mast climber frame using a bolt gun and the dropping of the frame onto the concrete surface of the yard. It is reasonable to assume that both events would occur at the Shawfield Road site when cradles are being assembled.

4.0 NOISE IMPACT ASSESSMENT

4.1 Introduction

Based on the various investigations of activities at the nearby industrial premises and the environmental noise survey described in Section 3.0 above, the sources to consider are the everyday noise from Haywood and Padgett, and the occasional use of the Apollo Cradles site. These are discussed separately in the following sections.

To provide mitigation of the noise from both locations, it is proposed that the north-west boundary has solid timber fencing at nominally 2400mm height in order to provide acoustic screening, continuing along the north-west boundary of the neighbouring land at 2000mm height, to the extent shown on the architectural drawing NPS-DRA-A-(00)-020, revision P3.

This works favourably with the topography, as the site and adjoining land are elevated above both H&P and Apollo.

4.2 Haywood and Padgett – Plant Noise

As noted in Section 3.7 above, there was low level continuous plant noise audible from the H&P plant from the outset. It is reasonable to consider the background level at measurement position 1 (L_{A90} 41 dB) as the $L_{Aeq, 15 \text{ mins}}$ specific noise level for this source.

It is not possible to accurately determine the true background sound level in the absence of this source, as even the background level at measurement position 2 was affected by the plant noise to some extent, although at this distance from major roads the L_{A90} can be assumed to be around 30 – 35 dB, and on that basis the BS 4142:2014 conclusion would technically be adverse.

However, given the low magnitude of the plant noise, and the acoustic screening to be provided to the boundary, the resultant noise level incident on the proposed dwellings is likely to be around $L_{Aeq, 15 \text{ mins}}$ 31 – 36 dB, assuming screening of 5 dB to the upper floor windows and 10 dB to the ground floor windows. With windows open for ventilation (nominally 12 dB noise reduction) the noise level inside the dwellings would be $L_{Aeq, 15 \text{ mins}}$ 19 – 24 dB.

This compares with a BS 8233:2014 recommended limit of 30 dB in bedrooms during the night – albeit for anonymous traffic noise sources, but the margin of compliance should compensate for the more noticeable character of the plant noise.

Thus, while plant noise is audible on the site, the levels are sufficiently low that the resulting impact on the dwellings should be negligible with the acoustic screening taken into account.

4.3 Haywood and Padgett – Service Yard Noise

During the night, the worst case $L_{Aeq, 15 \text{ mins}}$ at measurement position 1 was 46 dB, which is the BS 4142 specific sound level for the night time operations. During the day the calculated worst case $L_{Aeq, 1 \text{ hour}}$ is 50 dB (averaging the worst case consecutive periods), which is the specific sound level for the day.

Applying BS 4142 penalties for clearly perceptible impulsive noise (6 dB) and a correction of – 5 dB for acoustic screening to the upper floor windows of the new houses, the BS 4142 initial assessment of impact would be as follows:

BS 4142 initial assessment of impact		
Period	Night 15 minute period	Day 1 hour period
Specific sound level $L_{Aeq,T}$ dB	46	50
Penalty for clearly perceptible impulsive noise	+6	+6
Acoustic screening benefit	-5	-5
Rating level $L_{Ar,T}$ dB	47	51
Background level (measured, incl. plant noise)	41	41
Difference	+ 6	+ 10
Background level (estimated true background)	35	40
Difference	+12	+11

Thus, even when compared with the measured background level controlled by plant noise at the H&P premises, the initial assessment of impact would technically be 'significant adverse'. This is virtually inevitable in an assessment location where service yard noise is audible.

However, as with the plant noise it is important to consider the absolute levels and the resulting effect on the proposed houses, as follows:

External noise intrusion		
Period	Night 15 minute period	Day 1 hour period
Incident $L_{Aeq,T}$ dB, no screening	46	50
Acoustic screening benefit	-5	-5
Incident $L_{Aeq,T}$ dB, with screening	41	45
Noise reduction from facade with windows open	- 12	- 12
Indoor ambient noise level, windows open	29	33

The resulting indoor ambient noise levels with windows open are within the BS 8233:2014 recommended criteria for living areas during the relevant period. The margin of compliance with those criteria is small, and the specific rather than anonymous nature of the noise must be considered.

Thus, as additional mitigation any bedrooms on the south-west and north-west boundary (as marked on the attached plan 2814/SP2) should have alternative ventilation, for example, a small whole house ventilation unit, such that they have Approved Document F whole dwelling ventilation, and control of overheating with windows closed. The windows should still be openable for purge ventilation and for occupier choice. The remaining properties are set back further, and benefit from additional acoustic screening provided by the intervening buildings.

Overall, this represents reasonable control of noise from a service yard with relatively limited operations that generally operates during the day.

4.4 Apollo Cradles

As the operations at the Apollo Cradles Shawfield Road site only take place occasionally it has not been possible to measure actual operations, and while measurements of the main individual sources have been taken at the Shafton site, it is not possible to accurately calculate an $L_{Aeq, 15 \text{ mins}}$ for the purposes of a BS 4142 assessment.

However, given the magnitude of the levels, and the likely intensity of activity as cradles are assembled at short notice for emergency bridge repairs and similar applications, it is almost certain that the BS 4142 initial assessment of impact would be significant adverse.

It is possible to consider the noise levels in absolute terms using the L_{Amax} levels plotted on the attached graph 2814/G1, as set out in the following table. This assumes an arbitrary source location at the centre of the Apollo Cradles site, approximately 100 metres from the nearest housing plot:

External noise intrusion – Apollo Cradles operations		
Period	Bolt gun	Frame dropping
Typical L_{Amax} dB at 5 metres	95	102
Distance correction from 5 metres to 100 metres	- 26	- 26
Acoustic screening benefit	-5	-5
Incident L_{Amax} dB	64	71
Noise reduction from facade with windows open	- 12	- 12
Indoor L_{Amax} , windows open	52	59

The resulting indoor L_{Amax} outlined above are well above the widely used WHO derived night time L_{Amax} criterion of 45 dB, and would therefore present a risk of sleep disturbance in that scenario. The relatively infrequent operation of the site is an important factor to consider, although clearly there needs to be protection when the activity is taking place.

It would therefore be all the more important to provide alternative ventilation to the bedrooms of properties on the north-west and south-west boundaries as described in Section 4.3 above. Noise intrusion would then be as follows:

External noise intrusion – Apollo Cradles operations		
Period	Bolt gun	Frame dropping
Incident L_{Amax} dB	64	71
Noise reduction from facade with windows shut ($R_w + C_{tr}$ 27 dB glazing)	- 27	- 27
Indoor L_{Amax} , windows open	37	44

In this way, the indoor L_{Amax} would be below the WHO based criterion for sleep disturbance of 45 dB. During the day, the noise would clearly be very noticeable in the gardens, although this can be reasonably offset against the fact that the operations are relatively infrequent.

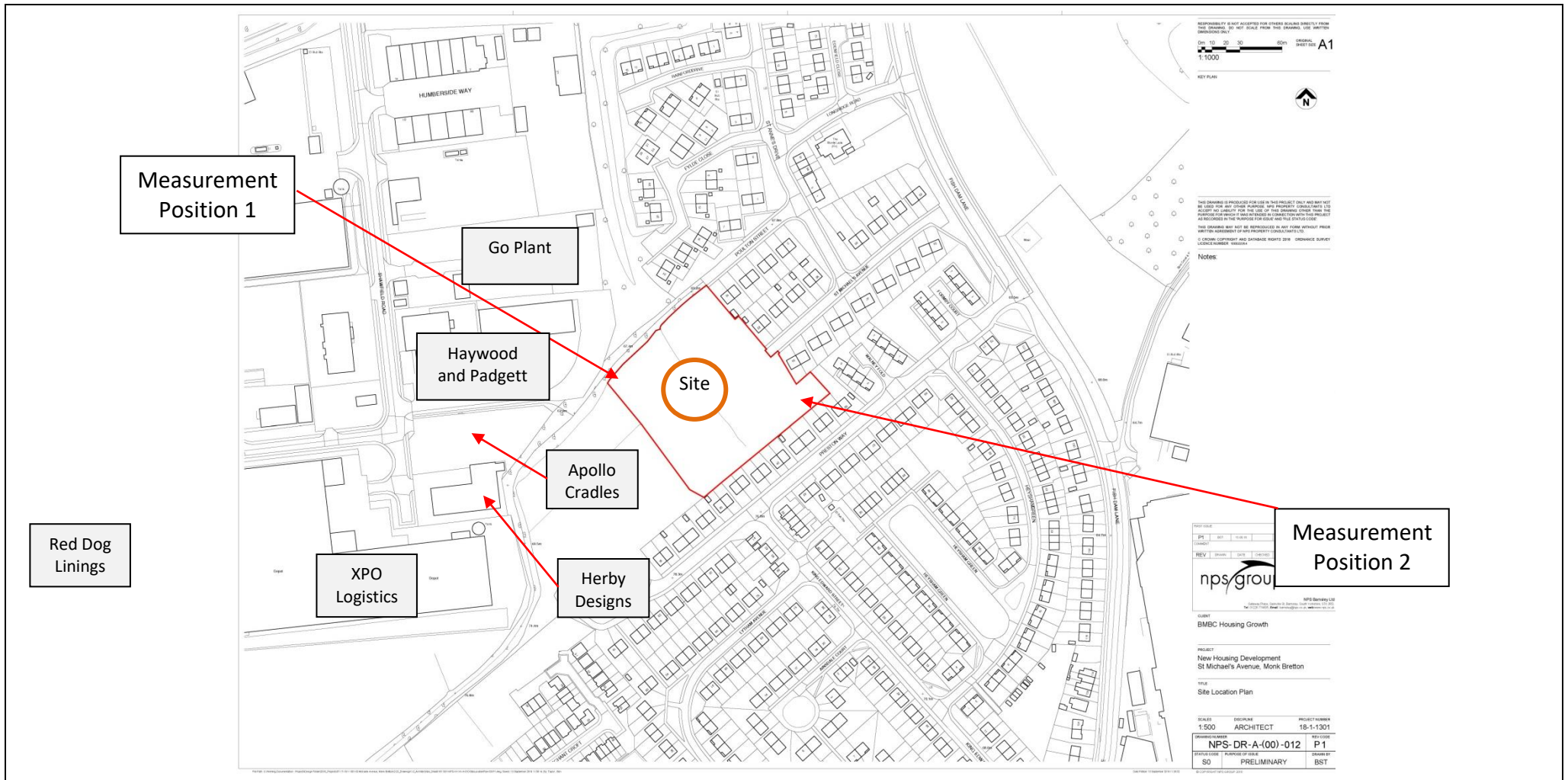
Finally, it is worth noting that the existing houses on Preston Way are at a broadly similar distance from the centre of the yard (around 100 metres), and in that sense the impact is not new, albeit there would be more noise sensitive receptors.

4.5 Scheme of Sound Insulation Measures – Summary

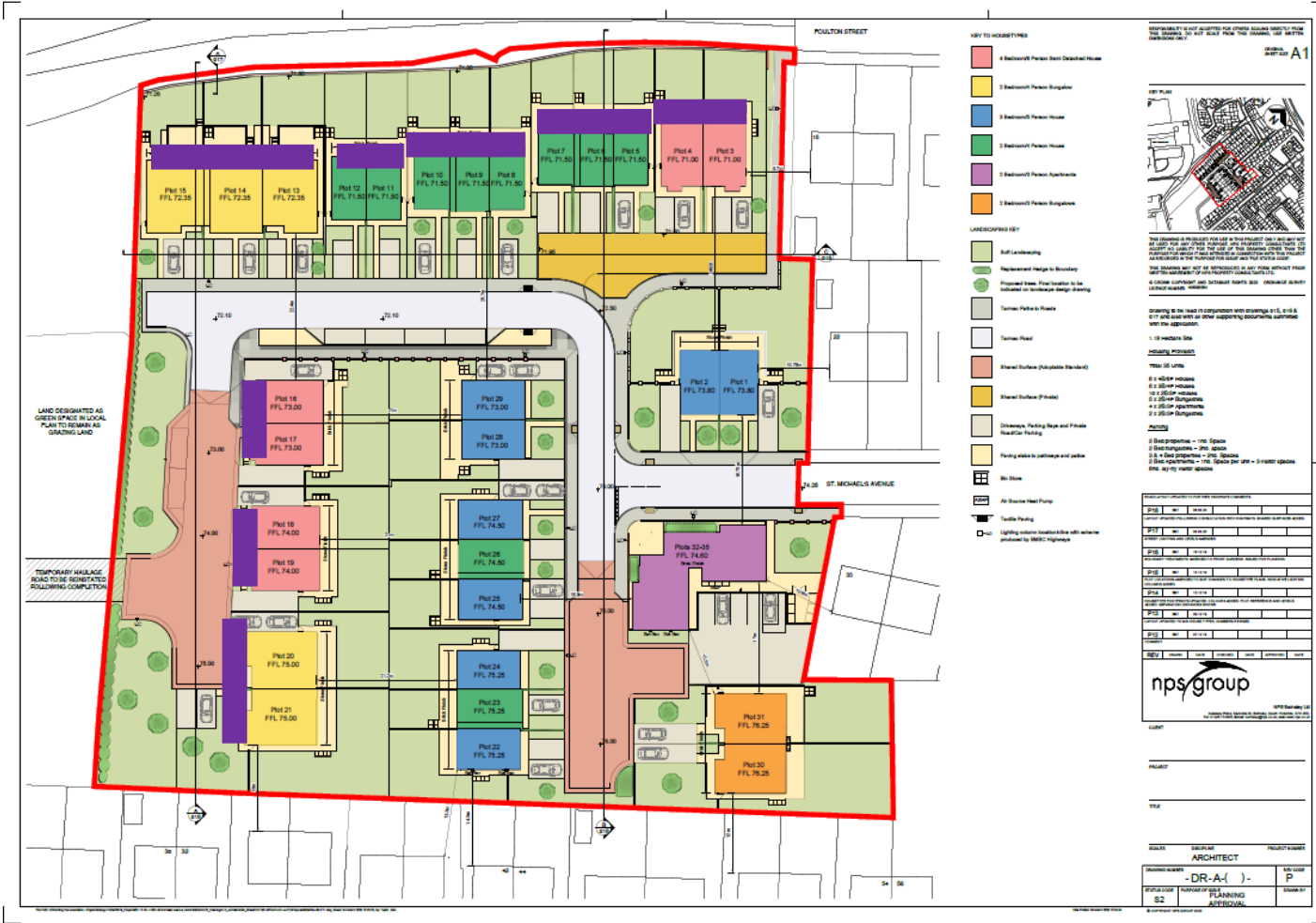
The proposal is to provide 2400mm high solid timber acoustic fencing along the length of the north-west boundary, and at 2000mm height along the north-west boundary of the neighbouring site as shown on the architectural drawing NPS-DRA-A-(00)-020, revision P3. An illustration of a typical barrier construction is shown on the attached sketch 2814/SK1.

The assessment indicates that additional sound insulation to the most affected bedrooms as marked on the attached site plan 2814/SP2 is required in the form of alternative ventilation (i.e. whole house ventilation to provide whole dwelling ventilation and sufficient control of overheating with windows closed).

FOR ACOUSTIC DESIGN TECHNOLOGY



Notes	Description Site Plan Showing Noise Monitoring Locations		 ACOUSTIC DESIGN TECHNOLOGY Noise and Vibration Consultants
	Project St Michael's Avenue, Monk Bretton		
	Survey Date 25 June 2020	Drawing No. 2814/SP1	



Notes

Bedrooms with alternative ventilation system



Description

Site plan showing alternative ventilation areas

Project

St Michael's Avenue, Monk Bretton

Survey Date

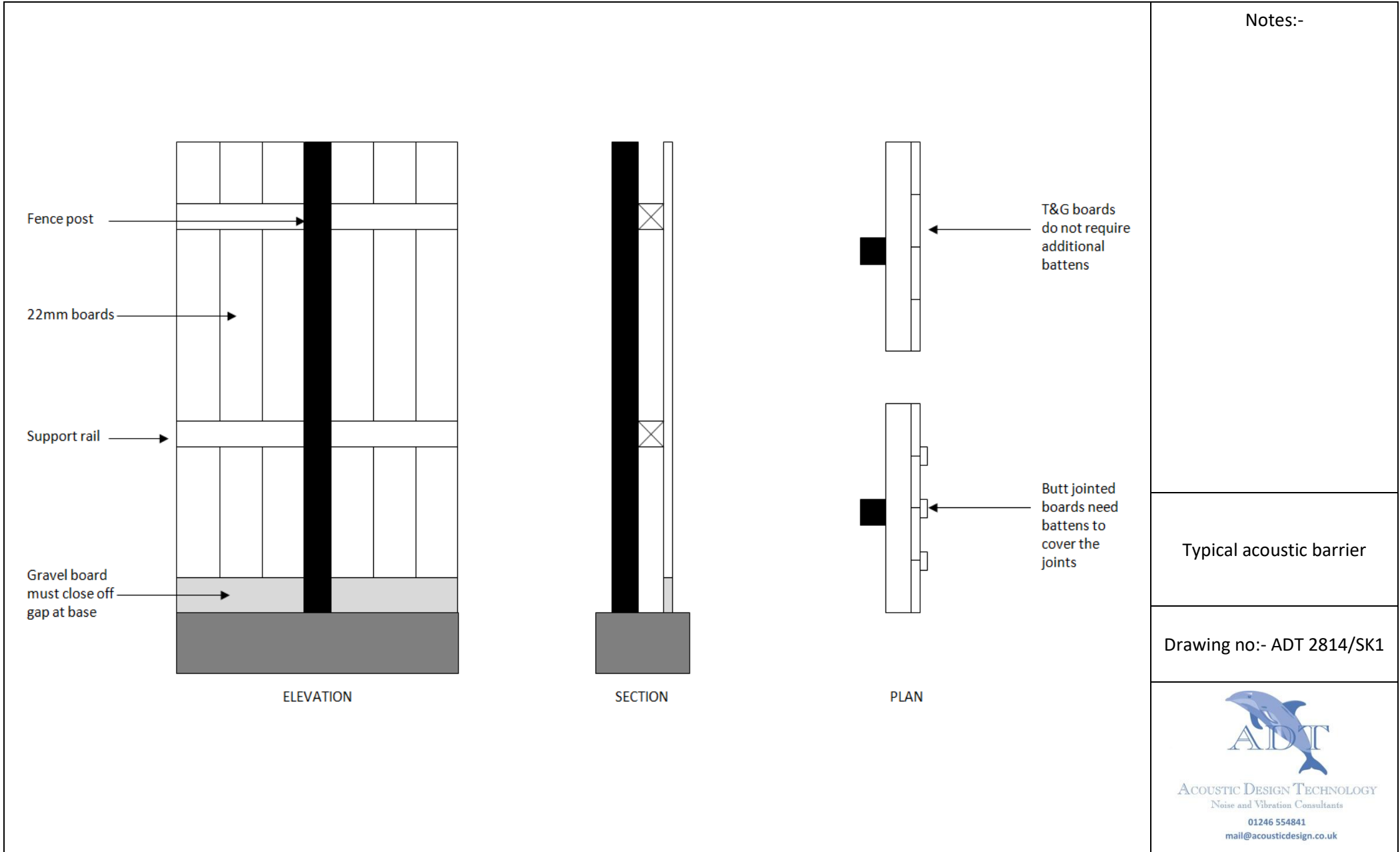
25 June 2020

Drawing No.

2814/SP2



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SITE SURVEY RESULTS, 25 JUNE 2020, POSITION 1

Period	L _{Aeq, 15mins} dB	L _{Amax} dB	L _{A90} dB	Notes
05:02 – 05:19	45	62	41	
05:38 – 05:54	45	64	41	
05:54 – 06:10	46	64	41	
06:21 – 06:38	44	60	42	
07:08 – 07:25	45	67	41	
07:25 – 07:41	47	67	42	
07:56 – 08:04	49	60	45	tanker being decanted at H&P
08:05 – 08:22	49	71	45	tanker being decanted at H&P
08:22 – 08:34	52	66	43	tanker final emptying incl. 'bang'
08:44 – 09:01	47	65	41	

Table 2814/T1

OCTAVE BAND LEQ,T

L_{eq, 15 mins} spectra at position 1 associated with worst case night and day L_{Aeq,15 mins}

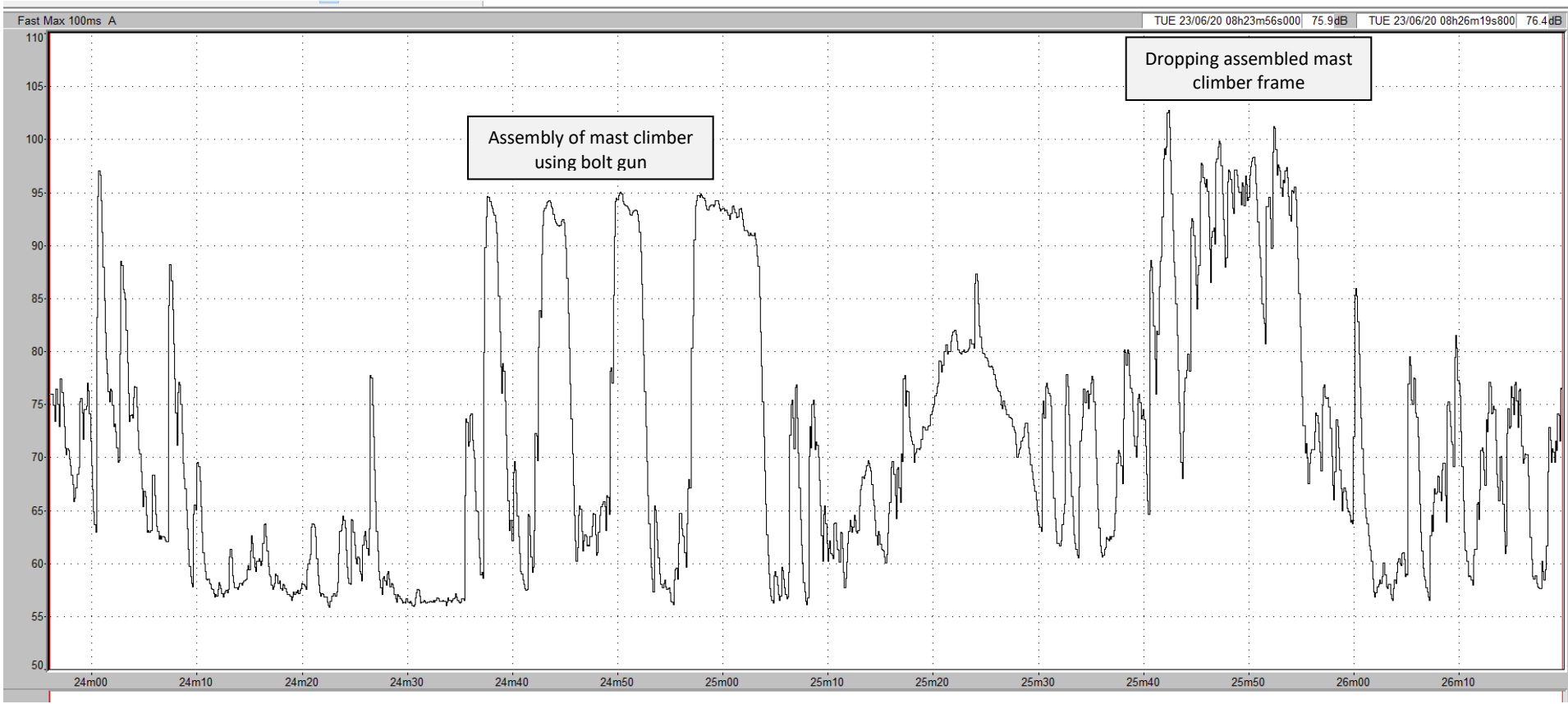
Period	Measured L _{eq,T} (dB) at octave band centre frequency (Hz)								L _{Aeq,T} dB
	63	125	250	500	1k	2k	4k	8k	
Night	53	46	41	44	41	37	35	29	46
Day	62	52	47	50	47	44	42	30	52


Table 2814/T2

SITE SURVEY RESULTS, 25 JUNE 2020, POSITION 2

Period	L _{Aeq, 15mins} dB	L _{Amax} dB	L _{A90} dB	Notes
05:21 – 05:38	47	72	39	peak level is car exhaust on Shawfield Road
06:10 – 06:20	45	59	40	
06:50 – 07:07	45	59	39	
07:41 – 07:55	50	68	39	helicopter flyovers, peak level is helicopter directly overhead
08:34 – 08:44	44	59	39	

TABLE 2814/T3



Notes	Description L _{Amax(F)} at 5 metres from scaffold assembly, Apollo Cradles Shafton		 ACUSTIC DESIGN TECHNOLOGY Noise and Vibration Consultants
	Project St Michael's Avenue, Monk Bretton		
	Survey Date 23 June 2020	Drawing No. 2814/G1	

APPENDIX A – INSTRUMENTATION

Manufacturer	Type and / or Model	Serial Number	Last Laboratory Calibration	Calibrator Output (dB)	Free Field Correction (dB)	Initial reading (dB)	Final reading (dB)
01dB	(Black) Solo Class 1 Sound Level Meter	65201	October 2019				
01dB	PRE 21 S Pre-Amplifier	15619	October 2019		-0.10	114.0	113.9
01dB	MCE 212 ½ inch Microphone	101204	October 2019				
Norsonic	Nor1251 Calibrator (Cal 4)	33453	February 2020	114.1			

APPENDIX B

Acoustic Terminology

The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and any variations in its level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

A-weighting The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the A-weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average person. It is also possible to calculate the A-weighted noise level by applying certain corrections to an un-weighted spectrum.

When the noise being measured has variable amplitude, such as traffic noise, it is necessary to qualify the basic dB unit. This may be done using a statistical index L_n dB, where n is any value between 0 and 100, and is the percentage of the sample time for which the stated level is exceeded. In defining the use of the index, both the value of n and the length of the sample period must be stated.

L_{10} L_{10} , being the level exceeded for 10% of the time, has been shown to be a good indicator for traffic noise intrusion, and is used in assessing the effect of traffic noise on residential or commercial premises.

L_{90} L_{90} is the level exceeded for 90% of the time, and is used as a measure of background noise level, as it excludes the effects of occasional transient levels, such as individual passing cars or aircraft.

In addition to the statistical noise indices defined above, the following noise units are also used to define variable amplitude noise sources:

$L_{eq,T}$ $L_{eq,T}$ is defined as the notional steady sound pressure level which, over a stated period of time, would contain the same amount of acoustical energy as the actual fluctuating sound measured over the same period. In other words, it is a measure of the "average" noise level

L_{max} L_{max} is the maximum time-weighted sound pressure level recorded over the stated time period

APPENDIX C
Definitions from BS 4142 : 2014

reference time interval, T_r

specified interval over which the specific sound level is determined (1 h during the day, and 15 min during the night)

specific sound level, $L_{Aeq,Tr}$

equivalent continuous A-weighted sound pressure level produced by the specific source at the assessment position produced over a given reference time interval, T_r

rating level, $L_{At,Tr}$

specific sound level plus any adjustment for the characteristic features of the sound

background noise level, $L_{A90,T}$

see Appendix B