SHARPS REDMORE

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Report

Tesco Extra, Wombwell Lane, Barnsley

Environmental Noise Assessment of a proposed retail unit

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1.0 Introduction

1.1 Sharps Redmore (SR) has been instructed to undertake a noise assessment for a proposed retail unit within the car park area of the Tesco Extra store at Wombwell Lane, Barnsley (see Appendix A).

1.2 The proposal is for a retail unit with associated delivery loading bay, customer car parking and fixed plant equipment. The proposed retail unit would occupy the northern corner of the Tesco Extra car park adjacent to the site boundary with the rear of properties on Wombwell Lane.

1.3 The objective of the assessment is to determine how noise that may be generated as a result of the proposed retail unit would affect residential amenity. Based on experience of similar retail units, the following main impacts have been identified:

- Noise from fixed mechanical services plant
- Noise from servicing activity
- Noise from trading activity

1.4 Section 2 contains a discussion of the available methods of assessment and assessment criteria.

1.5 Section 3 of this report presents details of the environmental noise survey undertaken at the site.

1.6 The different components of operational noise are considered in sections 4 to 6; the assessment conclusions are contained in section 7.

1.7 A guide to the acoustic terminology used within the report is included in Appendix E.

2.0 Assessment methodology and criteria

2.1 The National Planning Policy Framework (NPPF), March 2012, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 123 of the NPPF states the following:

"Planning policies and decisions should aim to:

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

2.2 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in the table below:

TABLE 1: Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up	Observed Adverse	Mitigate and reduce to a

Perception	Examples of Outcomes	Increasing Effect Level	Action
intrusive	volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Effect	minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.3 The NPPF and NPPG reinforce the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

2.4 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant

observed adverse effect, then according to the explanatory notes in the statement:

"… all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

2.5 Taking an overview of national policy aims and guidance it is clear that when considering the impact of noise that the fact can be heard and causes impact, is not reason to refusal an application as consideration should also be given to the significance of the impact and the mitigation measures available.

2.6 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 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.

Guideline noise values

2.7 The WHO advice is the most useful, comprehensive, and pertinent advice in this case, because it is not specific to the circumstances of the assessment. Instead, it provides guidance on acceptable limits in, for example, schools, dwellings and offices from noise occurring within the community.

2.8 The WHO guideline 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.

2.9 The National Physical Laboratory document *"Health Effect based noise assessment methods; a review and feasibility study", (September 1998)* contains an "interpretation" of the WHO guidelines (then in draft form) for the DETR. The summary of this section of the NPL report states *"In essence, the WHO guidelines represent a consensus view of international expert opinion on the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached"* (paragraph 5.4).

2.10 The World Health Organisation guideline noise values are summarised in the Table 2 below.

TABLE 2: WHO guideline noise 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)

2.11 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 document.

Changes in noise level

2.12 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}.

2.13 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 3: 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

2.14 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

2.15 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:

i) Determine the background sound levels, in terms of the index L_{A90}, at the receptor locations of interest.

ii) 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.

iii) Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.

iv) Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.

v) 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.

vi) 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". However the NPPF and NPPG state that where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement *"…all reasonable steps should be taken to mitigate and minimise adverse effects in health and quality of life while together taking into account the guiding principles of sustainable development. This does not mean that adverse effects cannot occur but that effort should be focused on minimising such effects"*.

2.16 BS 4142:2014 introduces the concept of '*context*' to 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). A*n 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).

2.17 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;

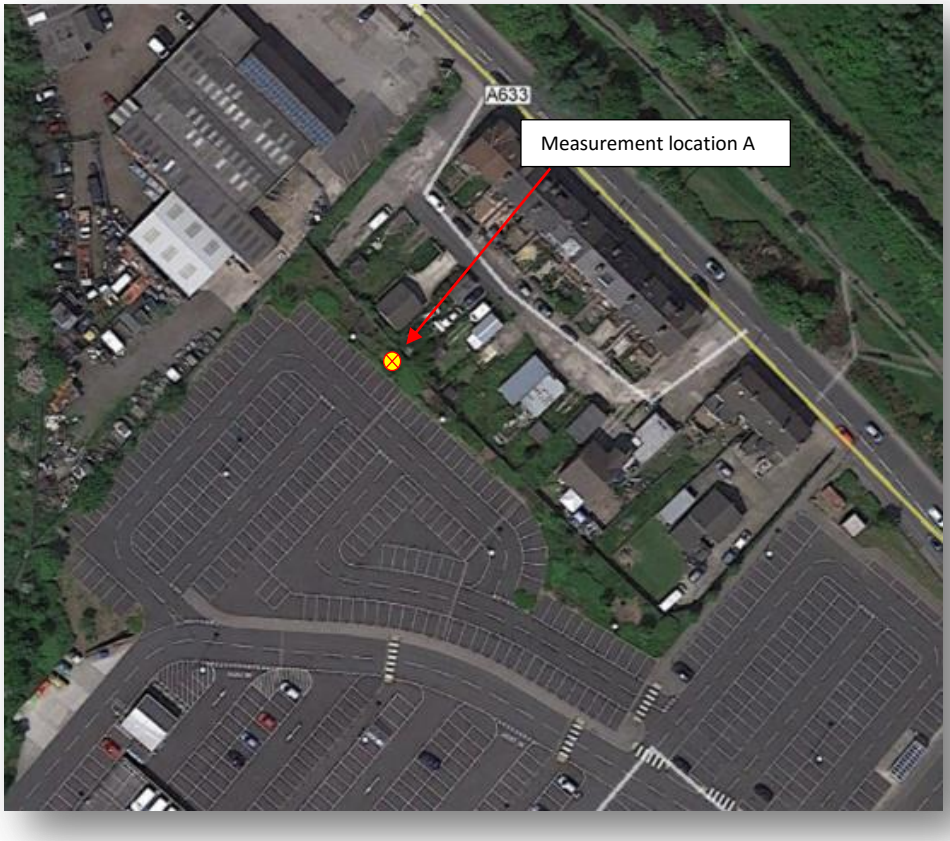
2.18 It is therefore entirely possible that whilst the numerical outcome of a BS 4142:2014 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in *context* the significance of the impact is reduced to an acceptable level.

3.0 Environmental noise survey details

3.1 A noise survey was undertaken at the site between Tuesday 17th October and Thursday 19th October 2017. The purpose of the survey was to establish the existing noise climate at a position representative of the closest residential properties to the proposed retail unit.

3.2 A single noise measurement location representative of the noise climate at the rear of the properties in Wombwell Lane was used (as indicated in Figure 1 below).

FIGURE 1: Noise measurement location



3.3 Unattended noise measurements were taken using a Norsonic 140 sound level meter fitted with an environmental microphone kit. The sound level meter was calibrated at the start and end of the measurements and no variation in levels noted.

3.4 Weather conditions during the survey were mostly dry and partly cloudy with temperatures ranging between 13°C to 9°C, winds were locally light and variable during the survey (<5m/s). Weather conditions are not considered to have influenced the measured noise levels.

3.5 Noise measurements were made every 15 minutes during the survey. The sound level meter microphone was located in free field conditions at a height of

approximately 2 metres above ground level at the boundary at the existing Tesco Extra car park and rear of the properties in Wombwell Lane.

3.6 The noise levels measured during the survey were dominated by local road traffic noise sources; the area of the car park adjacent to the noise monitoring equipment was unused during the survey.

3.7 The measured noise levels are summarised in Figure 2 and Table 4 below and presented in full in Appendix B.

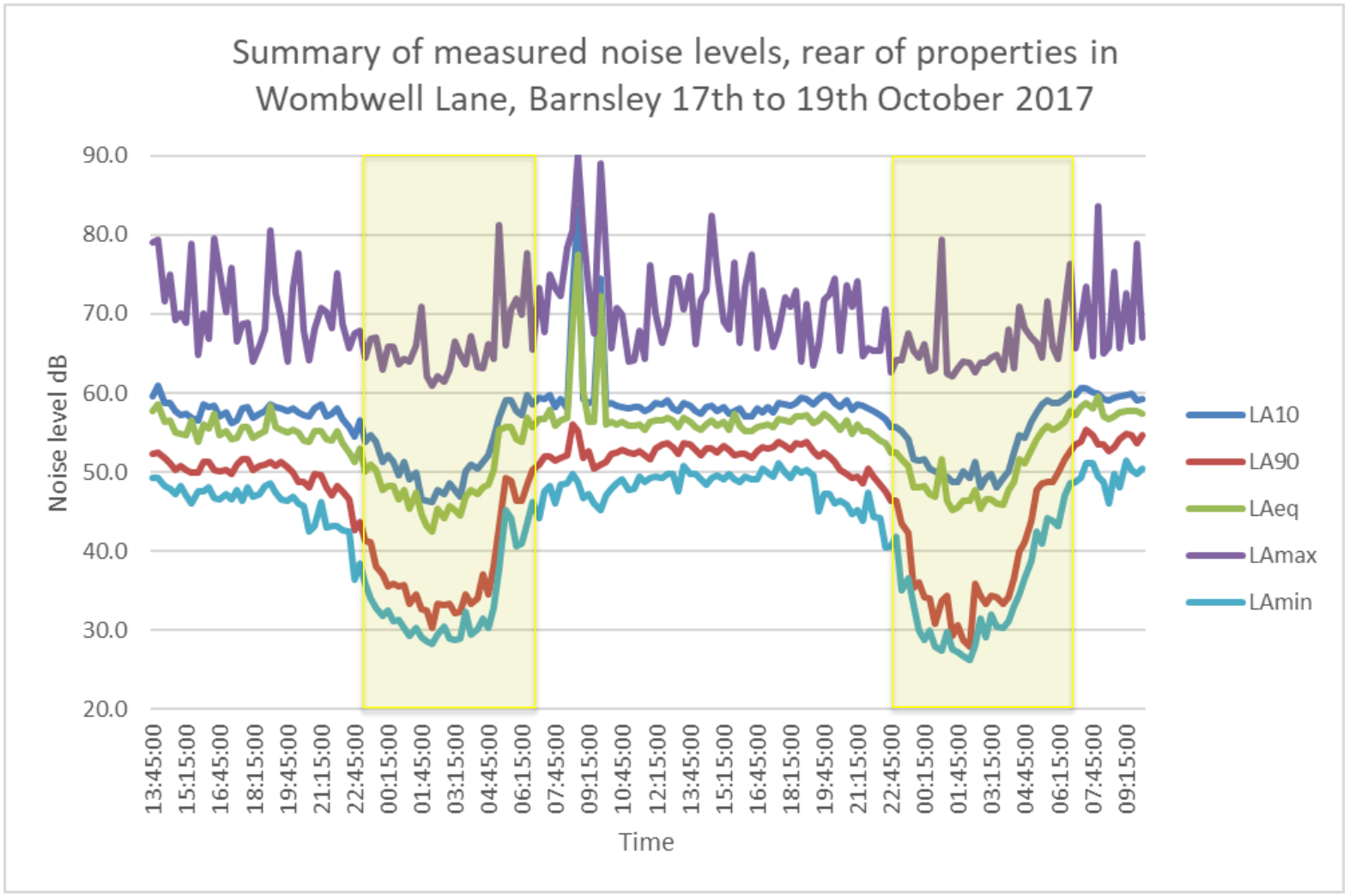
TABLE 4: Summary of measured noise level

Date	Time	Noise level dB		
		$L_{A90\ 1\ hour}$	$L_{A90\ 15\ mins}$	$L_{Aeq\ 1\ hour}$
17.10.17	14:00:00	51.4		56.8
	15:00:00	50.3		55.1
	16:00:00	50.8		56.0
	17:00:00	50.7		54.8
	18:00:00	50.9		55.1
	19:00:00	50.9		56.3
	20:00:00	48.9		54.6
	21:00:00	48.6		54.7
	22:00:00	46.3		53.4
	23:00:00	41.1	38.1	51.2
18.10.17	00:00:00	36.0	35.5	47.8
	01:00:00	34.1	32.6	46.5
	02:00:00	32.3	30.3	43.9
	03:00:00	33.1	32.1	45.7
	04:00:00	34.8	33.3	47.8
	05:00:00	44.8	38.1	54.7
	06:00:00	47.9	46.4	55.3
	07:00:00	51.6		56.9
	08:00:00	53.8		72.0
	09:00:00	51.5		66.7
	10:00:00	52.2		56.2
	11:00:00	52.4		55.8

Date	Time	Noise level dB		
		$L_{A90\ 1\ hour}$	$L_{A90\ 15\ mins}$	$L_{Aeq\ 1\ hour}$
18.10.17	12:00:00	53.0		56.6
	13:00:00	53.1		56.3
	14:00:00	52.7		56.0
	15:00:00	52.7		56.3
	16:00:00	52.3		55.5
	17:00:00	53.3		56.1
	18:00:00	53.3		56.7
	19:00:00	52.8		56.9
	20:00:00	50.8		56.3
	21:00:00	49.5		55.3
	22:00:00	48.0		53.8
	23:00:00	41.9	35.4	51.0
19.10.17	00:00:00	33.8	30.8	47.7
	01:00:00	32.0	29.2	48.1
	02:00:00	31.7	28.0	46.5
	03:00:00	33.8	33.3	46.2
	04:00:00	38.0	34.2	50.1
	05:00:00	47.2	43.8	54.7
	06:00:00	50.7	48.8	56.4
	07:00:00	54.3		58.1
	08:00:00	53.2		57.7
	09:00:00	54.3		57.7

3.8 The information presented in Figure 2 has been used to establish typical daytime and night time background noise levels. It is considered that the typical daytime background noise level is approximately 50 dB $L_{A90\ 16\ hours}$ and the typical night time background noise level is approximately 38 dB $L_{A90\ 8\ hours}$. In addition, the typical ambient period noise levels are 57 dB $L_{Aeq\ 16\ hour}$ for daytime and 51 dB $L_{Aeq\ 8\ hour}$ for night time.

FIGURE 2: Summary of measured noise levels



4.0 Noise from mechanical services plant

4.1 The precise details of the fixed plant equipment for the proposed retail unit are not known at this stage. The site layout plan indicates that fixed plant equipment would be located on the southern side of the unit adjacent to the delivery loading area. It is appropriate to seek to set plant noise limits that could be secured through imposition of a suitably worded planning condition, based on the survey of background sound levels.

4.2 The closest existing residential properties to the proposed retail unit fixed plant equipment are those on Wombwell Lane to the north.

4.3 The objective assessment of plant sound sources in commercial premises should be undertaken in accordance with British Standard 4142:2014. This Standard enables the resultant sound levels from new plant equipment to be compared against the existing background sound level (L_{A90}) of an area to assess the impact.

4.4 In terms of seeking to set appropriate plant rating sound limits, 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').

4.5 Hence in relation to the guidance above from BS 4142:2014 there is a strong technical case to seek to set plant sound limits that match the current background sound climate. This approach would lead to plant rating sound level of 50 dB daytime and 38 dB at night at the nearest noise sensitive property.

4.6 The following planning condition is recommended to secure the above criteria:

"*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 dBA between 0700 and 2300 hours and 38 dBA at all other times. The sound levels shall be determined by measurement or calculation at the nearest noise sensitive premises. The measurements and assessment shall be made according to BS 4142:2014.*"

5.0 Noise from customer car parking activity

5.1 SR has previously undertaken extensive noise monitoring of retail park 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.

5.2 The proposed area of reconfigured car parking would be approximately 10 metres from the closest residential property at 88A Wombwell Lane.

5.3 The resultant predicted car park activity noise level (during peak trading conditions) at 88A Wombwell Lane would be 48 dB $L_{Aeq,1hr}$ (with no correction for distance attenuation of measured source noise levels). Screening attenuation provided by the existing 2 metre high boundary fence would reduce car parking noise by 11 dB to 37 dB $L_{Aeq,1hr}$ during peak hour trading and 32 dB $L_{Aeq,1hr}$ during off peak trading.

5.4 The predicted car park noise levels are well below the existing daytime ambient noise climate and well below the WHO daytime guideline noise value.

5.5 The above car parking activity noise predictions indicate that the store could trade between 0700 and 2300 hours without associated noise giving rise to significant adverse impact.

6.0 Noise from delivery activity

6.1 The layout of the proposed retail unit locates the delivery loading bay on the southern side of the building well away from the closest residential properties in Wombwell Lane.

6.2 The proposed loading area would likely comprise of a reverse scissor lift unloading arrangement; roll cages will be taken off the delivery vehicle, onto the scissor lift and moved into the back of house area.

6.3 The noise levels of the different components of delivery event activity have been measured at a large number of retail units, and the following maximum noise levels and typical event durations have been used extensively in the planning and design of similar units:

TABLE 5: Delivery activity - baseline source noise levels (free field)

Event Noise Level (at 10 metres)					
Arrival		Unloading		Departure	
Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)
1	69	40	66	0.5	67

6.4 All these sound levels are representative at 10 metres and are measured with the microphone in free field, away from any reflecting surfaces. The levels stated are realistic worst case noise levels from a large collection of sample measurements and include all typical service yard activity noise including refrigeration units, cage movements, vehicle manoeuvres and reversing alarms.

6.5 Table 6 below summarises the predicted ambient ($L_{Aeq\,T}$) delivery activity noise levels at 88A Wombwell Lane (the full delivery event activity noise levels are included in Appendix D1).

TABLE 6: Predicted ambient ($L_{Aeq\,T}$) delivery activity noise levels

Receptor	Predicted noise level dB $L_{Aeq\,1\,hour}$
88A Wombwell Lane	33

6.6 An assessment of delivery activity noise levels using the methodology in BS 4142:2014 is presented in Appendix D2. The table below summarises the comparison of the predicted delivery rating level and background noise climate for both daytime (0700 to 2300 hours) and the night time periods (2300 to 0700 hours).

TABLE 7: Summary of BS 4142:2014 assessment of delivery activity noise

Receptor	Excess of rating level over background level dB		BS 4142 guidance
	Daytime	Night time	
88A Wombwell Lane	-14	0	Indicative of low impact impact*

*Depending on the 'context

6.7 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* (my 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"* (my emphasis).

6.8 The BS 4142 assessments at Appendix D2 summarises the key contextual considerations in this instance. The first is how the predicted delivery activity noise levels compare to the WHO guideline noise values; the table below shows this comparison.

TABLE 8: Comparison of predicted delivery event noise levels with the WHO guideline noise values

Noise level	Parameter	
	$L_{Aeq\,T}$	L_{Amax}
Receptor	88A Wombwell Lane	
Predicted delivery event noise level [1]	33	48
WHO guideline daytime/night time noise value [2]	55/45	60
Comply with WHO day/night time guidelines	YES	YES

Notes

[1] Where $L_{Aeq\,T}$ = 1 hour

[2] Where $L_{Aeq\,T}$ = 16 hours daytime and 8 hour night time

6.9 Predicted delivery event noise levels comply with the WHO daytime and night time guideline noise values.

6.10 The second key contextual consideration is how the predicted delivery activity noise levels compare to the existing ambient noise climate to consider the change in noise level.

TABLE 9: Change in noise level: 88A Wombwell Lane

Receptor	Date	Time	Noise level $L_{Aeq\ 1\ hour}$				Noise impact
			Existing noise climate	Predicted delivery activity noise	Overall existing + predicted	Change in level	
88A Wombwell Lane	17.10.17	14:00:00	56.8	33.0	56.8	0.0	None
		15:00:00	55.1	33.0	55.1	0.0	None
		16:00:00	56.0	33.0	56.0	0.0	None
		17:00:00	54.8	33.0	54.8	0.0	None
		18:00:00	55.1	33.0	55.1	0.0	None
		19:00:00	56.3	33.0	56.3	0.0	None
		20:00:00	54.6	33.0	54.6	0.0	None
		21:00:00	54.7	33.0	54.7	0.0	None
		22:00:00	53.4	33.0	53.4	0.0	None
		23:00:00	51.2	33.0	51.3	0.1	None
	18.10.17	00:00:00	47.8	33.0	47.9	0.1	None
		01:00:00	46.5	33.0	46.7	0.2	None
		02:00:00	43.9	33.0	44.2	0.3	None
		03:00:00	45.7	33.0	45.9	0.2	None
		04:00:00	47.8	33.0	47.9	0.1	None
		05:00:00	54.7	33.0	54.7	0.0	None
		06:00:00	55.3	33.0	55.3	0.0	None
		07:00:00	56.9	33.0	56.9	0.0	None
		08:00:00	72.0	33.0	72.0	0.0	None
		09:00:00	66.7	33.0	66.7	0.0	None
		10:00:00	56.2	33.0	56.2	0.0	None
		11:00:00	55.8	33.0	55.8	0.0	None
		12:00:00	56.6	33.0	56.6	0.0	None
		13:00:00	56.3	33.0	56.3	0.0	None
		14:00:00	56.0	33.0	56.0	0.0	None
		15:00:00	56.3	33.0	56.3	0.0	None
		16:00:00	55.5	33.0	55.5	0.0	None
	19.10.17	17:00:00	56.1	33.0	56.1	0.0	None
		18:00:00	56.7	33.0	56.7	0.0	None
		19:00:00	56.9	33.0	56.9	0.0	None
		20:00:00	56.3	33.0	56.3	0.0	None
		21:00:00	55.3	33.0	55.3	0.0	None
		22:00:00	53.8	33.0	53.8	0.0	None
		23:00:00	51.0	33.0	51.1	0.1	None
		00:00:00	47.7	33.0	47.8	0.1	None
		01:00:00	48.1	33.0	48.2	0.1	None
		02:00:00	46.5	33.0	46.7	0.2	None
		03:00:00	46.2	33.0	46.4	0.2	None
		04:00:00	50.1	33.0	50.2	0.1	None
		05:00:00	54.7	33.0	54.7	0.0	None
		06:00:00	56.4	33.0	56.4	0.0	None
		07:00:00	58.1	33.0	58.1	0.0	None
		08:00:00	57.7	33.0	57.7	0.0	None
		09:00:00	57.7	33.0	57.7	0.0	None

6.11 The impact classification in the context of change in noise level for delivery activity occurring at any time of the day or night is considered to be low.

6.12 Overall when considering the outcomes of all three assessment methods, it is concluded that deliveries could be made 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 the development could proceed without the likelihood of noise from subsequent operations giving rise to significant adverse impact, on the basis of the following operating hours:

Trading: 0700 to 2300 hours

Servicing: unrestricted

7.2 Fixed plant equipment can be designed such that the suggested criteria in the table below are achieved at the nearest noise sensitive properties.

TABLE 10: Proposed plant rating noise limits

Rating level limits (dB)	
Daytime	Night time
50 dB	38 dB

7.3 The following planning condition is recommended to secure the above criteria:

"*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 dBA between 0700 and 2300 hours and 38 dBA at all other times. The sound levels shall be determined by measurement or calculation at the nearest noise sensitive premises. The measurements and assessment shall be made according to BS 4142:2014.*"

7.4 In summary, based on a thorough assessment against objective standards, noise associated with the proposed retail unit would comply with the objectives of paragraph 123 of the NPPF and avoid significant adverse impact.

APPENDIX A

SITE LOCATION PLAN

Appendix A: Site location plan



APPENDIX B

NOISE SURVEY RESULTS

Appendix B1	Title: Noise survey results

Measurement location A - Rear of houses on Wombwell Lane, Barnsley

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
17.10.17	13:45:00	59.6	52.3	57.7	79.1	49.2
	14:00:00	61.0	52.4	58.6	79.3	49.3
	14:15:00	58.8	51.8	56.4	71.6	48.3
	14:30:00	58.8	51.1	56.5	75.0	47.9
	14:45:00	57.8	50.2	55.0	69.3	47.2
	15:00:00	57.2	50.8	54.8	70.1	48.2
	15:15:00	57.3	50.3	54.6	68.9	47.0
	15:30:00	56.8	50.0	56.5	78.9	46.0
	15:45:00	56.6	50.0	53.9	64.8	47.5
	16:00:00	58.5	51.3	56.0	70.1	47.6
	16:15:00	58.2	51.3	55.5	66.8	48.1
	16:30:00	58.4	50.3	57.3	79.5	46.7
	16:45:00	57.1	50.1	54.7	75.3	46.6
	17:00:00	57.5	50.3	55.1	70.3	47.2
	17:15:00	56.2	49.8	54.1	75.9	46.5
	17:30:00	56.6	51.0	54.4	66.5	47.7
	17:45:00	58.1	51.6	55.6	68.8	46.4
	18:00:00	58.2	51.7	55.7	68.9	48.0
	18:15:00	56.9	50.2	54.3	64.0	46.9
	18:30:00	57.3	50.8	54.9	66.0	47.2
	18:45:00	57.8	50.9	55.2	68.0	48.2
	19:00:00	58.5	51.2	58.4	80.5	48.5
	19:15:00	58.2	50.7	55.6	72.6	47.4
	19:30:00	58.1	51.2	55.4	69.6	46.5
	19:45:00	57.8	50.6	55.0	64.0	46.3
	20:00:00	58.0	49.9	55.3	73.5	46.9
	20:15:00	57.6	48.8	55.0	77.7	46.0
	20:30:00	57.2	48.8	54.0	67.8	45.7
	20:45:00	57.0	48.0	53.8	64.1	42.5
	21:00:00	58.0	49.7	55.2	68.1	43.2
	21:15:00	58.5	49.6	55.2	70.7	46.2
	21:30:00	57.1	48.1	54.1	70.2	43.0
	21:45:00	57.4	47.1	54.0	68.2	43.2
	22:00:00	58.1	48.2	55.1	75.1	43.2
	22:15:00	56.7	47.6	53.7	68.7	42.7
	22:30:00	55.7	46.6	52.5	65.7	42.5
	22:45:00	54.5	42.7	51.3	67.5	36.4
	23:00:00	56.6	43.6	52.9	67.8	38.5
	23:15:00	53.8	41.3	50.1	64.5	35.9
	23:30:00	54.6	41.2	51.0	66.8	34.0
	23:45:00	53.8	38.1	50.2	67.0	32.9
18.10.17	00:00:00	51.3	37.0	47.8	62.9	31.8
	00:15:00	52.2	35.5	48.3	65.8	32.5
	00:30:00	51.3	35.8	48.2	65.8	31.2
	00:45:00	49.6	35.5	46.5	63.6	31.3
	01:00:00	51.3	35.7	47.8	64.3	30.3
	01:15:00	49.0	33.4	45.4	64.0	29.2
	01:30:00	49.9	34.6	47.4	66.0	30.3
	01:45:00	46.6	32.6	44.7	71.0	29.1
	02:00:00	46.3	32.5	43.2	62.1	28.6
	02:15:00	46.2	30.3	42.5	60.9	28.2

Appendix B2	Title: Noise survey results

Measurement location A - Rear of houses on Wombwell Lane, Barnsley

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
18.10.17	02:30:00	47.8	33.3	45.4	62.2	29.4
	02:45:00	47.3	33.1	44.1	61.4	30.4
	03:00:00	48.6	33.3	45.7	63.0	28.9
	03:15:00	47.8	32.1	45.2	66.6	28.7
	03:30:00	46.9	32.3	44.5	64.9	28.9
	03:45:00	50.1	34.5	46.9	63.6	32.4
	04:00:00	51.0	33.3	47.7	67.2	29.5
	04:15:00	50.5	34.1	47.2	63.3	30.2
	04:30:00	51.2	37.0	48.0	63.1	31.5
	04:45:00	52.2	34.6	48.4	66.1	30.3
	05:00:00	54.3	38.1	50.2	64.3	32.8
	05:15:00	56.9	43.0	55.3	81.2	37.8
	05:30:00	59.1	49.3	55.6	66.0	45.2
	05:45:00	59.0	48.9	55.7	70.6	44.1
	06:00:00	57.7	46.4	54.2	72.0	40.6
	06:15:00	57.2	46.4	53.9	69.9	40.9
	06:30:00	59.7	48.4	56.8	77.7	43.5
	06:45:00	58.6	50.2	55.7	65.5	46.2
	07:00:00	59.4	51.0	56.7	73.3	44.1
	07:15:00	59.3	52.0	56.7	67.7	47.6
	07:30:00	59.8	51.9	57.9	75.0	48.2
	07:45:00	58.3	51.5	55.9	73.3	46.0
	08:00:00	59.3	51.8	56.6	72.3	48.4
	08:15:00	58.0	52.1	56.8	78.4	48.5
	08:30:00	72.6	56.1	68.4	80.5	49.7
	08:45:00	83.5	55.1	77.5	90.1	48.7
	09:00:00	59.2	51.8	60.2	80.4	46.7
	09:15:00	58.7	52.6	56.3	73.2	47.3
	09:30:00	59.1	50.5	56.3	67.6	46.0
	09:45:00	74.5	50.9	72.3	89.0	45.2
	10:00:00	58.5	51.3	56.1	77.8	47.0
	10:15:00	58.7	52.3	56.3	65.6	47.9
	10:30:00	58.4	52.5	56.1	70.8	48.6
	10:45:00	58.3	52.8	56.3	69.9	49.1
	11:00:00	58.1	52.4	55.9	63.9	47.8
	11:15:00	58.3	52.3	55.9	64.2	47.9
	11:30:00	58.3	52.6	56.0	67.9	49.5
	11:45:00	57.8	52.2	55.4	64.3	48.7
	12:00:00	58.0	51.7	56.3	76.1	49.3
	12:15:00	58.8	52.9	56.6	70.1	49.5
	12:30:00	58.6	53.5	56.6	66.4	49.3
	12:45:00	59.0	53.7	56.8	68.7	49.7
	13:00:00	58.1	53.1	56.5	74.4	49.8
	13:15:00	57.7	52.3	55.6	74.5	47.5
	13:30:00	58.8	53.6	56.8	70.5	50.7
	13:45:00	58.4	53.4	56.4	74.8	49.8
	14:00:00	57.7	52.8	55.7	66.2	49.8
	14:15:00	57.4	52.2	55.4	71.8	49.1
	14:30:00	58.2	52.9	56.1	73.0	48.4
	14:45:00	58.4	52.9	56.6	82.4	49.3
	15:00:00	57.7	52.5	55.8	75.5	49.6

Appendix B3	Title: Noise survey results

Measurement location A - Rear of houses on Wombwell Lane, Barnsley

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
18.10.17	15:15:00	58.3	53.3	56.3	69.0	49.1
	15:30:00	57.3	52.8	55.4	68.0	49.8
	15:45:00	57.8	52.2	57.4	76.5	49.1
	16:00:00	58.0	52.3	55.8	66.3	48.7
	16:15:00	57.0	52.3	55.2	73.5	49.4
	16:30:00	57.0	51.8	55.2	77.6	49.0
	16:45:00	58.0	52.6	55.7	65.6	49.1
	17:00:00	57.6	53.1	55.9	73.0	50.5
	17:15:00	58.2	53.0	56.1	69.8	49.9
	17:30:00	57.6	53.2	55.7	65.8	49.4
	17:45:00	58.7	53.8	56.7	67.8	51.1
	18:00:00	58.6	53.3	56.5	72.1	50.0
	18:15:00	58.4	52.8	56.3	71.0	49.2
	18:30:00	58.7	53.6	57.0	72.9	50.5
	18:45:00	59.4	53.4	57.0	64.0	50.0
	19:00:00	59.2	53.8	57.2	71.2	50.2
	19:15:00	58.5	52.7	56.2	63.4	49.6
	19:30:00	59.2	52.0	56.6	66.2	45.0
	19:45:00	59.8	52.5	57.4	71.7	47.3
	20:00:00	59.5	51.9	56.9	72.4	47.3
	20:15:00	58.7	51.3	56.2	74.5	46.1
	20:30:00	58.2	50.2	55.3	65.3	46.4
	20:45:00	59.1	49.8	56.5	73.7	45.8
	21:00:00	57.9	49.2	54.9	70.9	44.7
	21:15:00	58.6	49.5	56.0	74.2	45.2
	21:30:00	58.4	48.6	55.1	64.6	43.9
	21:45:00	58.1	50.5	55.1	65.7	47.4
	22:00:00	57.8	49.4	54.7	65.4	44.4
	22:15:00	57.2	48.4	54.0	65.4	44.1
	22:30:00	56.7	47.6	53.7	70.5	40.5
	22:45:00	55.6	46.4	52.4	62.7	40.6
	23:00:00	55.7	46.4	52.4	64.1	41.8
	23:15:00	55.2	43.5	51.7	64.2	35.0
	23:30:00	54.2	42.3	50.7	67.5	36.6
	23:45:00	51.6	35.4	48.1	65.4	33.1
19.10.17	00:00:00	51.5	36.0	48.1	64.5	30.0
	00:15:00	51.6	34.2	48.3	66.2	28.8
	00:30:00	50.4	34.1	47.2	62.8	30.0
	00:45:00	50.1	30.8	46.9	63.2	27.9
	01:00:00	49.6	33.6	51.6	79.3	27.4
	01:15:00	49.5	34.3	46.3	62.5	29.8
	01:30:00	48.7	29.2	45.2	62.2	27.6
	01:45:00	48.8	30.7	45.6	63.1	27.3
	02:00:00	50.1	28.7	46.4	64.0	26.7
	02:15:00	49.3	28.0	46.4	63.8	26.3
	02:30:00	51.2	35.9	47.7	62.7	28.1
	02:45:00	48.1	34.3	45.3	63.8	31.4
	03:00:00	49.2	33.3	46.5	63.8	29.1
	03:15:00	49.8	34.4	46.5	64.5	32.0
	03:30:00	48.1	34.2	46.0	64.9	30.4
	03:45:00	49.3	33.3	45.8	63.0	30.3

Appendix B4	Title: Noise survey results

Measurement location A - Rear of houses on Wombwell Lane, Barnsley

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
19.10.17	04:00:00	50.1	34.2	47.8	68.1	31.1
	04:15:00	52.4	36.6	48.7	63.2	33.0
	04:30:00	54.7	40.0	51.6	70.9	34.5
	04:45:00	54.4	41.2	51.1	68.2	36.6
	05:00:00	56.3	43.8	52.8	67.1	38.7
	05:15:00	57.6	47.7	54.2	66.4	42.4
	05:30:00	58.6	48.5	55.2	64.5	40.9
	05:45:00	59.1	48.7	55.9	71.6	44.1
	06:00:00	58.7	48.8	55.3	65.8	43.9
	06:15:00	58.7	49.9	55.6	64.4	43.2
	06:30:00	59.3	51.6	56.4	70.9	47.1
	06:45:00	60.0	52.6	57.7	76.3	48.6
	07:00:00	59.7	53.4	57.2	65.6	48.7
	07:15:00	60.6	53.9	58.3	68.9	49.3
	07:30:00	60.6	55.3	58.7	73.4	51.1
	07:45:00	60.1	54.7	58.0	64.7	51.1
	08:00:00	60.0	53.5	59.5	83.6	49.5
	08:15:00	59.3	53.4	57.0	65.0	48.7
	08:30:00	59.0	52.7	56.7	65.8	46.1
	08:45:00	59.4	53.2	57.1	75.4	49.7
	09:00:00	59.6	54.2	57.5	65.7	48.1
	09:15:00	59.7	54.8	57.8	72.6	51.4
	09:30:00	59.9	54.6	57.8	66.6	50.2
	09:45:00	59.0	53.6	57.7	78.9	49.7
	10:00:00	59.3	54.6	57.4	67.1	50.4

APPENDIX C

SCREENING CALCULATIONS

Appendix C1

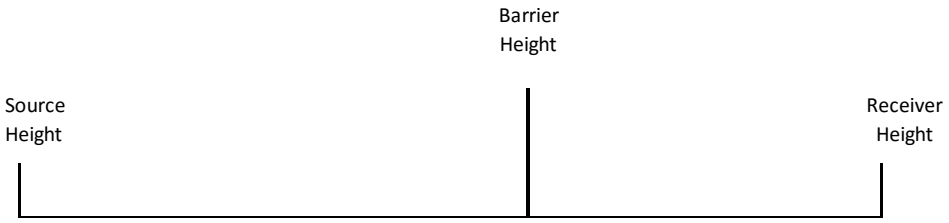
BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: **88A Wombwell Lane**

Project: **Tesco Extra site, Barnsley**

Source: **Car parking activity** **Receiver:** **88A Wombwell Lane**



Source-to-Barrier Distance	5.0 m
Receiver-to-Barrier Distance	5.0 m

Source Height	0.5 m
Receiver Height	1.5 m
Barrier Height	2.0 m

Path difference = 0.195 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**6.5**	**7.7**	**9.4**	**11.6**	**14.1**	**16.9**	**19.7**	**22.7**	**10.7 dBA**

Appendix C2

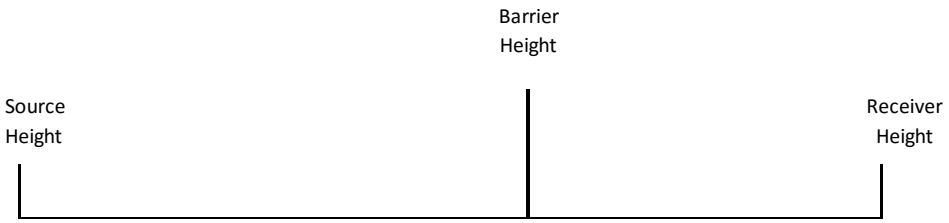
BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: **88A Wombwell Lane**

Project: **Tesco Extra site, Barnsley**

Source: **Delivery activity: Arrival and departure** **Receiver:** **88A Wombwell Lane**



Source-to-Barrier Distance	43.0 m
Receiver-to-Barrier Distance	53.0 m

Source Height	1.0 m
Receiver Height	4.5 m
Barrier Height	5.0 m

Path difference = 0.124 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**5.9**	**6.8**	**8.2**	**10.1**	**12.4**	**15.0**	**17.8**	**20.8**	**9.8 dBA**

Appendix C3

BASIC BARRIER ATTENUATION

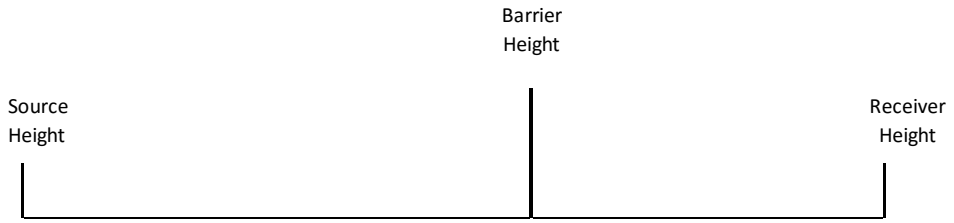
(based on Maekawa or CRTN)

Receptor: **88A Wombwell Lane**

Project: **Tesco Extra site, Barnsley**

Source: **Delivery activity: Unloading**

Receiver: **88A Wombwell Lane**



Source-to-Barrier Distance	12.0 m
Receiver-to-Barrier Distance	72.0 m

Source Height	1.5 m
Receiver Height	4.5 m
Barrier Height	5.0 m

Path difference = 0.448 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**8.0**	**9.8**	**12.1**	**14.6**	**17.4**	**20.3**	**23.3**	**26.2**	**12.8 dBA**

APPENDIX D

PREDICTED DELIVERY EVENT NOISE LEVELS AND BS 4142 ASSESSMENT

Appendix D1: Predicted delivery activity noise levels – 88A Wombwell Lane

Assessment project: Proposed retail unit, Tesco Extra Barnsley	Delivery component		
	Arrival	**Unloading**	**Departure**
Delivery noise activity - predicted ambient noise levels ($L_{Aeq\ T}$) *			
Closest residential property address:	**88A Wombwell Lane**		
Source noise level at 10 metres $L_{Aeq\ T}$	69	66	67
Time - minutes	1	40	0.5
Distance between noise source and residential property in metres	96	84	96
Screening attenuation dB	10	13	10
Convert to 1 hour - dB	-17.8	-1.8	-20.8
Convert to 15 mins - dB	-11.8	-0.3	-
Distance attenuation correction - dB	-19.6	-18.5	-19.6
Activity $L_{Aeq\ 1\ hr}$	21.6 dB	32.8 dB	16.6 dB
Activity $L_{Aeq\ 15\ mins}$	27.6 dB	34.2 dB	-
Rating level correction	0.0 dB	3.0 dB	0.0 dB
Resultant daytime rating level $L_{Ar,\ Tr}$	21.6 dB	35.8 dB	16.6 dB
Resultant nighttime rating level $L_{Ar,\ Tr}$	27.6 dB	37.2 dB	-
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\ 1\ hr}$	**33 dB**		
Overall delivery activity noise (arrival + unloading) $L_{Aeq\ 15\ mins}$	**35 dB**		
Rating level dB $L_{Aeq\ 1\ hr}$	**36 dB**		
Rating level dB $L_{Aeq\ 15\ mins}$	**38 dB**		
Delivery noise activity - predicted peak noise levels (L_{Amax})			
Source noise level at 10 metres L_{amax}	75	79	75
Distance between noise source and residential property in metres	96	84	96
Screening attenuation dB	10	13	10
Distance attenuation correction - dB	-19.6	-18.5	-19.6
Peak noise level L_{Amax}	**45 dB**	**48 dB**	**45 dB**

*Where T = 1 hour for comparison with WHO guidelines and daytime BS 4142 assessment, and 15 minutes for BS 4142 night time assessment

Appendix D2: Assessment of delivery activity noise using BS 4142:2014

Results	**Time period**		**Relevant clause**	**Commentary**
	0700-2300	2300-0700		
Receptor	88A Wombwell Lane			
Background sound level dB (L_{A90})	35 dB	35 dB	**8.1, 8.1.3**	For night time (2300 to 0700 hours) background sound level is the lowest 15 minute L_{A90} sample in the hour; for daytime the background sound level is the $L_{A90\ 1hour}$ value
Specific sound level - predicted delivery event noise level	33 dB	35 dB		Predicted delivery activity noise levelis $L_{Aeq\ 15\ minutes}$ for night time and $L_{Aeq\ 1\ hour}$ for daytime.
Acoustic feature correction	+3 dB	+3 dB	**9.2**	Delivery activity noise is typically characterised by a series of short impulsive bangs, crashes and 'rattles' associated with the movement of produce roll cages. With significant screening provided by the retail store building to the closest residential properties, the impulsivity associated with a delivery event at night is considered to be just perceptible.
Rating level	36 dB	38 dB	**9.2**	
Background sound level	50 dB	38 dB	**8.1** **8.1.3**	
Excess of rating level over background level	-14	0	**11**	
Assessment is indicative of low impact	**Relevant clause 11** The context is: 1. Predicted delivery event noise levels ($L_{Aeq\ 1\ hour}$) are well below the WHO daytime and night time guideline values 2. The predicted delivery event noise levels are well below the existing ambient noise climate			
Uncertainty of the assessment	**Relevant clause 10**			
	The excess of the rating level over the background sound level ranges between 0 to -14 dB, in this instance the uncertainty of the measurement is unlikely to have any significance to the outcome of the assessment.			

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:

$$60 - 20 \text{ Log } {}^{160}/_{10} = 60 - 24 = 36 \text{ dB}.$$