



Replacement Lidl Store,
Great North Road, Milford
Haven

Noise Impact Assessment

For Lidl

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1. INTRODUCTION

1.1 Overview

Hydrock Consultants are appointed by Lidl to provide acoustic consultancy services in relation to the replacement Lidl Store, Great North Road, Milford Haven.

The proposals involve the demolition of an existing Lidl food store unit, Enterprise car rental unit, and 3 residential dwellings on the site, and re-development of the site with construction of a replacement Lidl food store unit. This proposed new Lidl food store would have a GFA of 2,121m² (an increase of 908m² from the existing store), with 102 dedicated parking spaces.

As part of the re-development, the delivery bay will be re-located and the car park will be expanded.

This report provides an assessment of noise that may arise from the relocated delivery bay, expanded car park, and any new fixed plant and services associated with operations of the replacement Lidl store.

A baseline noise survey was carried out over the period Friday 4th February and Monday 8th February 2021.

2. ASSESSMENT CRITERIA

2.1 Planning Policy Wales, 2021

Planning Policy Wales (PPW), Edition 11, 12th January 2021, sets out the land use planning policies of the Welsh Government.

The primary objective of which is to "ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales."

PPW provides the following guidance with regards to noise:

"6.7.12 Planning authorities must consider current and future sources of air and noise pollution as part of developing their strategies for locating new development. The pattern of proposed development should be informed by the sensitivity of, and compatibility of, uses in relation to the sources of airborne pollution and the importance of ensuring appropriate soundscapes. Green infrastructure provision will be an important means of addressing the cumulative impacts of air and noise pollution and soundscapes on individuals and society and provide benefits for social and ecosystems resilience.

6.7.13 When developing strategies, proposing or assessing development proposals it will be essential to understand the implications of the transport demand associated with the proposal and the effect this may have now and in the foreseeable future. When proposing to introduce a development activity into an area the impacts which existing pollution sources (including roads, railways and industrial or commercial operations) have in terms of air and noise pollution should be carefully considered, particularly taking into account any increases in pollution levels which may be reasonably expected in the foreseeable future as a result of increased transport activity.

6.7.14 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission."

2.2 British Standard 4142:2014+A1:2019

The standard method for assessing the noise impact from industrial and commercial activity is British Standard BS4142 "Method for rating and assessing industrial and commercial sound". BS 4142: 1997 referred to in the consultation response has been replaced with a new version from 2014. A BS4142 assessment is made by determining the difference between the intrusive noise under consideration (known as 'the specific noise') and the background noise at the receptor. The background noise, as represented by the L_{A90} parameter, is the noise level in the absence of the specific noise. The standard requires an assessment of the typical background noise level.

The specific noise is assessed in terms of the L_{Aeq} parameter but a character penalty can be applied for tonal, impulsive or intermittent characteristics. Intermittency is defined as having an identifiable on/off condition and a penalty of 3dB is applicable if "*the intermittence is readily distinctive against the residual acoustic environment*". The specific noise should be calculated or measured over a 1-hour period during the day and a 15-minute period during the night.

The specific noise level (L_{Aeq}), with the character correction (if necessary), is known as the rating level, L_{Ar} . The standard then gives the following criteria for assessment based on the difference between the background noise (L_{A90}) and the rating noise (L_{Ar}):

- "a) Typically, the greater this difference the greater the magnitude of the impact.*
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) 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 has a low impact, depending on the context."*

The standard highlights the importance of considering the context in which a sound occurs. Factors including the absolute sound level, the character of the sound, the sensitivity of the receptor and the existing acoustic character of the area should be considered when assessing the noise impact.

The standard notes the need to consider absolute sound levels where background sound levels are low:

"For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

Where the background sound levels and rating level are low, absolute levels might be as, or more, relevant than margin by which the rating level exceeds the background. This is especially true at night."

One of the significant differences between BS4142:2014 and previous editions of the Standard is the explicit requirement to consider context as part of the assessment.

It is no longer adequate to simply compare the Rating Level and the Background Sound Level without due regard to the context of the acoustic environment and the sound source. The context can significantly affect the outcome of the Initial Estimate, which is based solely on the difference between the Rating and Background Sound Levels.

Due to the way L_{90} is calculated it means that the difference between Rating and Background Sound Levels can be identical for two locations with very different acoustic characteristics and corresponding sensitivities to noise.

In addition to comparing the level and character of the specific and residual sound, the context also includes careful consideration of other factors such as the character of the locale e.g. quiet rural or predominantly industrial; noise sensitive receptors e.g. outdoor amenity space or indoors; and duration and time of specific sound e.g. 24/7 operation or one event per week.

Depending upon the context and in instances where the background sound level is considered to be low, other guidance may be more appropriate, such as considering the potential impact of sound on residents during the night when the primary concern is to ensure that they are not disturbed whilst sleeping, possibly with open bedroom windows. In this case the difference between Background Sound Level and Rating Level outdoors is likely to be of little significance to the residents indoors.

It is considered therefore on the basis of the above guidance that in addition to assessing noise impacts against existing background sound levels at receptors, it may be more appropriate to consider noise impacts within existing dwellings.

2.3 BS8233:2014 Guidance on sound insulation and noise reduction for buildings

For dwellings the main considerations are to protect sleep in bedrooms and to protect resting, listening and communicating in other rooms. For noise without a specific character, it is desirable that the overall average levels during the 8-hour night (2300-0700 hours) or 16-hour day time (0700-2300 hours) periods do not exceed 30dBA or 35dBA respectively.

For amenity space, such as gardens and patios, it is desirable that the average level does not exceed 50dBA, with an upper guideline value of 55dBA which would be acceptable in noisier environments.

For dwellings with conventional windows, an internal target of 35dBA during the day, and 30dBA during the night, equates to around 50dBA and 45dBA during the day and night respectively outside noise sensitive rooms with openable windows.

2.3.1 Notes on the Application of BS8233:2014 Noise Limits

The BS8233:2014 noise limits are for noise without a specific character. The standard notes that people are often more tolerant of noise without a specific identifiable character and that noise from neighbours (or a specific businesses) can trigger “*complex emotional reactions*”. Therefore, in the UK, the BS8233:2014 noise limits (which are derived from WHO Guidelines) are often applied only to what is termed “*anonymous noise*”. That is, noise without a specific character and that cannot be easily identified as emanating from a single business, building, or neighbour.

It should be noted that the BS8233:2014 noise limits are derived from limits identified in the World Health Organisation (WHO) “*Guidelines for Community Noise*”, which are applicable to annoyance:

“The effects of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30 dB L_{Aeq} for continuous noise and 45 dB L_{Amax} for single sound events. Lower noise levels may be disturbing depending on the nature of the noise source. At night-time, outside sound levels about 1 metre from facades of living spaces should not exceed 45 dB L_{Aeq} , so that people may sleep with bedroom windows open. This value was obtained by assuming that the noise reduction from outside to inside with the window open is 15 dB. To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB L_{Aeq} .”

BS4142:2014 is the standard method for assessing commercial and industrial noise in the UK. However, in certain circumstances BS4142:2014 notes that alternative noise limits such as those contained in BS8233:2014 and WHO Guidelines may be applicable.

It is considered that the BS8233:2014 noise limits are applicable where the intrusive noise is from a single identifiable source (e.g. Lidl) but, the affected residents are unlikely to exhibit “*complex emotional reactions*”; for example, because it is an existing and welcome business. It is further considered that BS8233:2014/WHO may be more applicable to night-time noise affecting bedrooms than BS4142:2014 as the critical effect is sleep disturbance.

It is not considered appropriate to assess average Lidl delivery noise over an 8-hour night or 16-hour day, as would be done for continuous noise sources (such as traffic), when assessing to the BS8233:2014 noise limits. This is due to the generally short duration of delivery noise.

Hydrock consider that if short term noise levels from commercial activity, such delivery noise, is 5dB below the BS8233:2014 average day or night-time recommended levels, this would constitute a “low impact” in real terms. This is on the basis that, although the intrusive noise may be audible at this level, it is unlikely to have

any impact on the normal use of habitable rooms and would often be below the internal background sound level from sources within the dwelling.

3. PROPOSED DEVELOPMENT

3.1 Site Overview

The proposed development is a replacement of an existing Lidl store. The proposed site plan overlaid on the existing site is shown in Figure 1, below. The site is in Milford Haven town centre and is surrounded on all sides by residential dwellings.

The existing delivery bay is at the north west of the existing site, facing east. This will be relocated to the south west, facing north. The replacement car park is to be located at the north of the proposed site.



Figure 1: Proposed Development site and surroundings

4. NOISE SURVEY

To enable an assessment of the baseline ambient noise levels in the area, environmental noise measurements were undertaken on site between Friday 5th February and Monday 8th February 2021.

4.1 Methodology

A measurement location was selected on the proposed development site in order to quantify the baseline noise levels representative of local noise sensitive receptors at Vaynor Road, as well as capture noise from deliveries to the existing Lidl store delivery bay. Figure 2 shows the measurement location.



Figure 2: Measurement Location

The measurement microphone was located at a height of 1.5m above ground. Measurements were undertaken in accordance with the guidance outlined in the relevant British Standards, BS 4142:2014 and BS 7445-1:2003. The monitoring procedure followed the guidance outlined in BS 7445:2003 Part 1, Section 5.2.3 and section 5.2.2.

Measurements were ‘free field’, i.e. the microphone was more than 3.5m from reflective elements except the ground. A wind shield was fitted to the monitoring equipment at all times. The meter was unattended for most of the measurement period.

4.2 Equipment

Details of the sound monitoring equipment used for the acquisition of the prevailing noise levels are provided in Table 4.

Table 1: Survey Equipment

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	01254313
Rion	Pre-Amplifier	NH-25	76628
Rion	Microphone	UC-59	12139
Rion	Acoustic Calibrator	NC-74	35157400

Equipment calibration certificates can be provided on request. A field calibrator was used before and after the survey. Calibration drift was within normal tolerances

4.3 Weather Conditions

Average recorded wind speeds during the environmental noise measurement process did not generally exceed 5 m/s. Wind direction was predominantly from the north and the west on 5nd February, and from the north and east between 6th February and 8th February. There was no significant rainfall recorded during the survey period.

Temperatures ranged between 0° and 8° Celsius.

BS 4142:2014 provides the following guidance with regards to the acquisition of environmental noise measurements and weather conditions:

‘An effective windshield should be used to minimize turbulence at the microphone.’

‘NOTE Windshields are generally effective up to wind speeds of 5 m/s’ and, ‘exercise caution when making measurements in poor weather conditions such as wind speeds greater than 5 m/s.’

Weather conditions during the noise survey were suitable for the acquisition of noise data. Measurements are therefore considered to adhere to the guidance of the relevant British Standard and no correction has been applied to prevailing noise levels.

5. RESULTS

5.1 Environmental Noise Survey

An environmental noise survey was undertaken on the proposed development site.

Calculations of the measured noise data were undertaken as per guidance outlined in Section 5.

Three main acoustic parameters were measured using a time interval of 5 minute periods as described below.

- $L_{Aeq,T}$ dB, defined as the 'A' weighted equivalent continuous sound pressure level. Over a defined time period 'T', it is the sound pressure level equivalent to the acoustic energy of the fluctuating sound signal. It is often referred to as the 'ambient noise level'.
- $L_{Amax,F,T}$ dB, defined as the 'A' weighted maximum sound pressure level that occurred during the time period 'T' acquired using a 'fast' time weighting (i.e. a sample every 125ms). It is commonly used to describe the highest noise level that occurred during an event such as a vehicle pass-by.
- $L_{A90,T}$ dB, defined as the 'A' weighted sound pressure level exceeded for 90% of the measurement period 'T'. It is a statistical parameter and cannot be directly combined with other acoustic parameters. It is generally used to describe the prevailing background noise level.

A noise level time history over the full measurement period is presented in Figure 24, which demonstrates the current noise climate on the proposed development site.

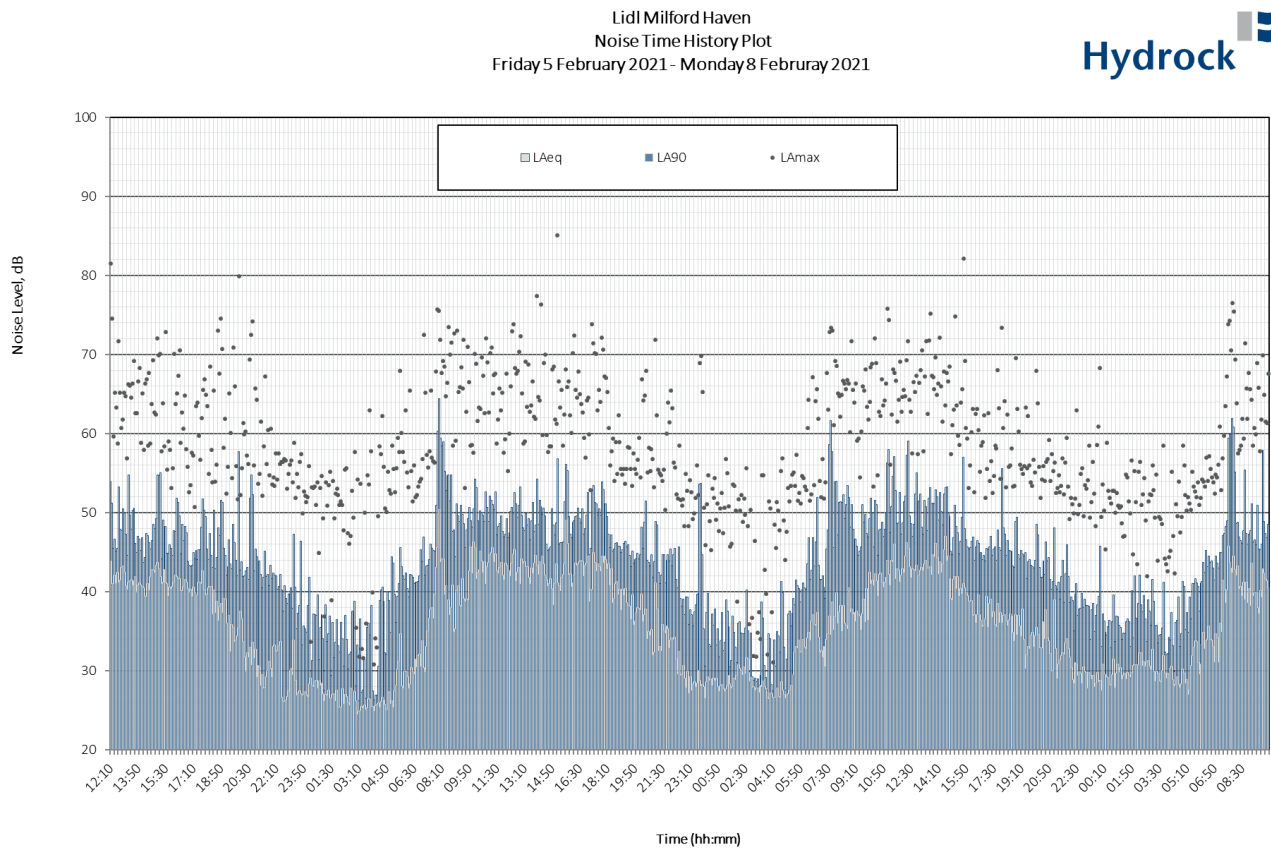


Figure 3: Environmental Noise Survey Measurement Graph

A summary of the 16-hour daytime (0700hrs to 2300hrs) and 8-hour night time (2300hrs to 0700hrs) equivalent continuous levels ($L_{Aeq,T}$) and background sound levels (L_{A90}) are presented in Table 5.

Table 2: Survey Summary-Noise Levels

Period	5 th February 2021	6 th February 2021	7 th February 2021	8 th February 2021
Daytime L_{Aeq} (16hour) dB	48	51	50	53
Night-Time L_{Aeq} (8hour) dB	39	41	39	-
Typical Daytime L_{A90} (1hour) dB	41	44	37	39
Typical Night-Time L_{A90} (15mins) dB	27	28	30	-

6. PROPOSED OPERATIONAL IMPACT ASSESSMENT CRITERIA

6.1 Proposed Plant and Services Provision and Deliveries Noise Impact Assessment Criteria

The proposed development will incorporate building services plant which can potentially vent to external locations or have externally located plant items, currently it is understood to include items such as chillers, condensing units and potentially air handling equipment.

The development will also be subject to deliveries. The current Lidl food store has permission to receive deliveries 24 hours a day, and currently receives two deliveries in a 24-hour period – 1 during the daytime and 1 during the night. The delivery bay is currently located to the north of the existing site, but will be re-located to the south west of the proposed site, meaning noise associated with deliveries will be affecting different residential dwellings.

The nearest noise sensitive properties have been identified as:

- The rear of existing residential dwellings adjacent.

A statistical assessment of background noise levels has been undertaken in accordance with BS 4142:2014.

Typical background noise levels at the site, are found to be as below:

- L_{A90} 40 dB daytime (0700hrs to 2300hrs)
- L_{A90} 28 dB night time (2300hrs to 0700hrs)

During the daytime a proposed noise limit of parity with prevailing background sound level is advised for design purposes in accordance with the procedures of BS 4142:2014. This will result in a “Low Impact” when assessed in accordance with BS4142:2014.

Table 3: Proposed Plant Limits-Daytime

Parameter	Period	Noise Levels, dB
$L_{Ar,1hour}$	Daytime (0700hrs to 2300hrs)	40

During the night time the measured background sound levels are low. Therefore, implementation of a plant noise limit relative to existing external night-time background sound levels is unnecessarily onerous and not practicable.

Particularly where the COVID 19 impact on night time economy may be resulting in artificially low night time background sound level.

As per Section 2.0 above BS4142:2014 A2019 states:

"The absolute level of sound, for a given difference between the rating level and the background sound level, the magnitude of the overall impact may be greater for an acoustic environment where residential sound levels are low.

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

It is therefore proposed to control fixed plant and services levels at night to at least 5dB below internal noise level limits for good sleeping conditions as provided in BS8233:2014, for internal areas within existing adjacent

residential dwellings. **Note**, during the night time period, good conditions for sleep are the primary concern as opposed to external noise level amenity.

On this basis, proposed external night-time fixed services plant noise limits at adjacent existing sensitive dwellings are presented in Table 18.

Table 4: Proposed Plant Limits-Night time

Parameter	Period	Noise Levels, dB
$L_{Ar,15mins}$	Night Time (2300hrs to 0700hrs)	40

The above external noise rating level limit due to fixed plant and services at night at adjacent dwellings would result in an internal noise level at night with windows open in of no more than 25dB $L_{Aeq,T}$, this is 5dB below BS8233:2014 8-hour internal noise level recommendations for suitable internal sleeping conditions of 30dB $L_{Aeq,T}$ and therefore considered a “Low Impact”.

The proposed night-time limit will sufficiently control fixed plant and services, and delivery noise such that the occupants may sleep without significant impacts and plant noise is unlikely to be audible within dwellings even with windows open. I.e. typical internal noise sources in existing dwellings, such as domestic boilers and fridges, will often exceed this noise level.

A noise impact assessment of this proposed night-time plant limit is summarised in Table 19.

Table 5: Night Time Indicative Impact Assessment

Parameter	Period	Noise Levels, dB $L_{Aeq,T}$
BS8233:2014 internal sleeping conditions design criteria.	Night Time (2300hrs to 0700hrs)	30
Predicted internal noise from proposed development at existing sensitive receptors with windows open	Night Time (2300hrs to 0700hrs)	40-15=25
Difference	Night Time (2300hrs to 0700hrs)	-5 (Low Impact)

The noise limits in Table 17 and 18 are to be assessed ‘free-field’ at any height above ground and 1.0m from the nearest noise sensitive property façade. It applies to the overall combined operation of building services plant without any specific tone or character.

Note, where plant noise or deliveries will contain specific tones or intermittent character, then a further penalty should be applied in accordance with guidance from BS4142:2014.

On the basis of the above, further impact assessments have been provided against this proposed criterion.

7. OPERATIONAL NOISE ASSESSMENT

7.1 Delivery Bay

The current Lidl food store has permission to receive deliveries 24 hours a day, and currently receives two deliveries in a 24-hour period – 1 during the daytime and 1 during the night. The delivery bay is currently located to the north of the existing site, but will be re-located to the south west of the proposed site, meaning noise associated with deliveries will be affecting different residential dwellings.

Current proposals show a 1.8m fence is to be positioned along the site boundary between the delivery bay and nearest affected residential dwelling. Based on the height of a standard HGV trailer it is unlikely that this 1.8m fence will provide any significant acoustic screening to the first-floor windows of the nearest affected residential dwelling.

7.2 Delivery Noise Level Measurements

Hydrock Consultants have undertaken noise level measurements of a Lidl store delivery at another site, whilst delivery was taking place in order to quantify noise generation from expected future deliveries at Lidl, Milford Haven. Table 6 provides measured noise levels.

Table 6: Delivery noise level measurements

Activity	Measured Noise Level (dB, $L_{Aeq, T}$)	Measurement Distance from source
Goods unloading (Typical 5min period)	67	2m
HGV Vehicle movement	76	2m
HGV Idling	67	10m

7.3 Daytime Assessment BS4142:2014

Calculations to determine the noise level at the façade of the nearest affected residential receptor during the daytime have been undertaken. Time corrections have been applied assuming a 1-hour daytime assessment period.

Where relevant acoustic feature corrections have been applied for impulsiveness associated with unloading cages and stock, and tonality of reversing sirens.

The results of the daytime noise impact assessment are summarised in Table 7 below.

Table 7: Calculated noise level at nearest affected residential receptor-Day time

Noise Source	Source Noise	Reference	Average Distance	Level at	On-time	on	Receptor Noise Level (L _{Aeq} , dB)
Lorry driving on to and from site.	76	2	20	56	10	-	30
Lorry Manoeuvring into position	76	2	20	56	20	-	33
Lorry idling	67	10	17	62	60	-	45
Lorry Unloading	67	2	17	48	810	-6	42
Total sound pressure level at receptor, L _{Aeq,T} dB							47
Correction for impulsiveness incorporated to result, dB							+3
Correction for tonality incorporated to result, dB							+2
Calculated noise rating level, L _{A,r,Tr} dB							52
Typical Daytime Background Noise Level L _{A90, 1 hour} dB							40
Excess over background							+12
BS4142:2014 impact Assessment							Significant Adverse Impact

7.4 Night Time Assessment BS4142:2014

Calculations to determine the noise level at the façade of the nearest affected residential receptor during the night time have been undertaken. Time corrections have been applied assuming a 15-minute assessment period. The results are summarised in Table 8 below as assessed against the criteria proposed in Table 4 which represents a low impact to sleeping and resting amenity during the night time period.

Table 8: Calculated noise level at nearest affected residential receptor-Night time

Noise Source	Source	Reference	Average	Level at	On-time	on time	Receptor Noise Level (L _{Aeq} , dB)
Lorry driving on to and from site.	76	2	20	56	10	-20	36
Lorry Manoeuvring into position	76	2	20	56	20	-17	39
Lorry idling	67	10	17	62	60	-12	51
Lorry Unloading	67	2	17	48	810	0	48
Total sound pressure level at receptor, L _{Aeq,T} dB							53
Correction for impulsiveness incorporated to result, dB							+3
Correction for tonality incorporated to result, dB							+2
Calculated noise rating level, L _{Ar,Tr} dB							58
Proposed External BS4142:2014 Night Time Noise Rating Level Limit L _{ATr} dB _{15 minutes}							40
Excess over Proposed Design Criteria							+18
BS4142:2014 impact Assessment							Significant Adverse Impact

7.5 BS4142 Noise Impact Assessment

The predicted rating level is around 12 dB higher than the typical daytime background sound level, and 18dB higher than the proposed noise rating level limit deemed suitable to protect night time internal residential amenity, therefore a significant adverse impact is predicted when assessed to sensitive receptors.

7.5.1 Site Context

As per Section 2.0 of this document BS4142:2014 states that

“depending upon the context and in instances where the background sound level is considered to be low, other guidance may be more appropriate, such as considering the potential impact of sound on residents during the night when the primary concern is to ensure that they are not disturbed whilst sleeping, possibly with open bedroom windows.”

In addition, It should be noted that due to the influence of Covid-19 on the night time economy and traffic flows, background sound levels during the survey may have been lower than normal.

Also it should be considered that Lidl operations have affected all houses in the vicinity for over a decade, as such that character of the sound would be typical of that existing, albeit at a higher magnitude than previously experienced at the particular receptors now being assessed.

7.6 Indoor Noise Level Risk Assessment.

For noise without a specific character, it is desirable that the overall average levels during the 8-hour night or 16-hour day time periods do not exceed 30dBA or 35dBA respectively. BS8233 includes a note that states ‘Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

On the basis new distinct sources of noise which may result in potential impacts are at least 5dB below suitable resting and sleeping noise level recommendations from BS8233:2014 internal to dwellings identified above, this would also be considered to constitute a “low impact” in real terms.

Further calculations have been undertaken to assess the predicted rating level at the façade of the nearest affected residential dwellings as a predicted internal level within the dwelling “worst case” with windows open.

For the purposes of the calculation, the sound reduction of an open window has been taken as 15dB, as used within various acoustic guidance documentation such as WHO Guidelines for Community Noise, 1999 and ProPG “Professional Practice Guidance on Planning & Noise”.

The noise impact assessment compares the 1 hour and 15 minute noise impact assessment period for deliveries as assessed in accordance with BS4142:2014 compared with the 16 hour and 8 hour day and night time BS823:2014 indoor noise level recommendations respectively minus 5dB.

Table 9: Calculations to predict internal noise level within nearest residential dwelling-Daytime

	Daytime
BS4142:2014 Noise rating level at residential façade $L_{Ar,1\text{ hour}}$ dB	52
Sound reduction of open window dB	-15
Internal level within dwelling dB $L_{Aeq, 1\text{ hour}}$ due to delivery	37
Proposed Internal Daytime Resting/Sleeping Noise Rating Level Limit Recommendation dB $L_{Ar, 1\text{ hour}}$	30
Exceedance	+7

Table 10: Calculations to predict internal noise level within nearest residential dwelling-Night Time

	Night Time
Noise rating level at residential façade $L_{Ar,15\text{ minute}}$ dB	58
Sound reduction of open window	-15
Internal level within dwelling dB $L_{Aeq, 15\text{ minutes}}$ due to delivery	43
Proposed Internal Night Time Resting/Sleeping Noise Rating Level Limit Recommendation dB $L_{Ar, 15\text{ minute}}$	25
Exceedance	+18

Is it evident that from the above, that even considering attenuation afforded by open windows in the context of suitable internal noise levels for residential amenity, noise levels in dwellings due to deliveries (unmitigated) will not be acceptable, exceeding a level 5dB below good resting and sleeping conditions from BS8233:2014 by +7 and +18 dB during the day and night period respectively.

8. DELIVERY MITIGATION ASSESSMENT

8.1 Overview

Mitigation is recommended to control noise from the delivery bay at the nearest affected residential dwellings and achieve internal noise levels due to deliveries which are at least 5dB below BS8233:2014 internal noise criteria for daytime resting, and night time sleeping within the dwelling during the delivery

Possible mitigation options could include:

- Utilising a QDS (quiet delivery system);
- The provision of a more effective acoustic screen between the dwelling(s) and the delivery bay;
- Re-location of the delivery bay such that it is further away from nearby dwellings and potentially screened by the intervening proposed building.

8.2 QDS (Quiet Delivery System)

Previous national UK government case studies intended to facilitate sustainable food retail within the UK and reduce day time deliveries ([Reducing noise to make deliveries outside normal delivery hours - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/case-studies/reducing-noise-to-make-deliveries-outside-normal-delivery-hours)) have shown that utilizing a Quiet Delivery System can reduce maximum sound levels associated with supermarket deliveries by up to 10 dB.

The QDS also specifically aims to mitigate tonality and impulsiveness from the delivery operation, as such no feature correction has been applied within the below re-assessment

Table 11: Reassessment of noise Impact at noise sensitively nearest residential dwelling with QDS Implementation-Daytime

Assessment Parameter or Correction	Daytime
Noise Rating level at residential façade due to delivery dB $L_{Ar, 1 \text{ hour}}$.	47
QDS Delivery Mitigation	-10
QDS Mitigated Noise Rating level at residential façade due to delivery dB $L_{Ar, 1 \text{ hour}}$.	37
Typical Daytime Background Noise Level $L_{A90, 1 \text{ hour}}$ dB	40
Exceedance	-3
BS4142:2014 impact Assessment	"Low Impact"
Insertion loss for Open Window	-15
Internal level within dwelling due to delivery (QDS mitigated) dB $L_{Aeq, 1 \text{ hour}}$	22
Proposed Internal Daytime Resting Internal Amenity Noise Rating Level Limit dB $L_{Ar, 1 \text{ hour}}$.	30
Exceedance	-8
BS8233:2014 Internal Amenity Impact Assessment	"Low Impact"

Table 12: Reassessment of noise Impact at noise sensitively nearest residential dwelling with QDS Implementation-Night time

Assessment Parameter or Correction	Daytime
Noise Rating level at residential façade due to delivery dB $L_{Ar, 1 \text{ hour}}$.	53
QDS Delivery Mitigation	-10
QDS Mitigated Noise Rating level at residential façade due to delivery dB $L_{Ar, 1 \text{ hour}}$.	43
Proposed Noise Rating Level Limit to Protect Residential Amenity $L_{Ar, 15 \text{ minute}}$ dB	40
Exceedance	+3
BS4142:2014 impact Assessment	“Moderate Impact”
Insertion loss for Open Window	-15
Internal level within dwelling due to delivery (QDS mitigated) dB $L_{Aeq, 1 \text{ hour}}$	28
Proposed Internal Night Time Resting/Sleeping Noise Rating Level Limit Recommendation dB $L_{Aeq, 16 \text{ hour}}$	25
Exceedance	+3
BS8233:2014 Internal Amenity Impact Assessment	“Moderate Impact”

8.2.1 QDS Implementation Summary

On the basis of the above assessment, it is evident that the noise rating level external to dwellings due to deliveries would be 3 dB below daytime background sound levels, and 3dB above the proposed external rating level limit during the night from Section 6.0 of this document intended to protect internal residential sleeping and resting amenity during the night.

It is also evident that achieving a 10 dB reduction in noise contribution from the delivery bay in this case would result in internal noise levels due to deliveries of 22dB, and 28dB during the day and night time periods respectively. This is 8dB below and 3dB above the proposed internal noise criteria which in turn is based upon protection of internal residential amenity during the day and night time periods.

In general deliveries are therefore considered to represent a “Low Impact” and “Moderate Impact” with the implementation of a QDS during the day and night time period respectively both external and internal to existing dwelling receptors.

It should also be noted that the above assessments by default consider windows open as a worst-case assessment (typical during summer periods).

With windows closed, as may be typical during the remainder of the year, findings might result in an internal noise levels in sensitive receptors due to deliveries with a QDS in place of 12dB and 18dB during the day and night time period respectively, assuming standard double glazing with a basic acoustic performance of around 25dB R_w .

An example Quiet Delivery System Noise Management Plan can be found in Appendix A.

Therefore, effectively QDS mitigated delivery noise is likely to have a significantly reduced impact on sleep quality in bedrooms or normal activities in living rooms.

However, the external noise rating level would be 3dB above the proposed noise rating level limit from Table 4 at night and therefore could be considered to constitute a moderate impact.

On this basis and as “best practicable means” approach, it is recommended that further mitigation is provided by the client both to protect sensitive residential receptors and protect ongoing commercial concerns from nuisance action.

8.3 Acoustic Screen Design and Assessment Commentary

In addition to the identified QDS, possible further mitigation options include utilizing acoustic screening or relocation of the loading bay.

At present relocation of the loading bay is not being considered a feasible strategy. Therefore, consideration has been given to provision of acoustic screening to the loading bay in its current position.

An acoustic screen has been modelled for inclusion in a reassessment. It would be proposed to provide a barrier to the side of the loading bay to screen line of sight from the roof and side panel of an unloading HGV to 1st floor receptor windows.

There will also be benefits to the day time noise impact assessment as a result of this proposal.

Hydrock calculate that if a screen as indicated in the figures below is provided, additional mitigation of a least -5dB can be provided to the noise rating level from delivery unloading operations.

Figure 3 below outlines the typical configuration for such a barrier. Typically, the barrier should have a minimum surface mass of 12kg/m² this might comprise a Kingspan Façade Panel comprising a metal face, thermal panel or similar.

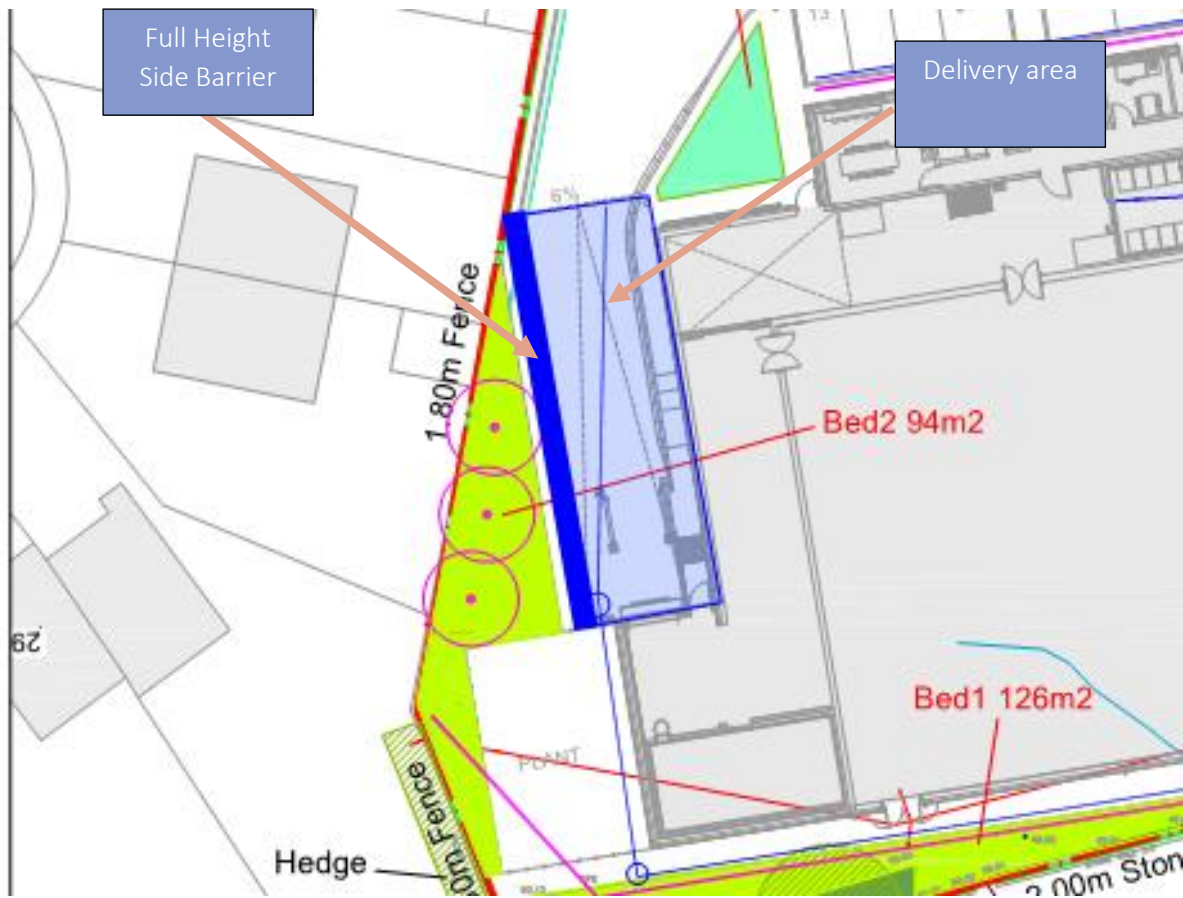


Figure 4: Delivery Barrier Enclosure

The below re-assessment (Table 11 & 12) takes into account the QDS and proposed enclosure, as outlined above. The QDS will also mitigate tonality and impulsiveness from the delivery operation, as such no feature correction has been applied:

Calculations to determine the noise level at the façade of the nearest affected residential receptor during the daytime have been undertaken. Time corrections have been applied assuming a 1-hour assessment period. The results are summarised in Table 12 below.

Table 13: Calculated noise level at nearest affected residential receptor-Day Time

Noise Source	Source Noise Level (L _{Aeq} , dB)	Reference Distance (m)	Average Distance to Receptor (m)	Level at receptor (L _{Aeq} , dB)	On-time (seconds)	on time correction dB	Receptor Noise Level
Lorry driving on to and from site.	76	2	20	56	10	-26	30
Lorry Manoeuvring into position	76	2	20	56	20	-23	33
Lorry idling	67	10	17	62	60	-18	40*
Lorry Unloading	67	2	17	48	810	-6	37*
Total sound pressure level at receptor, L _{Aeq,T} dB							42
Quiet Delivery System							-10
Correction for impulsiveness incorporated to result, dB							+0
Correction for tonality incorporated to result, dB							+0
Calculated noise rating level, L _{Ar,T} dB							32
Typical Daytime Background Noise Level L _{A90, 1 hour} dB							40
Excess over external background noise level							-8
BS4142:2014 impact Assessment							“Low Impact”
Insertion loss for Open Window							-15
Internal level within dwelling due to delivery (QDS and Enclosure mitigated) dB L _{Aeq} , 1 hour							17
Proposed Internal Daytime Resting Internal Amenity Noise Rating Level Limit dB L _{Ar} , 1 hour.							30
Exceedance							-13
BS8233:2014 Internal Amenity Impact Assessment							“Low Impact”

*-5dB attenuation for barrier.

Calculations to determine the noise level at the façade of the nearest affected residential receptor during the night time have been undertaken. Time corrections have been applied assuming a 15-minute assessment period. The results are summarised in Table 12 below.

Table 14: Calculated noise level at nearest affected residential receptor-Night Time

Noise Source	Source Noise Level (L_{Aeq} , dB)	Reference Distance (m)	Average Distance to Receptor (m)	Level at receptor (L_{Aeq} , dB)	On-time (seconds)	on time correction dB	Receptor Noise Level
Lorry driving on to and from site.	76	2	20	56	10	-20	36
Lorry Manoeuvring into position	76	2	20	56	20	-17	24
Lorry idling	67	10	17	62	60	-12	46*
Lorry Unloading	67	2	17	48	810	0	43*
Total sound pressure level at receptor, $L_{Aeq,T}$ dB							48
Quiet Delivery System							-10
Correction for impulsiveness incorporated to result, dB							+0
Correction for tonality incorporated to result, dB							+0
Calculated noise rating level, $L_{Ar,Tr}$ dB							38
Proposed Noise Rating Level Limit to Protect Residential Amenity $L_{Ar, 15 \text{ minute}}$ dB							40
Excess over background noise level							-2
BS4142:2014 impact Assessment							Low Impact
Insertion loss for Open Window							-15
Internal level within dwelling due to delivery (QDS and Enclosure mitigated) dB $L_{Aeq, 1 \text{ hour}}$							23
Internal Daytime Resting Internal Amenity Noise Rating Level Limit dB $L_{Ar, 1 \text{ hour}}$							30
Exceedance							-7
BS8233:2014 Internal Amenity Impact Assessment							“Low Impact”

*-5dB attenuation for barrier

It is evident from the above that when assessed in accordance with BS4142:2014 outside and inside sensitive receptors a “low impact” can be achieved subject to the measures proposed being implemented.

BS4142:2014 states:

“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 has a low impact, depending on the context.”

In addition, internal noise levels from deliveries will be at least 13dB and 7dB below the proposed internal design criteria indicated in Section 2.0 of this document.

9. OPERATIONAL CAR PARK TRAFFIC NOISE IMPACT ASSESSMENT

9.1 Proposed Development Trip Generation Difference

The project Transport Consultants (Corun) have calculated the predicted difference in trip generation for weekdays and Saturdays. This data is presented hourly within the Corun Transport Statement. 12-Hour total differences have been summarised in Table 13 and have been used to calculate the increase in 12-hour noise generation from the expanded car park.

DMRB (Design Manual for Roads and Bridges) states:

- A change in road traffic noise of less than 1 dB $L_{A10,18h}$ in the short term (e.g., when a project is opened) is of negligible significance;
- In the long term (typically 15 years after project opening), a 3 dB $L_{A10,18h}$ change is considered of negligible significance.

The magnitude of noise impact as a result of traffic is classified as per the below tables (Table 13 & 14) in the short and long term respectively.

Table 15: Classification of magnitude of noise impacts in the short term

Noise Change- $L_{A10, 18hour}$	Magnitude of Impact
0	No Change
0.1-0.9	Negligible
1-2.9	Minor
3-4.9	Moderate
5+	Major

Table 16: Classification of magnitude of noise impacts in the long term

Noise Change- $L_{A10, 18hour}$	Magnitude of Impact
0	No Change
0.1-2.9	Negligible
3-4.9	Minor
5-9.9	Moderate
10+	Major

Noise levels generated by the car park are predicted to increase by around 2 dB over a 12-hour period. It should be considered that noise will be spread over a larger car park provision, the below therefore represents a worst-case assessment.

Table 17: Proposed Development Trip Generation Difference

	Existing Development Total Two-Way Trips	Proposed Development Total Two-Way Trips	Difference	% Increase on Total Two-Way Trips	Noise Increase dB	Noise Impact
Weekday 12-Hour Total (07:00 – 19:00)	1,114	1,841	+727	64%	+2.2	Minor
Saturday 12-Hour Total (07:00 – 19:00)	1,301	2,162	+861	66%	+2.2	Negligible.

It is evident from the above assessment that in the short term there may be a minor impact as a result of the expanded parking provision during the opening year, however in the longer term (future 15 years) this impact will ultimately be negligible.

9.2 Traffic Noise Assessment on Local Network

BS4142:2014 is not appropriate for the assessment of road traffic noise on public highways. Highways Agency guidance on the assessment of road noise is provided in the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3. The DMRB assessment method is based on the increase in the 18-hour road noise levels as defined in the Calculation of Road Traffic Noise (CRTN), DoF, 1988. CRTN describes a method for predicted the road noise level based on 18-hour Annual Average Weekday Traffic flow rates (AAWT), HGV percentage, traffic speed and other factors. However, DMRB provides a simple method for determining if a significant noise impact is likely based on the change in flow rate:

“A change in noise level of 1 dB $L_{A10,18h}$ is equivalent to a 25% increase or a 20% decrease in traffic”

It is further noted that a change in the road noise level of less than 1 dB is negligible. Therefore, any increase in traffic flow of less than 25% is likely to be negligible with respect to noise.

Corun has provided a Transport Statement for the proposed development, and have calculated the predicted increase in traffic flow on the A4076 Great North Road by combining existing traffic flow with the predicted increase in trips to the proposed development. This is summarised in Table 18. Percentage increases in traffic flow are around 5%, resulting in a negligible increase in noise generation from the A4076 at sensitive receptors along the A4076 as a result of the expanded parking provision associated with the development.

Table 18: Proposed Development Highway Impact

Time Period	Total 2019 Two-way A4076 Flow (all motor vehicles)	Proposed Development Weekday Increase In Trips	Combined Flow	% Impact on Observed Flow	Noise Increase dB	Noise Impact
AM Highway Peak Hour (09:00 – 10:00)	1,131	+53	1,184	+4.7%	<0.20	Negligible
AM Highway Peak Hour (16:00 – 17:00)	1,433	+77	1,510	+5.4%	<0.22	Negligible
12-Hour Peak Hour (07:00 – 19:00)	13,340	+725	14,065	+5.4%	<0.22	Negligible

Further information on predicted traffic flow can be found in the Corun document '20-00721-TS01_Lidl Milford Haven_V1'.

9.3 Lidl Design Manual

In addition to the above guidance Lidl have a “good practice” contractual requirement provided for MEP (Mechanical, Electrical and Plumbing) subcontractors or consultants.

This guidance states:

“External noise levels shall be determined by noise survey to establish current background levels and as agreed with the local Environmental Services.

This shall be carried out by a suitably qualified Acoustic Consultant appointed by Lidl.

The Noise Report shall be submitted as part of the tender documentation, to ensure atmospheric attenuation is accounted for at tender stage, prior to the contract being let.”

Thus, it is clear, that contractually Lidl require design engineers to adhere to the design recommendations of this noise planning report provided by the acoustic engineer, if it is accepted by the Local Authority, and as such recommendations can be successfully accommodated into the detailed design.

9.4 Proposed Condition

The below planning condition could be used to ensure suitable control of fixed plant and services noise:

“All recommendations detailed in the Noise Planning Report (REF. LMH-HYD-ZZ-XX-RP-Y-1001) (Hydrock, March 2021) submitted with the application with regards to mitigation of fixed plant and services noise impact shall be implemented in full prior to the commencement of the use permitted and be permanently maintained.

Reason: In order to safeguard the amenity of adjoining residential occupiers.”

10. CONSTRUCTION PHASE NOISE IMPACTS

10.1 CEMP

During the construction phase, there may be short term noise impacts associated with the construction of the new building and resurfacing of new car park layouts.

It is proposed to manage this via provision of a CEMP (Construction Environmental Management Plan) incorporating best practice mitigation as per guidance in BS 5228-1:2009+A1:2014 *“Code of practice for noise and vibration control on construction and open sites. Noise & Vibration”*.

A typical Noise Chapter for a CEMP is included in Appendix B to this document.

10.2 Section 61 and Construction Noise and Vibration Monitoring

A Section 61 application, including a desktop noise impact assessment, would allow noise and vibration impacts and appropriate limits to be clearly identified before construction begins. This can avoid stoppages due to noise and vibration complaints where the agreed limits have not been exceeded.

Noise and vibration monitoring during construction may be required to ensure noise limits identified in the CEMP or Section 61 agreement are not exceeded.

11. SUMMARY

An assessment has been made of noise from the proposed re-development of the Lidl food store, Milford Haven.

Operational noise from the delivery bay is predicted to exceed existing background noise levels and BS8233:2014 internal noise criteria at the closest existing dwellings.

It is therefore recommended that mitigation is incorporated to reduce noise from the delivery bay to a low impact in accordance with BS4142:2014.

There will be a small increase on traffic flows on local roads and in the car park as a result of the development. However, the noise impact of this is expected to be negligible or minor.

Limits have been proposed for the control of noise from fixed plant and services associated with the development. Installers will be contractually obliged to achieve these limits.

Appendix A Quiet Delivery System Example

The following is an example of a Quiet Delivery System Noise Management Plan.

In order to prevent the noise associated with deliveries from disturbing neighbouring residents it is important that all the control measures below are adhered to at all times:

1. Unless otherwise instructed, drivers must ensure that reversing alarms and trailer refrigeration units (if fitted) are switched off before arriving at the site. This is to be checked by the store personnel asking the driver when opening the service yard gate to enable the vehicle to enter the service yard.
2. Do not use the extended (double decker) dock for night time deliveries
3. Ensure the arrival bell is inaudible at any dwellings in the vicinity of the site, particularly during the night.
4. Avoid any unnecessary activity in the yard during the night and take care at all times to avoid unnecessary noise production – for example rather than letting a pallet fall to the ground, lower it down instead (observing appropriate manual handling practices). Minimize vehicle manoeuvring and ensure engines are switched off when vehicles are stationary.
5. Ensure salvage or other materials are not loaded into trailers during the night, keeping the amount of unloading and associated activity to the necessary minimum.
6. Unless unavoidable, heavier pallets e.g., drinks should not be delivered during the night.
7. Ensure that latches/bolts on gates are modified if necessary, to avoid unnecessary noise production.
8. Ensure that all personnel are aware of the need to avoid unnecessary noise, know how to do so, that this message is reinforced with correct signage at prominent locations within the service yard and adherence is supported and monitored by management.
9. Ensure that the dock levellers are used correctly and that the correct Quiet Mark hand pallet truck or Pedestrian Operated Electrically Powered pallet truck is used correctly by properly trained personnel for unloading all deliveries during the night.
10. Consistent with training, move the pallet truck slowly across the dock leveller/ plate and bed of the trailer, and very slowly when entering/ leaving pallets to avoid noise being radiated from the bed of the trailer. Once inside the building the pallets may be moved at usual speed.
11. To prevent noise within the building from breaking out keep doors closed, particularly during the night.
12. Establish good communications with neighbouring residents, ensuring they realise their concerns are taken seriously and they know how to raise any issues that they may have with the store. If people realise that their concerns are taken seriously and that care is taken to prevent excessive noise, they are less likely to be disturbed than would otherwise be the case.
13. If there is a major failure that will prevent this system being adhered to, such as unavailability of the correct pallet truck, postpone the night time deliveries until the morning or the problem has been resolved.

Appendix B CEMP Chapter-Noise and Vibration

Introduction

Excessive noise and vibration as a result of construction activities has the potential to produce a significant negative effect on nearby noise sensitive receivers. This section describes a noise management plan in order to control and limit noise and vibration so that affected properties and other sensitive receptors are protected from excessive noise and vibration levels.

This document is prepared with regard to relevant British Standards and Legislative Guidelines including:

- British Standard 5228-1:2009 'Noise and Vibration Control on Construction and Open Sites;
- British Standard 5228-2:2009 'Noise and Vibration Control on Construction and Open Sites;
- British Standard 6472-1:2008 'Guide to Evaluation of Human Exposure to Vibration in Buildings' Part 1: Vibration Sources Other Than Blasting;
- British Standard 6472:2008 'Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz);
- The Control of Pollution Act 1974;
- The Environmental Protection Act 1990;

At this time there is no specific management construction phasing scheme therefore, this assessment will focus on providing general advice and best practice guidance on the control of noise and vibration from construction and open sites.

Noise and Vibration Management

General

Access to the development site will be facilitated at all reasonable times for inspection and/or noise measurements by the local authority environmental health personnel, following appropriate site-specific induction and/or health and safety training.

Notifications

An early establishment of relations should be conducted and maintained throughout the scheme of site work between the development team and community. Good relations can be achieved and maintained by providing insight into the proposed construction scheme, updating local residents on continued progress and by treating complaints fairly and expeditiously.

Occupiers of nearby properties should be informed in advance of specific works taking place that may be considered highly noise sensitive (e.g. piling operations), including the duration and likely noise and vibration impacts. In the case of work required in response to an emergency, the local authority and local residents will be advised as soon as reasonably practicable that work is taking place.

Potentially affected residents will also be notified of a Helpline phone number.

Construction Site Management

Best Practicable Means (BPM) should be followed by the contractor and all subsequent sub-contractors in order to reduce undue noise and vibration on the local community.

The following guidance should be followed for the BPM:

Each item of plant used on the worksites will comply with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument (SI) 2001/1701.

The recommendations set out in Annex B of Part 1 of BS 5228 and Sections 7.3 and 9.2 of Part 4 of BS 5228 with regard to noise and vibration options will be adopted unless agreed in advance with the relevant local authority.

Materials will be handled with care e.g. material such as scaffolding and steelwork will be placed rather than dropped.

Drop heights of materials from lorries and other plant will be kept to a minimum.

With regards to the piling of foundations, if this is required for any of the proposed buildings, the avoidance of driven piling, for example by using rotary bored piling where possible, will ensure noise and vibration effects during these works will be reduced.

Fixed and semi-fixed ancillary plant such as generators, compressors and pumps liable to create noise and/or vibration whilst in operation will, as far as reasonably practicable, be located away from sensitive receptors.

The use of barriers to absorb and/or deflect noise away from noise sensitive areas will be employed where required and reasonably practicable.

All plant used on site, paying particular attention to the integrity of silencers and acoustic enclosures will be maintained in good and efficient working order and operated such that noise emissions are minimised as far as reasonably practicable.

As far as reasonably practicable, any plant, equipment or items fitted with noise control equipment found to be defective will not be operated until repaired.

Where reasonably practicable, fixed items of construction plant should be electrically powered in preference to diesel or petrol driven.

Vehicles and mechanical plant employed for any activity associated with the construction works will, where reasonably practicable, be fitted with effective exhaust silencers and will be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable.

Machines in intermittent use should be shut down or throttled down to a minimum during periods between work.

Static noise emitting equipment operating continuously will be housed within a suitable acoustic enclosure.

Vibration Management

There is potential for excessive vibration causing disturbance to local residents and/or dwellings. The significance of vibration can be assessed using the Vibration Dose Value (VDV) or more commonly for demolition/construction the Peak Particle Velocity (PPV).

With regards to the protection of dwellings, as per the guidance of BS 5228 2:2009, the lowest transient vibration threshold for cosmetic damage to buildings is 15 mm s^{-1} at 4 Hz.

It should be noted that with regards to continuous vibration, such as may occur during sheet piling operations, threshold levels may need to be reduced by 50%.

It is therefore proposed that the upper vibration threshold level be limited to 7.5 mm s^{-1} at the site boundary to reduce the risk of damage.

A scheme of vibration surveillance may be necessary at the site boundaries should high impact construction events, such as pilling, be conducted in proximity to the identified noise sensitive receivers.

Testing of high impact activities, such as piling, should be conducted to determine their compliance to the relevant British standards and best practice guidelines. Should high impact activities be determined to be within the threshold tolerance, surveillance may be ceased until the following is undertaken:

If the proximity of high impact activities to the identified noise sensitive receivers is increased; and the frequency of high impact activities is increased It must be ensured that local residents are instructed in writing of any high impact activities likely to generate excessive levels of vibration prior to the commencement of the activity.

Vehicle Movement

The following measures should be considered when developing a scheme of site vehicle movement:

- Site access should be selected at an appropriate location as far from the identified receivers as practicable;
- Deliveries should be programmed to arrive during daytime hours only (within the hours outlined in Section 2.3);
- Delivery vehicles should be prohibited from waiting within the delivery area with their engines running; and
- Speed should be limited to 5 mph.

1.1 Reversing Alarms

As far as reasonably practicable the noise from reversing alarms should be controlled and limited. This will be managed through the following hierarchy of techniques:

The site layout will be designed to limit and where reasonably practicable, avoid the need for the reversing of vehicles. Drivers will be familiar with the worksite layout.

Banksmen will be utilised to avoid, as far as reasonably practicable, the use of reversing alarms.

Reversing alarms incorporating one of more of the features listed below or any other comparable system will be used where reasonably practicable;

- i) highly directional sounders;
- ii) use of broadband signals;
- iii) self-adjusting output sounders;
- iv) and flashing warning lights.

Reversing alarms will be set to the minimum output noise level required for health and safety compliance.

Noise and Vibration Management Conclusion

This document has been prepared using the guidance of the relevant British standards, legislation and best practice guidelines regarding construction noise and vibration assessment and control. At this stage no explicit conditions are attached to the proposals.

This plan contains a "best practicable means" noise management plan in order to best protect the amenity of the identified nearest noise sensitive receivers as best as reasonably practicable.

Appropriate measures have been suggested for the construction phase of the proposed development at this stage of the planning process.