



THE KAY GROUP UK LTD

ROCKINGHAM, DEARNE VALLEY
SERVICE STATION

NOISE ASSESSMENT FOR PLANNING PURPOSES

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AEC REPORT: P3604/R1/AGB

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1.0 INTRODUCTION

- 1.1 Acoustic & Engineering Consultants Limited (AEC) has been appointed by PKB Consultants on behalf of The Kay Group (UK) Ltd to prepare a noise assessment of the proposed new Service Station / Costa drive through, located on the Rockingham Roundabout, Dearne Valley Parkway. The noise assessment is required to accompany the associated planning application for the development.
- 1.2 Although the site already has permitted use for a service station, the original application did not include an assessment of noise associated with the jet washers or car vacuums. As such, the Environmental Health Officer with Barnsley Council, James Gardham requested that a noise assessment of the proposed jet washers is undertaken and that the assessment should also confirm noise levels of any mechanical services plant associated with the development.
- 1.3 Prior to undertaking the assessment, AEC spoke with James Gardham when it was confirmed that the assessment could be undertaken with reference to the background and general ambient noise level data presented in the report prepared for the original development by Enzygo consultants, ref. SHF.1122.002.NO.R.001.C.
- 1.4 Acoustic terminology used in this report is described in brief in Appendix A.

2.0 SITE DESCRIPTION

- 2.1 The development site is located off the Rockingham Roundabout, Dearne Valley Parkway, Barnsley as identified on Figure 1, below.
- 2.2 Dearne Valley Parkway runs directly to the east of the site with the Rockingham Roundabout directly to the northeast.
- 2.3 The nearest residential properties to the development are located on Locksley Gardens, some 80m to the northwest of the site. In between the residential properties and site is the existing Rockingham Business Park.
- 2.4 It is noted that there is a 2m high (approximately) close boarded timber fence around the rear and side gardens of the housing on Locksley Gardens.
- 2.5 The location of the various noise sources that are being assessed are identified on Figure 1, below.

3.0 NOISE SURVEYS.

Existing Noise Climate

- 3.1 A general ambient and background noise survey was undertaken by Enzygo in August 2014. The noise data associated with the survey were presented in the Enzygo report ref SHF.1122.002.NO.R.001.C, dated March 2015.
- 3.2 Extended measurements were undertaken in the rear garden of 53 Locksley Gardens, which is the nearest property to the development, between approximately 1715h on Thursday 21 August to 1115h on Tuesday 26 August 2014.
- 3.3 Full details of the noise survey and measured data are presented in the report, however, in summary, the general ambient and background noise level data is presented in Table 1, below.

Table 1 – Summary of Measured Data @ 53 Locksley Close

| Day | Measure Noise Level, dB | | | | |
|----------|-------------------------|------------------|------------------|-------------------|------------------|
| | Day | | Night | | |
| | L _{Aeq} | L _{A90} | L _{Aeq} | L _{Amax} | L _{A90} |
| Weekday | 56.5 | 50.0 | 56.0 | 93.6 | 43.5 |
| Saturday | 49.4 | 45.5 | 44.8 | 64.4 | 37.9 |
| Sunday | 52.4 | 45.0 | 50.2 | 64.4 | 39.1 |

Garage Operational Noise

- 3.4 AEC has previously undertaken noise level measurements of jet washers, vacuums and air/water machines at other Kay Group sites in relation to previous developments. Full details of the measurement procedure are included as Appendix B, with measured noise levels presented in Table B1. It is understood that the equipment proposed will be the same as that previously measured by AEC.

4.0 BASIS OF ASSESSMENT

National Planning Policy Framework

- 4.1 The latest Planning Policies are included in the National Planning Policy Framework published by the Department for Communities and Local Government and dated March 2012. This document provides relatively little mention of planning policies with regard to noise with the exception of paragraph 123 that states:

‘Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.’*

BS4142:2014

- 4.2 BS4142:2014 ‘Methods for rating and assessing industrial and commercial sound’ (BS4142), describes methods for rating and assessing industrial and commercial sound by comparing the specific sound level (that directly attributable to the industrial/commercial sound) to the prevailing background sound level ($dBL_{A90, T}$) over relevant periods that the commercial/industrial activities occur.
- 4.3 It is necessary to determine the specific sound level from the industrial/commercial activities over a period of one hour during the daytime and/or 15 minutes during the night-time. The specific sound level relates to the specific commercial/industrial sound source only and has to be corrected to take account of other sound sources generally in the area, residual sound. Daytime is normally considered to be over the period 0700 to 2300 hours, and night-time 2300 to 0700 hours.
- 4.4 BS4142, in section 9, identifies that certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where present at the assessment location, such features are taken into account by adding a correction to the specific sound level to obtain the rating level. A correction should be applied if one or more of the following features occur, or are expected to be present for new or modified sound sources:

Tonality- for sound ranging from not tonal to prominently tonal a correction of 0 to 6dB should be considered.

Impulsivity- A correction of up to 9dB can be applied for sound that is highly impulsive, considering both the rapidity and overall change in sound level.

Other- Where a sound features characteristics that are neither tonal nor impulsive but are readily distinctive against the residual environment a penalty of 3dB can be applied.

Intermittency- If intermittency is distinctive against the residual environment a penalty of 3dB can be applied.

- 4.5 The significance of the potential impact is indicated by the difference between the background sound level and the rating level. Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
 - Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
 - The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.
- 4.6 With regard to undertaking the assessment, BS4142 indicates that the context of the sound must be taken into consideration.
- 4.7 Section 11 of BS4142, indicates that where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. For the purposes of this assessment it is considered that background noise levels below about 30dB and rating levels below about 35dB are low.
- 4.8 In these instances, AEC would suggest comparing the noise levels to limits identified in The World Health Organisation's (WHO) document '*Guidelines for Community Noise*' and BS8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' (BS8233) details of which are discussed below.
- 4.9 For potential noise sources associated with the garage, which are not fixed items of plant / equipment, AEC considers that it is appropriate to compare the noise to the existing maximum and general ambient noise levels and to noise level limits identified in WHO guidelines in BS8233.

5.0 ASSESSMENT OF PROPOSED DEVELOPMENT

Jet Washers, Vacuum and Air / Water

- 5.1 It is understood that the current proposals are to use the jet washers, vacuums and air / water machine between 0700 and 2300h only. As such, the assessment only covers this period .
- 5.2 The noise levels for the jet washers, vacuum and air/water machine presented in Appendix B relate to a single operation. In order to obtain an hourly daytime and 15-minute night-time 'specific noise level' the measured operational noise levels and frequency of use are presented in Table 2, below. The uses per hour are typically the 'worst-case' confirmed by the operator.
- 5.3 In relation to the mechanical services plant associated with operation of the retail units this source is assessed separately later on in this section.

Table 2 – Specific Noise Levels Associated with Jet Wash, Vac and Air/Water

| Equipment | Operational Noise Level, dBL _{Aeq} @ 2m | Typical Operational Period | Uses Per Hour | 'Specific Noise Level' dBL _{Aeq, 1hr} @ 2m |
|------------------|--|----------------------------|---------------|---|
| Jet wash machine | 69 | 4min | 15* | 69 |
| Jet wash hose | 77 | 4min | 15* | 77 |
| Vacuum | 66 | 3min | 4 | 59 |
| Air/Water | 69 | 2min | 4 | 60 |

*Across all 5 machines

- 5.4 It should be noted that based on AEC's measurements, the washers, vacuums and air/water machines all had alarms associated with them. These alarms have been ignored in the assessment as it is understood they are not an essential item and as such, would be disabled before installation into the proposed garage.
- 5.5 Tables 3 and 4, below, present the calculated specific noise levels of all items of equipment combined, at the ground floor windows of 53 Locksley Gardens.

Table 3 – Overall Daytime Specific Noise Level at 53 Locksley Gardens

| Equipment | 'Specific Noise Level', dBL _{Aeq, 1h} @ 2m | Distance to Properties, m | Distance Correction, dB | Screening | 'Specific Noise Level' dBL _{Aeq, 1 hr} |
|----------------------|---|---------------------------|-------------------------|-----------|---|
| Jet wash machine | 70 | 90 | -33 | -10 | 26 |
| Jet wash hose | 78 | 90 | -33 | -10 | 34 |
| Vacuum | 59 | 98 | -34 | -10 | 15 |
| Air / Water | 60 | 98 | -34 | -10 | 16 |
| Overall Total | | | | | 35 |

Table 4: BS4142 Daytime Assessment to 53 Locksley Gardens

| Description | Daytime (0700 to 2300h) BS4142 Assessment |
|---|---|
| Specific noise level at housing (including screening) | 35dB _{LAeq, 1hour} |
| Rating level (+3dB for intermittency and potential character) | 38 |
| Background | ≈45dB _{LA90} |
| Excess of rating over background | -7 |
| Significance on impact based on BS4142 | Assessment indicates a low impact due to fixed items of plant |

- 5.6 As identified in Tables 3 and 4, the resultant noise levels generated by the usage of the of the jet washers, vacuum and air / water would be below a level where the significance of any potential impact would be low and, as such, the noise levels should be considered acceptable.

Mechanical Service Plant Associated with the Retail and Costa

- 5.7 It is assumed that a number of plant items could run throughout the night for refrigeration purposes, as such, it would seem appropriate to assess the plant during the night-time period. Based on the propose plant items that will be installed, the resultant noise levels external to first floor bedroom windows of 53 Locksley Gardens are presented in Table 5, below.

Table 5: Noise Levels due to External Plant external to 53 Locksley Gardens

| Equipment | Combined Level @ 10m | Distance to Receiver | Distance Correction | Barrier | Resultant External Noise Level |
|--|----------------------|----------------------|---------------------|---------|--------------------------------|
| Service Station Retail | | | | | |
| 5 Condensers | 34dB | 80 | -18 | - | 16dB |
| 2 Chillers with housed compressor pack | 38dB | 80 | -18 | - | 20dB |
| 2 Glycol Units | 37dB | 80 | -18 | - | 19dB |
| Costa | | | | | |
| 4 x Mitsubishi Condensers | 37dB | 100 | -20 | - | 17dB |
| Total from all items | | | | | 24dB |

- 5.8 With reference to the above, the night-time BS4142 assessment is presented in Table 6 below.

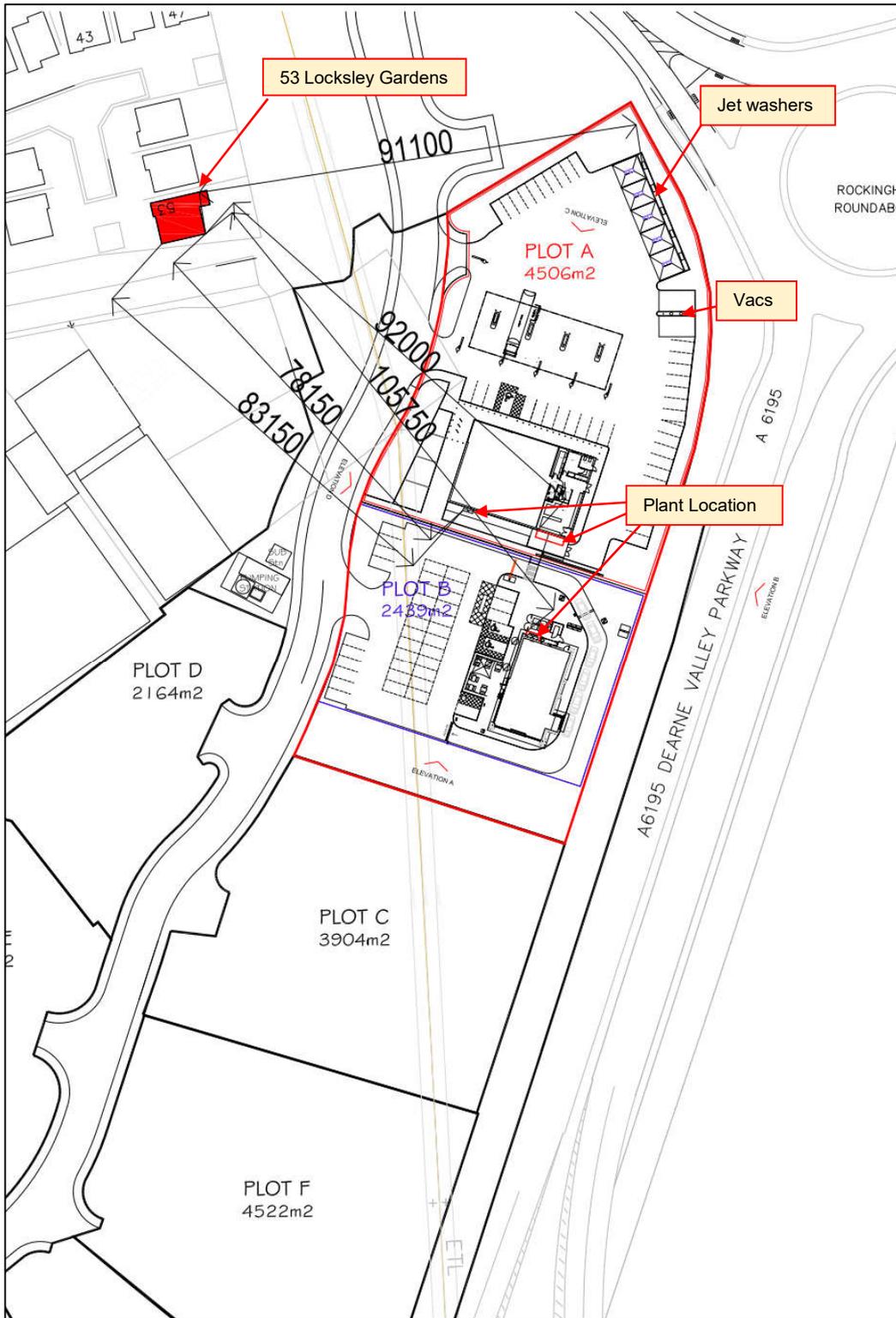
Table 6: BS4142 Night-time Mechanical Services Plant Noise Assessment to 53 Locksley Gardens

| Description | Daytime (2300 to 0700h) BS4142 Assessment |
|--|--|
| Specific noise level at housing | 24dB _{LAeq, 15min} |
| Rating level – any potential character would not be audible at the residential due to the very low level | 24 |
| Background | ≈38dB _{LA90} |
| Excess of rating over background | -14 |
| Significance on impact based on BS4142 | Assessment indicates a very low potential for any impact and, in reality the plant would not be audible at the residential |

6.0 SUMMARY AND CONCLUSIONS

- 6.1 Acoustic and Engineering Consultants Limited has been appointed by PKB Consultants on behalf of the Kay Group (UK) Ltd, to undertake a noise assessment for the proposed development of a service station on the site adjacent to the Rockingham Roundabout, Dearne Valley, Barnsley.
- 6.2 Although the site has already been granted planning permission for use as a service station, the original assessment did not include noise associated with jet washers and vacuums. As such the James Gardham (EHO) requested that these potential noise sources were assessed, in addition to mechanical services plant associated with the retail and the Costa drive through.
- 6.3 General ambient and background noise levels previously measured by Enzygo, at locations representative of the nearest proposed residential properties to the development site, have been used to assess for a proposed new service station.
- 6.4 Based on the measured noise levels and operational noise level data previously obtained by AEC, a BS4142 assessment has been undertaken for jet washers, vacuums and air/water stations. The assessment has demonstrated that the 'worst-case' noise rating level associated with these sources would be around 7dB below the daytime background (L_{90}) noise levels and, as such below a level where there is a low probability of adverse comments.
- 6.5 With reference to the proposed mechanical services plant associated with the retail building and Costa drive through, a night-time BS4142 assessment demonstrates that plant noise levels should be some 14dB below the lowest measured background noise, which is a strong indication that adverse comments would not be received in relation to these noise sources.

FIGURE 1 – Site Location Plan Showing Jet Washers, Plant and Vac Locations



APPENDIX A – Acoustic Terminology in Brief

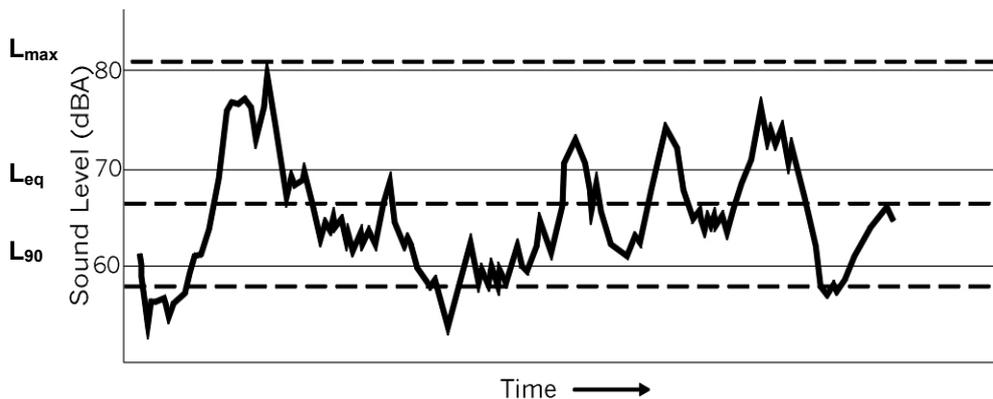
Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hertz to 20,000 Hertz. Although sound can be of one discrete frequency – a ‘pure tone’ – most noise is made up of many different frequencies.

The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same subjective way. This is the basis of the A-weighted sound pressure level *dBA*, normally used to assess the effect of noise on people. The *dBA* weighting emphasizes or reduces the importance of certain frequencies within the audible range.

Noise Units

In order to assess environmental noise, measurements are carried out by sampling over specific periods of time, such as fifteen minutes or one hour, the statistically determined results being used to quantify various aspects of the noise.

The figure below shows an example of sound level varying with time. Because of this time variation the same period of noise can be described by several different levels. The most common of these are described below.



Example of Sound Level Varying With Time

- $L_{Aeq,T}$** The equivalent continuous (A-weighted) sound level may be considered as the “average” sound level over a given time, T. It is used for assessing noise from various sources including transportation, industrial and construction sources and can be considered as the “ambient” noise level.
- L_{A90}** The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value used to describe the “background” noise.
- L_{Amax}** The maximum (A-weighted) sound level during a measurement period.
- L_{AE}** The A-weighted sound exposure level is the equivalent noise level of an event as if the event was of one-second duration and allows the overall average, L_{Aeq} , level to be determined over different time periods for a number of events. L_{AE} is a mathematical unit which cannot easily be described in terms of perception.

APPENDIX B – Measurement Procedure for Garage Operational Noise Levels

Date & Time of Survey: Tue 21 September 2010 0630h to 0830h.

Personnel Present: Andy Burke (AEC).

Equipment Used: B&K 2250 Real Time Analyser (AEC Kit 3).

Weather Conditions: Overcast, dry, 12°C, little or no wind.

Measurement Procedure: Noise levels were measured at varying distances from the items of equipment at different locations around an existing fully operational modern Service Station located in Clitheroe.

All locations were selected to measure maximum and average noise levels due to the equipment and plant associated with the garage use. Measurements were taken in terms of, L_{Aeq} , L_{A90} and L_{Amax} (fast response) typically over 10 to 45 second periods.

All the measurements were taken in free-field at a height of 1.5m above ground and wherever possible, noise levels due to traffic on the garage forecourt and the nearby main road were paused out.

The sound level analyser, which conforms to BS EN 60651:1994 “Specification for sound level meters” and BS EN 60804:2001 “Integrating-averaging sound level meters” was in calibration and check calibrated before and after the measurement periods using a Bruel & Kjaer type 4231 (94dB) calibrator. There was no significant drift of calibration.

Measured Data: Full results are given in Table B1.

Table B1 – Garage Operational Noise Levels

| Equipment | Distance | Measured Noise level, dB | | | Notes |
|------------------|----------|--------------------------|-----------|------------|---|
| | | L_{Aeq} | L_{A90} | L_{Amax} | |
| Tire Inflator | 2m | 69.2 | 68.8 | 71.3 | 30 seconds per 20p. Alarm currently sounds at beginning |
| Vac | 2m | 66.3 | 65.6 | 68.8 | Measured at a number of positions around Vac |
| Jet wash machine | 2m | 69.3 | 69.0 | 71.2 | Just the machine compressor |
| Jet wash nozzle | 2m | 77.4 | - | 82.5 | Washing bodywork |