*JSP CONSULTANTS*
*(Consultants in Noise & Vibration)*

***2 Millards Way Upton Scudamore***
***Nr Warminster Wiltshire BA12 0DR***

Tel: 01985 847405 Fax: 01985 847405

Mr J S Pollard BSc, C Eng, MIOA
*(Member of Association of Noise Consultants)*

***Email: jspnoise@aol.com***
***Website: www.jspconsultants.co.uk***

# ENVIRONMENTAL NOISE ASSESSMENT

# FOR PROPOSED RESIDENTIAL DEVELOPMENT

# LOWER EDGE ROAD, ELLAND

**Prepared for**

**J & S Boyle**

**Date: 2 October 2017**

**Report No: RPT1332**

# 1. INTRODUCTION

As part of an outline planning application for a residential development at Lower Edge Road, Elland, an acoustic survey was conducted on the 14th and 15th September 2017 and the results are presented in this report. The site is located next to a railway line, an industrial estate and some minor roads.

The purpose of the exercise was to conduct an initial assessment into the suitability of the proposed site for residential use against railway noise and road traffic noise. The proposal involves introducing a new residential area into an existing rail and road traffic noise situation and, in order to assist the assessment process, this report looks at the Government/Industry methods that have been adopted over the past 10 years to assess sites. These include the previously adopted PPG24 style category approach, the later Government's National Framework initiative and the recent ProPG proposals. These alternative approaches are discussed further in section 4.

Owing to the presence of industrial noise on site, a BS4142 assessment has also been included.

# 2. SITE DESCRIPTION

The development site is a large area of land to the south of the main railway line between Sowerby Bridge and Brighouse (see figure 1). The site is currently open fields, with existing housing and a primary school to the west, a large wooded area to the east and the Lowfields Way industrial park to the north on the other side of the railway line. The M62 motor lies further south and other main roads in the vicinity are the A629 to the west and the A6025 to the north-west. The adjacent land rises very steeply to the south, so that most of the M62 noise is shielded by the terrain. The M62 motorway is a managed motorway, so that traffic flows are controlled on occasions and can be subject to partial closures at night for maintenance etc.

The proposed draft layout of the site is shown in figure 2 with approximately 222 houses spread across 2 areas either side of a public open space beneath a line of electricity pylons. The railway line lies in a cutting at its western end and an embankment at its eastern end. The latter has a road bridge providing access from Lower Edge End, but this road (known as Shaw Lane) is currently closed to vehicles. This is because access is currently not required to an industrial area at its northern end, which has recently been demolished. It is understood that the school is due to be extended eastwards into the area to the south of the proposed development site.

The railway is a main line covering trains between Leeds and Manchester and between Leeds and Huddersfield and contains a number of different passenger train types and freight trains.

The large industrial estate on the other side of the railway line consists of a mixture of companies including Mitcheldever Tyres, Lowfield Agricultural Supplies and Expect Distribution and there is an EHT station at the far north-west corner.

# 3. MEASUREMENT PROCEDURE

Four measurement positions were selected to cover the site as shown in figure 1. Position 1 covered the Old Earth primary school, positions 2 and 3 covered the northern boundary along the railway line and position 4 covered the eastern boundary next to the closed Shaw Lane.

All 4 locations were freefield positions with a height of 1.5m above local ground level.

The measurement equipment consisted of two Bruel & Kjaer 2260 Precision Computing Sound Level Meters set to record the Leq, L10, L90 & Lmax noise levels over different averaging periods depending on measurement position. Measurements took place firstly during the afternoon period of 15.30-20.20, with position 1 monitored for 1.25 hours, position 2 for 3.75 hours and position 3 for 2.5 hours. Position 4 was not monitored during the daytime. Further measurement then took place during the night time between 01.20 hours and 05.00 hours, with position 1 for about 45 minutes, position 2 for 2.5 hours, position 3 for 80 minutes and positions 4 for two sessions of 15 minutes and 13 minutes.

During the site visits some frequency related information was recorded in the form of 1/1 octave and 1/3 octave band Leq values. This information is available for later analysis and assessment when the site layout has been finalised in terms of location of individual houses or blocks of flats.

Weather conditions during the daytime were light rain with wet roads, and gusty wind conditions, which affected some of the measurements. Weather conditions at night were clear or cloudy with the occasional shower and breezy wind conditions.

## 4. PLANNING POLICIES FOR NOISE ASSESSMENTS

Up until 2012 potential residential development sites were assessed relative to PPG24. Planning policy guideline PPG24 (reference 1) previously provided Noise Exposure Categories (NEC's) to assist local planning authorities in assessing new residential developments alongside existing transport related noise sources. The categories A to D (see figure 3 reproduced from reference 1) defined noise level ranges for different noise sources. The noise levels applied to free field data.

Category A represented circumstances in which noise need not be considered a determining factor; category B applied to the situation where noise should be taken into account; category C covered noise levels where planning permission should not normally be granted and category D was for planning permission refusal.

The noise levels are defined in Leq (dBA) units and two values exist for each exposure category. The first is a 16 hour Leq value covering the daytime period 07.00-23.00 and the second is an 8 hour Leq value covering the night time period 23.00-07.00. In order to determine the appropriate noise category for a specific site it was normally necessary to conduct 24 hour measurements on site. Alternatively prediction procedures could be used where appropriate based on limited measurement periods.

Planning Policy Guidance documents, including PPG24 were withdrawn in 2012 as part of the Government's National Framework initiative. The National Policy Framework document states that there should be a presumption in favour of 'sustainable development' although the definition of 'sustainable' as far noise is concerned is not entirely clear. Paragraph 173 of the document under a section entitled 'Preventing unacceptable risks from pollution and land instability' states that

"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, while recognising that many developments will create some noise; 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."

As part of the discussion of ''significant adverse'' and ''adverse'' the NPSE introduced the concepts of No Observed Effect Level, Lowest Observed Adverse Effect Level and Significant Observed Adverse Effect Level.

Unfortunately the above statements, whilst setting clear objectives in general terms, do not set any clear guidance in numerical terms and are open to different assessment approaches.

The latest documents produced jointly by the Association of Noise Consultants, the Institute of Acoustics and the Chartered Institute of Environmental Health (references 2, 3 and 4) have attempted to overcome this lack of definitive guidance by introducing an initial risk assessment process with indicative noise levels for various degrees of increasing risk of adverse effect from noise. Unfortunately, whilst the lowest category of negligible risk has a defined noise range, the other higher categories of low, medium and high risk have no clearly defined ranges and are open to interpretation by the assessor, depending on the accompanying acoustic design process that follows. The latter involves the Local Authorities being satisfied that any proposal for new housing has followed a good

acoustic design process and requiring the applicants to produce an Acoustic Design Statement, as discussed in the ProPG supplementary document 2 (reference 4).

Whilst PPG24 appears to be no longer valid to assess sites acoustically, a final alternative has yet to be put in its place, pending the Government and Industry responses to the ProPG documents. In the meantime Local Authorities have to set their own guidance by revising and updating their local plans in line with the National Planning Policy Framework and some of them have chosen to continue with some form of the PPG24 noise exposure categories to gain an insight into the suitability of sites for residential development. One such example is Bath & North East Somerset Council whilst other councils rely on the internal noise level requirements of BS8233 (reference 5).

# 5. INDUSTRIAL NOISE ASSESSMENT PROCEDURE

Industrial noise is normally assessed by means of BS 4142, which provides a means of rating industrial noise affecting mixed residential and industrial areas.

The 1997 version of B.S.4142 (reference 6) rates industrial noise by comparing the predicted or measured Leq noise level from the industrial activity with existing background L90 noise levels. If the industrial noise, after correcting for special characteristics, exceeds the background noise by 10 dBA or higher, complaints are likely. A difference of 5 dBA is of marginal significance and smaller differences give lesser likelihood of complaints, until a difference of -10 dBA means that complaints are unlikely.

In order to conduct such an assessment it is necessary to measure the L90 background noise levels with the industrial noise absent, and the industrial noise needs to be of sufficiently long duration to enable a representative Leq to be measured.

For a daytime B.S.4142 assessment the industrial noise needs to be measured or calculated over a reference time interval $T_R$ of 1 hour. For a night time B.S.4142 assessment the reference time interval $T_R$ is 5 minutes.

A later version of BS4142 was introduced in 2014 (reference 7), which is considerably more involved and more complicated than the 1997 version. The main differences, apart from the need to conduct more extensive measurement and analysis, relate to the rating level of the acoustic features of the noise source with different methods for assessing the rating penalty and different corrections for noise source characteristics of tonality, impulsivity, distinctiveness and intermittency. The assessment period has now changed to 15 minutes for night time, but the daytime assessment period has remained unchanged at 1 hour. Also the rating criteria terminology has changed to ‘significant adverse impact’ for a noise level difference from L90 background of +10 dB, ‘adverse impact’ for +5 dB difference, down to a ‘low impact’ where the rating level does not exceed the background level.

The Association of Noise Consultants is currently producing guidance for its members regarding the application of the 2014 BS4142 edition and the impletion of its procedures. The review is being carried out on a chapter- by- chapter basis with the aim of clarifying any areas of ambiguity in the text and providing further guidance/interpretation where required.

# 6. RESULTS AND DISCUSSION

## 6.1 General Comments

The measured noise levels are presented in tables 1-4 in the form of the statistical Leq, L10, L90 and Lmax values over 15 minute measurement periods, together with on site observations. The daytime noise environment consisted of a mixture of train noise, industrial noise, school activity noise and distant road traffic noise, but these contributions varied with measurement position and time of day. .

The industrial noise was considered to be very prominent, according to the site surveyor, with continuous warehouse distribution type operations at Expect Distributions from fork lift truck movements etc, plus refrigeration units and ventilation plant etc at the other industrial units.

The latter included joinery activities with dust extraction units etc and included tonal noise content.

Consequently position 2 and position 4 (due to the lie of the land) were most affected by the industrial noise. Position 3 was dominated by train noise, with less industrial noise due to its greater distance from the Expect Distributions site. The train drivers regularly operated a hooter alongside position 3, due it is believed to a level crossing, known as Brighouse Boundary Walk, which crosses the tracks about 300m east of the Shaw Lane boundary. Position 2 was also affected by train noise, but to a lesser extent due to shielding by the railway cutting. Position 1 was controlled by the school activity, particularly children playing, although the trains were audible at this location.

The M62 road traffic noise was audible, but not really measurable due to its lower level relative to industry and train noise.

As shown in table 1 the position 1 data varied between 51 and 60 dBA Leq (15 minutes), depending on whether children were outside the school or not. The position 2 data (table 1) varied between 50 dBA Leq (15 minutes) and 60 dBA Leq (15 minutes), depending on the number of trains passing the site in the 15 minute measurement period. Similar comments applied to position 3 (table 2), but with higher noise levels between 48 dBA Leq (15 minutes) and 68 dBA Leq (15 minutes) due to the train embankment situation. Lmax levels were also very high from the train hooter operation, reaching 100 dBA in one case

The night time noise environment was also dominated by industrial noise, plus contributions from the train movements (see tables 3 and 4). Position 1 varied between 45 and 46 dBA Leq (15 minutes), whilst position 2 varied between 47 and 62 dBA Leq (15 minutes) depending on number of trains. Position 3 varied between 44 and 67 dBA Leq (15 minutes) depending on number of trains and finally position 4 showed night time levels of 44-49 dBA Leq (15 minutes), but only 2 sets of data were recorded at this location.

## 6.2 Train Noise

Tables 5 and 6 provides the single event train noise levels in terms of SEL and Lmax units, together with train type, direction of travel (W-E means west to east E-W means east to west) and a duration time, which is the time shown on the noise meter during a train pass and represents the duration of the event above the measurement equipment trigger level.

SEL is an event related noise level and the greater the duration of the event, the greater the SEL value. Leq is defined as the equivalent continuous noise level i.e. for a noise level varying with time, it can be considered as the continuous steady noise level which would have the same total A weighted acoustic energy as the real fluctuating noise measured over the same time period. With this unit, therefore, it is possible to compare a steady state noise level with a time fluctuating signal, and different events can be compared on a like for like basis. Leq is related to SEL by the relationship

$$LEQ = 10\log_{10} \frac{1}{T} \sum_{1}^{n} 10^{(SEL/10)}$$ where n = number of events in time T (seconds)

Thus the Leq associated with a number of train passes can be calculated from the measured train data.

Table 5 applies to measurement position 2 and table 6 applies to position 3. Also tables 5 and 6 slightly overlap during early evening and during part of the night when 2 sets of equipment were in operation at the same time. Thus it is possible to compare measured levels at the 2 positions for a given train pass, and the data shows position 3 levels much higher than position 2 levels. This is to be expected bearing in mind that the railway is on an embankment at position 3 and in a cutting at position 2.

These two tables also show much higher SEL and Lmax values when train hooting takes place during the train pass, particular for position 3.

Whilst there is no railway station at Elland, the nearest stations to the development site are Brighouse to the east, Sowerby Bridge to the west and Halifax to the north west. From an examination of the passenger train timetables for Halifax to Brighouse route through Elland and the Brighouse to Sowerby Bridge route through Elland, it is possible to estimate the approximate train times past the development site. These are shown in table 7 together with the direction of travel and the train company (NR stands for Northern Rail and GC stands for Grand Central). A comparison of table 7 with tables 2 and 3 for the appropriate late afternoon and early evening periods, shows reasonable correlation between the estimated train pass times and the actual measured train times at positions 2 and 3.

The information from table 7 suggests that on a typical weekday the following total passenger train movements pass the site:-

**Daytime (07.00-23.00)**

| | |
|---|---|
| West to east | 35 trains |
| East to west | 33 trains |
| | 68 trains |

**Night Time (23.00-07.00)**

| | |
|---|---|
| West to east | 2 trains |
| East to west | 0 trains |
| | 2 trains |

Total = 70 trains

Each set of train noise SEL data can be converted to Leq values for train noise for the given measurement period. For example the data acquired at position 2 for the 60 minute period 17.26-18.25 (see table 5) covers 11 trains and produces an Leq for this total period of 56.3 dBA. Since the total number of passenger train movements during the daytime period 07.00-23.00 is 68, the 16 hour Leq value also becomes 52.2 dBA. Similarly for the same 1 hour period at position 3, table 6 produces an Leq level of 67.1 dBA for the same 11 trains. This produces an 16 hour Leq value of 63.0 dBA.

For the 8 hour night time period (23.00-07.00), the timetable shows a total of only 2 passenger trains. This produces an 8 hour Leq value of 39.9 dBA at position 2 and 50.7 dBA at position 3. These values only apply to passenger trains.

Freight movements also take place along this line, but are difficult to quantify in terms of numbers and times of operation. Freight movements during the daytime are likely to be small in number, relative to the 68 passenger trains, and are unlikely to affect the 16 hour Leq values.

As far as night time is concerned, some information on freight movements can be obtained by access to an online search systems such as ‘realtimetrains.co.uk’, whereby passenger and freight movements can be listed for any period on any railway line. Not all sites provide historic data and one of the websites states that the freight information provided ‘can never be 100% accurate due to the inherent poor time keeping and last minute cancellations, etc’. Nevertheless some typical weekday freight movements past Elland from ‘realtimetrains.co.uk’ are shown in table 8 for the night time period 23.00-07.00. Based on the measured 3 freight train noise levels in table 5 and 6 over a 1 hour period, the 9 possible freight movements at night of table 8 produce an 8 hour Leq of 53.2 dBA at position 2. Similarly from table 6 data the 9 possible freight movements give an 8 hour Leq of 59.4 dBA at position3.

## 6.3 PPG24 Type Categorisation

It is of interest to apply a PPG24 type assessment to the development site in order to set the scene initially based on previous Government guidance. A PPG24 assessment normally requires an open plan site with no buildings, and since was a large open field, the data can be read across directly to the various categories.

As shown in figure 3 there are separate categories for road traffic, rail traffic and mixed sources, with slightly different level ranges depending on which source dominates. The mixed source could include industrial noise, but only where no individual noise source is dominant. Where industrial noise is dominant it is necessary to use BS4142.

Had PPG24 still been applicable, daytime levels of 51-60 dBA Leq (15 minutes) at position 1, suggest PPG24 category B assuming transportation noise. Similar daytime levels of 50- 60 dBA Leq (15 minutes) at position 2 also indicate category B for rail noise, whereas position 3 at 48-68 dBA Leq (15 minutes) is on the border line of category B/C for rail noise, although 15 minute periods are not necessarily representative of the full 16 hour period.

A better comparison is the 16 hour values calculated in the previous section, showing levels of 52 dBA Leq (16 hour) and 63 dBA Leq (16 hour ) at positions 2 and 3 respectively for train noise only. This would place position 2 in category A for position 1 and category B for position 3, but no account has been taken of the industrial noise at these 2 locations.

For night time category B looks appropriate for most of the site, based on the measured 15 minute values for mixed sources and/or the train noise only calculations of the previous sections 6.1 and 6.2. Close to the railway line, however, category C would be more appropriate due to the possible freight movements at night.

The above discussion has considered SEL and Leq values. Tables 5 and 6, however, also show the measured maximum noise levels (Lmax) during the train passes. The noise exposure category table of PPG24 has a footnote, which states ‘sites where individual noise events regularly exceed 82 dBA Lmax (S time weighting) several times in any hour should be treated as being in NEC C’ for night time. The measurements were conducted using the fast (F) time weighting on the sound level meter rather than the slow (S) time weighting. Since the fast setting is generally believed to register 2 dBA higher Lmax noise levels than the slow setting, the Lmax values in tables 5 and 6 would need to be decreased by 2 dBA for a slow setting assessment. When the 2 dBA correction is included, the 82 dBA Lmax (S time waiting) is not regularly exceeded by any passing trains at position 2, but the same conclusion can not be made for position 3. Owing to the noisy hooter operation position 3 exceedances could be several times in any hour, leading to a category C night time designation at position 3.

## 6.4 Other Government/industry Categorisation

As far as the National Policy Framework document is concerned the document provides no guidance on specific criteria to assess development sites and directs the reader to other acoustic documents such as BS8233.

As far as the latest ProPG proposals are concerned, levels over 50 dBA Leq (16 hr) daytime and 40 dBA Leq (8 hr) night time are classified in reference 2 as increasing risk of adverse effect. Moving up the scale, levels in the approximate range 50-60 dBA Leq daytime and 40-50 dBA Leq night time are considered to be low noise level sites and acceptable for development, subject to a good design process which demonstrates acoustic mitigation/minimisation of adverse impacts for the completed development. Further up the scale in the approximate range 60-70 dBA Leq daytime and 50-60 dBA Leq night time, the site is considered to be less suitable for development and may be refused unless a good acoustic design is followed and demonstrated to avoid significant adverse impacts. Towards the top end of the scale, approximately above 70 dBA Leq daytime and 60 dBA Leq night time, it is important that a very good and detailed Acoustic Design Statement is produced.

Unfortunately the various ranges are open to interpretation by the acoustic consultant and the Local Authority.

It would appear from the above discussion that the Elland site on a transportation noise basis is a low noise site at the southern end, and less suitable for development at the northern end alongside the railway line. Thus from an acoustic point of view most of the site could be suitable for development, subject to the consideration of suitable mitigation measures in the form of a separate Acoustic Design Statement report. This report needs to be the subject of the next stage of work when the detailed plans for the site become available. Likely mitigation measures could be non habitable rooms at the front of the site, high standards of acoustic double glazing, acoustically treated room ventilation, acoustic shielding, boundary fences/walls etc. but the ADS will need to take into account other issues such as heating/air conditioning requirements, provision of external amenity spaces etc.

The Industry documents make it clear, however, that 'ProPG is restricted to sites that are exposed predominantly to noise from transportation sources'.

## 6.5 BS 4142 Assessment

PPG24 and ProPG do not really deal with industrial noise and instead refer the reader to BS 4142. The Expect Distribution operations and other industrial operations on the Lowfields Way estate clearly last a long time, both daytime and night time and consequently there are no corrections to be made for periods of operation shorter than the BS4142 assessment periods.

As stated in the 1997 version of BS4142 certain acoustic features of plant/equipment noise can increase the likelihood of complaints and consequently BS4142:1997 takes such features into account by adding 5 dB to the specific noise level to obtain the rating level. This 5 dB correction applies if the noise source contains a distinguishable discrete continuous note, or distinct impulses or is irregular enough to attract attention. Since the Expect Distribution operations exhibit some or all of these characteristics, then the 5 dB rating correction applies in this situation.

In order to apply BS4142, it is necessary to measure the background noise level without any industrial noise. This is difficult to determine since Lowfield Way industrial noise covered the whole development site. Tables 1 and 2 show similar Leq and L90 levels for all the measurement positions when train noise is absent, confirming that industrial noise is prominent across the site. Hence it is difficult to gauge the L90 levels without industrial noise, but they are probably going to be around 40 dBA daytime and 30 dBA night time in between passing trains, for this type of semi rural/semi urban area with the M62 motorway in the vicinity. Consequently the industrial Leq noise is going to be at least 5 dBA above the L90 background noise daytime and possibly 15 dBA above night time L90 levels.

When the 5 dBA rating correction is added the industrial noise is going to be at least 10 dBA above daytime background L90 noise and possibly 20 dBA above night time background L90 noise.

If the 2014 version of BS4142 is adopted, then there could in general terms be a 0-6 dB rating correction for tonality, up to 9 dB for impulsivity, and 3 dB for intermittency. Unfortunately the Standard does not provide much guidance on how to combine these correction terms, which in theory could amount to 18 dB in total. In practice the Standard provides some worked examples in the Appendices and the maximum correction among 13 examples is 13 dB for a scrap yard operation. Clearly Expect Distribution (and other businesses) are not operating scrap yards, but the company's operations could warrant 9 dB for impulsivity, 3 dB for intermittency, and 6 dB for a tonality correction, still giving a total 18 dB rating correction. Either way BS4142 gives an assessment result of 'complaints likely' for the 1997 version and 'significant adverse impact likely' for the 2014 version. Thus the site area close to Lowfields

Way needs acoustic mitigation measures, in order for it to be suitable for housing, with night time being the worst case situation.

## 7. CONCLUDING REMARKS

A noise measurement survey has been carried out as far as train noise and industrial noise is concerned and has placed the proposed development site in a mixture of PPG24 categories B and C depending on daytime or night time, and depending on distance from adjacent railway and the Lowfields Way industrial site, should PPG24 have still been applicable today.

In the absence of PPG24 guidelines, ProPG advice indicates that most of the site should be suitable for development with the southern section in a low noise category, whilst the northern section needs careful design to protect future residential noise amenity.

The likely requirements for the development are:-

(1) Enhanced acoustic glazing and an alternative form of acoustically treated ventilation for housing plots along the northern part of the site to ensure a good standard of internal noise.

(2) Suitable acoustic screening for gardens along the northern boundary of the site.

(3) For the remainder of the site, subject to final layouts, it is likely that standard thermal glazing and standard trickle ventilation will suffice.

The Local Authority's requirement for noise levels inside properties is not known, but is likely to be based on guidance from British Standard BS 8233 (reference 5). BS 8233 quotes internal noise levels of 35 dBA Leq for reasonable resting/listening conditions in living rooms and 30 dBA Leq for good sleeping conditions in bedrooms at night. The averaging time period intended for these BS 8233 values is 16 hours for daytime (07.00-23.00) and 8 hours for night time (23.00-07.00), but in reality the limits are often used for shorter periods such as 1 hour. As far as traffic noise is concerned, a 10 or minute measurement period in any given daytime hour is a good measure of the 1 hour value. Some Local Authorities also specify the need to meet a 45 dBA Lmax requirement in bedrooms at night. This requirement for individual events was part of the BS8233 guidance in the 1999 version, but was dropped in the later 2014 version.

The exact locations of the residential units have still to be finalised, but by way of example, if a façade was close to the railway line, then measured freefield levels of around 87 dBA Lmax (see table 6) from passing trains without hooters would require window glazing attenuation of 45 dBA after applying the façade correction to meet the 45 dBA Lmax requirement. The corresponding Rw values would normally be about 5 dB higher, but would need to be the subject of a more detailed calculation procedure. This can be conducted when the proposed site layout becomes more detailed and discussions have taken place with the Developer and the Architect on the preparation of an Acoustic Design Statement report.

With regard to garden amenity of the site, it may be necessary to orientate properties along the northern boundary, such that the dwellings themselves protect garden amenity, given the current external noise levels and the need for suitable barrier screening for gardens.

## 8. REFERENCES

1. *Planning and Noise*
*PPG 24 September 1994, Dept. of Environment*

2. *ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise. New Residential Development*
*Main Document Published by ANC, IOA & CIEH May 2017*

3. *ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise. New Residential Development*
*Supplementary Document 1 Published by ANC, IOA & CIEH May 2017*

4. *ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise. New Residential Development*
*Supplementary Document 2 Published by ANC, IOA & CIEH May 2017*

5. *Guidance on Sound Insulation & Noise Reduction for Buildings*
BS 8233: 2014

6. *Rating Industrial Noise Affecting Mixed Residential & Industrial Areas*
*BS4142: 1997*

7 *Methods for Rating & Assessing Industrial & Commercial Sound*
*BS4142: 2014*

**Statement of Disclaimer**

The Consultant cannot guarantee that the objectives of the investigation have been achieved, but every reasonable effort has been made to provide expert advice and measurement assistance during the investigation and preparation of the report, based on information made available by the client.

**TABLE 1 - MEASURED SITE NOISE LEVELS (dBA) DAYTIME POSITIONS 1 & 2**

| Position | Period | Leq | L10 | L90 | Lmax | Observations |
|---|---|---|---|---|---|---|
| 1 | 15.39-15.53 | 50.8 | 52.7 | 48.2 | 63.1 | Industrial noise |
| 1 | 15.54-16.09 | 59.6 | 63.2 | 52.3 | 75.5 | School activity |
| 1 | 16.09-16.24 | 57.3 | 60.4 | 51.4 | 74.1 | School activity |
| 1 | 16.24-16.39 | 57.7 | 60.8 | 50.1 | 75.0 | School activity |
| 2 | 16.23-16.38 | 56.6 | 55.9 | 51.7 | 74.9 | 2 trains |
| 2 | 16.38-16.53 | 60.0 | 55.7 | 51.6 | 81.2 | 2 trains |
| 2 | 16.53-17.08 | 57.4 | 55.6 | 51.9 | 77.6 | 1 train |
| 2 | 17.08-17.23 | 54.2 | 56.1 | 51.8 | 66.7 | 1 train |
| 2 | 17.23-17.38 | 56.8 | 56.3 | 52.4 | 76.5 | 3 trains & hooter |
| 2 | 17.38-17.53 | 58.0 | 56.0 | 50.7 | 80.2 | 1 train |
| 2 | 17.53-18.08 | 55.4 | 54.6 | 49.9 | 76.6 | 1 train |
| 2 | 18.08-18.23 | 51.5 | 52.5 | 50.4 | 58.3 | No trains |
| 2 | 18.23-18.38 | 57.9 | 53.9 | 51.0 | 78.6 | 4 trains & hooter |
| 2 | 18.38-18.53 | 52.3 | 53.8 | 50.6 | 57.6 | No trains |
| 2 | 18.53-19.08 | 57.1 | 53.6 | 50.8 | 77.9 | 2 trains |
| 2 | 19.08-19.23 | 51.7 | 52.9 | 50.3 | 57.5 | No trains |
| 2 | 19.23-19.38 | 56.5 | 53.7 | 50.5 | 77.4 | 2 trains |
| 2 | 19.38-19.53 | 50.5 | 51.8 | 49.1 | 54.9 | No trains |

**TABLE 2 - MEASURED SITE NOISE LEVELS (dBA) DAYTIME POSITION 3**

| Position | Period | Leq | L10 | L90 | Lmax | Observations |
|---|---|---|---|---|---|---|
| 3 | 17.14-17.29 | 65.0 | 54.2 | 47.3 | 94.0 | 2 trains & hooter |
| 3 | 17.29-17.44 | 63.4 | 54.3 | 47.7 | 94.3 | 1 train & hooter |
| 3 | 17.44-17.59 | 61.1 | 51.4 | 46.8 | 83.3 | 1 train |
| 3 | 17.59-18.14 | 59.0 | 50.2 | 46.2 | 83.8 | 1 train |
| 3 | 18.14-18.29 | 60.5 | 49.7 | 45.8 | 85.9 | 2 trains |
| 3 | 18.29-18.44 | 66.5 | 51.5 | 46.8 | 95.1 | 2 trains& hooter |
| 3 | 18.44-18.59 | 47.7 | 49.1 | 45.9 | 57.1 | No trains |
| 3 | 18.59-19.14 | 61.5 | 50.5 | 45.7 | 84.1 | 2 trains |
| 3 | 19.14-19.29 | 68.3 | 50.7 | 46.0 | 100.3 | 2 trains & hooter |
| 3 | 19.29-19.42 | 57.8 | 50.3 | 45.1 | 83.0 | 1 train |

**TABLE 3- MEASURED SITE NOISE LEVELS (dBA) NIGHT TIME POSITIONS 1 & 2**

| Position | Period | Leq | L10 | L90 | Lmax | Observations |
|---|---|---|---|---|---|---|
| 1 | 01.30-01.45 | 46.0 | 47.5 | 44.2 | 60.6 | |
| 1 | 01.45-02.00 | 45.2 | 46.8 | 43.5 | 52.7 | |
| 1 | 02.00-02.15 | 45.0 | 46.1 | 43.6 | 59.2 | |
| 2 | 01.41-01.56 | 51.0 | 49.7 | 47.7 | 77.9 | |
| 2 | 01.56-02.11 | 48.8 | 49.8 | 47.5 | 64.9 | |
| 2 | 02.11-02.26 | 48.0 | 48.9 | 47.0 | 52.9 | |
| 2 | 02.26-02.41 | 47.6 | 48.6 | 46.6 | 59.5 | |
| 2 | 02.41-02.56 | 48.6 | 47.6 | 45.6 | 69.8 | 1 train |
| 2 | 02.56-03.11 | 61.4 | 51.1 | 45.8 | 82.1 | 2 trains |
| 2 | 03.11-03.26 | 62.2 | 49.5 | 47.1 | 82.6 | 1 train |
| 2 | 03.26-03.41 | 47.3 | 48.1 | 46.4 | 53.1 | |
| 2 | 03.41-03.56 | 47.6 | 48.5 | 46.5 | 55.4 | |
| 2 | 03.58-04.13 | 50.0 | 49.1 | 46.9 | 70.7 | 1 train |

**TABLE 4 MEASURED SITE NOISE LEVELS (dBA) NIGHT TIME POSITIONS 3 & 4**

| Position | Period | Leq | L10 | L90 | Lmax | Observations |
|---|---|---|---|---|---|---|
| | | | | | | |
| 3 | 03.02-03.17 | 63.1 | 46.4 | 40.9 | 86.0 | 1 train |
| | | | | | | |
| 3 | 03.17-03.32 | 67.1 | 46.2 | 41.1 | 87.8 | 1 train |
| | | | | | | |
| 3 | 03.32-03.47 | 42.2 | 43.6 | 40.3 | 51.3 | No trains |
| | | | | | | |
| 3 | 03.47-04.02 | 42.7 | 44.2 | 40.9 | 48.5 | No trains |
| | | | | | | |
| 3 | 04.02-04.17 | 52.4 | 44.7 | 41.2 | 78.4 | 1 train |
| | | | | | | |
| 4 | 02.28-02.43 | 43.9 | 45.2 | 41.9 | 59.6 | No trains, industrial noise |
| | | | | | | |
| 4 | 04.40-04.53 | 48.6 | 49.1 | 45. | 64.5 | No trains, industrial noise |
| | | | | | | |

**TABLE 5 MEASURED TRAIN NOISE LEVELS (dBA) AT POSITION 2**

| Time | Train Type | Train Direction | LEQ | SEL | Lmax | Duration (Seconds) | Observations |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 16.23 | Local | W-E | | 80.3 | 74.9 | 15 | |
| 16.27 | Local | | | 78.1 | 73.5 | 15 | |
| 16.50 | Trans Penine | E-W | | 80.5 | 85.4 | 15 | |
| 16.53 | Freight | E-W | | 81.2 | 85.6 | 35 | |
| 17.02 | Local | E-W | | 79.8 | 74.2 | 20 | |
| 17.08 | Local | | | 87.2 | 77.6 | 15 | |
| 17.25 | Grand Central | E-W | | 77.3 | 71.8 | 15 | |
| 17.26 | Grand Central | W-E | | 79.9 | 76.5 | 15 | With train hooter |
| 17.29 | Local | | | 75.5 | 71.6 | 10 | |
| 17.45 | GWR Freight | E-W | | 85.8 | 80.2 | 35 | |
| 18.04 | Local | E-W | | 81.9 | 76.6 | 20 | |
| 18.24 | Local | W-E | | 81.7 | 77.9 | 15 | |
| 18.27 | Trans Penine | W-E | | 81.7 | 78.6 | 20 | |
| 18.30 | Grand Central | E-W | | 77.5 | 71.6 | 25 | With train hooter |
| 18.34 | Grand Central | W-E | | 78.2 | 72.6 | 25 | With train hooter |
| 19.00 | Local | E-W | | 82.9 | 77.9 | 20 | |
| 19.06 | Local | E-W | | 81.0 | 77.0 | 20 | |
| 19.26 | Local | | | 80.9 | 76.8 | 20 | |
| 19.29 | Local | | | 81.5 | 77.4 | - | |
| 20.15 | Freight | | | 95.1 | 87.3 | 47 | |
| | | | | | | | |
| 02.54 | Freight | | | 74.0 | 69.8 | 20 | |
| 02.58 | Freight | E-W | | 88.0 | 80.6 | 45 | |
| 03.10 | Freight | E-W | | 87.6 | 82.1 | 50 | |
| 03.23 | Freight | | | 91.6 | 82.6 | 45 | |
| 04.08 | Passenger | | | 75.1 | 70.7 | 15 | |
| | | | | | | | |

**TABLE 6 MEASURED TRAIN NOISE LEVELS (dBA) AT POSITION 3**

| Time | Train Type | Train Direction | LEQ | SEL | Lmax | Duration | Observations |
|---|---|---|---|---|---|---|---|
| | | | | | | (Seconds) | |
| 17.25 | Grand Central | E-W | | 83.5 | 78.8 | 25 | |
| 17.26 | Grand Central | W-E | | 94.1 | 94.0 | 30 | With train hooter |
| 17.30 | Local | | | 92.7 | 94.3 | 15 | With train hooter |
| 17.45 | Freight | E-W | | 90.3 | 83.3 | 40 | |
| 18.04 | Local | | | 88.2 | 83.8 | 25 | |
| 18.24 | Local | | | 86.5 | 83.8 | 25 | |
| 18.26 | Trans Penine | W-E | | 87.2 | 85.9 | 30 | |
| 18.30 | Grand Central | | | 84.2 | 80.0 | 25 | |
| 18.34 | Grand Central | W-E | | 95.7 | 95.1 | 30 | With train hooter |
| 19.00 | Local | E-W | | 88.5 | 84.1 | 30 | |
| 19.06 | Local | | | 87.0 | 84.1 | 30 | |
| 19.26 | Local | E-W | | 97.8 | 100.3 | 30 | With train hooter |
| 19.29 | Local | W-E | | 86.4 | 83.0 | 35 | |
| | | | | | | | |
| 02.58 | Freight | E-W | | 92.9 | 86.8 | 40 | |
| 03.10 | Freight | E-W | | 92.5 | 86.0 | 75 | |
| 03.22 | Freight | | | 96.6 | 87.8 | 65 | |
| 04.08 | Passenger | | | 82.0 | 78.4 | 35 | |
| | | | | | | | |

**TABLE 7– ESTIMATED PASSENGER TRAIN TIMES THROUGH ELLAND**

| Time | Direction | Type | Time | Direction | Type | Time | Direction | Type | Time | Direction | Type | Time | Direction | Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| 06.43 | W-E | NR | 10.08 | E-W | GC | 13.29 | W-E | GC | 17.07 | E-W | NR | 20.22 | W-E | NR |
| 07.06 | E-W | NR | 10.22 | W-E | NR | 13.29 | W-E | GC | 17.09 | E-W | NR | 20.29 | W-E | GC |
| 07.13 | E-W | GC | 10.29 | W-E | GC | 14.06 | E-W | NR | 17.22 | W-E | NR | 20.54 | E-W | GC |
| 07.14 | W-E | GC | 10.40 | W-E | GC | 14.08 | E-W | GC | 17.29 | E-W | GC | 21.05 | W-E | GC |
| 07.50 | W-E | NR | 11.06 | E-W | NR | 14.22 | W-E | NR | 17.29 | W-E | GC | 21.44 | E-W | GC |
| 08.06 | E-W | NR | 11.08 | E-W | GC | 14.29 | W-E | GC | 18.08 | E-W | NR | 22.04 | W-E | GC |
| 08.08 | E-W | GC | 11.22 | W-E | NR | 14.53 | W-E | GC | 18.10 | E-W | GC | 22.14 | E-W | GC |
| 08.14 | W-E | GC | 11.29 | W-E | GC | 15.06 | E-W | NR | 18.22 | W-E | NR | 22.38 | E-W | GC |
| 08.22 | W-E | NR | 12.06 | E-W | NR | 15.08 | E-W | GC | 18.29 | W-E | GC | 22.53 | W-E | GC |
| 08.29 | W-E | GC | 12.08 | E-W | GC | 15.22 | W-E | NR | 18.33 | E-W | GC | 23.57 | W-E | GC |
| 09.06 | E-W | NR | 12.22 | W-E | NR | 15.29 | W-E | GC | 19.06 | E-W | NR | | | |
| 09.08 | E-W | GC | 12.29 | W-E | GC | 16.06 | E-W | NR | 19.09 | E-W | GC | | | |
| 09.22 | W-E | NR | 13.06 | E-W | NR | 16.08 | E-W | GC | 19.22 | W-E | NR | | | |
| 09.29 | W-E | GC | 13.08 | E-W | GC | 16.22 | W-E | NR | 19.29 | W-E | GC | | | |
| 10.06 | E-W | NR | 13.22 | W-E | NR | 16.29 | W-E | GC | 20.09 | E-W | GC | | | |

**TABLE 8 –POSSIBLE NIGHT TIME FREIGHT MOVEMENTS PAST ELLAND**

| Origin | **Destination** | **Time** |
|---|---|---|
| | | |
| Knowsley Freight Terminal | Wilton Efw Terminal | 23.02 |
| Hall Royal Junction | Ilkely | 23.45 |
| Hall Royal Junction | Ilkely | 00.45 |
| Drax Aes (Gbrf) | Liverpool Biomass Tml Gbf | 02.59 |
| Tees N.Y. | Knowsley Freight Terminal | 04.14 |
| Drax Aes (Gbrf) | Liverpool Biomass Tml Gbf | 04.33 |
| Doncaster Down Decoy (Gbrf) | Collyhurst Street Gbf | 05.04 |
| Lindsey Oil Refinery Colas | Colas Ribble Rail | 06.07 |
| Liverpool Biomass Tml Gbf | Drax Aes (Gbrf) | 06.48 |
| | | |

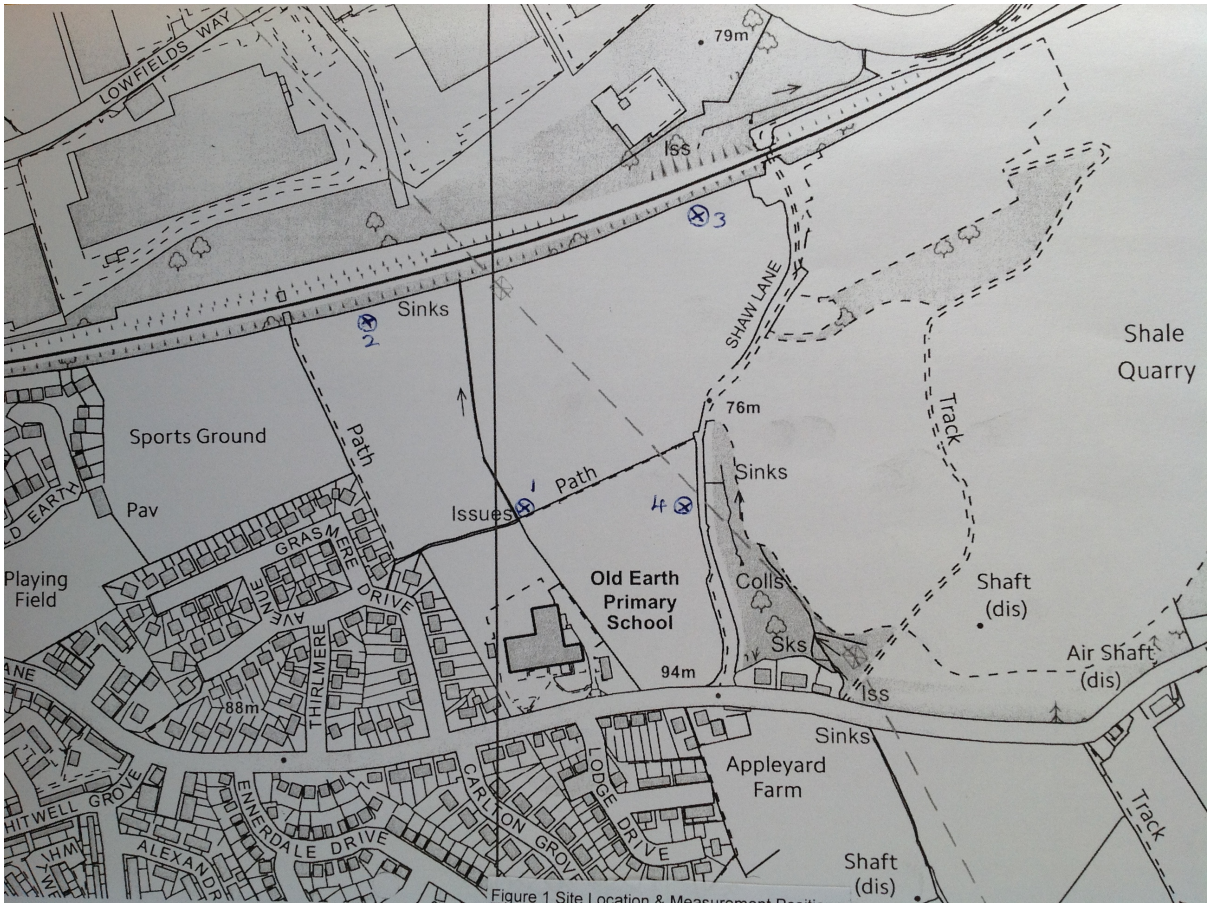


Figure 1 Site Location & Measurement Positions

Figure 2 Proposed Draft Site Layout

| NOISE LEVELS CORRESPONDING TO NOISE EXPOSURE CATEGORIES FOR NEW DWELLINGS Leq dBA | | | | |
|---|---|---|---|---|
| | NOISE EXPOSURE CATEGORY | | | |
| NOISE SOURCE | A | B | C | D |
| road traffic | | | | |
| 07.00-23.00 | <55 | 55-63 | 63-72 | >72 |
| 23.00-07.00 | <45 | 45-57 | 57-66 | >66 |
| rail traffic | | | | |
| 07.00-23.00 | <55 | 55-66 | 66-74 | >74 |
| 23.00-07.00 | <45 | 45-59 | 59-66 | >66 |
| air traffic | | | | |
| 07.00-23.00 | <57 | 57-66 | 66-72 | >72 |
| 23.00-07.00 | <48 | 48-57 | 57-66 | >66 |
| mixed sources | | | | |
| 07.00-23.00 | <55 | 55-63 | 63-72 | >72 |
| 23.00-07.00 | <45 | 45-57 | 57-66 | >66 |

**Fig. 3. Recommended Noise Exposure Categories for New Dwellings near Existing Noise Sources (Reproduced from Reference 1)**