SHARPS REDMORE

ACOUSTIC CONSULTANTS

Report

Tesco Express, Station Road, Hayling Island

Environmental Noise Assessment of a proposal to allow Sunday delivery hours

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1.0 Introduction

1.1 Deliveries to the Tesco Express store at Station Road, Hayling Island are controlled by a planning condition 1 of consent 08/68697/003, dated 6th January 2009.

1.2 Planning condition 1 of consent 08/68697/003 states:

> *"1 No delivery vehicles shall enter or leave the premises the subject of this application except between the hours of 07:00 hours and 20:00 hours Monday to Friday and 08:00 hours to 20:00 hours on Saturdays and Bank Holidays, and not at all on Sundays.*
>
> *Reason: To safeguard the amenities of the locality and having regard to Policies PC1 and D1 of the Havant Borough District Wide Local Plan 1996-2011".*

1.3 Sharps Redmore (SR) has been instructed to undertake a noise assessment to determine whether deliveries could be permitted on a Sunday without associated noise giving rise to significant adverse impact which is the test under the NPPF.

1.4 This report provides an update to the noise assessment report drafted in October 2012 which also sought to assess the noise impact of Sunday deliveries. The October 2012 assessment is reproduced at Appendix A.

1.5 Deliveries to the Tesco Express store are received through the car park at the rear of the store. A site location plan is reproduced at Appendix B.

1.6 The closest residential properties to the store are in Station Road, and Aubrey Close to the rear.

1.7 Details of a noise survey undertaken at the site are presented in Section 2 whilst Section 3 contains the noise assessment criteria.

1.8 An assessment of noise from deliveries is presented in section 4.0; delivery activity noise reduction measures are outlined in section 5.0.

1.9 The assessment conclusions are presented in section 6.0.

1.10 A guide to the acoustic terminology used in this report is shown in Appendix F.

2.0 Environmental noise survey details

2.1 A noise survey was undertaken at the site on Sunday 22nd November 2015. The purpose of the survey was to establish the existing Sunday noise climate at a position representative of the closest residential properties to the Tesco Express delivery area.

2.2 A single noise measurement location was used during the survey; measurement location A was located to be representative of the noise climate at the closest residential properties around the store (Station Road and Aubrey Close). The noise measurement location is indicated at Appendix B

2.3 The weather conditions during the noise survey were dry, partly cloudy (30% cloud cover) and cool (6°C) with a light northerly wind (<5mph). Weather conditions are not considered to have adversely affected the noise measurements.

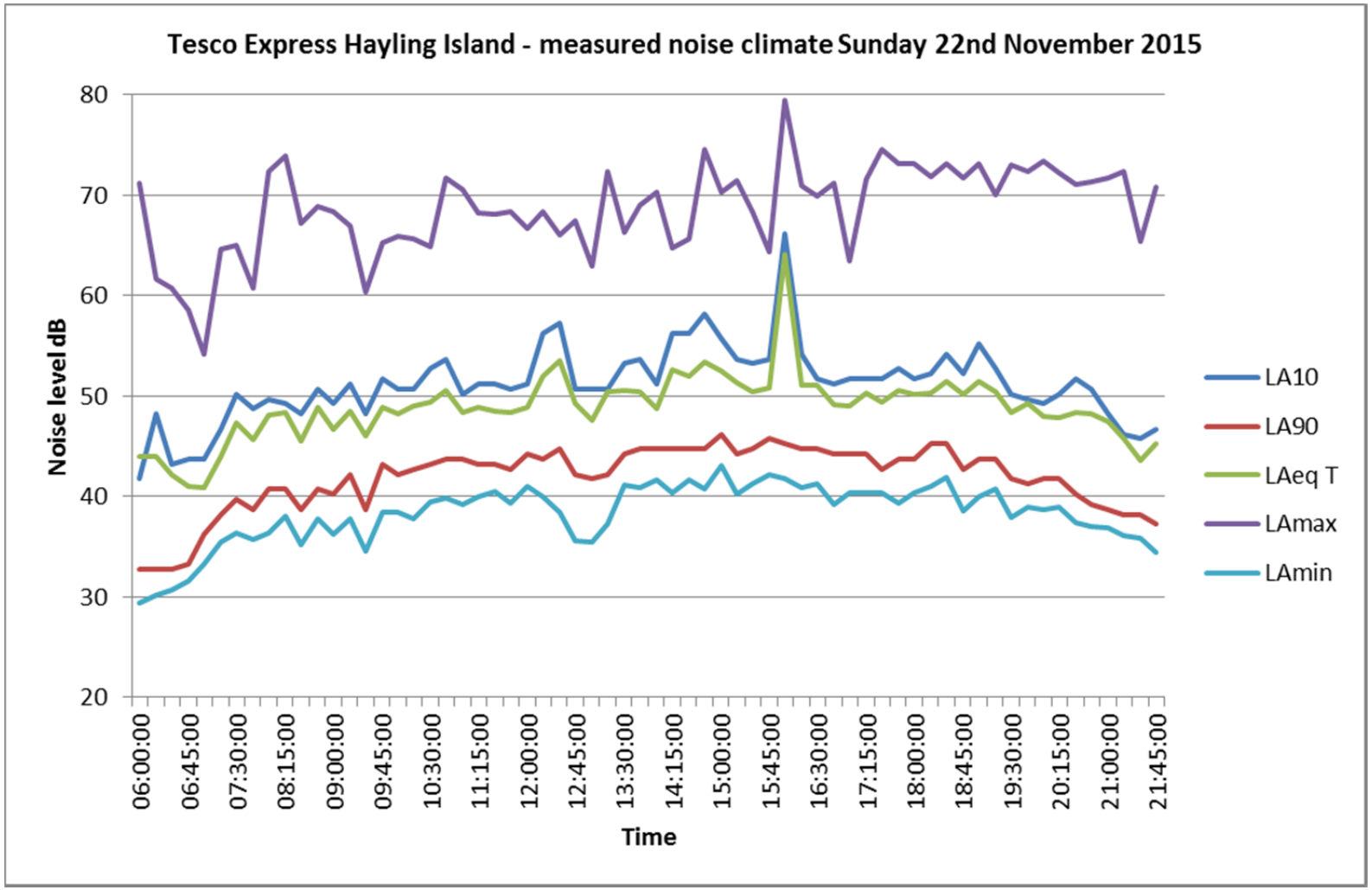
2.4 The noise measurements were carried out using a Norsonic 118 sound level meter. The sound level meter was calibrated at the start and end of the measurements and no variation in levels were observed. The unattended noise measurements were taken over 15 minute sample periods.

2.5 All measurements were taken in free field conditions with the microphone approximately 3 metres above local ground level.

2.6 The measured background noise levels are summarised in Figure 1 and Table 1 and presented in full in Appendix C.

2.7 The noise levels in Table 1 shall be used as a baseline against which to determine the noise impact of deliveries at these times in accordance with the guidance in BS 4142:2014.

FIGURE 1: Summary of measured noise levels.



2.8 Table 1 below summarises the measured hourly background and ambient noise levels:

TABLE 1: Measured background and ambient noise levels

Time	Noise level dB	
	$L_{A90\ 1\ hour}$	$L_{Aeq\ 1\ hour}$
07:00:00	38.2	45.0
08:00:00	40.2	47.8
09:00:00	41.1	47.7
10:00:00	43.0	49.4
11:00:00	43.2	48.6
12:00:00	43.7	51.3
13:00:00	43.2	49.9
14:00:00	44.7	52.0
15:00:00	45.2	51.3
16:00:00	44.7	58.6
17:00:00	43.7	49.9
18:00:00	44.2	50.5
19:00:00	42.6	50.1
20:00:00	40.7	48.1
21:00:00	38.1	45.7

3.0 Assessment methodology and criteria

3.1 The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social 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[27] on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts[27] 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 business wanting to develop in continuance of their business should not have unreasonable restrictions put on them because changes in nearby land uses since they were established;[28] 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

3.2 It can be seen that the NPPF reinforces 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."

[27] See Explanatory note to the Noise Policy Statement for England (Department for the Environment, Food and Rural Affairs).

[28] Subject to the provisions of the Environmental Protection Act 1990 and other relevant law.

3.3 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."

3.4 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. British Standard (BS) 8233:2014 and World Health Organisation (WHO) "*Guidelines for Community Noise"* contain such guidelines.

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 to compare the resultant sound level against the background sound level (L_{A90}) of the area. This is the method employed by BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the new 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

3.5 There are a number of guidance documents that contain recommended guideline noise values. These are discussed below.

3.6 British Standard 8233:2014 is principally intended to assist in the design of new dwellings; however, the Standard does state that it may be used in the assessment of noise from new sources being brought to existing dwellings.

3.7 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.

3.8 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).

3.9 The World Health Organisation/BS 8233 guideline noise values are summarised in the following table:

TABLE 2: WHO/BS 8233 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)
BS 8233:2014 "Sound Insulation and noise reduction for buildings"	L_{AeqT} = 55 dB	Upper limit for external steady noise. (gardens and patios).
	L_{AeqT} = 50 dB	Desirable limit for external steady noise. (gardens and patios).
	$L_{Aeq\ 16\ hours}$ = 35 dB	Resting, living room day. (Internal – steady noise)
	$L_{Aeq\ 16\ hours}$ = 40 dB	Dining, dining room day. (Internal – steady noise)
	$L_{Aeq\ 16\ hour}$ = 35 dB	Sleeping, bedroom day (Internal – steady noise)

3.10 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, for this assessment calculations are carried out to a 1 hour time base, which is a more stringent assessment than is given in BS 8233 and WHO guidance documents.

Changes in noise level

3.11 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}.

3.12 The following table 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	Negligible
3 – 5	Perceptible	Slight/moderate
6 – 10	Up to a doubling	Moderate/significant
11 – 15	More than a doubling	Substantial
>15	-	Severe

3.13 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

3.14 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:

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"*.

3.15 BS 4142:2014 is a radical departure from the assessment methodology of the former 1997 Edition. There are a number of key changes to BS 4142:2014 that are worthy of consideration in the 'context' of this noise assessment; these are:

- Sound and noise;
- Title/Scope;
- Context;
- Acoustic feature corrections;
- Uncertainty.

Sound and noise

3.16 Throughout the 2014 version of BS 4142 great care is taken to use the word 'sound' as opposed to 'noise'. The foreword to the new version explains that "*response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood. This edition of the standard recognizes the importance of the context in which a sound occurs. Great care has, therefore, been taken in the use of the words "sound" and "noise". Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive*.

Title/Scope

3.17 The 2014 edition of BS 4142 is entitled *"Methods for rating and assessing industrial and commercial sound"*; this is different to the former 1997 version of BS 4142 which was entitled *"Method for Rating industrial noise affecting mixed residential and industrial areas"*.

3.18 The scope to the 1997 edition limited the standard to the rating of noise from factories, or industrial premises, or fixed installations, or sources of an industrial nature in commercial premises to determine the likelihood of complaint. The scope of BS 4142:2014 has been broadened to provide a method for rating and assessing sound of an industrial and or commercial nature. The scope now specifically includes sound from industrial and manufacturing processes, sound from fixed plant, sound from loading and unloading of goods at industrial and commercial sites and mobile plant forming an intrinsic part of the overall sound from a premises or process.

3.19 Sharps Redmore has contended over the past 20 years that the assessment of delivery activity and other non-industrial type noise sources should not be carried out using the BS 4142 assessment methodology. There were both strong textual and technical reasons for maintaining this position.

3.20 The textual reason was in the title of BS 4142; the 1997 version was titled *"Method for rating industrial noise affecting mixed residential and industrial areas."* I do not believe that noise from a retail delivery event is industrial in nature, nor can a Tesco store be classed as an industrial noise source. BS 4142: 1997 is explicitly clear in that BS4142: 1997 should be used for assessing industrial noise. The scope to BS4142:1997 limits the application of the assessment method to "*noise levels from factories, or industrial premises, or fixed installations, or sources of an industrial nature in commercial premises*". Whilst it was reasonable to consider fixed plant equipment associated with a retail development as "*sources of an industrial nature in commercial premises";* the same could not be said in relation to delivery event noise.

3.21 The technical reasons were that BS 4142: 1997 is intended as a guide to assessing steady or pseudo-steady noise, such as that from machinery (originally intended to be for factory installations). Upon review of the first edition of BS 4142, published in 1967, it is quite evident that it was intended to assess the likelihood of complaints from fixed plant machinery and factories. This was still borne out in the 1997 version of the document with all four examples presented in Annex A relating to noise from factory installations.

3.22 Perhaps the most important aspect in considering the applicability of BS 4142 to the assessment of loading and unloading (delivery activity) noise was the fact that the 1997 (and earlier editions) were not based on any substantive research on human response to industrial noise sources. The Foreword to the 1997 version states *"the user is reminded that this standard is not based on substantive research but rather on accumulated experience"*.

3.23 During the formal consultation process of the draft version of BS 4142:2014 it was identified that the basis for the proposed draft BS 4142 was also "accumulated experience" rather than research into human response to different types of noise source. The main concern with this is whilst weight can be given to almost 50 years accumulated experience in relation to the assessment of industrial type noise sources using BS 4142 (with the first version being issued in 1967), the same cannot be said when the scope of the Standard is extended to specifically include loading and unloading activity at industrial/commercial premises. In the foreword to BS 4142:2014 it explains that some aspects of the standard are based on research undertaken since the publication of the previous version. Further 'NOTE 3' to section 11 in BS 4142:2014 states "*Consideration ought to be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.*

3.24 However, upon closer inspection of the Bibliography to the document, there appears to be no specific research undertaken with regard to noise from unloading or loading activities at commercial premises (for example, deliveries to a retail store or similar, which are likely to be fairly common applications of BS

4142:2014). Any broadly relevant examples are made in the context of existing industrial premises; this is a key point in relation to 'context', upon which we comment next.

Context

3.25 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).

3.26 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;
- The ability to mitigate the specific sound through various methods, for example by screening, the selection of quiet plant equipment, the use of attenuators and louvres, through the imposition of noise management plans and good practice, façade design and layout/orientation;
- The form and scale of a development. For example, does the proposed development involve a new industrial or commercial premises being built or is the proposal the installation of new plant or an extension to an existing premises?

3.27 It is therefore entirely possible that whilst the numerical outcome of a BS 4142 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.

Acoustic feature corrections

3.28 The revised BS 4142:2014 offers an overhaul to the way in which previous editions of the Standard applied a rating penalty for acoustic character. Until the release of the 2014 version, the BS 4142 assessment methodology allowed for the addition of a single 5 dB rating level correction to the specific sound for acoustic features such as tonality, impulsiveness or if the noise was irregular enough to attract attention.

3.29 BS 4142:2014 extensively changes the way in which a rating level correction is to be applied. The new Standard allows up to 6 dB to be added to the specific sound level for tonality, with a rating correction of up to 9 dB to be added depending on the degree of impulsivity; both of these rating level corrections can be added together in linear fashion if required. Where the source is neither tonal nor impulsive but that a feature characteristic is present that makes the sound source readily distinctive a correction of 3 dB can be added. Finally a correction of 3 dB can be applied for intermittency.

3.30 Hence under the methodology of BS4142:2014 noise sources that would formerly have only been corrected by up to 5 dB (using BS 4142:1997), may now be corrected by up to 18 dB which could significantly influence the outcome of the assessment. It is for reasons such as this that the *context* of an assessment is extremely important.

Uncertainty

3.31 The assessment methodology now includes for the issue of uncertainty to be taken into consideration and reported. The Standard explains how to reduce the element of uncertainty through good practice. The new examples in Annex A of the Standard show how uncertainty is to be included in the calculation, however the examples are unclear on how one defines a numerical value to place on uncertainty.

4.0 Noise from delivery activity

4.1 The service yard area is located on the northern side of the store building. The closest residential properties to the Tesco Express delivery area are in Aubrey Close and Station Road.

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

TABLE 4: 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	25	63	1	67

4.3 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 delivery activity noise including refrigeration units, cage movements, vehicle manoeuvres and reversing alarms.

4.4 Table 5 below summarises the predicted ambient ($L_{Aeq\ T}$) and peak (L_{Amax}) delivery activity noise levels at 32C Station Road, 5 Aubrey Close and 18 Station Road (full delivery event activity noise predictions are included at Appendices D1-D3).

TABLE 5: Predicted ambient ($L_{Aeq\ T}$) delivery activity noise levels

Receptor	Predicted noise level dB
	$L_{Aeq\ 1\ hour}$
32C Station Road	48
5 Aubrey Close	44
18 Station Road	43

4.5 Assessments of delivery activity noise levels using the methodology in BS 4142:2014 are presented in Appendices D4 to D6. The table below summarises the comparison of the predicted delivery rating level and Sunday background noise climate.

TABLE 6: Summary of BS 4142:2014 assessment of delivery activity noise

Time period	Receptor/BS 4142 background-rating level difference		
	32C Station Road	5 Aubrey Close	18 Station Road
0800-0900	+11	+7	+6
0900-1000	+10	+6	+5
1000-1100	+8	+4	+3
1100-1200	+8	+4	+3
1200-1300	+8	+4	+2
1300-1400	+7	+4	+3
1400-1500	+8	+3	+1
1500-1600	+6	+2	+1
1600-1700	+6	+3	+1
1700-1800	+7	+4	+2
1800-1900	+7	+3	+2
1900-2000	+9	+5	+3

4.6 The BS 4142 assessment indicates that the greatest impact occurs between 0800 and 1000 hours when the predicted rating sound level is between +10 dB and +11 dB above the background noise level. Typically the difference between the rating level and background sound level is between +2 and + 8 dB. The guidance in BS 4142:2014, Section 11, states:

"a) *Typically, the greater this difference, the greater the magnitude of the impact.*

b) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*

c) *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*

d) *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 having a low impact, depending on the context".

4.7 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).

4.8 The BS 4142 assessment at Appendices D4 to D6 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 7: Comparison of predicted delivery event noise levels with the WHO daytime guideline noise values

Receptor	Predicted delivery activity noise level (dB $L_{Aeq\ 1\ hour}$)	WHO daytime guideline value (dB $L_{Aeq\ 16\ hours}$)*
32C Station Road	48	50
5 Aubrey Close	44	50
18 Station Road	43	50

* WHO Moderate annoyance criterion;

4.9 In the context of the WHO guideline noise values the significance of the impact would be low for Sunday deliveries occurring between 0800 and 2000 hours.

4.10 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 8: Change in noise level

Receptor	Time	Noise level $L_{Aeq\ 1\ hour}$				Noise Impact
		Existing noise climate	Predicted delivery activity noise	Overall existing + predicted	Change in noise level	
32C Station Road	0800 - 0900	47.8	48.0	50.9	3.1	Slight
	0900 - 1000	47.7	48.0	50.9	3.2	Slight
	1000 - 1100	49.4	48.0	51.8	2.4	None
	1100 - 1200	48.6	48.0	51.3	2.7	None
	1200 - 1300	51.3	48.0	53.0	1.7	None
	1300 - 1400	49.9	48.0	52.1	2.2	None
	1400 - 1500	52.0	48.0	53.5	1.5	None
	1500 - 1600	51.3	48.0	53.0	1.7	None
	1600 - 1700	58.6	48.0	59.0	0.4	None
	1700 - 1800	49.9	48.0	52.1	2.2	None
	1800 - 1900	50.5	48.0	52.4	1.9	None
	1900 - 2000	50.1	48.0	52.2	2.1	None
5 Aubrey Close	0800 - 0900	47.8	44.0	49.3	1.5	None
	0900 - 1000	47.7	44.0	49.2	1.5	None
	1000 - 1100	49.4	44.0	50.5	1.1	None
	1100 - 1200	48.6	44.0	49.9	1.3	None
	1200 - 1300	51.3	44.0	52.0	0.7	None
	1300 - 1400	49.9	44.0	50.9	1.0	None
	1400 - 1500	52.0	44.0	52.6	0.6	None
	1500 - 1600	51.3	44.0	52.0	0.7	None
	1600 - 1700	58.6	44.0	58.7	0.1	None
	1700 - 1800	49.9	44.0	50.9	1.0	None
	1800 - 1900	50.5	44.0	51.4	0.9	None
	1900 - 2000	50.1	44.0	51.1	1.0	None
18 Station Road	0800 - 0900	47.8	43.0	49.0	1.2	None
	0900 - 1000	47.7	43.0	49.0	1.3	None
	1000 - 1100	49.4	43.0	50.3	0.9	None
	1100 - 1200	48.6	43.0	49.7	1.1	None
	1200 - 1300	51.3	43.0	51.9	0.6	None
	1300 - 1400	49.9	43.0	50.7	0.8	None
	1400 - 1500	52.0	43.0	52.5	0.5	None
	1500 - 1600	51.3	43.0	51.9	0.6	None
	1600 - 1700	58.6	43.0	58.7	0.1	None
	1700 - 1800	49.9	43.0	50.7	0.8	None
	1800 - 1900	50.5	43.0	51.2	0.7	None
	1900 - 2000	50.1	43.0	50.9	0.8	None

4.11 The impact classification in the context of change in noise level for delivery activity occurring between 0800 and 2000 hours on a Sunday is low.

4.12 Overall this assessment objectively demonstrates that when considered in context, deliveries could be made between 0800 and 2000 hours on a Sunday without associated noise giving rise to significant adverse impact; which is the test under paragraph 123 of the NPPF.

5.0 Delivery activity noise reduction measures

5.1 It is recommended that the following noise minimisation measures shall be implemented at all times to reduce noise levels from delivery activity:

- There will be adequate signage and instruction to ensure that all drivers and staff follow the noise management measures;
- All engines to be switched off as soon as vehicles are parked at the unloading dock;
- Whilst vehicles remain stationary in the delivery area, no engines are to be left idling for more than 30 seconds;
- Refrigeration units are not to be operated whilst stationary on the Tesco site;
- All delivery vehicles to be driven in as quiet a manner as possible, avoiding unnecessary engine revving;
- No radios or stereos to be left on in vehicles during deliveries or at other times;
- Staff to be instructed to work quietly when outside the store or in the service yard - only performing essential tasks where noise could be generated;
- All components of the delivery system to be maintained in good working order;

5.2 The provision of these delivery activity noise reducing measures could be secured by imposition of an appropriately worded planning condition.

6.0 Assessment conclusions

6.1 Tesco is seeking the amendment of planning condition 1 of consent 08/68697/003 to allow deliveries to the Tesco Express on Sundays between 0800 and 2000 hours.

6.2 Predicted delivery event noise levels comply with the daytime WHO/BS 8233 guideline noise values, and are generally lower than the existing ambient noise climate. Therefore the proposal to allow deliveries between 0800 and 2000 hours on Sundays would not give rise to significant adverse noise impacts, which is the test under paragraph 123 of the NPPF.

APPENDIX A

SHARPS REDMORE NOISE ASSESSMENT REPORT OCTOBER 2012

SHARPS REDMORE PARTNERSHIP

ACOUSTIC CONSULTANTS

ENVIRONMENTAL NOISE ASSESSMENT

TESCO EXPREE, STATION ROAD

HAYLING ISLAND

Prepared by:

Gary King

MIOA.

Report - Tesco Express, Station Rd, Hayling Island

Project No: 1213051

31st October 2012

ANC THE ASSOCIATION OF NOISE CONSULTANTS

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1.0 Introduction

1.1 Sharps Redmore Partnership have been instructed to undertake a noise assessment of a proposal to allow a relaxation of a condition restricting delivery hours at the Tesco Express Store, 28 Station Road, Hayling Island.

1.2 Deliveries to the store are currently restricted by planning condition (ref 08/68697/003 dated 6th Jan 2009) to between the following hours:

Monday to Friday:	0600 – 2000 hours
Saturday:	0800 – 2000 hours
Sunday:	No deliveries permitted
Bank Holidays:	0800 – 2000 hours

1.3 Planning permission is now being sought vary the above hours to permit deliveries on a Sunday.

1.4 The shop has been trading for many years and deliveries are received through the car park at the rear of the store. Station Road is a busy route with many commercial/retail premises. The nearest noise sensitive properties to the store are the flat above Lloyds Chemist, which backs onto the service yard area and 26 Station Road, which is located immediately adjacent to the car park entrance.

1.5 The objective of the assessment is to determine the impact of noise from an extension to current consented delivery times, including Sunday's, on the noise sensitive properties identified above.

1.6 Prior to carrying out this assessment, SRP contacted Havant Borough Council, Environmental Health Department and were advised that there have been no complaints from local residents regarding noise from existing deliveries to the store.

1.7 Section 2.0 of this report presents an explanation of noise policy and assessment criteria. Section 3.0 of this report sets out the findings of our environmental noise survey and section 4.0 contains an assessment of noise arising from variation of delivery hours. The assessment conclusions are presented in section 5.0.

1.8 A guide to the acoustic terminology used in this report is shown in Appendix A.

2.0 Assessment methodology and criteria

National Policy

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 The NPPF refers to the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which reinforces and supplements the NPPF. The NPSE 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."*

2.3 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 (LOAEL) and a level which represents a significant observed adverse effect (SOAEL), 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."*

Local Policy

2.4 The Havant Borough Core Strategy 2011 sets out the strategic policies and some detailed development management policies against which planning applications will be assessed. In terms of noise regard is had to Policy CS 16 'High Quality Design' paragraph 1(e) which states:

"The development does not cause unacceptable (SRP emphasis) harm to the amenity of neighbours through smell, loss of privacy, outlook, noise and overlooking."

2.5 Taking an overview of the National Policy and Guidance, therefore, it is clear that when considering the impact of noise one must consider the significance of any impact. The presence of an adverse impact in itself is not sufficient to refuse permission.

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. British Standard (BS) 8233:1999 and World Health Organisation (WHO) "*Guidelines for Community Noise"* contain such guidelines.

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 to compare the resultant noise level against the background noise level (L_{A90}) of the area. This is the method employed by BS 4142:1997 to determine the likelihood of complaint from noise of an industrial nature. It is best suited to the assessment of steady or pseudo-steady noise and is not appropriate in this case.

Guideline noise values

2.7 There are a number of guidance documents that contain recommended guideline noise values. These are discussed below.

2.8 British Standard 8233:1999 is principally intended to assist in the design of new dwellings; however, the Standard does state that it may be used in the assessment of noise from new sources being brought to existing dwellings.

2.9 BS 8233:1999 was based on the advice contained in a draft of World Health Organisation document "Guidelines for Community Noise". This document was released in final form in 2000. World Health Organisation guidance is referenced in the NPSE.

2.10 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.

2.11 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, physiological or sociological 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.

2.12 The WHO LOAEL guideline values are summarised in the following table:

Value	Guidance	Location
L_{AeqT} = 55 dB	Few seriously annoyed, Daytime and evening.	Continuous noise, outdoor living areas
L_{AeqT} = 50 dB	Few moderately annoyed, Daytime and evening.	Continuous noise, outdoor living areas
L_{AeqT} = 35 dB	Acceptable level to avoid speech interference, daytime and evening.	Continuous noise, Dwellings, indoors
L_{AeqT} = 45 dB	To avoid sleep disturbance, window open at night.	Continuous noise, outside bedrooms, outdoor values
L_{AeqT} = 30 dB	To avoid sleep disturbance at night.	Continuous noise, Bedrooms, indoors
L_{AMAX} = 60 dB	To avoid sleep disturbance, window open at night.	Noise peaks, outside bedrooms, Outdoor values
L_{AMAX} = 45 dB	To avoid sleep disturbance at night.	Noise peaks, Bedrooms, indoors

2.13 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 the guidance documents.

Changes in noise level

2.14 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}.

2.15 The following table shows the response to changes in noise (known as a Semantic Scale):

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

Ref: Manning "Criteria for the Environmental Assessment, Planning and Mitigation of Railway Noise" ProcIOA Vol 20 Part 1 (1998) pp 195 – 202.

Summary

2.16 Taking into the noise assessment methods detailed above the WHO guideline values have been selected to ensure that noise generated on and in the vicinity of the site from extension of delivery times will not cause significant adverse impacts on health and quality of life or unacceptable harm to the amenity in accordance with national and local policy.

3.0 Noise Survey Details

3.1 Two separate noise surveys were undertaken at the site to establish the existing noise climate at a position representative of the nearest residential properties. Noise level measurements were taken during a Saturday and Sunday at two locations as shown in Fig 1 below:

Fig 1: Measurement location

3.2 The monitoring locations were chosen to be representative of the nearest noise sensitive properties to the existing Tesco Express store.

3.3 Noise measurements were carried out using a Norsonic 118 sound level meter. The sound level meter was calibrated at the start and end of each set of measurements and no variation in levels were noted. Noise measurements were taken over 10 minute periods.

3.4 Weather conditions during each of the following surveys were dry, mild with winds below 5m/s; the conditions satisfied the requirements of BS 4142: 1997. The measurements were undertaken in free field conditions with the microphone positioned 1.5 metres above local ground height.

3.5 Measurements were taken between 0800 – 0900 hours, 1200 – 1300 hours, and between 1900 – 2000 hours. The times were chosen to represent the quietest times during which deliveries may be received by the store. No measurements were taken during the period 1200 – 1300 hours on Saturday 27th October, due to a Great South Run taking place during this time.

3.6 The noise survey results are summarised in the table below. Full details of the results are shown in Appendix B to this report.

Table 3.1: Survey Results

	Morning (0800-0900 hrs) $L_{Aeq10min}$		Afternoon (1200 – 1300 hrs) $L_{Aeq10min}$		Evening (1900 – 2000 hrs) $L_{Aeq,10min}$	
	ML1	ML2	ML1	ML2	ML1	ML2
Saturday	47 – 48 dB	61 – 62 dB	n/a	n/a	49 – 50 dB	63 – 65 dB
Sunday	45 – 48 dB	60 – 62 dB	48 – 50 dB	62 – 63 dB	51 dB	63 dB

3.7 Noise levels at both locations were generally consistent during the day and were dominated by road traffic on Station Road and existing trading noise from activity at the Tesco Express and the neighbouring retail units.

3.8 There was no significant variation in noise levels between a Saturday and Sunday at either location. At location ML2 peak noise levels were caused by traffic, including commercial vehicles on Station Road.

4.0 Assessment of Delivery Vehicle Noise

4.1 Delivery vehicles enter the store through the car park entrance and are unloaded in service area at the rear of the retail shops. Goods are received in cages that are unloaded with a tail gate and then wheeled into the bulk store room area, where they are processed. Therefore the main noise impact from the delivery process is the noise from vehicles arriving/departing and from the unloading of goods.

Unloading activity

4.2 Delivery event activity has been measured at a large number of Tesco Express stores; the following maximum noise levels and event duration has been recorded:

Table 4.1: Delivery event noise levels

Event Noise Level					
Arrival		Unloading		Departure	
Duration (mins)	Level (dB)	Duration (mins)	Level (dB)	Duration (mins)	Level (dB)
1	69	25	63	1	67

4.3 The noise levels displayed are appropriate at a distance of 10 metres. Where the event is relative to a moving source it is necessary to make a judgement as to the "*centre of activity*." The sound levels shown include all service yard noise sources such as vehicle manoeuvres, reversing alarms, refrigeration units, tailgate noise and cage rolling noise.

4.4 The nearest noise sensitive property to the unloading area is 30a Station Road which is 30 metres from the unloading area. Using the adjusted data, the following table shows the calculated noise level, of service activity, at the nearest residential property. A façade effect of 3 dB is allowed, to account for the reflections when in close proximity to the façade of the receiver dwellings.

Arrival	L_{Aeq}
Screened and adjusted baseline level	L_{Aeq1} = 69
Distance attenuation to 30 metres = 20 log $^{10}/_{30}$ = -10	L_{Aeq1} = 59
Convert to 1 hour = 10 log $^{1}/_{60}$ = -18	$L_{Aeq1\ hr}$ = 41
Unloading	
Screened and adjusted baseline level	L_{Aeq30} = 63
Distance attenuation to 30 metres = -20 log $^{10}/_{30}$ = -10	L_{Aeq30} = 53
Convert to 1 hour = 10 log $^{25}/_{60}$ = -4	$L_{Aeq1\ hr}$ = 49
Departure	
Screened and adjusted baseline level	$L_{Aeq0.5}$ = 65
Distance attenuation to 30 metres = -20 log $^{10}/_{30}$ = -10	$L_{Aeq0.5}$ = 55
Convert to 1 hour = 10 log $^{1}/_{60}$ = -18	$L_{Aeq1\ hr}$ = 37
Addition of components: $L_{Aeq1\ hr}$ = 41 + 49 + 37 (+3 façade)	$L_{Aeq1\ hr}$ = 53 dB

4.5 This calculated noise levels comply with recommended guideline values for daytime noise.

4.6 On that basis, it is considered that the proposed delivery activity between 0800 and 2000 hours on a Sunday will not cause harm to amenity or annoyance. It is of note that the range of the existing noise climate is not significantly different on a Sunday to that on a Saturday, where deliveries are permitted to take place and have not caused any complaints from local residents.

Noise from vehicles arrival/departure

4.7 Vehicles will enter/exit the site via the access off Station Road. During the survey it was noted that Station Road is a busy route, carrying a steady flow of vehicles including local buses. Noise from vehicles entering the site will be no greater or different in character from vehicles on Station Road. Therefore considering the relative low number of deliveries that will be received by the store, noise from delivery vehicles entering and leaving the site will not cause a significant impact to local residents.

4.8 The World Health Organisation Guideline Values for Community Noise and the other guidance documents referred to do not distinguish between Sundays and any other day of the week and the guideline levels are based on the lowest level of noise that begins to have any effect, even on the most sensitive of persons, at any time, irrespective of the day of the week.

4.9 On that basis, there is no technical reason to conclude that noise from deliveries on Sundays between 0800 and 2000 hours, would be disturbing to the residents in the vicinity.

5.0 Summary and Conclusions

5.1 Noise from delivery events at the store, between 0800 and 2000 hours on Sundays would comply with guideline values.

5.2 There is no significant variation in the existing noise climate between a Saturday, when deliveries are permitted, and a Sunday.

5.3 SRP have been advised by the Environmental Health Department at Havent Borough Council that no complaints have been received regarding existing deliveries to the store.

5.4 Therefore having undertaken this assessment against objective criteria, it is considered that the store could be serviced between 0800 and 2000 hours on Sundays without causing significant impact or disturbance to nearby residents, or degrading the noise environment.

APPENDIX A

ACOUSTIC TERMINOLOGY

Acoustic Terminology

A1 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.

A2 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.

A3 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).

A4 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.

A5 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.

A6 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.

A7 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.

A8 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:

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

Appendix B: Survey Results

Saturday 27th October

ML1			
Time	L_{Aeq}	L_{Amax}	L_{A90}
07:56	47.2	59.7	41.2
08:30	48.3	64.3	42.3
19:03	49.2	59	44.2
19:35	50.1	61.4	44

ML2			
Time	L_{Aeq}	L_{Amax}	L_{A90}
08:18	61.4	75.4	42.1
08:42	62.3	78	47.3
19:23	65.1	81	54.6
19:47	63.2	78	55.3

Sunday 27th October

ML1			
Time	L_{Aeq}	L_{Amax}	L_{A90}
07:54	47.2	59.4	41.2
08:17	45.2	60.3	40.3
08:58	48.1	58.6	40.2
12:17	48.3	62.2	41.2
12:42	48.1	63.3	41
13:09	49.6	60.1	44.1
19:15	51.1	66.7	44.3

ML2			
Time	L_{Aeq}	L_{Amax}	L_{A90}
08:05	60.4	78	40.2
08:44	60.9	82	43.1
09:09	62.3	78	48.7
12:28	63.5	82.1	50.9
12:55	62.5	74	50.9
13:19	63.3	74.6	51.7
19:27	62.6	75.7	45.8

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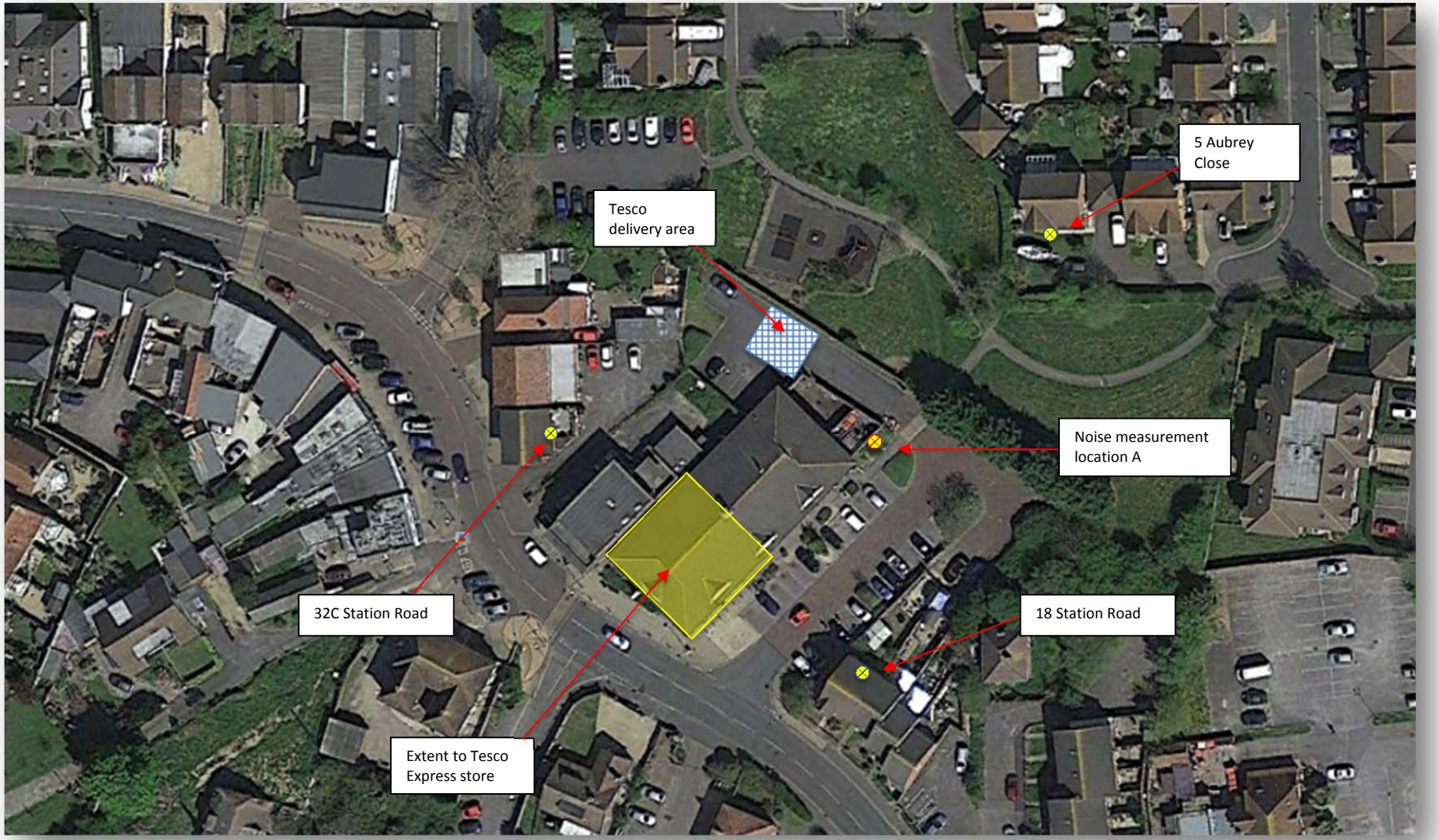
APPENDIX B

SITE PLAN SHOWING NOISE MEASUREMENT LOCATIONS

Appendix B: Site plan showing noise measurement location



APPENDIX C

NOISE SURVEY RESULTS

Appendix C1	Title: Noise survey results

Measurement location A - Tesco Express Station Road, Hayling Island

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
22.11.15	06:00:00	41.7	32.7	43.9	71.2	29.4
	06:15:00	48.2	32.7	43.9	61.7	30.2
	06:30:00	43.2	32.7	42.2	60.7	30.6
	06:45:00	43.7	33.2	41.0	58.6	31.6
	07:00:00	43.7	36.2	40.9	54.1	33.2
	07:15:00	46.7	38.2	44.0	64.6	35.4
	07:30:00	50.2	39.7	47.3	65.0	36.3
	07:45:00	48.7	38.7	45.6	60.7	35.7
	08:00:00	49.7	40.7	48.1	72.4	36.3
	08:15:00	49.2	40.7	48.3	73.9	38.0
	08:30:00	48.2	38.7	45.5	67.2	35.2
	08:45:00	50.7	40.7	48.8	68.9	37.7
	09:00:00	49.2	40.2	46.7	68.4	36.2
	09:15:00	51.2	42.2	48.5	67.0	37.8
	09:30:00	48.2	38.7	46.0	60.3	34.5
	09:45:00	51.7	43.2	48.9	65.2	38.4
	10:00:00	50.7	42.2	48.2	65.9	38.4
	10:15:00	50.7	42.7	49.0	65.7	37.8
	10:30:00	52.7	43.2	49.4	64.9	39.4
	10:45:00	53.7	43.7	50.5	71.7	39.8
	11:00:00	50.2	43.7	48.4	70.6	39.2
	11:15:00	51.2	43.2	48.9	68.2	39.9
	11:30:00	51.2	43.2	48.5	68.1	40.5
	11:45:00	50.7	42.7	48.4	68.3	39.3
	12:00:00	51.2	44.2	48.8	66.7	41.0
	12:15:00	56.2	43.7	52.0	68.4	39.9
	12:30:00	57.2	44.7	53.5	66.1	38.4
	12:45:00	50.7	42.2	49.2	67.5	35.6
	13:00:00	50.7	41.7	47.6	62.9	35.4
	13:15:00	50.7	42.2	50.4	72.4	37.2
	13:30:00	53.2	44.2	50.5	66.3	41.1
	13:45:00	53.7	44.7	50.4	69.0	40.9
	14:00:00	51.2	44.7	48.7	70.3	41.6
	14:15:00	56.2	44.7	52.6	64.7	40.3
	14:30:00	56.2	44.7	52.0	65.6	41.6
	14:45:00	58.2	44.7	53.4	74.5	40.7
	15:00:00	55.7	46.2	52.5	70.3	43.1
	15:15:00	53.7	44.2	51.3	71.4	40.2
	15:30:00	53.2	44.7	50.4	68.3	41.3
	15:45:00	53.7	45.7	50.8	64.4	42.1
	16:00:00	66.2	45.2	64.1	79.5	41.7
	16:15:00	54.2	44.7	51.1	71.0	40.8
	16:30:00	51.7	44.7	51.1	69.9	41.2
	16:45:00	51.2	44.2	49.1	71.2	39.2
	17:00:00	51.7	44.2	49.0	63.4	40.4
	17:15:00	51.7	44.2	50.3	71.6	40.4
	17:30:00	51.7	42.7	49.4	74.6	40.3
	17:45:00	52.7	43.7	50.6	73.2	39.3
	18:00:00	51.7	43.7	50.1	73.2	40.4
	18:15:00	52.2	45.2	50.3	71.9	41.0
	18:30:00	54.2	45.2	51.4	73.2	41.9
	18:45:00	52.2	42.7	50.1	71.7	38.5

Appendix C2	Title: Noise survey results

Measurement location A - Tesco Express Station Road, Hayling Island

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
22.11.15	19:00:00	55.2	43.7	51.5	73.1	40.0
	19:15:00	52.7	43.7	50.4	70.0	40.7
	19:30:00	50.2	41.7	48.4	73.0	37.9
	19:45:00	49.7	41.2	49.3	72.4	38.9
	20:00:00	49.2	41.7	47.9	73.4	38.7
	20:15:00	50.2	41.7	47.8	72.2	38.9
	20:30:00	51.7	40.2	48.3	71.1	37.4
	20:45:00	50.7	39.2	48.2	71.3	37.0
	21:00:00	48.2	38.7	47.4	71.7	36.8
	21:15:00	46.2	38.2	45.7	72.4	36.1
	21:30:00	45.7	38.2	43.6	65.4	35.8
	21:45:00	46.7	37.2	45.3	70.8	34.4

APPENDIX D

PREDICTED DELIVERY EVENT NOISE LEVELS: BS 4142 ASSESSMENT

APPENDIX D1: Predicted delivery event noise levels 32C Station Road

Assessment project: Tesco Express Station Road Hayling Island	Delivery component		
	Arrival	**Unloading**	**Departure**
Delivery noise activity - predicted ambient noise levels ($L_{Aeq\,T}$)			
Closest residential property address:	**32C Station Road**		
Source noise level at 10 metres $L_{Aeq\,T}$	69	63	67
Time - minutes	1	25	1
Distance between noise source and residential property in metres	65	36	65
Screening attenuation (from Appendix B) dB	9.0	0.0	9.0
Convert to 1 hour - dB	-17.8	-3.8	-17.8
Distance attenuation correction - dB	-16.3	-11.1	-16.3
Activity $L_{Aeq\,1\,hr}$	26.0 dB	48.1 dB	24.0 dB
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\,1\,hr}$	**48 dB**		

APPENDIX D2: Predicted delivery event noise levels 5 Aubrey Close

Assessment project: Tesco Express Station Road Hayling Island	Delivery component		
	Arrival	**Unloading**	**Departure**
Delivery noise activity - predicted ambient noise levels ($L_{Aeq\,T}$)			
Closest residential property address:	**5 Aubrey Close**		
Source noise level at 10 metres $L_{Aeq\,T}$	69	63	67
Time - minutes	1	25	1
Distance between noise source and residential property in metres	40	45	40
Screening attenuation (from Appendix B) dB	0.0	5.0	0.0
Convert to 1 hour - dB	-17.8	-3.8	-17.8
Distance attenuation correction - dB	-12.0	-13.1	-12.0
Activity $L_{Aeq\,1\,hr}$	39.2 dB	41.1 dB	37.2 dB
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\,1\,hr}$	**44 dB**		

APPENDIX D3: Predicted delivery event noise levels 18 Station Road

Assessment project: Tesco Express Station Road Hayling Island	Delivery component		
	Arrival	**Unloading**	**Departure**
Delivery noise activity - predicted ambient noise levels ($L_{Aeq\,T}$)			
Closest residential property address:	**18 Station Road**		
Source noise level at 10 metres $L_{Aeq\,T}$	69	63	67
Time - minutes	1	25	1
Distance between noise source and residential property in metres	35	52	35
Screening attenuation (from Appendix B) dB	0.0	11.0	0.0
Convert to 1 hour - dB	-17.8	-3.8	-17.8
Distance attenuation correction - dB	-10.9	-14.3	-10.9
Activity $L_{Aeq\,1\,hr}$	40.3 dB	33.9 dB	38.3 dB
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\,1\,hr}$	**43 dB**		

APPENDIX D4: Assessment of delivery activity noise using BS 4142:2014 - 32C Station Road

Receptor	32C Station Road												Relevant clause	Commentary
Results	**Time period**													
	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	1900-2000		
Background sound level	40 dB	41 dB	43 dB	43 dB	44 dB	43 dB	45 dB	45 dB	45 dB	44 dB	44 dB	43 dB	**8.1, 8.1.3**	For daytime background sound level is the 1 hour L_{A90}
Specific sound level - predicted delivery event noise level	48 dB	48 dB	48 dB	48 dB	48 dB	48 dB	48 dB	48 dB	48 dB	48 dB	48 dB	48 dB		Predicted delivery activity noise level ($L_{Aeq\ 1\ hour}$ daytime)
Acoustic feature correction	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+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. The receptor at 32C Station Road is a first floor flat; the receptor location is therefore internal. Given the sound reduction across a partially open window (-10 to -15 dB) the impulsivity associated with a delivery event within the flat is considered to be just perceptible (attracting a correction of +3 dB).
Rating level	51 dB	51 dB	51 dB	51 dB	51 dB	51 dB	51 dB	51 dB	51 dB	51 dB	51 dB	51 dB	**9.2**	
Background sound level	40 dB	41 dB	43 dB	43 dB	44 dB	43 dB	45 dB	45 dB	45 dB	44 dB	44 dB	43 dB	**8.1** **8.1.3**	
Excess of rating level over background level	+11	+10	+8	+8	+7	+8	+6	+6	+6	+7	+7	+9	**11**	
Assessment indicates a situation between indicative of adverse impact and significant adverse impact.	**Relevant clause 11** The context is: 1. Predicted delivery event noise level ($L_{Aeq\ 1\ hour}$) comply with the WHO daytime guideline value (50 dB $L_{Aeq\ 16\ hour}$) 2. The predicted delivery event noise level is below the existing ambient noise levels between 0800 and 2000 hours. 3. The site is currently in retail use; noise associated with retail activity can therefore be expected													
Uncertainty of the assessment	**Relevant clause 10**													
	The excess of the rating level over the background sound level is +6 to +11 dB, in this instance the uncertainty of the measurement may have some significance to the outcome of the assessment.													

APPENDIX D5: Assessment of delivery activity noise using BS 4142:2014 - 5 Aubrey Close

Receptor	5 Aubrey Close												Relevant clause	Commentary
Results	**Time period**													
	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	1900-2000		
Background sound level	40 dB	41 dB	43 dB	43 dB	44 dB	43 dB	45 dB	45 dB	45 dB	44 dB	44 dB	43 dB	**8.1, 8.1.3**	For daytime background sound level is the 1 hour L_{A90}
Specific sound level - predicted delivery event noise level	44 dB	44 dB	44 dB	44 dB	44 dB	44 dB	44 dB	44 dB	44 dB	44 dB	44 dB	44 dB		Predicted delivery activity noise level ($L_{Aeq\ 1\ hour}$ daytime)
Acoustic feature correction	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+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. The receptor at 5 Aubrey Close is screened to the unloading area; the impulsivity associated with a delivery event at this receptor is considered to be just perceptible (attracting a correction of +3 dB).
Rating level	47 dB	47 dB	47 dB	47 dB	47 dB	47 dB	47 dB	47 dB	47 dB	47 dB	47 dB	47 dB	**9.2**	
Background sound level	40 dB	41 dB	43 dB	43 dB	44 dB	43 dB	45 dB	45 dB	45 dB	44 dB	44 dB	43 dB	**8.1** **8.1.3**	
Excess of rating level over background level	+7	+6	+4	+4	+4	+4	+3	+2	+3	+4	+3	+5	**11**	
Assessment indicates a situation between indicative of low impact and adverse impact.	**Relevant clause 11** The context is: 1. Predicted delivery event noise level ($L_{Aeq\ 1\ hour}$) comply with the WHO daytime guideline value (50 dB $L_{Aeq\ 16\ hour}$) 2. The predicted delivery event noise level is below the existing ambient noise levels between 0800 and 2000 hours. 3. The site is currently in retail use; noise associated with retail activity can therefore be expected													
Uncertainty of the assessment	**Relevant clause 10**													
	The excess of the rating level over the background sound level is +2 to +7 dB, in this instance the uncertainty of the measurement may have some significance to the outcome of the assessment.													

APPENDIX D6: Assessment of delivery activity noise using BS 4142:2014 – 18 Station Road

Receptor	18 Station Road												Relevant clause	Commentary
Results	**Time period**													
	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	1900-2000		
Background sound level	40 dB	41 dB	43 dB	43 dB	44 dB	43 dB	45 dB	45 dB	45 dB	44 dB	44 dB	43 dB	**8.1, 8.1.3**	For daytime background sound level is the 1 hour L_{A90}
Specific sound level - predicted delivery event noise level	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB		Predicted delivery activity noise level ($L_{Aeq\ 1\ hour}$ daytime)
Acoustic feature correction	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+3 dB	+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. The receptor at 18 Station Road is screened to the unloading area; the impulsivity associated with a delivery event at this receptor is considered to be just perceptible (attracting a correction of +3 dB).
Rating level	46 dB	46 dB	46 dB	46 dB	46 dB	46 dB	46 dB	46 dB	46 dB	46 dB	46 dB	46 dB	**9.2**	
Background sound level	40 dB	41 dB	43 dB	43 dB	44 dB	43 dB	45 dB	45 dB	45 dB	44 dB	44 dB	43 dB	**8.1** **8.1.3**	
Excess of rating level over background level	+6	+5	+3	+3	+2	+3	+1	+1	+1	+2	+2	+3	**11**	
Assessment indicates a situation between indicative of low impact and adverse impact.	**Relevant clause 11** The context is: 1. Predicted delivery event noise level ($L_{Aeq\ 1\ hour}$) comply with the WHO daytime guideline value (50 dB $L_{Aeq\ 16\ hour}$) 2. The predicted delivery event noise level is below the existing ambient noise levels between 0800 and 2000 hours. 3. The site is currently in retail use; noise associated with retail activity can therefore be expected													
Uncertainty of the assessment	**Relevant clause 10** The excess of the rating level over the background sound level is +1 to +6 dB, in this instance the uncertainty of the measurement may have some significance to the outcome of the assessment. This assessment is based on background noise level data collected at a single measurement location towards the rear of the site. The measured background noise levels are considered to be representative of the noise climate to the rear of 32C Station Road and of the properties to the rear of the site, including those in Aubrey Close. However, a previous noise assessment at this site, undertaken by Sharps Redmore in October 2012, indicated a difference of approximately 12 dB between the levels measured towards the rear of the site, and those measured adjacent to 18 Station Road, which is much closer to activity within the retail car park and vehicles using Station Road. This is a factor of uncertainty; there is no reason why the higher background noise levels measured in October 2012 adjacent to 18 Station Road, would not be found today. The affect of higher background noise levels at 18 Station Road, would be to reduce the stated impact from a positive value (shown to be between +1 and +6 dB) to a negative value, which would be indicative of low impact.													

APPENDIX E

SCREENING CALCULATIONS

Appendix E1

BASIC BARRIER ATTENUATION

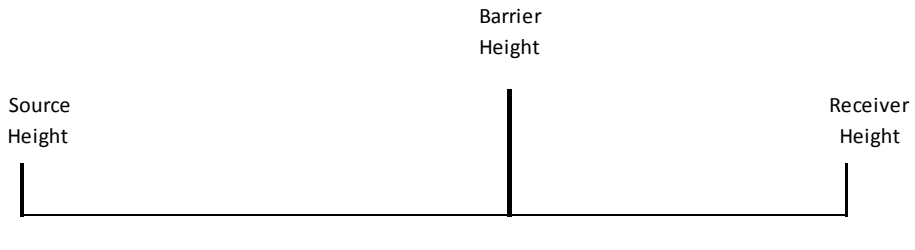
(based on Maekawa or CRTN)

Receptor: **32C Station Road**

Project: **Tesco Express Station Road Hayling Island**

Source: **Delivery activity: arrival and departure**

Receiver: **32C Station Road**



Source-to-Barrier Distance	28.0 m
Receiver-to-Barrier Distance	37.0 m

Source Height	1.0 m
Receiver Height	4.5 m
Barrier Height	4.0 m

Path difference = 0.069 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**5.5**	**6.0**	**7.0**	**8.5**	**10.5**	**12.8**	**15.5**	**18.3**	**8.7 dBA**

Appendix E2

BASIC BARRIER ATTENUATION

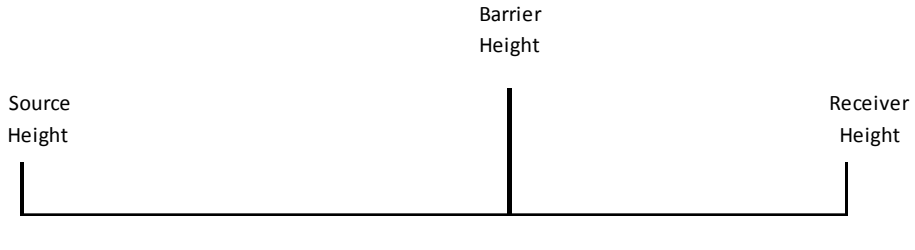
(based on Maekawa or CRTN)

Receptor: **5 Aubrey Close**

Project: **Tesco Express Station Road Hayling Island**

Source: **Delivery activity: unloading**

Receiver: **5 Aubrey Close**



Source-to-Barrier Distance	28.0 m
Receiver-to-Barrier Distance	37.0 m

Source Height	1.5 m
Receiver Height	1.5 m
Barrier Height	1.8 m

Path difference = 0.003 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**4.8**	**4.8**	**4.9**	**5.0**	**5.2**	**5.6**	**6.4**	**7.5**	**5.2 dBA**

Appendix E3

BASIC BARRIER ATTENUATION

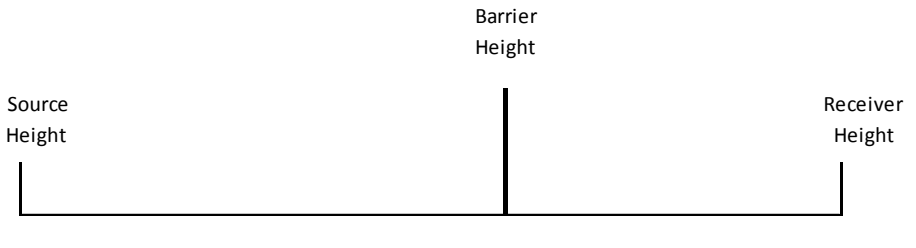
(based on Maekawa or CRTN)

Receptor: **18 Station Road**

Project: **Tesco Express Station Road Hayling Island**

Source: **Delivery activity: unloading**

Receiver: **18 Station Road**



Source-to-Barrier Distance	19.0 m
Receiver-to-Barrier Distance	33.0 m

Source Height	1.5 m
Receiver Height	1.5 m
Barrier Height	4.0 m

Path difference = 0.258 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**6.9**	**8.3**	**10.2**	**12.6**	**15.2**	**18.0**	**20.9**	**23.9**	**11.4 dBA**

APPENDIX F

ACOUSTIC TERMINOLOGY

Acoustic Terminology

F1 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.

F2 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.

F3 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).

F4 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.

F5 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.

F6 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.

F7 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.

F8 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:

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