



Environmental Sound Level Survey

at

Ardagh Group

**Burton Road
Monk Bretton
South Yorkshire
S71 2QG**

FTON64710

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ARDAGH GROUP

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1.0 INTRODUCTION

This survey has been commissioned by Ardagh Group to assess the general sound levels arising from its glass manufacturing site at Monk Bretton near Barnsley. The survey has been commissioned to provide a baseline prior to the building of a new warehouse unit on the site. Only the closest sensitive receptor to the new building location has been investigated in the BS 4142:2014 assessment.

All measurements undertaken in this survey have been taken in accordance with the requirements of BS4142:2014.

2.0 NOISE UNITS AND STANDARDS

2.1 Noise Units

For the purposes of an assessment there is a distinction between sound and noise. Sound can be measured by a measuring system such as a sound level meter. Noise is the human response to sound and is often defined as unwanted sound either because it is loud, unpleasant or is perceived as causing a nuisance.

The range of audible sound is from 0 dB to 140 dB. The frequency response of the ear is usually taken to be about 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the sound measuring instrument. The weighting which is most widely used and which correlates best with subjective response to sound is the dB(A) weighting. This is an internationally accepted standard for sound measurements.

For variable sound sources such as traffic, a difference of 3 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall sound by 3 dB. The "loudness" of a sound is a purely subjective parameter, but it is generally accepted that an increase/decrease of 10 dB corresponds to a doubling/halving in perceived loudness.

External sound levels are rarely steady, but rise and fall according to activities within an area. In an attempt to produce a figure that relates this variable sound level to subjective response, a number of indices have been developed. These include:

i) **The L_{Amax} sound level;**

This is the maximum sound level recorded over the measurement period and provides an indication of the highest sound levels registered during the measurement period.

ii) **The $L_{Aeq,T}$ sound level;**

This is the "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard (BS) 7445 [1] as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time". It is a unit commonly used to describe construction sound, sound from industrial premises and is the most suitable unit for the description of other forms of environmental sound.

iv) **The L_{A90} sound level;**

This is the residual sound level that is exceeded for 90% of the measurement period and gives an indication of the sound level during quieter periods. It is often referred to as the background sound level and is used in the assessment of disturbance from industrial noise.

In addition, the term 'ambient sound' is often referred to. Ambient sound is defined in BS 4142:2014 [2] as the 'totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far'. It is commonly measured in terms of $L_{Aeq,T}$.

2.2 Planning in relation to Noise (PPG24) and BS 4142

Sections 19 and 20 of Annex 3 of PPG 24 [3] recommend using guidance contained in BS 4142 to assess the likelihood of complaints in regards to noise arising from industrial developments. As well as sound arising from industrial and manufacturing processes, the

standard is also appropriate for assessing sound from the loading and unloading of materials and from mobile plant and vehicles that are an intrinsic part of operations at industrial and commercial installations.

BS 4142:2014 is intended for assessing the outdoor sound emanating from installations on human sensitive receptors who might be inside or outside a dwelling/premises used for residential purposes. It is not intended to determine if a nuisance has or has not been caused by an installation or for the derivation of indoor sound levels.

2.3 Method of Assessing Sound from Fixed Installations

BS 4142 was first published in 1967 and has been used extensively by local authorities and consultants as a method to rate sound from fixed industrial and commercial installations. The standard was revised considerably in 1990 and clarified in 1997 in response to comments received. This edition (2014) provides further guidance on application of the standard and certain aspects such as corrections for character and uncertainty of measurement.

The standard advocates the use of $L_{Aeq,T}$, a level which is directly measurable and is comprised of the residual and specific sound. When used to assess industrial/commercial sound, a rating level is determined by subtracting the L_{A90} background level from the ambient level. Measured sound levels are rounded up at a value of 0.5dB. Where relevant, BS 4142 requires a correction factor (rating penalty) to be applied to the specific sound level based on a subjective assessment of its characteristics to obtain revised rating level. According to the standard the level of adjustment is determined by a sound's tonality, impulsivity, intermittency or other distinguishable characteristic(s). A tonal quality might include a whine, hiss, screech, hum etc. Impulse noises for example include bangs, clicks, clatters, or thumps

Depending on the context, the significance of industrial/commercial sound can be determined by the differential between the rating and background sound levels. A difference of around 10 dB or higher indicates a significant adverse impact. A difference of around 5 dB indicates an adverse impact. The lower a rating level (in dB) relative to the measured background sound level, the lower the likelihood that the specific sound source will have an adverse impact.

BS 4142:2014 states that the 'where practical, minimise the influence of reflections by making the measurements at least 3.5m from any reflecting surface other than the ground'. Measurements should be made at a height of between 1.2 and 1.5 m above ground level unless an alternative height can be justified. These recommendations were adhered to in this survey.

Precautions were also taken to reduce the potential of interferences on the measurements taken from environmental factors such as wind, rain, electrical transmissions etc. Weather parameters were recorded at each chosen measurement location.

According to the standard, when assessing the sound over a daily period the hours between 07:00 and 23:00 are considered to be the daytime period and 23:00 to 07:00 are referred to as night time hours. These periods have been adopted for this assessment. Although BS 4142:2014 is used to assess annoyance, sleep disturbance and other adverse impacts, it must be highlighted that not all adverse impacts lead to complaints and equally, not all complaints are evidence of an adverse impact.

3.0 INSTRUMENTATION

3.1 Day and Night Time Industrial Sound Monitoring

On the 18th and 19th June 2018, an environmental sound level survey was carried out to monitor existing industrial sound levels within the immediate vicinity of the Ardagh Group manufacturing site in Monk Bretton. The monitoring equipment was used to assess general sound levels over three reference intervals at one sensitive receptor location, pre-selected by Ardagh Group for the 2018 survey. The residual measurement location was selected along the same stretch of road but far enough away from the Ardagh site to remove all site noise from the measurements. Monitoring was undertaken over an approximate 16 hour period to represent day, evening and night time conditions. Daytime measurements were collected between 14:00 and 17:00. Two night time measurements were taken between 21:00 and 23:00, and between 01:00 and 04:00 hours.

According to Ardagh Group personnel the site was functioning in full and stated processes and running conditions very rarely change. The site operates on a 24/7 basis.

The instrument used to take the various measurements was a Bruel & Kjaer 2250 Type 1 Sound Level Meter. To ensure that no significant drift had occurred over the survey period, the instrument was calibrated prior to and immediately following the survey using a Bruel & Kjaer 4230 Calibrator. All instrumentation was within the manufacturers' periods of calibration, as specified in BS 4142:2014.

The positioning of the monitoring equipment at each of the receptor locations was carefully considered so that a free field measurement could be taken. The microphone was at a height of 1.5m above ground level. The L_{Aeq} , L_{Amax} , and L_{A90} metrics were logged over the measurement periods at all receptor locations. Because the volume of weekend traffic passing the receptor locations was considerably less than experienced during the previous survey, its dominant effect on the measurements could be screened out at source.

4.0 SITE SETTING AND EXISTING NOISE LEVELS

4.1 The Ardagh, Monk Bretton manufacturing facility

The Ardagh Group, Monk Bretton facility manufactures glass bottles for various commercial uses. Production runs 7 days a week, 24 hours a day with very little process downtime or variation in production speeds. The facility has been at this location for over 60 years and many of the surrounding residential properties were once owned by the plant.

The production process includes the mixing of raw materials in a furnace to be moulded into the finished product. The manufacturing facility has a number of emission stacks, roof fans and motors which produce a distinguishable hum, noticeable when on site and in some surrounding residential areas.

All across the different production facilities, a number of mobile plant items are used to aid in the loading/ unloading of materials, transportation of goods, picking pallets and waste removal. HGV movement is also fairly frequent across most of the site traffic routes. Other than this and the low level hum from the lines inside the buildings, there were no particularly distinguishable sounds at the sensitive receptor at Fish Dam Lane.

This survey focuses on the West side of the site where it borders Fish Dam Lane. Ardagh Group is proposing to build a new warehouse building on this side of the site. The closest residential receptor to this new warehouse would be 156 Fish Dam Lane which is situated on a slight rise in the road, opposite the staff carpark and pedestrian entrance. Between this receptor and the proposed warehouse are the following (in order moving away); Fish Dam Road, a line of mature deciduous trees, the corner of the staff car park, a further line of trees, an unmade byway (Far Field Lane) and finally the site perimeter fence. The receptor will reportedly be 91.7m from the corner of the new warehouse development. Due to its location, the new warehouse and much of the site at this West side is sunken by a few meters relative to the road level. The entrance to the new warehouse would be on the north side of the site. The residential receptors on Fish Dam Road are unlikely to have direct line of site to the new warehouse but do to the majority of the production areas.

4.2 Immediate Vicinity of the Ardagh Group Installation

The Ardagh, Monk Bretton site is bordered on all three sides by busy inter-town single carriageway roads, Fish Dam Lane to the West, Burton road to the South/East and West Green Way to the North. Various pockets of residential houses and streets fill in the area around the West and East to make up the village of Monk Bretton. Directly to the South and North of the site is green land with no obvious commercial use. The village also has a couple of commercial trading estates occupied by small commercial businesses. The Ardagh site has its own train line for deliveries and exports coming in to the north of the site. The line is a dead end at the facility and it was reported that trains only arrive during day time hours, approximately three times a week. There were no trains during the sampling period of this survey.

Figure 1: Immediate vicinity of the installation



Figure 2: West side of site, sensitive receptor location and proposed warehouse



5.0 RESULTS

5.1 Ambient Sound Levels between 14:00 and 17:00

Table 1

Location/Time Period	Survey Metric			Notes
	L _{Aeq} dB	L _{A90} dB	L _{Amax} dB	
Boundary of residential property 156 Fish Dam Lane, lat. / long. 53.573583, -1.442760 15:15 – 15:45	72	56	87	Eastern boundary of the property directly facing the installation-free field location. On Fish Dam Lane. Scattered clouds and dry conditions, 26 °C, wind 8m/s. Location on a rise slightly above site height. 2 lines of trees between receptor and new warehouse development but clear line of site to main production plant. Some nearby plant vehicle movement witnessed. Busy road sound from Fish Dam Lane which was too frequent to screen out. No noticeable sounds from installation.

5.2 Ambient Sound Levels between 21:00 and 01:00

Table 2

Location/Time Period	Survey Metric			Notes
	L _{Aeq} dB	L _{A90} dB	L _{Amax} dB	
Boundary of residential property 156 Fish Dam Lane, lat. / long. 53.573583, -1.442760 22:20 – 22:35	58	56	71	Eastern boundary of the property directly facing the installation-free field location. On Fish Dam Lane. Scattered clouds and dry conditions, 19°C, wind 6m/s. Location on a rise slightly above site height. 2 lines of trees between receptor and new warehouse development but clear line of site to main production plant. Some nearby plant vehicle movement witnessed. Significant audible hum from production facility. No noticeable characteristic sounds. Road quiet and the little passing traffic was screened out of the measurement.

5.3 Ambient Sound Levels between 01:00 and 04:00

Table 3

Location/Time Period	Survey Metric			Notes
	L _{Aeq} dB	L _{A90} dB	L _{Amax} dB	
Boundary of residential property 156 Fish Dam Lane, lat. / long. 53.573583, -1.442760 01:30 – 01:45	57	55	79	Eastern boundary of the property directly facing the installation-free field location. On Fish Dam Lane. Mostly cloudy and dry conditions, 17°C, wind 5m/s. Location on a rise slightly above site height. 2 lines of trees between receptor and new warehouse development but clear line of site to main production plant. Some nearby plant vehicle movement witnessed. Significant audible hum from production facility. No noticeable characteristic sounds. Road quiet and the little passing traffic was screened out of the measurement.

5.4 Residual Sound Levels between 14:00 and 17:00

Table 4

Location	Survey Metric			Notes
	L _{Aeq} dB	L _{A90} dB	L _{Amax} dB	
Layby on Fish Dam Lane, 0.5mile north of facility. lat. / long. 53.579886, -1.445041 16:00 – 16:30	69	53	82	Layby with equal distance to road as previous measurements Scattered clouds and dry conditions, 26 °C, wind 8m/s. Road busy with traffic and not able to be screened out

5.5 Residual Sound Levels between 21:00 and 01:00

Table 5

Location	Survey Metric			Notes
	L _{Aeq} dB	L _{A90} dB	L _{Amax} dB	
Layby on Fish Dam Lane, 0.5mile north of facility. lat. / long. 53.579886, -1.445041 22:45 – 11:00	46	53	69	Layby with equal distance to road as previous measurements Scattered clouds and dry conditions, 19°C, wind 6m/s. Limited passing traffic which was screened out

5.6 Residual Sound Levels between 01:00 and 04:00

Table 6

Location	Survey Metric			Notes
	L _{Aeq} dB	L _{A90} dB	L _{Amax} dB	
Layby on Fish Dam Lane, 0.5mile north of facility. lat. / long. 53.579886, -1.445041 1:55 – 2:10	41	53	36	Layby with equal distance to road as previous measurements Mostly cloudy and dry conditions, 17°C, wind 5m/s. Limited passing traffic which was screened out

6.0 BS4142 ASSESSMENT

A BS4142 assessment has been made for one residential receptor location to determine the likelihood of adverse impact from operations undertaken on the Ardagh installation and site. The individual receptor location assessments are presented below.

Table 7: Fish Dam Lane (residential receptor)

Parameter	Assessment Period		
	Day (before 17:00)	Night (between 21:00 and 01:00)	Night (between 01:00 and 04:00)
¹ Background Sound Level L_{A90}	53	53	53
² Measured Sound Level L_{Aeq}	72	58	57
Specific Sound Level L_{Aeq}	69	58	57
Acoustic Feature Penalty	0	0	0
Rating Level	69	58	57
Excess of Rating Over Background	16	5	4
Initial Estimate of Adverse Impact	*	A potential of adverse impact	A potential of adverse impact

Notes:

- (1) A-rated sound pressure level of residual sound at the 90th percentile
(2) Composed of the residual and specific sound levels

 Due to the heavy influence of local traffic on the daytime measurements, no estimate of adverse impact has been made

7.0 SUMMARY AND CONCLUSIONS

From the data collected as part of this survey and from the evaluation carried out in accordance with the requirements of BS4142 it can be seen that there is a potential adverse impact. Based on the results of this monitoring survey the following estimates of adverse impact have been derived.

Day

The measurements taken during the daytime were heavily influenced by passing traffic. There was a constant stream of traffic making filtering it out impossible. Although the excess over the background is very high, this is likely to be solely due to the traffic noise. No noise was noticeable originating from the facility over that of the traffic noise during the daytime survey.

Evening

A potential of adverse impact – once traffic noise on Fish Dam Lane had reduced later in the evening, the hum of the manufacturing facility was clearly audible and notable in the measurements. No acoustic feature penalty was applied due to a lack of specific tonal or impulse noises.

Night

A potential of adverse impact – again with traffic noise greatly reduced or non-existent, the hum of the production facility was audible and quantifiable in the results. No acoustic feature penalty was applied due to a lack of specific tonal or impulse noises.

In the experience of the author of this report and from site observations and measurements made it is unlikely that there will be noise nuisance issues currently attributable to the Ardagh Group, Monk Bretton site. The general production facility noise is not a recent occurrence and specific impulse or tonal noises, more likely to lead to complaint, were not witnessed. Moreover, it is unlikely that the implementation of the new warehouse unit, once fully constructed, will increase the likelihood of adverse impacts as it is reported that noise sources will be contained within in the unit and no impulse or tonal noises will be generated.