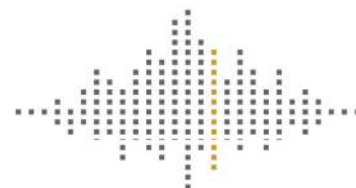


SHARPS REDMORE

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Report

Noise assessment of a
proposed McDonalds
restaurant, Tesco Gwyn's
Drift, Pontardawe, Swansea

Prepared by

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DISCLAIMER

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1.0 Introduction

- 1.1 Sharps Redmore (SR) has been instructed to undertake a noise assessment of a proposed McDonalds restaurant with drive-through facility, within the Tesco car park at Gwyn's Drift, Pontardawe, Swansea.
- 1.2 The site is currently occupied by an area of Tesco car park, adjacent to the site access and petrol filling station. The site is bordered by the A4067 and Lon Tanyrallt beyond to the south-east and Llys Glanrafon to the north-west. The closest noise sensitive properties to the proposal site are in Llys Glanrafon and Lon Tanyrallt.
- 1.3 The proposal is for a 24 hour operating McDonalds restaurant with a drive thru facility. The car park would be located on the south side of the site, with restaurant and drive thru to the north, as indicated at Appendix A.
- 1.4 The objective of the assessment is to determine how noise that may be generated as a result of the proposal would affect the amenity of the closest residential properties.
- 1.5 Section 2 of this report contains a discussion of the available methods of assessment and assessment criteria.
- 1.6 Section 3 of this report sets out the findings of an environmental noise survey, undertaken at a location representative of the noise climate at the closest noise sensitive properties to the proposal site.
- 1.7 The different components of operational noise are considered in sections 4 to 6 of this report.
- 1.8 The assessment conclusions are contained in section 7 of this report.
- 1.9 A guide to the acoustic terminology used in this report is shown in Appendix E.

2.0 Assessment methodology and criteria

- 2.1 Section 6.7.14 of Planning Policy Wales (PPW Revision 11, February 2021) states: “Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.”
- 2.2 It is clear that where the policy refers to “proposed development should be designed *wherever possible* [my emphasis] to prevent adverse effects to amenity”. This policy has the same meaning as that contained in the NPPF, whereby when adverse impacts occur, they should be mitigated and reduced as far as possible, and not that such adverse impacts should not occur. It goes on “where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission”. In other words, if noise reaches a level above the threshold of an adverse impact, i.e it is significant, planning permission may be refused.
- 2.3 General guidance on noise for planning applications is still contained in Technical Advice Note (TAN 11), "Noise", issued in October 1997. TAN 11 contains advice in Annex A on the suitable noise limits for residential development near to different types of noise sources such as road traffic, rail traffic, air traffic, or mixed sources.
- 2.4 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:
- i) The effect may be determined by reference to guideline noise values, such as those contained in the World Health Organisation (WHO) “*Guidelines for Community Noise*”.
 - ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.
 - iii) Another method is described within BS 4142:2014+A1:2019 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the newly revised standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

Guidelines for Community Noise

- 2.5 The WHO “Community Noise Guidelines” (CNG) values are appropriate to what are termed “critical health effects”. This means that the limits are at the lowest noise level that would result in any psychological or physiological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL), but do not define the level above which

effects are significant (the SOAEL). Compliance with the LOAEL should, therefore, be seen as a robust aim.

- 2.6 In 2018 the WHO published the “Environmental Noise Guidelines for the European Region” (ENGER). The new WHO Environmental Noise Guidelines (page 28) explain that “*The current environmental noise guidelines for the European Region supersede the CNG from 1999. Nevertheless, the GDG (Guideline Development Group) recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid*”. Hence the CNG remain relevant to this assessment.
- 2.7 The WHO ENGER brings together the latest research on the effects of specific types of noise on health in relation to transportation noise sources (road, rail and aircraft noise exposure), wind turbines and leisure noise. Hence in direct relation to the specific proposal that this noise assessment considers, the new WHO ENGER are not of material consideration.
- 2.8 The relevant World Health Organisation (CNG) noise values are summarised in the following table:

TABLE 1: WHO CNG values

Document	Level	Guidance
World Health Organisation “Community Noise 2000”	$L_{AeqT} = 55$ dB	Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	$L_{AeqT} = 50$ dB	Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	$L_{AeqT} = 35$ dB	Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	$L_{AeqT} = 30$ dB	Sleep disturbance, night-time (indoors)
	$L_{Amax} = 60$ dB	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
	$L_{Amax} = 45$ dB	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)

- 2.9 For L_{AeqT} criteria the time base (T) given in the documents is 16 hours for daytime limits and 8 hours for night time limits. When assessing impact, this has the tendency to smooth out the hourly variations in noise level. As such, our calculations are carried out to a 1 hour time base, which is a more stringent assessment than is given in WHO Guidelines for Community Noise.
- 2.10 The internal CNG values can be converted to an external value by the addition of the attenuation provided by a partially open window of 15 dB.

Changes in noise level

- 2.11 Changes in noise levels of less than 3 dBA are not perceptible under normal conditions and changes of 10 dBA are equivalent to a doubling of loudness. This guidance has been accepted by inspectors, at inquiry, to encompass changes in noise levels in the index L_{AeqT} .

- 2.12 Table 3 below shows the response to changes in noise (known as a semantic scale); this table has been developed from general consensus opinion of acousticians.

TABLE 2: Change in noise level

Change in noise level L_{AeqT} dB	Response	Impact
<3	Imperceptible	None
3 – 5	Perceptible	Slight/moderate
6 – 10	Up to a doubling	Moderate/significant
11 – 15	More than a doubling	Substantial
>15	-	Severe

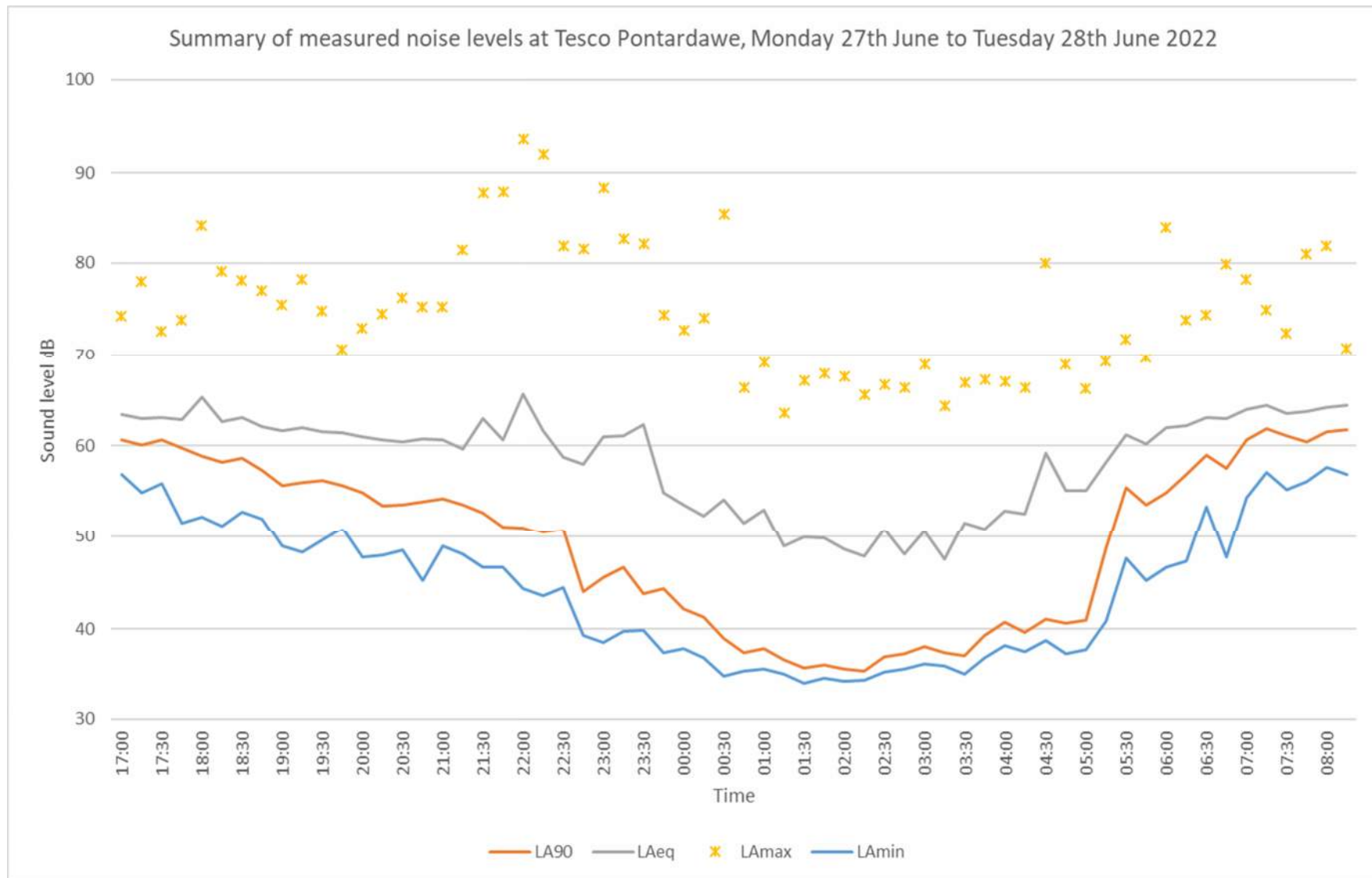
- 2.13 Where the existing ambient noise level is already above the criteria developed from the various guidance documents, it may be considered unreasonable to adopt such criteria. It would be reasonable, however, given the above statement, to consider criteria which do not exceed the existing noise climate, thus giving rise to an overall 3 dB increase i.e. the minimum perceptible. If it is less than the minimum perceptible it cannot be described as disturbing or to affect the amenity of residents.

Assessment using BS 4142:2014+A1:2019

- 2.14 As outlined, this British Standard enables the significance of sound impact to be determined in relation to industrial and commercial sources. The significance of sound impact is to be determined according to the following summary process:
- Determine the background sound levels, in terms of the index L_{A90} , at the receptor locations of interest.
 - Determine the specific sound level of the source being assessed, in terms of its L_{AeqT} level ($T = 1$ hour for day or 15 minutes for night), at the receptor location of interest.
 - Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.
 - Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.
 - A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the context. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.
 - The intent of the planning system is to ensure that a development does not result in “significant adverse impacts on health and quality of life.” BS 4142:2014 considers that the threshold of significant adverse impact is “a difference around +10 dB or more ... depending upon the context”.

- 2.15 BS 4142:2014+A1:2019 uses the concept of ‘context’ in the process of identifying noise impact. Section 11 of BS 4142:2014 explains “*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs* (our emphasis). *An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context*” (our emphasis).
- 2.16 There are many *context* points to consider when undertaking an assessment of sound impact including:
- The absolute level of sound;
 - The character and level of the specific sound in the context of the existing noise climate; for example, is the sound to occur in a location already characterised by similar activities as those proposed?
 - The sensitivity of the receptors;
 - The time and duration that the specific sound is to occur;
 - The conclusions of assessments undertaken using alternative assessment methods, for example WHO guidelines noise values or change in noise level.
- 2.17 It is therefore entirely possible that whilst the numerical outcome of a BS 4142:2014+A1:2019 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in *context* the significance of the impact is reduced to an acceptable level.

FIGURE 2: Summary of measured noise levels



3.7 The measured period noise levels are presented in Table 4 below:

TABLE 4: Measured period noise levels

Date	Time	Sound level dB		
		L _{A90} 1 hour	L _{A90} 15 minutes	L _{Aeq} 1 hour
27.6.22	17:00	60.3		69.1
	18:00	58.3		69.4
	19:00	56.0		67.7
	20:00	54.1		66.8
	21:00	53.0		67.2
	22:00	49.1		68.1
	23:00		43.8	66.6
28.6.22	00:00		37.5	59.1
	01:00		35.8	56.8
	02:00		35.5	55.0
	03:00		37.1	56.5
	04:00		39.6	61.9
	05:00		41.0	65.3
	06:00		55.0	68.6
	07:00	61.0		69.9

3.8 The noise level presented in Figure 2 and Table 4 above indicate a typical daytime background noise climate of 50 to 55 dB L_{A90} and 36 dB L_{A90} at night.

4.0 Assessment of noise from fixed plant equipment

- 4.1 The objective assessment of plant sound sources in commercial premises should be undertaken in accordance with British Standard 4142:2014+A1:2019. This Standard enables the resultant sound levels from new plant equipment to be compared against the existing typical background sound level (L_{A90}) of an area to establish the significance of the sound impact.
- 4.2 In determining suitable plant sound criteria SR have considered measured background sound levels taken during the noise survey. The survey indicates a typical daytime background noise climate of around 50dB and typical night time background noise levels of around 36dB.
- 4.3 To ensure that the amenity of local residents would not be affected, this assessment considers the robust approach that predicted plant rating noise levels should not exceed the typical measured background sound levels. The advice in BS 4142:2014 is that *"The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source of having a low impact, depending on the context"* (clause 11, note 'd').
- 4.4 On the basis of the above, the following overall plant sound limits at the nearest residential properties would result:

TABLE 5: Proposed plant rating sound limits

Rating level limits (dB)	
Daytime	Night time
50 dB	36 dB

- 4.5 It is to be noted that all of the plant equipment may operate all of the time, such that the controlling factor in terms of noise level limit is the night time background noise climate (36 dBA).
- 4.6 The following planning condition is recommended:
- "No fixed plant and/or machinery shall come into operation until details of the fixed plant and machinery serving the development hereby permitted, and any mitigation measures to achieve this condition, are submitted to and approved in writing by the local planning authority. The rating level of the sound emitted from the site shall not exceed 50 dB between 0700 and 2300 hours and 36 dB at any other time. The sound levels shall be determined by measurement or calculation at the nearest residential premises. The measurements and assessment shall be made according to BS 4142:2014+A1:2019."*
- 4.7 The plant is to be located on the roof of the restaurant, screened by a solid parapet screen approximately 2 metres above roof level. The plant would comprise of a kitchen extract fan, Air Handling Units for the kitchen and restaurant areas, chiller units and various AC condensing units.

4.8 The following table contains a schedule of proposed plant for both proposed units:

TABLE 6: Proposed plant equipment units

Description	Octave band (Hz) sound power/ pressure levels dB L _w /dB L _p								
	L _w /L _p	63	125	250	500	1K	2K	4K	8K
S1 Kitchen AHU fresh air intake	L _w	73	80	81	77	72	70	69	67
S1 Kitchen AHU breakout	L _w	65	68	61	55	43	42	41	29
S2 Restaurant AHU fresh air intake	L _w	71	79	76	72	69	67	64	59
S2 Restaurant AHU breakout	L _w	63	79	76	72	69	67	64	59
EF1 Kitchen extract exhaust	L _w	104	95	100	89	84	80	77	68
EF1 fan motor	L _p	66 dBA at 1metre							
EF1 Kitchen extract casing breakout	L _p @1m	60	55	61	50	42	36	38	31
EF3 store room extract	L _w	54	56	60	62	61	58	53	46
EF2 WC extract	L _w	54	56	60	62	61	58	53	46
Freezer condenser	L _p	42 dBA at 10 metres							
Chiller condenser	L _p	37 dBA at 10 metres							
Managers office condenser	L _p @1m	53	52	53	45	43	39	33	28
Crew room condenser	L _w	64 dBA							
Door curtain condenser	L _w	59 dBA							
Air source heat pump	L _w	59 dBA							
S1/C1, S1/C2, S1/C3 condenser units (each)	L _p @1m	66	60	60	60	56	53	49	42
S2/C1, S2/C2 condenser unit (each)	L _p @1m	67	62	60	61	56	52	49	42
ABS Drinks condenser	L _p @1m	62 dBA							

4.9 SR uses an environmental noise modelling software package called 'NoysPlot'. This software enables coordinates to be entered for the relative positions of noise sources, receivers and barriers to calculate a resultant noise level at a given noise receptor. The software carries out 'text book' atmospheric side calculations with regard to distance and screening attenuation by referencing relative source and receiver positions.

4.10 The height coordinates used in the 'NoysPlot' model have been extrapolated from the Architects elevation drawings and from site observations, and using Google Earth. The horizontal coordinates are referenced from an arbitrary 'x', 'y' position on a grid system.

- 4.11 The software considers these noise sources which are detailed in the noise source input schedule in Appendix C2. From the manufacturers noise level data that have been supplied there is no indication that the plant has any tonal component.
- 4.12 NoysPlot uses operating time information to calculate noise levels for daytime and night time operation. The time period that the equipment is assumed to be operating is denoted by 'D' to indicate daytime only operation; an 'N' to denote night time usage and 'A' to indicate that the equipment runs all the time. Since the McDonald's would operate within the night time period, the noise model has been set up such that all of the equipment operates all of the time.
- 4.13 NoysPlot has the capability to accept input noise data in a number of formats. Where available, the ventilation plant manufacturer's sound power level data (designated by the letter W in the L_p/L_w column of the input schedule) is used. Where the sound power level data is not available the manufacturer's un-weighted octave band sound pressure levels at a stated distance are used (designated P but with an N in the dBA column of the schedule to indicate un-weighted). Alternatively the manufacturer's A-weighted, single figure, averaged level at the stated distance is used (designated 'P' with 'Y' in the dBA column of the schedule). For this assessment, both single figure A-weighted noise level data and unweighted sound power/pressure level data has been used.
- 4.14 The surface directivity is also assessed for all cases – this depends on the number of adjacent reflective surfaces – the number can be seen in the column headed Q in the input schedule.
- 4.15 Where outlet dimensions are known the angle of directivity is inputted relative to a northern origin. The following directivity has been used for the following noise sources.

TABLE 7: Outlet directivity factors

Plant item	Angle of directivity relative of north	Direction opening is facing
S1 Kitchen fresh air intake	270°	West
EF1 Kitchen exhaust	360°	Vertical discharge
S2 Restaurant fresh air intake	0°	North

- 4.16 A summary of the atmospheric noise calculations for daytime and night time are displayed in Appendix C3. Calculations for each source to receiver can be made available upon request. These calculations take into account the attenuation afforded by distance, outlet reflection, angular and surface directivity and acoustic screening. The software maintains a logarithmic summation for each receiver position and ranks the individual noise sources in order of contribution to the overall noise level (highest at the top of the list). This assists with the identification of those noise sources requiring additional noise control.
- 4.17 The input data defining the locations of the noise sources, the receivers and screening are shown in Appendix C2. The NoysPlot noise model principally considers two noise barrier types; the barrier descriptor 'R' is used in the schedule to denote a ring type whereby only noise transmitted over the top of the barrier is considered; whilst noise barriers denoted

'F' for finite consider noise transmitted over the top and around the ends of the barrier. A ring type barrier has been used in this assessment to model the proposed McDonalds building and parapet screen.

- 4.18 Calculations have been carried out for the closest noise sensitive properties to the site. The NoysPlot calculations (see Appendix C3) show the following resultant plant rating noise levels:

TABLE 8: Predicted plant (rating) sound levels

Noise sensitive receptor	Predicted rating sound level dB(A)*	
	Daytime	Night time
62 Lon Tanyrallt	32	32
5 Llys Glanrafon	28	28
6-13 Llys Glanrafon	27	27

*NOTE: no rating level corrections have been applied since no acoustic features are anticipated to be present at any receptor location

- 4.19 In order to achieve the predicted noise levels in Table 8 it is recommended that an attenuator is fitted to the atmospheric side of the kitchen extract fan. The table below (and the schedule at Appendix C1.2) presents the minimum insertion loss requirements for the recommended attenuator:

TABLE 9: Minimum insertion loss requirements

Equipment name/reference	Insertion loss – Mid frequency octave bands (Hz)							
	63	125	250	500	1K	2K	4K	8K
EF1 Kitchen extract fan	6	12	20	22	24	24	22	16

- 4.20 The predicted plant rating noise levels are 18 dB below the existing daytime background noise climate at the closest receptor (Lon Tanyrallt) and 4 dB below the night time background noise climate. BS 4142:2014 explains that where the rating noise level is below the existing background noise climate this situation is indicative of low impact (depending upon context).

5.0 Noise from 'drive-thru' activity

- 5.1 SR have previously undertaken measurements of customer activity and associated noise levels from drive-thru facilities at similar sites.
- 5.2 There are principally four events associated with a customer visit to the drive thru facility. These are arrival of a customer vehicle, the ordering of the food, followed by payment and collection and the movement along the access road to depart the site. These activities do not involve occupants leaving the vehicle, with the associated door slams, so peak noise levels are generated by the acceleration of the vehicle away from the order/collection windows.
- 5.3 The layout of the site would be such that the vehicles cannot travel at speed around the drive through loops. As such, noise levels generated by drive-thru facilities are not particularly high.
- 5.4 Measurements of these four activities, taken at a reference distance of 10 metres from the centre of activity, gave the following typical noise levels:

TABLE 10: Drive-thru activity source noise levels

Activity	SEL	L _{AMAX}
Arrival of vehicle	72 dBA	63 dB
Ordering	70 dBA	61 dB
Collection, Payment and departure	72 dBA	62 dB
Slow movement (20km/h) on access road	72 dBA	63 dB

- 5.5 The SEL (single event or sound exposure level) is a parameter used to denote the sound energy of an event into a standard 1-second time period. This can then be used to convert a number of events of unknown or varying duration into a L_{Aeq T} ambient noise level.
- 5.6 The nearest noise sensitive receptors to the proposed drive-thru facility are the properties 6-13 Llys Glanrafon to the north-west of the proposal site and the properties at Lon Tanyralit to the south-east.
- 5.7 SR has been supplied with forecasted customer arrival data for the proposed McDonald's 'drive-thru' facility. The predicted drive thru noise levels presented in this assessment are based on the calculated Friday and Saturday peak hour drive thru flows. Typical off-peak times (2100 to 0600 hours) have also been assessed alongside the least busy hour (0400 hours). The data used in this assessment has been provided by Hydrock.

- 5.8 Using the forecasted customer vehicle movements the following overall noise levels are predicted (arrival, ordering, collection and departure) at the noise sensitive receptors from the use of the McDonald's drive-thru. The full calculations are presented at Appendix D.

TABLE 11: Predicted 'drive-thru' activity noise levels

Receptor:	6-13 Llys Glanrafon				
Period:	Friday peak hour	Saturday peak hour	Off-peak	Lowest hour	L _{Amax}
Parameter	L _{Aeq} 1 hour				
Predicted noise level dB:	42	42	33	26	46

Receptor:	1 Llys Glanrafon				
Period:	Friday peak hour	Saturday peak hour	Off-peak	Lowest hour	L _{Amax}
Parameter	L _{Aeq} 1 hour				
Predicted noise level dB:	37	38	29	21	40

Receptor:	62 Lon Tanyrallt				
Period:	Friday peak hour	Saturday peak hour	Off-peak	Lowest hour	L _{Amax}
Parameter	L _{Aeq} 1 hour				
Predicted noise level dB:	43	44	35	27	46

- 5.9 The noise levels predicted to arise from 'drive thru' activity at the proposed McDonald's restaurant fall well within the WHO guideline values for daytime and night time noise and are generally below the existing noise climate. With regard to predicted drive thru noise it is concluded that the proposed McDonald's unit could trade on an unrestricted time period basis without associated noise giving rise to significant adverse impact, which is the planning test.

6.0 Noise from car parking

- 6.1 This assessment considers customer car parking activity noise in the context of guideline noise values and the existing ambient noise climate.
- 6.2 SR has previously undertaken extensive noise monitoring of car parks; at 10 metres from the boundary of a busy car park measured noise levels are 48 dB $L_{Aeq,1hr}$ (free field) have been found. During off peak trading periods, car park source noise levels can be approximately 5 dB lower.
- 6.3 The closest noise sensitive property to the McDonalds car park would be the properties in Llys Glanrafon to the north-west of the proposal site, approximately 76 metres from the nearest parking spaces. The properties in Lon Tanyrallt would be approximately 86 metres from the closest parking spaces.
- 6.4 The resultant predicted car park activity noise level (during peak trading conditions) at Llys Glanrafon would be 30 dB $L_{Aeq\ 1\ hour}$ (allowing for distance attenuation of 18 dB) during peak trading hours, and 25 dB $L_{Aeq\ 1\ hour}$ during off peak times. At Lon Tanyrallt predicted car park activity noise levels (during peak trading conditions) would be 29 dB $L_{Aeq\ 1\ hour}$ (allowing for distance attenuation of 19 dB) during peak trading hours, and 24 dB $L_{Aeq\ 1\ hour}$ during off peak times.
- 6.5 Peak noise levels in car parks have been attributed to car door slam events. SR have measured noise from a considerable number of car door slam events and peak noise levels can be up to 66 dB L_{Amax} (free field) at 10 metres from the vehicle.
- 6.6 Resultant peak noise levels from car parking activity at the nearest properties in Llys Glanrafon would therefore be in the region of 48 dB L_{Amax} ($66 - 20\log(10/76)$). At the properties in Lon Tanyrallt, peak noise levels of 47 dB L_{Amax} ($66 - 20\log(10/86)$) could be expected from car parking activity.
- 6.7 Predicted customer car parking activity noise levels would comply with the WHO daytime and night guideline values. On this basis the proposed McDonald's restaurant could trade through the night time period on an unrestricted basis, without associated noise giving rise to significant adverse impact.

7.0 Assessment conclusions

7.1 Having undertaken this assessment against objective criteria it is concluded that noise from the operation of the proposed McDonalds restaurant and 'drive-thru' at Tesco Gwyn's Drift, Pontardawe, Swansea would not adversely affect the amenity of the existing residents.

7.2 The rating noise level of fixed plant will be designed and controlled so as to not exceed 50 dB daytime and 36 dB at night. These limits can be secured by the imposition of the following planning condition.

"No fixed plant and/or machinery shall come into operation until details of the fixed plant and machinery serving the development hereby permitted, and any mitigation measures to achieve this condition, are submitted to and approved in writing by the local planning authority. The rating level of the sound emitted from the site shall not exceed 50 dB between 0700 and 2300 hours and 36 dB at any other time. The sound levels shall be determined by measurement or calculation at the nearest residential premises. The measurements and assessment shall be made according to BS 4142:2014+A1:2019."

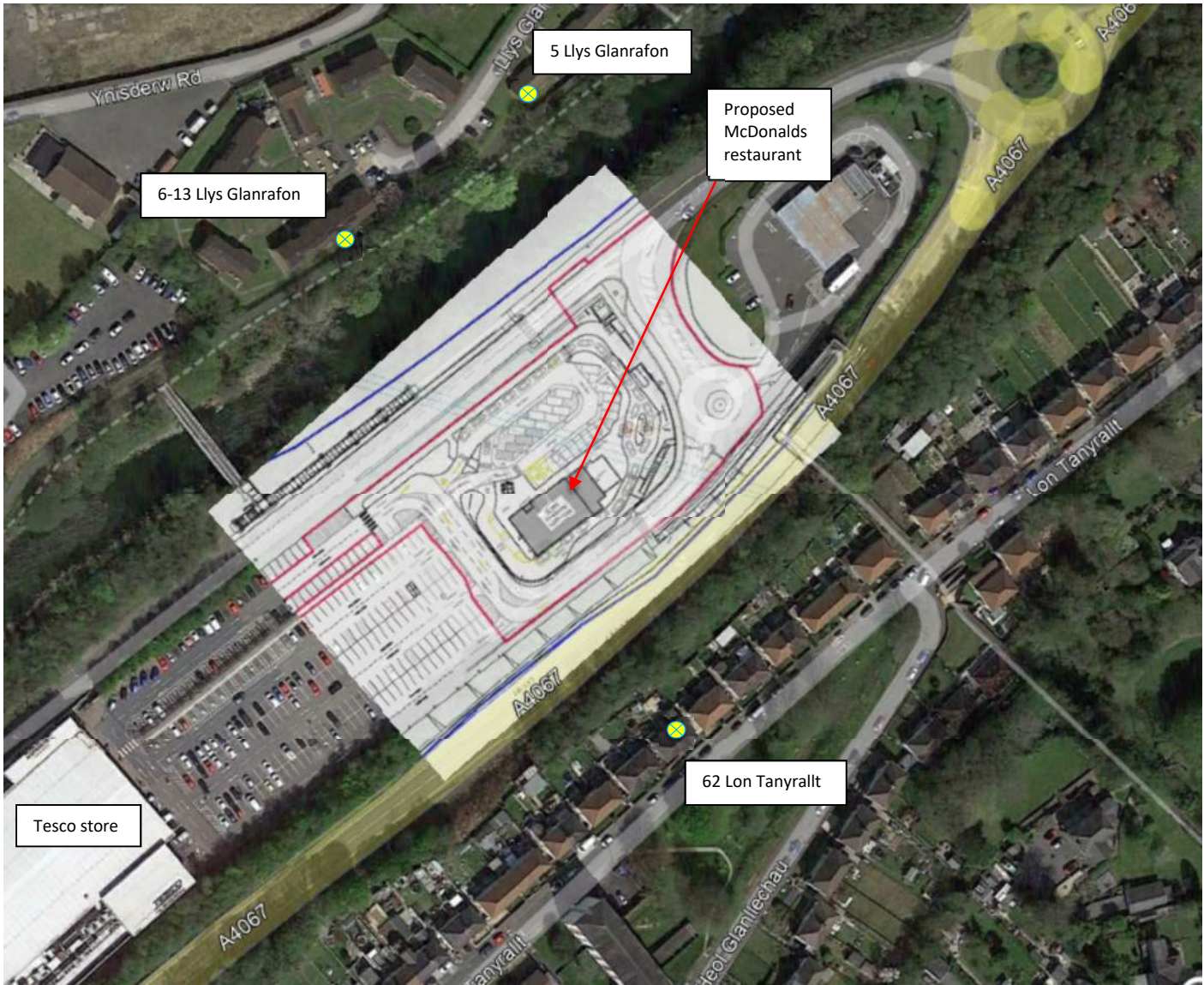
7.3 Noise from both the 'drive-thru' and from customer car parking activity would comply with daytime and night time WHO guidance values and is well below the existing noise climate.

7.4 It is concluded, therefore, that the proposed McDonalds restaurant with 'drive-thru' could trade on an unrestricted basis without associated noise causing significant adverse impact, in accordance with national planning policy aims.

APPENDIX A

PROPOSED SITE PLAN

Appendix A: Proposed site plan showing noise receptor locations



APPENDIX B

NOISE SURVEY RESULTS

Appendix B1		Title: Noise survey results				
Noise level measured at Tesco Pontardawe, Monday 27th to Tuesday 28th June 2022						
Date	Sample start time	Noise Parameter - dB				
		L _{A10}	L _{A90}	L _{Aeq}	L _{AFmax}	L _{AFmin}
27.6.22	17:00	64.9	60.7	63.4	74.3	56.9
	17:15	64.7	60.1	63.0	78.0	55.0
	17:30	64.8	60.6	63.1	72.6	56.0
	17:45	64.5	59.8	62.8	73.8	51.7
	18:00	66.3	58.9	65.2	84.0	52.3
	18:15	64.5	58.3	62.6	79.1	51.4
	18:30	64.9	58.7	63.1	78.1	52.9
	18:45	64.7	57.4	62.1	77.0	52.1
	19:00	64.0	55.7	61.6	75.5	49.0
	19:15	64.4	56.1	62.0	78.2	48.3
	19:30	63.9	56.3	61.5	74.8	49.6
	19:45	64.1	55.7	61.4	70.7	50.9
	20:00	63.5	55.0	61.0	73.0	47.7
	20:15	63.4	53.5	60.7	74.5	48.0
	20:30	63.2	53.7	60.4	76.2	48.5
	20:45	63.4	54.0	60.8	75.3	45.2
	21:00	63.5	54.3	60.6	75.3	49.0
	21:15	62.5	53.7	59.7	81.4	48.1
	21:30	63.8	52.8	63.0	87.5	46.6
	21:45	62.5	51.2	60.7	87.6	46.6
	22:00	62.6	51.1	65.6	93.6	44.3
	22:15	61.4	50.5	61.6	92.0	43.6
	22:30	61.1	50.8	58.8	81.8	44.5
	22:45	60.6	44.0	58.0	81.5	39.3
	23:00	62.1	45.6	61.0	88.1	38.6
	23:15	60.8	46.7	61.1	82.6	39.8
	23:30	61.6	43.8	62.3	82.0	39.9
	23:45	59.3	44.3	55.0	74.4	37.5
28.6.22	00:00	57.9	42.2	53.6	72.7	37.9
	00:15	57.3	41.3	52.5	74.1	36.9
	00:30	56.0	39.0	54.2	85.2	34.9
	00:45	56.3	37.5	51.7	66.3	35.5
	01:00	57.9	37.9	53.1	69.0	35.7
	01:15	53.5	36.7	49.0	63.6	35.2
	01:30	53.2	35.8	49.9	67.0	34.2
	01:45	53.5	36.2	49.8	67.8	34.7
	02:00	52.5	35.7	48.6	67.5	34.4
	02:15	50.2	35.5	47.9	65.5	34.5
	02:30	55.1	37.0	50.8	66.6	35.4
	02:45	50.4	37.3	48.1	66.3	35.7
	03:00	54.6	38.1	50.6	68.8	36.3
	03:15	50.4	37.5	47.5	64.3	36
	03:30	56.4	37.1	51.7	66.8	35.2
	03:45	55.3	39.3	51.0	67.2	36.9
	04:00	58.0	40.7	53.0	66.9	38.2
	04:15	57.4	39.6	52.7	66.3	37.6
	04:30	59.4	41.1	59.2	80.0	38.8

Appendix B2**Title: Noise survey results****Noise level measured at Tesco Pontardawe, Monday 27th to Tuesday 28th June 2022**

Date	Sample start time	Noise Parameter - dB				
		L _{A10}	L _{A90}	L _{Aeq}	L _{AFmax}	L _{AFmin}
28.6.22	04:45	59.4	40.6	55.2	68.8	37.4
	05:00	60.0	41.0	55.2	66.2	37.8
	05:15	61.7	48.7	58.3	69.1	40.8
	05:30	63.8	55.5	61.2	71.8	47.6
	05:45	63.2	53.6	60.2	69.6	45.2
	06:00	63.7	55.0	62.0	83.8	46.6
	06:15	64.7	56.9	62.2	73.8	47.3
	06:30	65.2	59.0	63.1	74.4	53.4
	06:45	65.6	57.6	63.0	79.9	47.7
	07:00	65.2	60.6	63.9	78.2	54.4
	07:15	66.1	61.9	64.4	74.9	57.1
	07:30	65.3	61.1	63.5	72.4	55.3
	07:45	65.7	60.4	63.7	81.0	56.2
	08:00	66.0	61.5	64.2	81.8	57.7
	08:15	66.1	61.7	64.4	70.8	56.9

APPENDIX C

‘NOYSPLOT’ NOISE MODEL: PLANT NOISE PREDICTIONS

Client: McDonalds			Appendix C1.1				Page: 1 of 1				
Project: McDonalds Pontadawe			Project no: 2221266								
Consultant: K J Metcalfe			Date: 30 June 2022								
Sound power levels (Lw) & sound pressure levels (Lp) for fans & other equipment											
Equipment name/reference	Lw/ Lp	Dist. (m)	On time D/N/A	Mid-frequency Octave Bands (Hz)							
				63	125	250	500	1k	2k	4k	8k
S1 Kitchen AHU Fresh Air Intake	Lw		A	73	80	81	77	72	70	69	67
S1 Kitchen AHU Breakout	Lw		A	65	68	61	55	43	42	41	29
S2 Restaurant AHU Fresh Air Intake	Lw		A	71	79	76	72	69	67	64	59
S2 Restaurant AHU Breakout	Lw		A	63	79	76	72	69	67	64	59
EF1 fan motor	Lp	1	A	66	dBA						
EF1 Kitchen Extract exhaust	Lw		A	104	95	100	89	84	80	77	68
EF1 Kitchen Extract duct breakout	Lp	1	A	60	55	61	50	42	36	38	31
EF3 Store Room Extract	Lw		A	54	56	60	62	61	58	53	46
EF2 WC Extract	Lw		A	54	56	60	62	61	58	53	46
Cold Room Condenser	Lp	10	A	37	dBA						
Freezer Room Condenser	Lp	10	A	42	dBA						
S1/C1 Condenser	Lp	1	A	66	60	60	60	56	53	49	42
S1/C2 Condenser	Lp	1	A	66	60	60	60	56	53	49	42
S1/C3 Condenser	Lp	1	A	66	60	60	60	56	53	49	42
S2/C1 Condenser	Lp	1	A	67	62	60	61	56	52	49	42
S2/C2 Condenser	Lp	1	A	67	62	60	61	56	52	49	42
ABS Drinks Condenser	Lp	1	A	62	dBA						
Managers Office Condenser	Lp	1	A	53	52	53	45	43	39	33	28
Crew Room Condenser	Lw		A	64	dBA						
Door Curtain Condenser	Lw		A	59	dBA						
ASHP	Lw		A	59	dBA						
Notes:											
1. Lw/Lp											
Lw means sound power level (dB)											
Lp means sound pressure level at the stated distance (dB@m)											
2. On times (On.time D/N/A):											
D (Day) means that the fan/equipment could operate at any time between 0700 and 2300 hours											
N (Night) means that the fan/equipment could operate at any time between 2300 and 0700 hours											
A (All) means that the fan/equipment could operate at any time during the day and night											

[illegible]

Appendix C2: NoysPlot input data, source, receptor and barrier data

Sharps Redmore Partnership
The White House, London Road, Copdock, Ipswich, IP8 3JH

Filename: p:\22 - Projects\2221266 McDonalds at Tesco Pontadawe-KJM\NoysPlot\KJM NoysPlot 30.6.22\McDonalds Pontadawe 30.6.22
Date: 30 June 2022
Entries by: K J Metcalfe
Project no: 2221266
Project title: McDonalds Pontadawe
Client's name: McDonalds

Map/plot details: Length: 3200
Width: 3200
Height: 250

Source data - description, co-ordinates, outlet size, percentage to atmosphere, directivity, sound levels and running period

Source description	Co-ordinates			Outlet details			%	Q	Run d/n/a	Lp/ Lw	dBA Y/N	Dist (m)	Noise level - Octave band centre frequency Hz							
	X m	Y m	Z m	Amm	Bmm	Ang.							63	125	250	500	1k	2k	4k	8k
S1 Kitchen AHU Fresh Air Intak	506.5	502.5	5.0	1200	900	270	100	1	A	W	N	0.0	73	80	81	77	72	70	69	67
S1 Kitchen AHU Breakout	509.5	502.5	5.5	0	0	0	100	1	A	W	N	0.0	73	80	81	77	72	70	69	67
S2 Restaurant AHU Fresh Air Intake	501.5	507.0	5.0	1200	900	0	100	1	A	W	N	0.0	71	79	76	72	69	67	64	59
S2 Restaurant AHU Breakout	503.5	504.0	5.5	0	0	0	100	1	A	W	N	0.0	71	79	76	72	69	67	64	59
EF1 fan motor	522.5	510.0	4.8	0	0	0	100	1	A	P	Y	1.0	66 dBA							
EF1 Kitchen Extract exhaust	517.5	509.0	5.0	1000	1000	360	100	1	A	P	N	1.0	104	95	100	89	84	80	77	68
EF1 Kitchen Extract duct breakout	519.5	502.0	4.8	0	0	0	100	1	A	P	N	1.0	60	55	61	50	42	36	38	31
EF3 Store Room Extract	528.0	512.5	4.2	0	0	0	100	1	A	W	N	0.0	54	56	60	62	61	58	53	46
EF2 WC Extract	520.5	510.5	4.2	0	0	0	100	1	A	W	N	0.0	54	56	60	62	61	58	53	46
Cold Room Condenser	524.5	502.5	4.5	0	0	0	100	2	A	P	Y	10.0	37 dBA							
Freezer Room Condenser	524.5	504.5	4.5	0	0	0	100	2	A	P	Y	10.0	42 dBA							
S1/C1 Condenser	508.5	505.0	4.5	0	0	0	100	2	A	P	N	1.0	66	60	60	60	56	53	49	42
S1/C2 Condenser	510.0	505.0	4.5	0	0	0	100	2	A	P	N	1.0	66	60	60	60	56	53	49	42
S1/C3 Condenser	511.5	505.0	4.5	0	0	0	100	2	A	P	N	1.0	66	60	60	60	56	53	49	42
S2/C1 Condenser	503.0	501.0	4.5	0	0	0	100	2	A	P	N	1.0	67	62	60	61	56	52	49	42
S2/C2 Condenser	504.0	501.0	4.5	0	0	0	100	2	A	P	N	1.0	67	62	60	61	56	52	49	42
ABS Drinks Condenser	506.0	501.5	4.5	0	0	0	100	2	A	P	Y	1.0	62 dBA							
Managers Office Condenser	501.0	501.0	4.0	0	0	0	100	2	A	P	N	1.0	53	52	53	45	43	39	33	28
Crew Room Condenser	524.5	506.5	4.0	0	0	0	100	2	A	W	Y	0.0	64 dBA							
Door Curtain Condenser	501.0	502.5	4.0	0	0	0	100	2	A	W	Y	0.0	59 dBA							
ASHP	520.5	505.5	4.5	0	0	0	100	2	A	W	Y	0.0	59 dBA							

Receptor data - description and co-ordinates

Receptor description	Co-ordinates			DNA
	X m	Y m	Z m	
6-13 Llys Glanrafon	505.0	614.0	4.5	A
5 Llys Glanrafon	572.0	610.0	4.5	A
62 Lon Tanyralt	510.0	437.0	15.0	A

Barrier data - description and co-ordinates

Barrier description	Co-ordinates					
	Start			End		
	X m	Y m	Z m	X m	Y m	Z m
Ring barrier	500.0	500.0	6.0	500.0	514.0	6.0
Ring barrier	500.0	514.0	6.0	513.0	514.0	6.0
Ring barrier	513.0	514.0	6.0	513.0	514.0	5.5
Ring barrier	513.0	514.0	5.5	525.5	514.0	5.5
Ring barrier	525.5	514.0	5.5	525.5	514.0	4.0
Ring barrier	525.5	514.0	4.0	531.0	513.5	4.0
Ring barrier	531.0	513.5	4.0	531.0	502.0	4.0
Ring barrier	531.0	502.0	4.0	525.5	502.0	4.0
Ring barrier	525.5	502.0	4.0	525.5	502.0	5.5
Ring barrier	525.5	502.0	5.5	525.5	500.0	5.5
Ring barrier	525.5	500.0	5.5	513.0	500.0	5.5
Ring barrier	513.0	500.0	5.5	513.0	500.0	6.0
Ring barrier	513.0	500.0	6.0	500.0	500.0	6.0

Appendix C3: Predicted day and night time noise levels

Overall receptor listings

Period: Day/night time

Overall daytime and night time plant noise levels (dB)	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
62 Lon Tanyrallt	48	38	33	27	24	21	20	21	32
5 Llys Glanrafon	44	34	29	24	20	18	16	17	28
6-13 Llys Glanrafon	44	34	29	24	19	14	9	0	27

Source noise levels at receiver: 6-13 Llys Glanrafon

Period: Day/night time

Plant item	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
S2 Restaurant AHU Fresh Air Intake	14	26	24	19	15	11	5	0	21
EF1 fan motor	38	27	19	12	7	3	1	0	18
EF1 Kitchen Extract exhaust	40	26	20	3	0	0	0	0	17
EF3 Store Room Extract	1	4	8	11	12	10	5	0	16
Freezer Room Condenser	36	25	17	10	5	2	0	0	15
ABS Drinks Condenser	35	24	16	8	3	0	0	0	14
S2/C1 Condenser	23	18	14	14	6	0	0	0	13
S2/C2 Condenser	23	18	14	14	6	0	0	0	13
S1 Kitchen AHU Fresh Air Intake	14	21	19	11	1	0	0	0	13
S1/C1 Condenser	22	15	14	12	5	0	0	0	12
S1/C2 Condenser	22	15	14	12	5	0	0	0	12
S1/C3 Condenser	22	15	14	12	5	0	0	0	12
Cold Room Condenser	31	20	13	5	1	0	0	0	11
Crew Room Condenser	29	18	9	1	0	0	0	0	7
EF1 Kitchen Extract duct breakout	14	9	14	2	0	0	0	0	6
ASHP	25	14	6	0	0	0	0	0	0
EF2 WC Extract	0	0	2	2	0	0	0	0	0
S1 Kitchen AHU Breakout	11	14	7	0	0	0	0	0	0
S2 Restaurant AHU Breakout	9	13	1	0	0	0	0	0	0
Managers Office Condenser	9	7	6	0	0	0	0	0	0
Door Curtain Condenser	24	12	4	0	0	0	0	0	0
Total Free field Lp and dBA	44	34	29	24	19	14	9	0	27

Source noise levels at receiver: 5 Llys Glanrafon

Period: Day/night time

Plant item	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Freezer Room Condenser	36	27	20	15	14	14	14	16	22
S2 Restaurant AHU Fresh Air Intake	13	24	21	17	13	8	3	0	19
Cold Room Condenser	31	21	15	9	8	9	9	11	17
EF1 fan motor	37	26	18	11	6	3	0	0	16
EF1 Kitchen Extract exhaust	39	25	19	2	0	0	0	0	16
EF3 Store Room Extract	0	3	7	10	11	9	4	0	15
ABS Drinks Condenser	35	24	17	10	5	2	0	0	15
S1 Kitchen AHU Fresh Air Intake	13	21	20	12	3	0	0	0	14
S1/C3 Condenser	22	15	14	13	7	2	0	0	13
S1/C1 Condenser	22	15	14	13	7	2	0	0	13
S1/C2 Condenser	22	15	14	13	7	2	0	0	13
Crew Room Condenser	30	20	13	7	4	3	3	5	13
S2/C2 Condenser	22	17	14	13	6	0	0	0	13
S2/C1 Condenser	22	17	14	13	6	0	0	0	13
EF1 Kitchen Extract duct breakout	13	8	13	2	0	0	0	0	5
ASHP	25	14	6	0	0	0	0	0	0
EF2 WC Extract	0	0	1	1	0	0	0	0	0
S1 Kitchen AHU Breakout	10	13	6	0	0	0	0	0	0
S2 Restaurant AHU Breakout	8	12	1	0	0	0	0	0	0
Managers Office Condenser	8	6	6	0	0	0	0	0	0
Door Curtain Condenser	23	12	3	0	0	0	0	0	0
Total Free field Lp and dBA	44	34	29	24	20	18	16	17	28

Source noise levels at receiver: 62 Lon Tanyrallt

Period: Day/night time

Plant item	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
EF1 fan motor	42	32	26	22	20	19	19	21	28
EF1 Kitchen Extract exhaust	44	30	26	13	3	0	0	0	22
Freezer Room Condenser	40	30	23	16	13	11	9	9	22
S1/C2 Condenser	27	20	19	18	12	7	0	0	18
S1/C3 Condenser	27	20	19	18	12	7	0	0	18
S1/C1 Condenser	27	20	19	18	12	7	0	0	18
S1 Kitchen AHU Fresh Air Intake	19	26	24	15	5	1	0	0	18
EF3 Store Room Extract	3	5	10	12	13	12	7	0	18
S2 Restaurant AHU Fresh Air Intake	16	25	20	13	7	5	2	0	16
ABS Drinks Condenser	38	26	17	9	3	0	0	1	16
EF2 WC Extract	3	5	9	12	11	8	5	0	15
Crew Room Condenser	34	24	17	10	6	3	1	1	15
Cold Room Condenser	35	24	16	9	4	0	0	0	14
S2/C1 Condenser	25	18	14	12	4	0	0	0	12
S2/C2 Condenser	25	18	14	12	4	0	0	0	12
ASHP	29	19	12	6	3	2	1	2	12
EF1 Kitchen Extract duct breakout	19	14	19	7	0	0	0	0	11
S1 Kitchen AHU Breakout	16	19	12	6	0	0	0	0	8
S2 Restaurant AHU Breakout	13	17	6	0	0	0	0	0	4
Managers Office Condenser	10	7	5	0	0	0	0	0	0
Door Curtain Condenser	26	14	5	0	0	0	0	0	0
Total Free field Lp and dBA	48	38	33	27	24	21	20	21	32

APPENDIX D

'DRIVE THRU' NOISE CALCULATIONS

APPENDIX D1.1: McDonalds drive thru ambient noise (L_{Aeq T}) level predictions: 6-13 Llys Glanrafon, Pontardawe, Swansea

TIME	Activity	SEL at 10 metres	No. of events	L _{Aeq 1 hour} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	L _{Aeq 1 hour} at receptor	Overall dB L _{Aeq 1 hour}
Friday peak hour	Arrival of vehicle	72 dB	87	56 dB	69 m	-17 dB	0 dB	39 dB	42 dB
	Ordering	70 dB	87	54 dB	104 m	-20 dB	0 dB	33 dB	
	Collection of order	72 dB	87	56 dB	115 m	-21 dB	-10 dB	25 dB	
	Departure of vehicle	72 dB	87	56 dB	85 m	-19 dB	0 dB	37 dB	

TIME	Activity	SEL at 10 metres	No. of events	L _{Aeq 1 hour} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	L _{Aeq 1 hour} at receptor	Overall dB L _{Aeq 1 hour}
Saturday peak hour	Arrival of vehicle	72 dB	91	56 dB	69 m	-17 dB	0 dB	39 dB	42 dB
	Ordering	70 dB	91	54 dB	104 m	-20 dB	0 dB	34 dB	
	Collection of order	72 dB	91	56 dB	115 m	-21 dB	-10 dB	25 dB	
	Departure of vehicle	72 dB	91	56 dB	85 m	-19 dB	0 dB	37 dB	

TIME	Activity	SEL at 10 metres	No. of events	L _{Aeq 1 hour} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	L _{Aeq 1 hour} at receptor	Overall dB L _{Aeq 1 hour}
Off-peak (21:00-06:00)	Arrival of vehicle	72 dB	12	47 dB	69 m	-17 dB	0 dB	30 dB	33 dB
	Ordering	70 dB	12	45 dB	104 m	-20 dB	0 dB	25 dB	
	Collection of order	72 dB	12	47 dB	115 m	-21 dB	-10 dB	16 dB	
	Departure of vehicle	72 dB	12	47 dB	85 m	-19 dB	0 dB	29 dB	

TIME	Activity	SEL at 10 metres	No. of events	L _{Aeq 1 hour} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	L _{Aeq 1 hour} at receptor	Overall dB L _{Aeq 1 hour}
04:00 (Lowest flows)	Arrival of vehicle	72 dB	2	39 dB	69 m	-17 dB	0 dB	23 dB	26 dB
	Ordering	70 dB	2	37 dB	104 m	-20 dB	0 dB	17 dB	
	Collection of order	72 dB	2	39 dB	115 m	-21 dB	-10 dB	8 dB	
	Departure of vehicle	72 dB	2	39 dB	85 m	-19 dB	0 dB	21 dB	

PEAK NOISE

Activity	L _{Amax} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB) *	L _{Amax} at receptor	Highest dB L _{Amax}
Arrival of vehicle	63 dB	69 m	-17 dB	0 dB	46 dB	46 dB
Ordering	61 dB	104 m	-20 dB	0 dB	41 dB	
Collection of order	62 dB	115 m	-21 dB	-10 dB	31 dB	
Departure of vehicle	63 dB	85 m	-19 dB	0 dB	44 dB	

APPENDIX D1.2: McDonalds drive thru ambient noise (L_{Aeq T}) level predictions: 1 Llys Glanrafon, Pontardawe, Swansea

TIME	Activity	SEL at 10 metres	No. of events	L _{Aeq 1 hour} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	L _{Aeq 1 hour} at receptor	Overall dB L _{Aeq 1 hour}
Friday peak hour	Arrival of vehicle	72 dB	87	56 dB	135 m	-23 dB	0 dB	33 dB	37 dB
	Ordering	70 dB	87	54 dB	124 m	-22 dB	0 dB	32 dB	
	Collection of order	72 dB	87	56 dB	157 m	-24 dB	-10 dB	22 dB	
	Departure of vehicle	72 dB	87	56 dB	151 m	-24 dB	0 dB	32 dB	

TIME	Activity	SEL at 10 metres	No. of events	L _{Aeq 1 hour} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	L _{Aeq 1 hour} at receptor	Overall dB L _{Aeq 1 hour}
Saturday peak hour	Arrival of vehicle	72 dB	91	56 dB	135 m	-23 dB	0 dB	33 dB	38 dB
	Ordering	70 dB	91	54 dB	124 m	-22 dB	0 dB	32 dB	
	Collection of order	72 dB	91	56 dB	157 m	-24 dB	-10 dB	22 dB	
	Departure of vehicle	72 dB	91	56 dB	151 m	-24 dB	0 dB	32 dB	

TIME	Activity	SEL at 10 metres	No. of events	L _{Aeq 1 hour} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	L _{Aeq 1 hour} at receptor	Overall dB L _{Aeq 1 hour}
Off-peak (21:00-06:00)	Arrival of vehicle	72 dB	12	47 dB	135 m	-23 dB	0 dB	25 dB	29 dB
	Ordering	70 dB	12	45 dB	124 m	-22 dB	0 dB	23 dB	
	Collection of order	72 dB	12	47 dB	157 m	-24 dB	-10 dB	13 dB	
	Departure of vehicle	72 dB	12	47 dB	151 m	-24 dB	0 dB	24 dB	

TIME	Activity	SEL at 10 metres	No. of events	L _{Aeq 1 hour} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	L _{Aeq 1 hour} at receptor	Overall dB L _{Aeq 1 hour}
04:00 (Lowest flows)	Arrival of vehicle	72 dB	2	39 dB	135 m	-23 dB	0 dB	17 dB	21 dB
	Ordering	70 dB	2	37 dB	124 m	-22 dB	0 dB	16 dB	
	Collection of order	72 dB	2	39 dB	157 m	-24 dB	-10 dB	6 dB	
	Departure of vehicle	72 dB	2	39 dB	151 m	-24 dB	0 dB	16 dB	

PEAK NOISE

Activity	L _{Amax} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB) *	L _{Amax} at receptor	Highest dB L _{Amax}
Arrival of vehicle	63 dB	135 m	-23 dB	0 dB	40 dB	40 dB
Ordering	61 dB	124 m	-22 dB	0 dB	39 dB	
Collection of order	62 dB	157 m	-24 dB	-10 dB	28 dB	
Departure of vehicle	63 dB	151 m	-24 dB	0 dB	39 dB	

APPENDIX D1.3: McDonalds drive thru ambient noise ($L_{Aeq,T}$) level predictions: '62 Lon Tanyrallt, Pontardawe, Swansea

TIME	Activity	SEL at 10 metres	No. of events	$L_{Aeq,1\text{ hour}}$ at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	$L_{Aeq,1\text{ hour}}$ at receptor	Overall dB $L_{Aeq,1\text{ hour}}$
Friday peak hour	Arrival of vehicle	72 dB	87	56 dB	103 m	-20 dB	0 dB	36 dB	43 dB
	Ordering	70 dB	87	54 dB	86 m	-19 dB	0 dB	35 dB	
	Collection of order	72 dB	87	56 dB	60 m	-16 dB	0 dB	40 dB	
	Departure of vehicle	72 dB	87	56 dB	95 m	-20 dB	0 dB	36 dB	

TIME	Activity	SEL at 10 metres	No. of events	$L_{Aeq,1\text{ hour}}$ at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	$L_{Aeq,1\text{ hour}}$ at receptor	Overall dB $L_{Aeq,1\text{ hour}}$
Saturday peak hour	Arrival of vehicle	72 dB	91	56 dB	103 m	-20 dB	0 dB	36 dB	44 dB
	Ordering	70 dB	91	54 dB	86 m	-19 dB	0 dB	35 dB	
	Collection of order	72 dB	91	56 dB	60 m	-16 dB	0 dB	40 dB	
	Departure of vehicle	72 dB	91	56 dB	95 m	-20 dB	0 dB	36 dB	

TIME	Activity	SEL at 10 metres	No. of events	$L_{Aeq,1\text{ hour}}$ at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	$L_{Aeq,1\text{ hour}}$ at receptor	Overall dB $L_{Aeq,1\text{ hour}}$
Off-peak (21:00-06:00)	Arrival of vehicle	72 dB	12	47 dB	103 m	-20 dB	0 dB	27 dB	35 dB
	Ordering	70 dB	12	45 dB	86 m	-19 dB	0 dB	27 dB	
	Collection of order	72 dB	12	47 dB	60 m	-16 dB	0 dB	32 dB	
	Departure of vehicle	72 dB	12	47 dB	95 m	-20 dB	0 dB	28 dB	

TIME	Activity	SEL at 10 metres	No. of events	$L_{Aeq,1\text{ hour}}$ at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	$L_{Aeq,1\text{ hour}}$ at receptor	Overall dB $L_{Aeq,1\text{ hour}}$
04:00 (Lowest flows)	Arrival of vehicle	72 dB	2	39 dB	103 m	-20 dB	0 dB	19 dB	27 dB
	Ordering	70 dB	2	37 dB	86 m	-19 dB	0 dB	19 dB	
	Collection of order	72 dB	2	39 dB	60 m	-16 dB	0 dB	24 dB	
	Departure of vehicle	72 dB	2	39 dB	95 m	-20 dB	0 dB	20 dB	

PEAK NOISE

Activity	L_{Amax} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB) *	L_{Amax} at receptor	Highest dB L_{Amax}
Arrival of vehicle	63 dB	103 m	-20 dB	0 dB	43 dB	46 dB
Ordering	61 dB	86 m	-19 dB	0 dB	42 dB	
Collection of order	62 dB	60 m	-16 dB	0 dB	46 dB	
Departure of vehicle	63 dB	95 m	-20 dB	0 dB	43 dB	

APPENDIX E

ACOUSTIC TERMINOLOGY

Acoustic Terminology

- E1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. 50 dB + 50 dB = 53 dB. Increases in continuous sound are perceived in the following manner:
- 1 dB increase - barely perceptible.
 - 3 dB increase - just noticeable.
 - 10 dB increase - perceived as twice as loud.
- E2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.
- E3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).
- E4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p . Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p .
- E5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.
- E6 The main noise indices in use in the UK are:
- L_{A90} : The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.
 - L_{Aeq} : The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other

words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

- L_{A10} : The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given sample. It has been used over many years to measure and assess road traffic noise.
- L_{AMAX} : The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.
- E7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB.}$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

- E8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = $20 \log$ (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \log \frac{160}{10} = 60 - 24 = 36 \text{ dB.}$$