

TECHNICAL REPORT Ref: 20450R01bMWpak

NOISE IMPACT ASSESSMENT

PROPOSED POULTRY PROCESSING FACILITY, PICKHILL LANE, WREXHAM.



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20186R02MWrmw	04.09.2011	Change of use for cheese packaging facility.
20462R01MWpak	10.10.2014	Change of use into poultry processing.
20462R01aMWpak	14.10.2014	Update of report better to reflect proposed usage.
20462R01bMW	17.10.2014	Removal of paragraph 1.2.1.

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1 Introduction

Environoise Consulting Limited was appointed by Mehta Holdings Limited to assess the noise impact associated with the redevelopment of the Maelor Packing Facility site in Wrexham into a poultry processing plant.

Operational noise will include noise from HGVs and plant egress. The scheme essentially comprises a poultry processing to replace the historic cheese cutting and packaging facility.

1.1 Background

1.1.1 The creamery was built by Cadburys in 1936 and was served by rail. The site was bought by The Milk Marketing Board in 1973 for butter and skimmed milk powder production and from 1976 to 1992, cheese manufacturing. In 1993, the site was converted into a pre-packing site by owners Dairy Crest. In 2006, the creamery was purchased by First Milk¹. The current owners of the site are Maelor Poultry (the applicant).

1.2 Proposed Facility

Change of use application utilizing comparable with the same:

- Buildings.
- Staff levels.
- HGV movements.

1.3 Site description

1.3.1 The existing packaging facility site is situated 3.8 kilometres to the south east of Wrexham and 1.8 kilometres south of the Wrexham Industrial Estate in a predominantly rural area with some housing. Just less than one kilometre (0.9km) to the south of the site is the small town of Bangor Is-Y-Coed.

1.3.2 The development site is bound by Pickhill Lane to the north with the A525 running north to south 0.3 km to the west of the facility. There are no motorways nearby.

¹ <http://www.coflein.gov.uk/en/site/91753/details/MAELOR+CREAMERY,+PICKHILL+LANE,+MARCHWIEL,+WREXHAM/>

2 Criteria

2.1 Local Authority Consultation

- 2.1.1 The previous noise survey and assessment methods were agreed with Mr. Nick Minchall of Environmental Protection, Wrexham Borough Council² for previous application for cheese cutting and packaging facility. It was agreed with Local Authority³ that another noise survey was required to support the planning application of the poultry processing facility.

2.2 Operational Noise

Technical Advice Note 11 (TAN 11) Noise

- 2.2.1 A noise impact assessment is required in accordance with the Welsh Guidance document 'Technical Advice Note 11 (TAN 11) Noise' under Item B17 which recommends the use of BS4142:1990 (now superseded by BS 4142: 1997 – 'Method for Rating industrial noise affecting Mixed Residential and Industrial Areas' for assessing industrial noise.

BS 4142: 1997

- 2.2.2 BS4142: 'Method for rating Industrial Noise affecting Mixed Residential and Industrial Areas' 1997ⁱ provides a method of determining the 'likelihood of complaint' due to industrial noise sources. The basis of the BS4142 standard is a comparison between the background noise level (L_{A90}) in the vicinity of residential locations and the Rating Level of the industrial noise source under consideration. The Rating Level is the specific noise level plus a 5 dB penalty added for the characteristic features of the noise.

- BS4142 suggests that a Rating Level excess of up to 5 dB(A) above the background noise level at the receptor is 'of marginal significance'.
- If the Rating Level due to the noise source exceeds the background noise level by more than 10 dB(A) then the indication is that 'complaints are likely'.
- If the Rating Level of the noise source is more than 10 dB(A) below the background noise level this is a positive indication that 'complaints are unlikely'.

Health and Safety at Work Act 1974

- 2.2.3 Employers' and employees' responsibilities for health and safety are laid down by the Health and Safety and Work Act (1974)ⁱⁱ. This Act seeks to protect all persons at work whether employers, employees or members of the general public affected by the work activities.

² Conversation between Miles Woolley, Environoise Consulting Limited and Nick Minchall, Environmental Protection, Wrexham Borough Council on Tuesday 23rd August 2011 and then subsequent email sent by Miles Woolley at 14:48 hours the same day.

³ Verbally agreed between Environmental Protection, Wrexham Borough Council and Miles Woolley, Environoise Consulting prior to the noise surveys.

The Control of Noise at Work Regulations 2005

- 2.2.4 On the 6 February 2003 the European Parliament issued the new Physical Agents (Noise) Directive 2003/10/ECⁱⁱⁱ. In the UK this resulted in the replacement of The Noise at Work Regulations 1989^{iv} with The Control of Noise Work Regulations 2005,^v introduced in April 2006. Employers and employees must comply with the regulations.
- 2.2.5 Lower limits for noise exposure and obligations on employers and employees have applied since 2006. The principal provisions of the Regulations are outlined under items 2.36 to 2.38.
- 2.2.6 When an employee is exposed at or above a Lower Exposure Action Value (LAV); i.e. a daily or weekly noise exposure of 80 dB(A) and a peak sound pressure level of 135 dB(C):
- Employers must make an assessment of the risk.
 - Hearing protection must be made available on request.
 - Information, instruction and training must be given.
- 2.2.7 When an employee is exposed at or above an Upper Exposure Action Value (UAV); i.e. a daily or weekly noise exposure of 85 dB(A) and a peak sound pressure level of 137 dB(C):
- The risk assessment must include measurement of noise levels.
 - Organisational and technical measures, not hearing protectors, must be taken to minimise noise exposure.
 - Areas must be designated as Hearing Protection Zones.
 - Hearing protection must be provided, employers must ensure that it is used and employees have a duty to use it.
- 2.2.8 No employee must be exposed above an exposure limit value; i.e. a daily or weekly noise exposure of 87 dB(A) and a peak sound pressure level of 140dB(C). Any hearing protection provided must bring exposure below the exposure limit value. The limit value is a final check to ensure that the employer has done all that is reasonably practicable, especially in circumstances where noise levels are high.

Calculation of Road Traffic Noise (CRTN)

- 2.2.9 Calculation of Road traffic Noise (CRTN) 1998^{vi} shows methods for calculating the road traffic noise associated with a proposed development. The noise levels calculated depend on many factors such as the flow of traffic, the average speed, the nature of the road surface and intervening ground, the percentage of HGV traffic etc.

Design Manual for Roads and Bridges (DMRB) 2008

- 2.2.10 Design Manual for Roads and Bridges (DMRB) 2008 Volume 11^{vii} describes how to assess noise and vibration effects from roads. The approach is to compare the 'with and without' scheme scenarios referred to as the 'do something' and 'do minimum' scenarios respectively.

- 2.2.11 A scale that is widely used to assess the significance of changes in road traffic noise has been developed from the DMRB to assess the noise effects caused by changes due to new developments, see Table 2.

Table 2: Significance of changes in road traffic noise levels.

Change in noise level (dB)	Impact Category	Initial Indicator of Significance
≥ 5	Major Adverse	Potentially significant increase
≥ 3 to ≤ 5	Moderate Adverse	Potentially significant increase
≥ 1 to < 3	Minor Adverse	Unlikely to be significant
< 1 to > -1	Negligible	Unlikely to be significant
≤ -1 to > -3	Minor Beneficial	Unlikely to be significant
≤ -3 to > -5	Moderate Beneficial	Potentially significant decrease
≤ -5	Major Beneficial	Potentially significant decrease

- 2.2.12 Additionally a major impact is identified for any properties experiencing an increase in noise levels in excess of 1 dB with the development in operation if the levels without the development in operation are already in excess of 68dB L_{Aeq} 16 hour.

3 Noise Survey

Daytime

- 3.1.1 Daytime noise levels were measured at three locations between 13:40hrs and 19:12hrs on 13th August 2014 representative of the nearest Noise Sensitive Receptors (NSRs). See Figure 1 for measurement locations with the existing site shown. See Appendix A for noise data.

Night-time

- 3.1.2 Night-time noise levels were measured at the same locations between 00:10hrs and 02:45hrs on 14th August 2014. See Appendix A for noise data.

- **Location 1:** 5m from the A525 opposite farm and south of 'Porthygan Farm'.
- **Location 2:** 10m from site entrance opposite 'Marlbrook' residential receptor also representative of Gloucester, Pickhill Lane.
- **Location 3:** 10m from residential block on 'Pickhill Old Hall' (farm and rented dwellings)*.

Figure 1: Noise measurement locations.



- 3.1.3 *Access to Location 3 was not possible for the night time measurement, therefore a measurement was made at Whiteside Cottage. Due to the low levels and lack of traffic this measurement can be deemed representative of the levels at Location 3.

3.1.4 Details of instrumentation used are given in Table 3.

Table 3: Instrument Details

Manufacturer	Equipment type	Serial number	Calibration date
Rion	NA-28 sound level meter	00501401	5 th December 2014
	NH-23 preamplifier	01440	
	UC-59 Microphone	03881	
	NC-34 calibrator with ½" adaptor	34904967	15 th July 2014
	WS03 Outdoor windshield	N/A	N/A
Tevion	Camera tripod 53 2A004353	N/A	N/A

3.1.5 The sound level meter was calibrated at the start and end of the noise surveys, there was no recorded drift greater than 0.3dB at 1 kHz. The calibration chain is traceable via United Kingdom Accreditation Service (UKAS) to National Standards held at the National Physical Laboratory (NPL).

4 Operational Noise Assessment

4.1 Overview

4.1.1 The noise impact of the operational facility will be from four main activities:

- Noise from cars and HGVs to and from the site.
- On-site vehicle movements.
- Noise break-out from internal processes e.g. the automated packaging facility.
- Noise egress from external plant.

4.2 Onsite vehicle movements

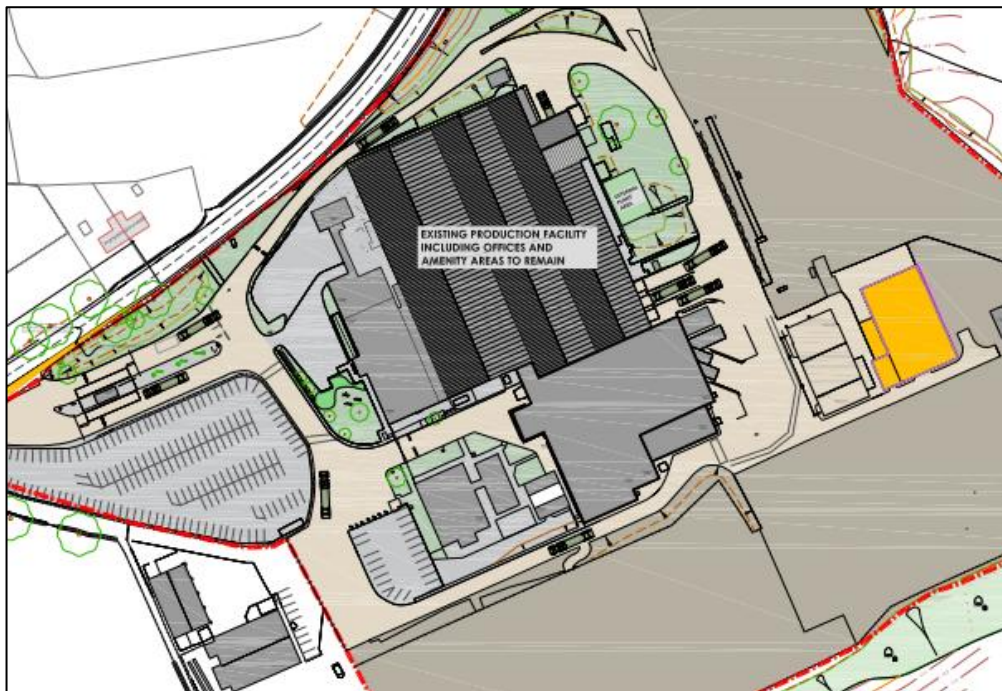
Staff Vehicles

4.2.1 Total staff numbers on the site are predicted to be less with up to 150 staff (formerly 220). This will result in a reduction in staff vehicle noise levels of 1.7dB which is considered “minor beneficial” and “unlikely to be significant” (see Table 2) when compared with the previous operation..

Future on site HGV Movements

4.2.2 Existing entrance operation and locations at Pickhill Lane will be unchanged. The proposed site layout is shown in Figure 1.

Figure 1: Proposed site layout.



- 4.2.3 The HGV movements on site are proposed to remain the same as when the site was operational as a cheese cutting and packaging facility.
- 4.2.4 Noise levels at NSR 2 will therefore not increase as a result which is considered “negligible” (see Table 2) when compared with the application for the cheese cutting and packaging facility. No further assessment is required.

4.3 Noise Egress from Internal Processes

- 4.3.1 The calculated upper Rating Levels within the industrial spaces proposed are shown in Table 4 so that the target criteria are met at the NSR’s. NSRs 2 and 3 have only been considered as NSR 1 is furthest away and therefore will be dealt with through this assessment.
- 4.3.2 The Rating Level includes a 5dB penalty on the assumption that internal noise levels will be intermittent or tonal. Therefore the recommended reverberant internal noise level limits are 5dB less, see the last two columns of Table 4.

Table 4: Internal noise levels limits Processing Facility.

Proposed Area	Upper Rating noise limit (dB) to NSR No.		Upper reverberant noise limit $L_{Aeq,T}$ within space (dB)	
	2	3	2	3
Production Facility	78	82	73	77

- 4.3.3 The recommended maximum internal reverberant noise levels shall be less than 77dB $L_{Aeq,T}$ within the Processing Facility so that targets are met at the receptors.
- 4.3.4 Internal reverberant noise levels should be less than 80dB $L_{Aeq,T}$ so that worker’s noise exposure levels do not exceed the Lower Action Value (LAV) of 80dBA prescribed in The Control of Noise at Work Regulations 2005.
- 4.3.5 We would expect noise levels to range between 78 and 83dB $L_{Aeq,T}$ for noise associated with palletizing, inspection and wrap so providing noise levels are at the lower end of these typical noise levels no further mitigation measures are necessary.
- 4.3.6 For the time being it is suggested that noise from poultry is dealt with through a suitable management plan and that a further noise survey should be done once the site is active.
- 4.3.7 Plant should be chosen for the Processing Facility so that the recommended targets are met. At the detailed stage (post Planning Approval), it would also be helpful to introduce hygiene compatible absorptive surfaces to reduce reverberation in the processing areas.

5 Traffic Noise Assessment & Results

Pickhill Lane

- 5.1.1 A three hour measurement made up of separate one hour periods was made at Location 2 so that the existing 16 hour traffic noise level could be assessed using the methodology in Calculation of Road Traffic Noise (CRTN)^{viii}. The current value of $L_{10(18 \text{ hour})}$ can be calculated from the following:

$$L_{A10(18\text{hour})} = L_{A10(3\text{hour})} - 1 \text{ dB}$$

The daytime ambient level can be calculated as follows:

$$L_{Aeq,16\text{hour}} = L_{A10(18 \text{ hour})} - 1 \text{ dB}$$

- 5.1.2 The $L_{A10(3\text{hour})}$ is the arithmetic mean of three consecutive values of hourly L_{A10} measured between 10.00 and 17.00 hrs which is 53.5dB $L_{A10(3 \text{ hour})}$. Therefore the calculated $L_{A10(18 \text{ hour})}$ at Location 2 is 52.5dB i.e. (53.5dB - 1dB = 52.5dB) or 51.5dB $L_{Aeq,16\text{hour}}$.

Existing Scenario

- 5.1.3 The 2011 measured noise level calculated was 57.1dB $L_{A10(18 \text{ hour})}$ or 56.1dB $L_{Aeq,16\text{hour}}$ at 5 metres from the road edge.
- 5.1.4 The 2014 level was a significant 4.6dB less meaning that (as the site is less active) noise from predicted flows will have a greater noise impact when compared with the current baseline noise level.

Proposed 'with scheme' Scenario

- 5.1.5 For NSRs on Pickhill Lane, the change in noise level due to road traffic will no longer be 'negligible' (based on measured 2011 levels). The change in traffic noise levels shall be categorised as 'moderate adverse' and a 'potentially significant increase'.
- 5.1.6 However, if the scheme is compared with the most recent previous application for the Cheese Cutting and Packaging Facility, there would be no change in the associated noise level. Therefore comparably the noise levels to NSR 2 will not increase which is considered "negligible" (see Table 2).

A525

- 5.1.7 It should be noted that the number of trips to and from the facility along the wider highway network (between Maelor and Whitchurch) will reduce with the development proposals. It is predicted that 1,300 trips annually will be removed from the wider highway network, as there will no longer be a requirement for HGV trips between Maelor and 'Grocontinental' sites located to the north via the A525.

- 5.1.8 Two way 18 hour traffic flow was not available, AM and PM flow data was available based on 2016 'without the scheme' and 2016 'with scheme' only. The greatest change in traffic flow is predicted during the morning so only AM flow data has been used. Furthermore, the data from Figures² has been split into two road sections northbound and south bound of the Pickhill Lane turn off from the A525 to further assess the noise impact on the broader road network. Flow rates have been taken in both directions for both the north and south sections, see Table 5.

Table 5: AM Traffic Noise with and without development 2016.

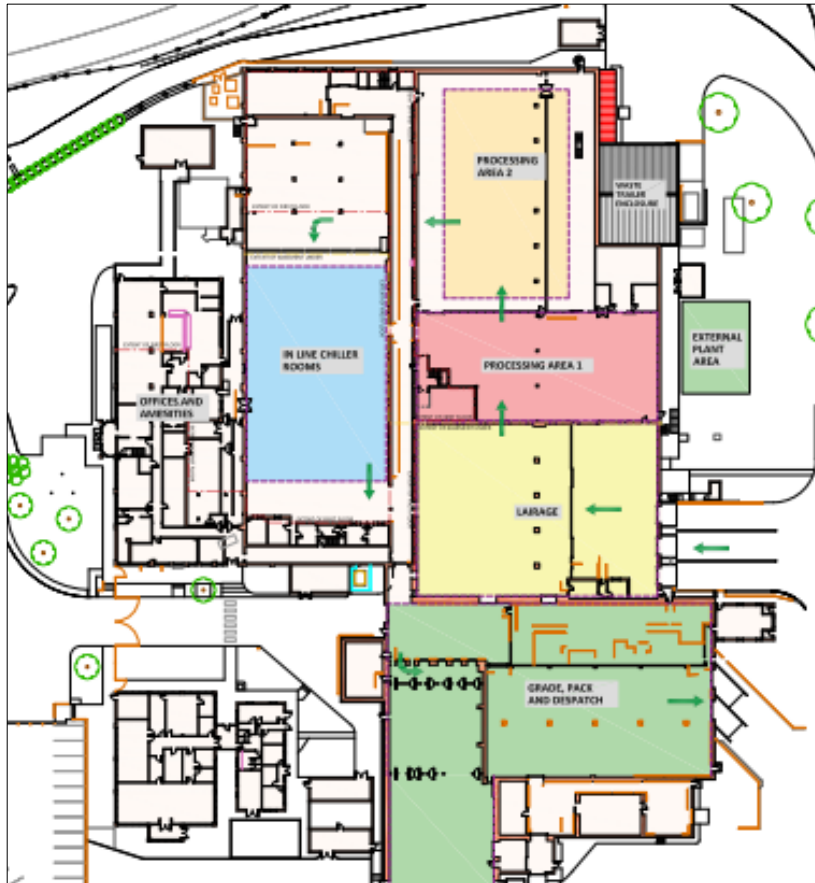
Period	Two way traffic flow – North Section	% HGVs – North Section	Two way traffic flow – South section	% HGVs – South Section
'without scheme'	551	7.1	611	6.3
'with scheme'	552	7.1	620	6.9

- 5.1.9 There will be no change in traffic noise arising from the proposed development in 2016 on the A525 section north of Pickhill Lane.
- 5.1.10 The change in traffic noise arising from the proposed development in 2016 is a 0.1 dB increase on the A525 section south of Pickhill Lane.
- 5.1.11 Therefore for NSRs on both north and southbound sections of the A525 the change in noise level due to road traffic will be 'negligible' in terms of impact category and 'unlikely to be significant', see Table 2.

6 External Plant Noise Assessment and Results

- 6.1.1 Noise from the proposed external plant area have been calculated to NSR 2 assuming they are both located as shown in Figure 2 (to the left of the main site shown in green). This location has been used as it presents the highest level of noise impact to NSR 2 given the shortest distance of 140 metres.

Figure 2: Proposed Site Layout including External Plant Area.



Calculation

- 6.1.2 Approximately 95% of plant will be located internally within the existing building. Noise from external plant at NSR 2 has been calculated using the following formula:
- $L_p = L_w - (20 \times \log r) - 11 + \text{Directivity Index}$
 - Where L_p = Sound Pressure Level (dBA).
 - Where L_w = Sound Power Level (dBA).
 - r = distance of plant to receiver (205m).
 - Directivity Index = 3dB (for hemi-spherical noise radiation).
- 6.1.3 We have assumed a nominal 10dBA attenuation due to shielding by the proposed buildings and no housing for proposed external plant.

Results

- 6.1.4 The noise target for external plant is 18dBA (28dBA – 10dB) for a “positive indication that complaints are unlikely” according to BS4142:1997 at the nearest receptor.
- 6.1.5 Noise from the external plant area should be designed to an overall sound power level of 79dB L_{WA} . Alternatively the plant shall have a sound power level of 84dB L_{WA} but be located in housing with a minimum sound reduction of 15dB.

7 Conclusions & Recommendations

7.1 Onsite Vehicle Movement Noise

7.1.1 No mitigation measures such as barriers are required; however we recommend the following actions for control of noise on site and general good practice.

- HGV engines should not be left idling.
- HGV doors should not be slammed (particularly during the night-time).
- HGVs must be limited to 5mph on site. There must be clear signage on entering, leaving and on the site to remind drivers of this protocol.
- Unnecessary use of horns to be prohibited, particularly during the night-time (23:00hrs – 07:00hrs).
- Use of white noise Reversing Alarms is preferable to reduce tonality.
- For FLTs ideally they would use a light warning systems rather than reversing alarms. If necessary FLT alarms should also be white noise.
- Appropriate signage to HGV drivers regarding speed, use of horns, turn engine off etc.
- Similarly, a Manager should be onsite during all deliveries to maintain good practice from drivers and store staff to minimize noise levels.
- Use of banksmen to guide reversing HGVs.

7.1.2 A collapsible dock shelter should be used by HGVs to contain noise from poultry and internal processes, see Figure 3.

Figure 3: Collapsible dock shelter.



7.2 Operational Noise Egress

7.2.1 Providing plant is compliant so that workers are not exposed to over the Lower Action Value (LAV) according to The control of Noise at Work Regulations, noise egress targets will be met. Further assessment (post planning) will be required once further details become available.

7.3 Traffic Noise

- 7.3.1 For NSRs on Pickhill Lane, the change in noise level due to road traffic will no longer be 'negligible' (based on measured 2011 levels). The change in traffic noise levels shall be categorised as 'moderate adverse' and a 'potentially significant increase'.
- 7.3.2 However, if the scheme is compared with the most recent previous application for the Cheese Cutting and Packaging Facility, there would be no change in associated noise level. Therefore comparably the noise levels to NSR 2 will not increase and will be considered "negligible" according to DMRB.

7.4 External Plant Noise

- 7.4.1 Noise from the external plant area should be designed to an overall sound power level of 79dB L_{WA} . Alternatively the plant shall have a sound power level of 84dB L_{WA} but be located in housing with a minimum sound reduction of 15dB.

7.5 Management Plan

- 7.5.1 In order to demonstrate the operator has identified all potential noise emission risks and has taken all appropriate measures to manage noise they will submit a noise management plan as a part of the development project. The expectation is that this Plan will be prepared and submitted for approval, via the discharge of an appropriate planning condition, prior to the facility being operational.

Noise Monitoring

- 7.5.2 The operator will outline in their noise management plan the monitoring procedures they will implement at the site. The monitoring results will be regularly reviewed and used to evaluate the effectiveness of the site's noise control measures in order to continuously improve the efficiency of noise mitigation measures.
- 7.5.3 Regular noise monitoring will be undertaken at predetermined times and locations around the site boundary. In the event of a noise related complaint from neighbours additional monitoring will be undertaken. The monitoring will be carried out by trained, competent personnel.
- 7.5.4 Site staff will record time, date, noise type, location and intensity during their routine monitoring. If a complaint is received the circumstances, time and date will be recorded and the operator will undertake an investigation to determine the source of the noise and ascertain the appropriate mitigation.

7.6 Environmental Permit

It should be borne in mind that a separate application will have to be made to the Environment Agency for a permit to operate in accordance with the Pollution Prevention and Control Regulations. Previously licences were granted by local authorities. Submission of a formal noise management plan, setting out the principles of operations to be adopted and relevant BAT's (Best Available Techniques) to be applied for noise control, will be submitted as part of the

application for a permit. This is likely to be in the form of an Integrated Pollution Prevention and Control (IPPC) (2008/1/EC) (IPPC) Assessment^{ix}.

References

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- ⁱ BS4142: 'Method for rating Industrial Noise affecting Mixed Residential and Industrial Areas' 1997.
 - ⁱⁱ The Health and Safety and Work Act (1974).
 - ⁱⁱⁱ The Physical Agents (Noise) Directive 2003/10/EC.
 - ^{iv} The Noise at Work Regulations 1989.
 - ^v The Control of Noise Work Regulations 2005.
 - ^{vi} Calculation of Road traffic Noise (CRTN) 1998.
 - ^{vii} Design Manual for Roads and Bridges (DMRB) 2008 Volume 11.
 - ^{viii} Calculation of Road Traffic Noise (CRTN).
 - ^{ix} Integrated Pollution Prevention and Control (IPPC) (2008/1/EC) (IPPC) Assessment.



Appendix A: Noise data

Table 6: Measured daytime hourly ambient noise levels.

Start Time (hh:mm)	Location	L _{eq, 1hour} octave band centre frequency (Hz)							L _{Aeq, 1hour} (dB)
		63	125	250	500	1k	2k	4k	
18:12	1	70.1	64.0	61.1	65.6	68.8	61.8	51.2	70.7
13:40	2	61.2	58.0	55.8	56.5	57.5	51.7	45.7	60.4
14:40	2	60.4	56.7	55.7	54.7	54.7	46.7	39.3	57.5
15:40	2	61.8	56.7	56.4	55.6	58.4	51.1	44.7	60.6
17:00	3	61.1	62.3	54.4	44.5	45.9	43.1	38.6	52.1

Table 7: Measured daytime L₁₀ noise levels.

Start Time (hh:mm)	Location	L _{10 (1hour)} octave band centre frequency (Hz)							L _{A10 (1 hour)} (dB)
		63	125	250	500	1k	2k	4k	
18:12	1	70.9	66.0	65.1	68.6	73.4	66.9	55.8	75.3
13:40	2	59.2	53.9	47.9	47.5	49.4	43.1	39.2	52.9
14:40	2	60.6	55.4	51.6	47.4	47.3	41.5	40.0	52.6
15:40	2	60.8	54.9	51.9	49.3	52.3	44.9	41.6	54.9
17:00	3	59.6	52.4	45.0	41.5	43.4	40.2	36.3	47.9

Table 8: Measured daytime background (L₉₀) noise levels.

Start Time (hh:mm)	Location	L _{90 (1hour)} octave band centre frequency (Hz)							L _{90 (1 hour)} (dB)
		63	125	250	500	1k	2k	4k	
18:12	1	43.8	38.0	32.2	33.8	36.5	31.7	25.1	39.8
13:40	2	45.9	39.9	35.3	34.1	35.4	30.5	26.1	39.7
14:40	2	47.0	40.0	35.4	33.5	35.1	30.5	28.0	39.5
15:40	2	48.1	40.5	36.3	34.5	36.3	31.6	28.5	40.8
17:00	3	47.8	42.0	34.4	33.8	36.2	30.6	25.3	40.0



Table 9: Measured night-time ambient noise levels.

Start Time (hh:mm)	Location	L _{eq, 5minutes} octave band centre frequency (Hz)							L _{Aeq, 5 minutes} (dB)
		63	125	250	500	1k	2k	4k	
02:15	1	66.3	56.7	55.3	61.4	61.5	52.5	45.3	63.8
02:20	1	46.8	36.7	32.5	36.0	36.6	29.6	20.2	39.1
02:25	1	51.1	45.7	45.0	50.3	57.8	47.7	37.7	58.6
02:30	1	60.5	53.0	51.7	54.9	55.7	47.0	37.7	57.9
02:35	1	69.9	56.2	56.4	59.0	59.0	51.3	42.7	61.6
02:40	1	39.5	33.9	28.8	24.4	20.9	18.8	16.0	27.7
00:50	2	48.5	39.4	34.4	34.9	35.6	26.1	14.9	38.0
00:55	2	44.8	38.6	34.6	33.2	37.4	26.7	13.6	38.8
01:00	2	46.5	38.0	33.7	40.6	41.2	28.4	15.5	43.0
01:05	2	43.2	36.8	32.5	33.0	38.8	28.4	13.6	39.9
01:10	2	43.7	40.1	36.0	32.5	38.0	30.1	13.9	39.7
01:15	2	47.0	43.9	36.1	37.7	40.8	29.7	16.1	42.3
01:20	2	46.9	42.4	35.5	34.5	34.1	24.6	13.8	37.2
01:25	2	45.2	41.7	35.6	32.9	39.2	28.5	14.0	40.3
00:04	3	41.5	34.2	28.9	32.4	30.2	22.8	20.5	34.0
00:09	3	44.1	37.4	33.3	33.8	34.5	26.4	25.7	37.9
00:14	3	43.5	34.7	28.0	29.1	30.7	22.2	11.3	33.0
00:19	3	41.4	31.8	26.2	26.8	26.3	18.3	11.0	29.4
00:24	3	39.7	33.3	28.3	28.7	30.3	21.4	10.9	32.4
00:29	3	39.6	32.1	28.2	29.9	29.0	19.1	10.7	31.8



Table 10: Measured night-time background noise levels.

Start Time (hh:mm)	Location	L ₉₀ (5 minutes) octave band centre frequency (Hz)							L ₉₀ (5 minutes) (dB)
		63	125	250	500	1k	2k	4k	
02:15	1	37.4	33.2	28.9	25.2	21.4	18.7	15.3	28.1
02:20	1	36.3	33.2	28.2	23.7	20.2	18.0	15.1	27.3
02:25	1	35.9	34.5	28.4	24.0	20.3	18.0	15.2	27.6
02:30	1	36.3	34.3	28.9	24.3	20.8	18.4	15.3	27.9
02:35	1	36.1	33.9	29.3	25.3	21.1	18.2	15.5	28.1
02:40	1	36.5	32.4	27.8	23.5	20.2	18.2	15.4	27.2
00:50	2	41.6	37.1	32.7	27.2	24.9	16.1	10.9	30.5
00:55	2	41.0	36.6	32.6	25.8	22.5	15.7	11.0	29.1
01:00	2	39.9	35.1	30.9	24.5	22.3	15.4	10.8	28.4
01:05	2	40.6	34.7	30.7	24.8	23.0	15.5	10.7	28.6
01:10	2	41.6	38.4	34.5	25.7	23.3	14.7	10.6	30.3
01:15	2	42.5	41.5	34.7	28.9	25.4	16.0	10.8	32.3
01:20	2	43.0	39.8	34.0	27.6	23.4	14.8	10.8	30.9
01:25	2	42.5	39.5	33.9	27.3	23.5	15.1	10.7	30.7
00:04	3	38.0	32.0	26.1	25.9	21.8	14.6	10.6	27.2
00:09	3	39.9	33.8	29.3	29.5	27.8	18.3	10.8	32.1
00:14	3	38.1	30.7	25.8	25.9	24.3	17.1	10.6	28.2
00:19	3	36.8	29.9	24.6	24.4	22.2	15.0	10.4	26.6
00:24	3	37.1	30.9	26.2	25.4	23.7	14.8	10.3	27.7
00:29	3	36.4	30.2	26.2	25.3	22.6	14.1	10.3	27.1

Appendix B: Terminology

Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal, Pa). Because of this wide range a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140dB.

The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure noise is weighted to represent the performance of the ear. This is known as the 'A weighting' and annotated as dB(A).

Table 6: Noise levels for common situations.

Typical noise level dB(A)	Example
0	Threshold of hearing
30	Rural area at night, still air
40	Public library, refrigerator humming at 2m
50	Quiet office, no machinery, Boiling kettle at 0.5m
60	Normal conversation
70	Telephone ringing at 2m, Vacuum cleaner at 3m
80	General factory noise level, HGV measured from pavement
90	Powered lawn motor, operators ear
100	Pneumatic drill at 5m
120	Discotheque – 1m in front of loudspeaker

The noise level at a measurement point is rarely steady, even in rural areas, and varies over a range dependent upon the effects of local noise sources. Close to a busy motorway, the noise levels may vary over a range of 5dB(A), whereas in a suburban area this may increase up to 40dB(A) and more due to the multitude of noise sources in such areas (cars, dogs, aircraft etc.) and their variable operation. Furthermore, the range of night-time noise levels will often be smaller and the levels significantly reduced compared with daytime levels. When considering environmental noise, it is necessary to consider how to quantify the existing noise (the ambient noise) to account for these second to second variations.

Human subjects are generally only capable of noticing changes in steady levels of no less than 3dB(A). It is generally accepted that a change of 10dB(A) in an overall, steady noise level is perceived to the human ear as a doubling (or halving) of the noise level. (These findings do not necessarily apply to transient or non-steady noise sources such as changes in noise due to change in road traffic flow, or intermittent noise sources).

The equivalent continuous A-weighted sound pressure level, L_{Aeq} , is the single number that represents the average sound energy measured over that period. The L_{Aeq} is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period. It is

commonly used to express the energy value from individual sources that vary in level over their operational cycle.

A parameter that is widely accepted as reflecting human perception of ambient noise is the background noise level, LA90. This is the noise level exceeded for 90% of the measurement period and generally reflects the noise level in the lulls between individual noise events. Over a 1 hour period, the LA90 will be the noise level exceeded for 54 minutes.

L_{Amax} is the maximum instantaneous sound pressure level attained during a measurement period (30 seconds, 5 minutes etc) and can be measured using slow or fast weighting. It is generally used when assessing the likelihood of night-time sleep disturbance.

Most environmental noise measurements and assessments are undertaken for 'free-field', away from any existing reflecting surfaces (other than the ground). However, it is sometimes necessary to consider noise levels immediately external to a façade when considering the impact on residents inside properties and this requires the addition of 3dB(A) to the predicted (or measured) free-field level due to noise reflection from the façade. The assessment of road traffic noise, for example, is based on predicted (or measured) façade noise level (using the L_{A10} statistical parameter).