



Environmental Noise Assessment

Island Green, Wrexham

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Island Green, Wrexham

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Content

Executive Summary

1.	Introduction.....	1
2.	Site Description and Development Proposals.....	2
2.1	Site Description	2
2.2	Development Proposals	2
3.	Planning Policy Guidance and Legislation.....	3
3.1	Guidance.....	3
3.2	Local Authority Consultation	4
4.	Assessment Methodology	5
4.1	HGV Deliveries.....	5
4.2	Car Park and ‘Drive-Thru’	5
4.3	BS 4142 Assessment.....	5
5.	Baseline Conditions	7
5.1	Noise Sensitive Receptors.....	7
5.2	Environmental Noise Survey.....	7
6.	Impact Assessment.....	9
6.1	HGV Deliveries.....	9
6.2	Car Park and Fast Food ‘Drive-Thru’ Movements	10
6.3	Fixed Plant	10
7.	Mitigation.....	13
8.	Conclusions	14

Figures

Figure 1:	Proposed Site Layout.....	15
Figure 2:	Noise Monitoring Locations and SRs.....	15
Figure 3:	Daytime Fixed Plant Noise Emission (dB LAeq,16hr)	16
Figure 4:	Night Time Fixed Plant Noise Emission (dB LAeq,8hr)	16
Figure 5:	Daytime Car Park Noise Emission (dB LAeq,16hr)	17

Tables

Table 1:	Significance of Noise from HGV Deliveries, Car Park and 'Drive-Thru'	5
Table 2:	BS 4142 Impact Level of Significance	6
Table 3:	Noise Sensitive Receptors	7
Table 4:	Noise Monitoring Locations.....	7
Table 5:	Noise Monitoring Equipment.....	8
Table 6:	Baseline Noise Measurements	8
Table 7:	HGV Deliveries Source Noise Levels	9
Table 8:	Significance of HGV Deliveries at SRs	9
Table 9:	Car Park and 'Drive-Thru' Noise Assessment	10
Table 10:	Fixed Plant Noise Levels	11
Table 11:	Predicted Restaurant External Plant Noise Levels	11

Appendices

Appendix A Acoustic Terminology

Appendix B Baseline Noise Measurements

Appendix C Noise Calculations

EXECUTIVE SUMMARY

Henderson RWF is seeking to obtain planning permission for a proposed Restaurant Development at Island Green Shopping Park, Wrexham.

In support of the planning application a noise assessment has been undertaken in accordance with BS 4142: 2014 having regard to Technical Advice Note 11 entitled 'Noise' and the requirements of Wrexham Council. The potential noise impact from HGV deliveries and other restaurant operations including car-park and 'drive-thru' operations, have been assessed by predicting the change in the prevailing noise climate. The potential noise impact from fixed external plant has been undertaken in accordance with BS4142 based on a typical plant compliment. The proposed operational hours of the restaurant are daytime only (0700-2300) with the potential for some items of fixed external plant to be operational 24/7, although at a reduced capacity during the night-time period.

The proposed development has mitigation inherent in the scheme design which has been taken into account when assessing the potential impact; namely a roof mounted plant noise barrier of not less than 1.5m above roof height.

The assessment, which is based on 1 HGV delivery within any 1 hour daytime period, indicates that an insignificant noise impact is predicted to occur during HGV deliveries.

Noise arising from the 'drive-thru' and car- parking activities associated with the restaurant has been assessed by predicting the change in the daytime hourly noise levels at the worst affected facades of the nearest sensitive receptors during peak periods. This assessment indicates that noise arising will have an insignificant impact on the closest noise sensitive receptors.

Control of plant noise levels through a suitably worded planning condition is considered to adequately protect the existing amenity of the area.

In conclusion, the proposed Development would not adversely affect the residential amenity of the surrounding area. There are no reasons therefore for the refusal of planning permission on the grounds of noise.

1. Introduction

Waterman Infrastructure and Environment Ltd (hereafter 'Waterman') has been instructed by Henderson RWF (hereafter 'the Applicant') to undertake an assessment of environmental noise associated with the operation of the proposed Restaurant Development located at Island Green Shopping Centre, Wrexham (hereafter referred to as the 'Site').

The Site is currently occupied by a car park which is associated with the existing Island Green shopping centre. The Applicant is seeking to obtain planning permission for the construction of a 'drive-thru' restaurant, (hereafter referred to as the 'Development').

The potential for the operation of the proposed Development to impact on noise levels at nearby residential dwellings, primarily associated with fixed plant, has been evaluated in accordance with BS 4142:2014. Potential impact from HGV deliveries, drive through and car park activities has been assessed against the predicted change in the prevailing noise levels.

The appendices associated with this report are as follows:

- Appendix A - Glossary of Acoustic Terms;
- Appendix B - Baseline Environmental Noise Survey;
- Appendix C - Noise Calculations.

2. Site Description and Development Proposals

2.1 Site Description

The Site, located in the centre of Wrexham, in an area of mixed residential and commercial use is bound by Pentre Felin to the south with commercial buildings to the east and west. The River Gwenfro flows adjacent to the northern boundary beyond which is the residential area of Y Werddon.

2.2 Development Proposals

The applicant wishes to seek planning permission for a restaurant incorporating a 'drive-thru' together with surface car parking. Operational hours of the proposed restaurant are 07:00 to 23:00 hours.

The proposed Site layout is presented as Figure 1.

3. Planning Policy Guidance and Legislation

Technical Advice Note (Wales) 11: Noise, 1997¹

Technical Advice Note 11 provides guidance on how the planning system may be used to minimise the adverse impact of noise without placing unreasonable restrictions on developments or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account when determining planning applications for developments which will either generate noise, or be exposed to existing noise sources.

Specifically, paragraph 8 states:

“Noise generating development

Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. They should also bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions.”

Where it is necessary to assess the impact of a proposed commercial or industrial development, paragraph B17 states that, where the standard is appropriate, BS 4142:1997² may be used to assess the likelihood of complaints arising from the proposed development. BS 4142 has been subsequently been updated in 2014, guidance is therefore drawn from the most recent version with regard to the assessment of commercial or industrial noise.

3.1 Guidance

British Standard 4142: Methods for Rating and Assessing Industrial and Commercial Sound, 2014

BS 4142³ provides a method for the rating and assessment of sound of an industrial and/or commercial nature. The assessment method allows the likely effects of sound on people to be determined. The significance of the sound depends upon the margin by which the ‘rating level’ ($L_{Ar,Tr}$) exceeds the background level (L_{A90}). Typically the greater this difference the greater the magnitude of the effect.

The ‘rating level’ is equal to the specific sound level if there are no acoustic features present (tonal/impulsive/intermittent). Depending on the acoustic feature an acoustic correction of +2 to +9dB may be applied to obtain the rating noise level. Where a sound has more than one acoustic feature of equal dominance then the appropriate acoustic corrections are summed.

The required performance of plant varies from local authority to local authority, however, for the purpose of this study a design goal has been set limiting plant noise to below the prevailing background noise level in terms of L_{A90} .

World Health Organisation Guidelines for Community Noise, 1999

The WHO published guidance on the desirable levels of environmental noise in 1999. In this document entitled, Guidelines for Community Noise⁴, the authors consider that sleep disturbance criteria should be taken as an internal noise level of 30dB $L_{Aeq, 8hr}$ or an external level of 45dB $L_{Aeq, 8hr}$, measured at 1m from the façade. It is also suggested that internal L_{Amax} levels of 45dB and external L_{Amax} levels of 60dB, should not be exceeded.

¹ Planning Guidance (Wales), (1997). Technical Advice Note (Wales) 11, Noise.

² BSI. (1997) BS 4142 ‘Method for rating noise industrial noise affecting mixed residential and industrial areas’.

³ British Standards Institute, 2014, BS 4142 ;Methods for rating and assessing Industrial and Commercial Sound, BSI

⁴ World Health Organisation. Guidelines for Community Noise. 1999

WHO guidance further states that ‘for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night’, which corresponds to external L_{Amax} levels at the SR above 60dB L_{Amax} .

For daytime levels, taken to be between 0700-2300, it is considered that:

“To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB L_{Aeq} on balconies, terraces, and outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB L_{Aeq} . Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.”

However, a review of health effects based noise assessment methods undertaken for the DETR by Porter *et al* in 1998⁵, just before the issue of Guidelines for Community Noise, it is noted that:

“Perhaps the main weakness of both WHO inspired documents is that they fail to consider the practicality of actually being able to achieve any of the stated guideline values.”

Based on the most recent national survey of noise exposure carried out in England and Wales in 2000 to 2001, the percentage of the population exposed to day and night-time noise levels exceeding the WHO guidelines are 54% and 67%, respectively. The studies⁶ indicate that:

“The percentage of the UK population exposed to daytime levels of 55dB $L_{Aeq,16hr}$ or greater, have decreased since 1990, whilst the percentage of the UK population exposed to night-time levels of 45dB $L_{Aeq,8hr}$ or greater, have increased since 1990, although this change is not considered statistically significant.”

Therefore, the levels suggested in Guidelines for Community Noise may be considered more aspirational than immediately attainable.

3.2 Local Authority Consultation

The strategy for the baseline noise survey was agreed in advance with Wrexham Council who confirmed acceptance of the proposed methodology by e-mail dated 2nd March 2015 (refer to Appendix B). The Environmental Health Officer (Nick Minshall) confirmed that their required noise condition with regard to fixed external plant is that the rating noise level should not exceed the prevailing background noise level.

⁵ Porter, N. D., Flindell, I. H. and Berry, B. F. Health Effect Based Noise Assessment Methods: A Review and Feasibility Study. NPL Report CMAM 16. National Physical Laboratory. September 1998.

⁶ Skinner, C. J and Grimwood, C. J. The UK National Noise Incidence Study 2000/2001. Noise Forum Conference. Building Research Establishment. May 2002.

4. Assessment Methodology

4.1 HGV Deliveries

There are no recognised procedures within the UK to determine the noise impact from HGV deliveries, 'drive-thru' and car park noise, although it is general consensus within the acoustic community that BS 4142:2014 is not appropriate. In this respect the selected assessment procedure is comparative and based on the change in the prevailing ambient noise level. The significance of potential noise impacts has been assessed based upon the significance criteria presented as Table 1.

Table 1: Significance of Noise from HGV Deliveries, Car Park and 'Drive-Thru'

Change in prevailing noise level (dB)	Significance
< 3	Insignificant
3 to 5	Minor
6 to 10	Moderate
≥ 10	Substantial

4.2 Car Park and 'Drive-Thru'

There are currently no guidelines in the United Kingdom for the assessment of noise from car park or 'drive-thru' activity. The interaction of potential noise sources such as engines operating at low speeds, closing of car doors and, and other unquantifiable noise (i.e. people talking) is by its nature, poorly defined.

However a Bavarian study has been undertaken originally in 1993 concerning sound emission from parking lots and bus terminals⁷ including a newer revised study concerning sound emission from parking lots, bus terminals, fast food restaurants, multi-storey car parks and subterranean garages of housing estates⁸. The studies undertook a large number of noise measurements on and around parking lots. Subsequent guidelines have been written on the calculation of sound emission of parking areas. Waterman uses proprietary noise modeling software Cadna-A which calculates predicted levels of noise emission due to the operation of parking lots using the guidance in the previously mentioned papers.

The predicted change in the prevailing noise levels resulting from the use of the car park and 'drive-thru' have been assessed against the criteria presented in Table 1.

4.3 BS 4142 Assessment

The noise impact from fixed plant and building services depends upon a number of factors including the absolute noise level, the nature of the noise, the time and duration at which the noise occurs, whether the noise is temporary, intermittent or permanent, whether the impact is as a result of a new source, or whether it is a change to an existing source and/or the sensitivity of the receptor.

Wrexham Council requires that the rating noise level does not exceed the prevailing background noise level and that the assessment is in accordance with BS 4142:2014.

- $L_{A,T} \leq L_{A90}$ (Where T is 1 hour during the day and 15 minutes during the night).

The significance of noise effects from a BS 4142:2014 assessment having regard to the noise requirements of Wrexham Council is presented as Table 2.

⁷ 1993 Edition, Issue 89, Collection for publications of the Bavarian Ministry for Environmental Protection (LfU), Munich.

⁸ August 2003 edition, Issue 89. Collection of publications of the Bavarian Ministry for environmental Protection (LfU), Augsburg; Kessler Verlagsdruckerei, 86399 Bobingen, ISBN 3-936385-26-2, ISSN 0723-0029 <http://www.bayern.de/lfu>

Table 2: BS 4142 Impact Level of Significance

Rating Noise Level – Background Level ($L_{A,r,Tr} - L_{A90}$)	Significance
≤ 0	Insignificant
> 0 to < 5	Minor
5 to < 10	Moderate
≥ 10	Substantial

5. Baseline Conditions

5.1 Noise Sensitive Receptors

The closest noise sensitive receptors (SR) to the site boundary were identified from inspection of aerial imagery and site visit. The identified noise sensitive receptors are summarized in Table 3.

Table 3: Noise Sensitive Receptors

SR	Description	Distance from Site Boundary (approximate)
A	Residential Accommodation at Y Werddon	8m North
B	St Mary's Catholic Primary School	35m South East
C	Residential Accommodation on Watery Lane	60 m West
D	Mitre Development	15m East

Across the existing Site there exists a variation in ground height. To the north of the proposed Site, the ground level is approximately 5m below that of the current car park. As a result, the ground floor of the Y Werddon building is below ground height relative to the Site with the first floor level being at the same level as the Development. For assessment purpose the potential impact on the first floor level of the Y Werddon building has been assessed therefore representing worst-case. SR B is elevated by approximately 5m above the Site, with SR C approximately at grade with the Site.

5.2 Environmental Noise Survey

Short term attended noise measurements were undertaken within the vicinity of the SRs on Y Werddon, Watery Road and Pentre Felin on Tuesday 3rd and Wednesday 4th of March, 2015. As previously discussed the baseline strategy and subsequent assessment methodology was agreed in advance with the Environmental Health Department of Wrexham Council. The monitoring locations are described in Table 4 and illustrated on Figure 2. All measurements were undertaken in free-field conditions, approximately 1.5m above ground height.

Figure 2 presents the existing Site layout, identified receptors and noise monitoring locations.

Table 4: Noise Monitoring Locations

Monitoring Location (Figure 2)	Description
ST1 ^[1]	Free-field noise measurements, approximately 4.5m from carriageway edge of Watery Road, opposite 19 Watery Road
ST2	Free-field noise measurement at site boundary with Y Werddon
ST3	Free-field noise measurement at Site boundary with Pentre Felin. Approximately 2m from Carriageway edge

Note ^[1] Monitoring location ST1 is considered representative of the noise levels expected at residential properties on Watery Road.

Monitored noise levels were recorded at five minute intervals throughout the survey period. The parameters logged were L_{Aeq} , L_{A01} , L_{A90} , L_{Amax} and L_{A10} . The noise monitoring equipment used during the surveys is described in Table 5.

Table 5: Noise Monitoring Equipment

Sound Level Meter	
Meter Model	Rion NL- 32
Serial Number	413528

The weather conditions throughout all monitoring periods were dry with wind speeds ranging from calm to slight breeze of 5 m/s or less, predominantly of a westerly direction.

The noise survey results are summarised as Table 6.

Table 6: Baseline Noise Measurements

Monitoring Location (Figure 2)	Monitoring Period	Average Noise Level dB (rounded to whole number)				
		$L_{Aeq,T}^{[1]}$	$L_{AMAX,T}^{[2]}$	$L_{A10,T}^{[3]}$	$L_{A01}^{[3]}$	$L_{A90,T}^{[3]}$
ST1	Quiet Day	66	83	68	73	57
	Night	55	76	49	66	35
ST2	Quiet Day	59	84	60	64	54
	Night	48	59	49	56	46
ST3	Quiet Day	68	83	71	76	57

Note: [1] Logarithmic average value reported. [2] 90th Percentile reported. [3] Average value reported

The dominant noise source at all locations was road traffic noise, primarily from Watery Road and Pentre Felin. Noise from vehicle movements within the car park itself also contributed to the noise climate. At ST2, running water from the River Gwenfro, the waterway adjacent to Y Werddon, was audible during the night-time monitoring periods.

6. Impact Assessment

6.1 HGV Deliveries

At this stage, opening hours and delivery times for the restaurant development are proposed to be daytime only. The noise impact assessment therefore is based on 1 HGV delivery during the daytime period (0700-2300). Deliveries to the restaurant would be made via the service yard area in the west of the site, with stock being transported by hand trollies into the storeroom area.

The noise levels from arrival, unloading and departure activities have been predicted at each of the closest SRs to the site boundary based on historic noise measurements obtained at a development similar to the proposed. The noise source data on which the predictions are based together with the predicted sound exposure levels (SELs) are presented as Table 7. Noise from reverse alarms has been included in the assessment.

Table 7: HGV Deliveries Source Noise Levels

Activity	Duration (HH:MM:SS)	Activity Distance from Meter (m)	Sound Event Level at 23m (SEL)	Sound Event Level at 65m (SEL)
HGV Arrival	00:00:44	1 (pass-by)	79.9	74.4
Reversing bleeper in goods yard	00:00:27	30	70.9	61.9
Engine idling noise & yard movements (loading)	00:20:00	30	86.7	77.7
HGV Departure	00:00:27	15	77.8	73.2
Event SEL (based on average SEL value)			78.6	71.8

The source noise levels in Table 7 have been used to determine noise levels at the closest SRs to the site boundary for the duration of the delivery period, in this case 30 minutes. The results of the predictions and the associated significance are presented as Table 8. Calculation details are provided in appendix C.

Table 8: Significance of HGV Deliveries at SRs

Period	Predicted HGV Delivery Noise Level dB $L_{Aeq, 30min}$	Prevailing Noise Level at SR (dB $L_{Aeq, 1h}$)	Change in Prevailing Noise Level dB $L_{Aeq, 30min}$	Significance
SR A - Y Werddon				
Daytime	55	59	1	Insignificant
SR B - Watery Road				
Daytime	48	66	0	Insignificant
SR C – St Marys Catholic School				
Daytime	42	59	0	Insignificant
SR D Mitre Development				
	42	66	0	Insignificant

Based on the results provided in Table 8, the overall change in prevailing noise levels will be **insignificant** at the nearest identified noise sensitive receptors to the development.

6.2 Car Park and Fast Food ‘Drive-Thru’ Movements

At this stage, opening hours for the ‘drive-thru’ are proposed to be daytime only and assessment has been undertaken on this basis. Noise emissions from the car park and restaurant ‘drive-thru’ have been predicted using Cadna-A® noise modelling software. Parameters of the future car park were derived from drawings supplied by Chapman Taylor, which includes provision for 26 parking spaces, a significant reduction over the existing 71 spaces.

For assessment purposes the following has been assumed:

- 3.72 vehicle movements per space per hour during the daytime period;
- No vehicle movements during the night-time period;
- 18 ‘drive-thru’ movements per hour during the daytime period;
- no ‘drive-thru’ movements per hour during the night-time period; and
- Duration of each ‘drive-thru’ is 3 minutes.

The Cadna-A® noise model also includes a single COD point for the ‘drive-thru’. The noise source data for the COD is based on historic measurements of existing COD intercoms, having a sound power level of 78 dB (A).

The assessment results are presented in Table 9 with predicted façade noise levels illustrated as Figure 5 representing the daytime period only. Source noise levels used for the ‘drive-thru’ element are derived from historic measurements at a similar development. Details of the noise sources used are presented in Appendix C.

Table 9: Car Park and ‘Drive-Thru’ Noise Assessment

Assessment Location (Figure 2)	Existing ambient noise levels (façade)		Predicted façade noise level	Change in noise Level at Façade	Significance
	Period	L _{Aeq,1-hour} (dB(A))			
SR A: Y Werddon	Daytime (0700-2300)	62	55	1	Insignificant
SR D: The Mitre	Daytime (0700-2300)	62	47	0	Insignificant

The predicted noise impact from car-park and ‘drive-thru’ activities based on the stated assumptions is **insignificant** at the nearest SRs (Y Werddon and The Mitre). It can be assumed that this automatically applies to the more distant SRs.

6.3 Fixed Plant

The proposed development includes a small complement of fixed mechanical plant servicing the restaurant. With the exception of the Customer Order Device (COD) intercom serving the ‘drive-thru’, plant associated with the restaurant would be located within dedicated plant areas at roof level, being enclosed by an acoustic grade barrier of not less than 1.5 metres in height from roof level.

Plant noise limits have been specified based on the prevailing noise climate, and the requirements of Wrexham Council. Plant noise levels must satisfy the criteria of Wrexham Council, in that the rating noise level does not exceed the prevailing background noise level (L_{A90}). It is assumed that the noise impact from fixed plant will be controlled by satisfying the required noise criteria outlined below.

Based on the baseline noise survey, the plant noise limits at the nearest SR (SR A: Y Werddon and SR D: The Mitre), expressed as a façade noise level, are:

- Daytime: - 54dB $L_{A_{r,Tr}}$ (rating noise level);
- Night-Time: - 46dB $L_{A_{r,Tr}}$ (rating noise level).

It should be noted that both limits are based on the average measured background noise level during the quiet day and night-time survey period.

Although plant specification is yet to be finalised, an assessment has been undertaken based on indicative plant typically used for this type of development:

- 1 no. kitchen extract fan
- 2 no. chillers serving cold storage rooms
- 2 no. air handling units
- 5 no. air conditioning condensers.

A 3-dimensional noise model has been constructed using Cadna-A® noise modelling software with scheme layout derived from drawings supplied by Chapman Taylor and indicative plant compliment presented as Table 10. For modelling purposes, it is assumed that the all of the plant previously outlined will be operating simultaneously during the daytime period. It is anticipated that only the chillers associated with the cold storage areas will operate throughout the night time period, however it is understood that that up to 3no. air handling units may also operate prior to opening hours between 06:00-07:00 and it is on this basis that the assessment has been undertaken for the night-time period.

Table 10: Fixed Plant Noise Levels

Plant Item	Measured Sound Pressure Level at 2m (dB(A))								dB(A) Per unit
	63	125	250	500	1000	2000	4000	8000	
Kitchen Extract	72.2	57.1	54.6	38.2	28	23.8	21	12.1	50
AHU (x2 No.)	26.8	45.9	61.4	63.8	66	65.2	69	57.9	73
Chiller Cond. (x2 No.)	32.8	51.9	58.4	62.8	65	63.2	63	57.9	70
Air Con Cond. (x5 No.)	34.8	42.9	41.4	43.8	47	45.2	40	38.9	52

For assessment purpose the following has been assumed:

- Plant is free from tonal and impulsive noise although it may operate intermittently as and when required;
- Plant is operating at full capacity during the daytime period;
- Plant is located within an acoustic grade noise barrier at roof level;
- Chiller plant operates at reduced capacity during the night; and
- No. 3 AHU operate between 06:00 to 07:00.

Table 11 presents the predicted plant noise levels at the nearest SRs namely SR A: Y Werddon and SR D: The Mitre. Predicted noise levels for the day and night time period are presented as Figures 3 and 4 respectively. As chiller plant is likely to operate intermittently during the night but at a reduced capacity, the specific noise level from this source during the night-time period has been increased by 3dB to derive the rating noise level, which is in accordance with the guidance prescribed within BS 4142: 2014.

Table 11: Predicted Restaurant External Plant Noise Levels

SR	Description	Rating Noise Level at SRs dB L _{Ar, Tr}	Prevailing Background Noise Level (L _{A90})	Difference (Rating Noise Level – L _{A90})	Significance
A	Daytime	45	54	-9	Insignificant
	Night	45	46	-1	Insignificant
D	Daytime	46	54	-8	Insignificant
	Night	46	46	-0	Insignificant

With reference to the significance criteria in Table 2, the assessment results indicate that plant noise would have an insignificant impact upon the closest noise sensitive receptor during both the day and night time periods. The predicted plant noise levels also satisfy the criteria of Wrexham Council, in that the rating noise level does not exceed the prevailing background noise level (L_{A90}). Compliance with the criteria at SR A and SR D, which are the closest receptors, automatically infers compliance for the other more distant receptors.

7. Mitigation

Mitigation is integral to the scheme design with the inclusion of a 1.5 metre high acoustic barrier surrounding the roof top mounted plant. With regard to external plant, provided the plant achieves Wrexham Council's noise condition of $\leq L_{A90}$, which may be controlled by a suitably worded planning condition, then it is considered that no further mitigation is required. It is recognised however, that plant selection in order to achieve the required noise criteria may have mitigation inherent in its design.

With this mitigation in place, the potential impact from the development, based on the stated assumptions, is predicted to be insignificant. On this basis no additional mitigation measures are proposed.

8. Conclusions

A noise assessment has been completed to assess the potential noise impacts associated with the operation of the proposed restaurant Development, including 'drive-thru' and car park activities together with noise from fixed external plant. At this stage of the Development it is proposed that the restaurant is operational during the daytime period only (0700-2300), although plant would have the potential to operate 24/7. It is on this basis that the assessments have been undertaken.

Noise surveys were completed during the daytime and night-time periods within the vicinity of the nearest noise sensitive receptors to the Site, against which the assessment has been made.

The proposed development has mitigation inherent in the scheme design which has been taken into account when assessing the potential impact; namely a roof mounted noise barrier of not less than 1.5m above roof height.

The predicted noise impact resultant from HGV deliveries is predicted to be **insignificant** at the closest SR's of Y Werddon and The Mitre.

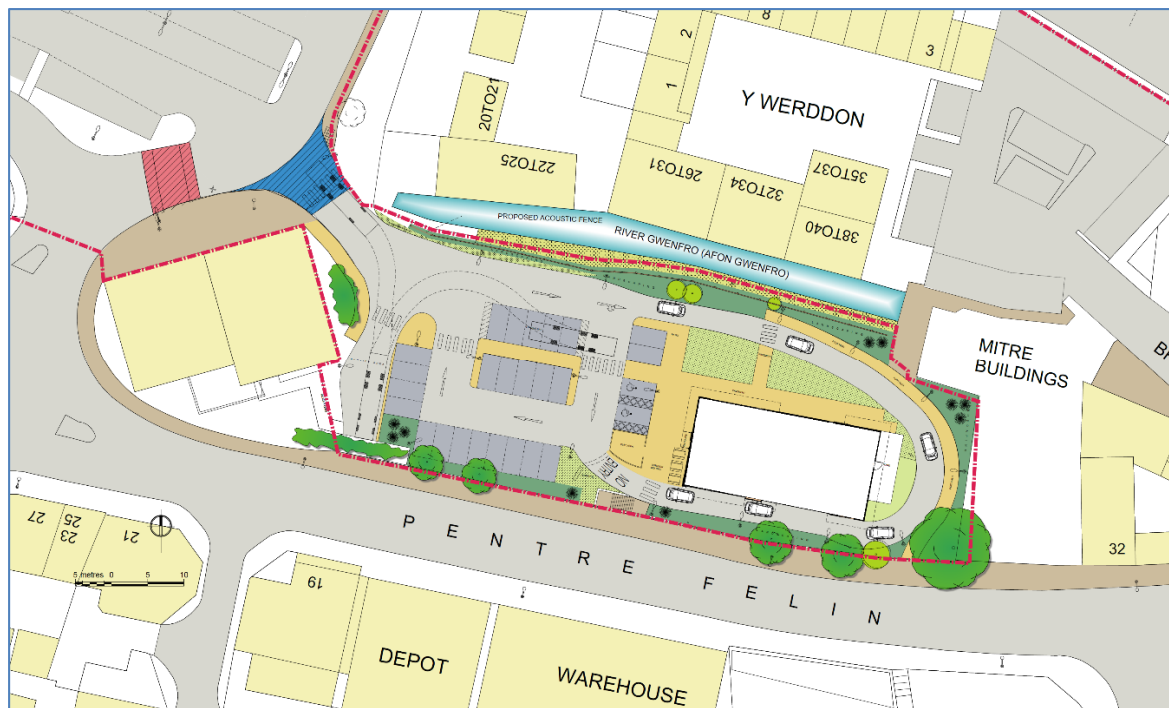
The predicted noise impact resultant from car park and restaurant 'drive-thru' operations is predicted to be **insignificant** at the closest SR's of Y Werddon, Watery Road, St Mary's Catholic Primary School and The Mitre.

A noise limit for fixed external plant was derived from the established prevailing background noise levels and the requirements of Wrexham Council. The potential impact from fixed external plant was predicted to be **insignificant** based on a typical external plant compliment.

In conclusion, based on the stated assumption with mitigation integral to the scheme design, the proposed Development would not adversely affect the residential amenity of the surrounding area. On this basis, there are no reasons therefore for the refusal of planning permission on the grounds of noise.

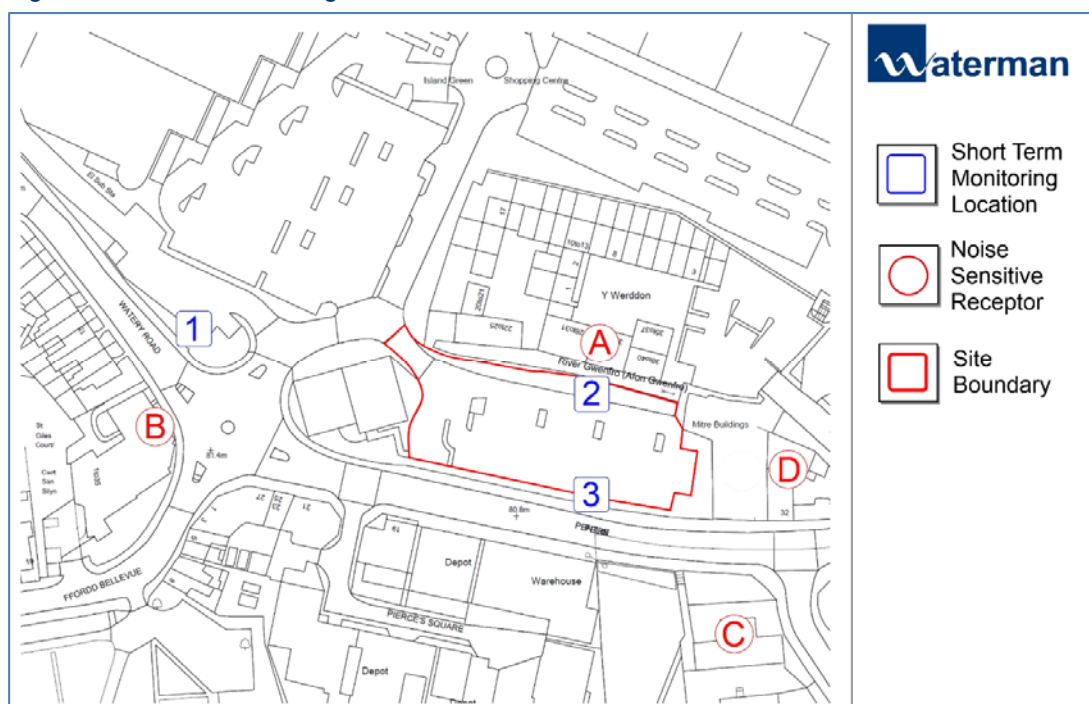
FIGURES

Figure 1: Proposed Site Layout



Source: Supplied by Chapman Taylor

Figure 2: Noise Monitoring Locations and SRs



Source: Supplied by Chapman Taylor

Figure 3: Daytime Fixed Plant Noise Emission (dB LAeq,16hr)



Figure 4: Night Time Fixed Plant Noise Emission (dB LAeq,8hr)



Figure 5: Daytime Car Park Noise Emission (dB LAeq,16hr)





APPENDICES

Appendix A Acoustic Terminology

AAWT	Annual average weekday traffic
Acoustic barrier	Solid walls or partitions, solid fences, earth mounds, buildings, etc. used to reduce noise, without eliminating it.
Ambient sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Background noise	Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).
Barrier	See "Acoustic barrier", a solid object used to attenuate sound.
Broadband	Containing the full range of frequencies.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. This instrument has been specifically developed to mimic the operation of the human ear. The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound is heard. The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping. Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels. The following are examples of the decibel readings of every day sounds; • Four engine jet aircraft at 100m 120 dB • Riveting of steel plate at 10m 105 dB • Pneumatic drill at 10m 90 dB • Circular wood saw at 10m 80 dB • Heavy road traffic at 10m 75 dB • Telephone bell at 10m 65 dB • Male speech, average at 10m 50 dB • Whisper at 10m 25 dB • Threshold of hearing, 1000 Hz 0 dB
dB(A): A-weighted decibels	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted dB(A) or as L_A dB. Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Free-Field	A situation in which the radiation from a sound source is completely unaffected by the presence of any reflecting surfaces.
Heavy vehicle	Heavy vehicles are assumed to be buses, rigid trucks and semi-trailer trucks with a weight greater than 3 tonnes. Also heavy vehicles can be defined in terms of length as buses, or trucks with a length exceeding 5.25 metres.
Lnn noise descriptors	Because noise varies with time, a single noise value cannot adequately define the noise ambient. For this reason, the acoustic environment is described using a number of noise level descriptors as follows;

L₁	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L₁₀	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{10,1-hour}	The L ₁₀ level measured over a 1 hour period.
L_{A10,18-hour}	The arithmetic average of the A-weighted L _{10,1-hour} levels for the 18 hour period between 6am and 12 midnight on a normal working day. It is a common traffic noise descriptor.
L₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L ₉₀ noise level. The A-weighted L ₉₀ is expressed as the L _{A90} .
L_{eq}	Equivalent sound pressure level - the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
L_{Aeq,1-hour}	The A-weighted L _{eq} noise level for a specific one-hour period.
L_{Amax}	The maximum RMS A-weighted sound pressure level occurring within a specified time period.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is 400% times the loudness of a sound of 65 dB.
Microphone	An electro acoustic transducer which receives an acoustic signal and delivers a corresponding electric signal.
Noise	Sound which a listener does not wish to hear.
Sound exposure level (L_{AE}) or SEL	A measure of A-weighted sound energy used to describe noise events such as the passing of train or aircraft; it is the A-weighted sound pressure level which, if occurring over a period of 1 second, would contain the same amount of A-weighted sound energy as the event.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.

Appendix B Baseline Noise Measurements

Consultation

From: Nick Minshall <Nick.Minshall@wrexham.gov.uk>
Sent: 3 March 3015 2015 11:31
To: Ashby, Robert
Cc: Brindle, Stephen
Subject: Proposed Noise Monitoring

Hello Robert

Your proposed methodology for the noise assessment looks fine.

Regards Nick

From: Ashby, Robert [<mailto:robert.ashby@watermangroup.com>]
Sent: 27 February 2015 16:57
To: Nick Minshall
Cc: Brindle, Stephen
Subject: Proposed Noise Monitoring

Dear Mr Minshall,

As part of a pre-planning enquiry, I have been asked to undertake a noise assessment of the proposed retail development at Island Green Shopping Park, Wrexham, and seek your approval in principle with our noise monitoring strategy.

I attach an aerial image which indicates the location of the development and the proposed monitoring locations. The Development proposal is will incorporate a drive through food outlet on the southern car park, with improvements and extensions to existing car parking.

We are still awaiting confirmation on operating hours. Similarly, delivery times are yet to be confirmed

Operating times for the existing retained commercial elements are expected to remain unchanged. It is understood that times of operation for plant is 24 hours albeit at a reduced rate during the night-time period. The noise sensitive receptors (SRs) most likely to be affected are those at Watery Road (SRA), approximately 15m from the southern Site boundary, and residences at Y Werddon (SRB), approximately 5m from the southern car park boundary. In addition to these residential receptors, St Mary's Cathedral has been identified as a possible noise sensitive receptor (SRC), adjacent to the Northern Site boundary.

It is proposed to conduct short term attended noise measurements within the vicinity of SRs A, B and C, as indicated on the attached aerial image.

An assessment of the monitored ambient noise levels against the guidance provided within BS 4142:2014, TAN 11: 1997, BS 8233: 2014, and World Health Organisation (WHO) Guidelines for Community Noise will be undertaken, to determine the suitability of the Site for commercial development.

Short term, attended noise monitoring will be conducted in order to measure the prevailing noise climate over a typical week-day period.

It is my intention to undertake 1 hour contiguous measurements for the daytime and 15 minute measurements for the night time periods at each location. Additionally, at monitoring location 2, I will undertake a shortened CRTN measurement to quantify road traffic noise at receptors along Watery Road.

The results of the noise survey will be used to establish:

1. Typical ambient (L_{eq}) and maximum (L_{max}) noise levels across the site;
2. Typical minimum background (L_{90}) noise levels used to set appropriate plant noise emission limits which all mechanical plant items would need to be designed (collectively) to achieve, having regard to the guidance contained in BS4142: 2015 'Methods for rating and assessing industrial and commercial sound' and the requirements of Wrexham Council ;
3. Appropriate acoustic performance standards for wider on-site activities that may be associated with the scheme (e.g. service deliveries), with the intention of avoiding disturbance at the nearest noise-sensitive receptors; HGV deliveries will be assessed by calculating the change in the prevailing noise level ($L_{Aeq,1\text{ hour}}$) during daytime deliveries.

Please let me know if there are any other factors that you wish for us to consider, in particular with regard to night-time noise measurement that would be most appreciated. Could you also confirm if Wrexham Council have a policy with regard to plant noise. Some councils require plant noise not to exceed the prevailing background noise level (L_{A90}) where as others require it to be a specified level (XdB) below background. In the absence of guidance, plant noise limits, where appropriate, will be set not to exceed the prevailing average background noise level (L_{A90}).

Lastly, if you could confirm if you agree in principle with our baseline noise survey approach this would also be greatly appreciated as we are hoping to progress this next week, weather permitting.

Please do contact me should you have any queries or if there is something else that you wish for us to consider.

Kind regards

Robert Ashby

Baseline Noise Monitoring

Monitoring Position ST1: Daytime

Date / Start Time	Measured Noise Level dB				
	L _{Aeq}	L _{Amax}	L _{A1}	L _{A10}	L _{A90}
03/03/2015 10:50	65.0	84.5	70.2	68.1	57.4
03/03/2015 10:55	65.8	78.2	74.3	68.5	58.2
03/03/2015 11:00	65.4	74.7	71.2	68.6	56.4
03/03/2015 11:05	68.6	91.6	80.7	68.8	55.3
03/03/2015 11:10	66.0	76.7	72.5	69.0	58.4
03/03/2015 11:15	65.2	74.2	71.1	67.9	59.1
03/03/2015 11:20	65.7	77.0	73.2	68.7	58.8
03/03/2015 11:25	66.0	75.9	73.0	68.8	58.7
03/03/2015 11:30	65.6	74.9	71.6	68.4	57.3
03/03/2015 11:35	65.6	75.9	72.7	68.5	58.8
03/03/2015 11:40	65.5	75.9	72.6	68.2	59.8
03/03/2015 11:45	65.5	74.1	71.6	68.4	57.2
03/03/2015 11:50	66.1	79.4	74.9	68.4	59.6
03/03/2015 11:55	66.7	80.8	78.1	68.7	57.1
03/03/2015 12:00	65.7	76.0	73.6	68.4	58.0
03/03/2015 12:05	67.3	81.0	76.5	70.2	58.0
03/03/2015 12:10	65.0	74.6	71.1	68.0	56.7
03/03/2015 12:15	65.3	75.1	73.4	68.7	55.1
03/03/2015 12:20	64.0	70.8	69.5	67.0	58.8
03/03/2015 12:25	65.1	86.1	71.7	67.4	53.5
03/03/2015 12:30	63.7	71.9	69.8	66.8	55.0
03/03/2015 12:35	65.5	76.1	73.0	68.5	56.5
03/03/2015 12:40	64.2	72.5	69.7	67.7	54.7
03/03/2015 12:45	65.0	73.3	70.1	67.9	57.7

Monitoring Position ST1: Night

Date / Start Time	Measured Noise Level dB				
	L _{Aeq}	L _{Amax}	L _{A1}	L _{A10}	L _{A90}
04/03/2015 01:25	57.4	75.2	71.5	57.4	35.7
04/03/2015 01:30	57.0	76.8	72.1	53.0	35.4
04/03/2015 01:35	56.6	75.7	71.4	53.5	34.9
04/03/2015 02:32	46.5	66.9	61.6	43.1	35.0
04/03/2015 02:37	53.2	75.2	68.3	46.8	35.0
04/03/2015 02:42	41.8	60.6	51.8	43.0	35.8

Monitoring Position ST2: Daytime

Date / Start Time	Measured Noise Level dB				
	L _{Aeq}	L _{Amax}	L _{A1}	L _{A10}	L _{A90}
03/03/2015 14:15	58.2	69.7	63.7	60.5	54.1
03/03/2015 14:20	57.8	65.0	62.7	60.0	54.1
03/03/2015 14:25	59.7	71.2	68.3	61.7	54.0
03/03/2015 14:30	59.8	88.4	64.3	60.2	54.8
03/03/2015 16:16	58.8	83.5	62.6	59.9	54.6
03/03/2015 16:21	57.5	64.4	61.8	59.5	53.8
03/03/2015 16:26	57.6	64.6	62.3	60.1	53.1
03/03/2015 16:31	58.9	72.3	65.0	61.3	55.1
03/03/2015 16:36	57.8	63.2	61.9	60.3	54.0
03/03/2015 16:41	59.1	67.7	62.4	61.1	56.3

Monitoring Position ST2: Night

Date / Start Time	Measured Noise Level dB				
	L _{Aeq}	L _{Amax}	L _{A1}	L _{A10}	L _{A90}
04/03/2015 01:48	48.0	59.1	56.9	49.0	45.8
04/03/2015 01:53	47.4	58.9	56.7	47.6	45.7
04/03/2015 02:55	48.3	56.7	55.3	51.8	45.8
04/03/2015 03:00	47.8	58.0	55.8	48.3	45.9

Monitoring Position ST3: Daytime

Date / Start Time	Measured Noise Level dB				
	L _{Aeq}	L _{Amax}	L _{A1}	L _{A10}	L _{A90}
04/03/2015 12:22	67.5	76.6	74.7	70.8	54.7
04/03/2015 12:27	67.9	76.6	74.7	71.4	57.0
04/03/2015 12:32	68.2	84.2	77.3	71.1	57.2
04/03/2015 12:37	68.8	80.8	75.9	71.9	58.0
04/03/2015 12:42	68.6	78.7	74.9	71.9	57.4

Appendix C Noise Calculations

Deliveries

SR A– Y Werddon

HGV SEL @ 23m = 87.9 dB(A)

$L_{Aeq} = SEL - 10 \times \log T$

Where: T is time in seconds (3600)

Table C 1: Predicted Change in Ambient Noise Level

Period	Predicted HGV Delivery Noise Level dB $L_{Aeq,20min}$	Prevailing Noise Level at SR dBL $L_{Aeq,1h}$	Overall Noise Level dB $L_{Aeq, 20min}$	Change in Prevailing Noise Level dB $L_{Aeq,20min}$
Daytime	55.35	58.5	59.4	0.9

Deliveries

SR C – St Mary’s Catholic Primary School

HGV SEL @ 65m = 80.4 dB(A)

$L_{Aeq} = SEL - 10 \times \log T$

Where: T is time in seconds (3600)

Table C 2: Predicted Change in Ambient Noise Level

Period	Predicted HGV Delivery Noise Level dB $L_{Aeq,20min}$	Prevailing Noise Level at SR dBL $L_{Aeq,1h}$	Overall Noise Level dB $L_{Aeq, 20min}$	Change in Prevailing Noise Level dB $L_{Aeq,20min}$
Daytime	47.8	65.7	65.7	0.0

Car Parking and Drive Thru Source Data

Table C 3: Drive Thru Vehicle Noise Level

Period	Noise Level dB $L_{Aeq,20s}$ at 10m	Noise Level dB L_{Amax} at 10m	SEL	Sound Power Level (db(A)) ^[1]
Daytime	52	64	65	92

Notes: [1] Sound power level derived from L_{Amax} value.

Table C 3: Drive Thru COD Noise Level

Period	Noise Level dB $L_{Aeq,20s}$ at 2m	Noise Level dB L_{Amax} at 10m	SEL	Sound Power Level (db(A)) ^[1]
Daytime	64	71	77	78

UK and Ireland Office Locations

