REPORT

Noise Impact Assessment

Parcel D1, Community Centre, Great Wilsey Park

Client: Pollard Edward Thomas

Reference: PC5895-100-105-RHD-XX-XX-RP-X-0002

Status: Final/2

Date: 3 July 2024

Royal HaskoningDHV
Enhancing Society Together

HASKONINGDHV UK LTD.

Westpoint
Peterborough Business Park
Lynch Wood
Peterborough
PE2 6FZ
United Kingdom
Water & Maritime

+44 1733 3344 55 **T**
info@uk.rhdhv.com **E**
royalhaskoningdhv.com **W**

Document title:	Noise Impact Assessment
Subtitle:	Parcel D1, Community Centre, Great Wilsey Park
Reference:	PC5895-100-105-RHD-XX-XX-RP-X-0002
Your reference:	
Status:	Final/2
Date:	3 July 2024
Project name:	Parcel D1, Community Centre, Great Wilsey Park
Project number:	PC5895-100-105
Author(s):	RHDHV
Drafted by:	LB
Checked by:	TB
Date:	3rd June 2024
Approved by:	NH
Date:	4th June 2024

Classification
Project related

Table of Contents

Table of Tables

1 Introduction

This noise assessment report was produced on behalf of Pollard Edward Thomas to support the application to West Suffolk Council (WSC) to discharge planning condition 10 imposed on the outline planning permission (ref. DC/15/2151/OUT) for the development of a proposed 'local centre' at Zone D1, Great Wilsey Park, Haverhill, hereafter referred to as the "proposed development". The condition reads:

> *Details of the local centres shall include a noise impact assessment and any mitigation measures necessary to control noise from activities within the buildings and by deliveries, plant and ventilation systems. Such details shall be submitted to and approved by the local planning authority and implemented before the use to which it relates is first commenced.*
>
> *Reason: To ensure that the residential development is protected from proposed noise sources.*

The proposed development site currently contains a construction site surrounded by heras fencing. The site and surrounding area is part of the wider Great Wilsey Park approved development (reference DC/15/2151/OUT). This site is located within Zone D1 and is bounded to the north by Gurteen Avenue, to the north-east by a proposed residential development (Zone A16) and to the south by a proposed school (Zone B1). The closest occupied residential properties are on the north side of Gurteen Avenue. The location of the proposed development is shown in **Appendix B**.

The proposed operating hours of the proposed community centre within Zone D1 are as follows:

- Café / Workspace – 08:00hrs – 18:00hrs
- Nursery – 07:30hrs – 18:00hrs
- Community centre:
  - Monday to Friday – 09:00hrs – 17:00hrs (potentially later opening to 21:00hrs for evening clubs)
  - Weekend use – 09:00hrs – 23:00hrs

The following sections of this report outline:

- the relevant policy and guidance for the noise assessment;
- the baseline noise conditions at the proposed development site;
- the potential for noise impacts from the proposed development on the nearest noise sensitive receptors and at the boundary of the site; and
- the mitigation measures required to prevent, reduce or offset any significant adverse impacts; and the likely residual impacts after these measures have been employed.

A summary of acoustic terminology relevant to this report is provided in **Appendix A**.

2 Planning Policy and Guidance

2.1 National Policy

UK planning policy with respect to noise is found in the National Planning Policy Framework (NPPF)[1], the National Planning Practice Guidance (NPPG)[2] and the Noise Policy Statement for England (NPSE)[3].

Regarding noise and planning, the NPPF contains the following short statements in paragraphs 180 (part e) and 191 (parts a & b) and longer explanatory text (paragraph 193) regarding integration of developments:

Paragraph 180

preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

Paragraph 191

a) Mitigate and reduce to a minimum potential adverse effects resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.

b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Paragraph 193

Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities. Existing businesses and facilities should not have unreasonable restrictions placed upon them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant should be required to provide suitable mitigation before the development is completed.

The NPSE has a long-term vision to "*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*". The vision is supported by the following three key aims intended to promote sustainable development with respect to noise:

- *"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".*

However, the NPSE recognises that it is not currently possible to define a single objective noise level having specific effects on people, hence the emphasis on "*promoting*" improvements to health and quality of life through effective management of noise, considered in the context of the wider environment and factors other than noise.

[1] *Ministry of Housing, Communities & Local Government (2023) National Planning Policy Framework*
[2] *Ministry of Housing, Communities & Local Government (2019) National Planning Practice Guidance: Noise. Last updated 22nd July 2019, last accessed 29th June 2021, https://www.gov.uk/guidance/noise--2*
[3] *Department for Environment, Food and Rural Affairs (DEFRA) (2010) Noise Policy Statement for England (NPSE)*

The NPPG web-based resource was originally launched by the Department for Communities and Local Government (DCLG) on 6 March 2014[4], to support the National Planning Policy Framework and make it more accessible. The overall aim of the guidance, tying in with the principles of the NPPF and the Explanatory Note of the NPSE, is to *'identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation'*.

A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the NPPG and reproduced in Error! Reference source not found..

Table 2-1: Noise exposure hierarchy

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level (NOEL)			
Not present	No Effect	No Observed Effect	No Specific Measures Required
No Observed Adverse Effect Level (NOAEL)			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to closing windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect (SOAE)	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect (UAE)	Prevent

[4] *Department for Levelling Up, Housing and Communities now responsible for updating this guidance*

2.2 Local Policy Guidance

The West Suffolk Local Plan (consisting of the former Forest Heath area (FHDC) and former St Edmundsbury area (SEBC) Local Plan documents) sets out the long-term planning and land use policies within West Suffolk. The site falls within the former SEBC area and is covered by the St Edmundsbury Core Strategy (December 2010)[5]. The extant Core Strategy contains the council's vision and strategy for the SEBC area and the policies which will be used in the determination of planning applications. The document does not contain any policies considered relevant to this assessment.

2.3 Assessment Methodology Guidance

2.3.1 British Standard (BS) 4142:2014+A1:2019 Method for Rating and Assessing Industrial and Commercial Sound[6]

BS 4142:2014+A1:2019 states that it can be used for "*rating and assessing sound of an industrial and/or commercial nature, which includes:*

a) sound from industrial and manufacturing processes;

b) sound from fixed installations which comprise mechanical and electrical plant and equipment;

c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and

d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from fork-lift trucks, or that from train or ship movements on or around an industrial and/or commercial site."

The basis of BS 4142 is a comparison between the *background sound level* in the vicinity of residential locations and the *rating level* of the noise source under consideration. The relevant parameters in this instance are as follows:

- *Background sound level* – $L_{A90,T}$ – defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F (Fast) and quoted to the nearest whole number of decibels;
- *Specific sound level* – $L_{Aeq,Tr}$ – the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T;
- *Residual Sound Level* – $L_{Aeq,T}$ – the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T; and
- *Rating level* – $L_{Ar,Tr}$ – the *specific sound level* plus any adjustment made for the characteristic features of the noise such as tonality, impulsivity and intermittency.

When comparing the *background* and the *rating sound* levels, the standard states that:

- "*Typically, the greater the difference, the greater the magnitude of impact.*

[5] *St Edmundsbury Borough Council (2010) St Edmundsbury Core Strategy. Available at https://www.westsuffolk.gov.uk/planning/Planning_Policies/local_plans/upload/Core-Strategy-December-2010.pdf Accessed 21st May 2024.*
[6] *British Standards Institution, British Standard 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound, London: BSI, 2019.*

Royal HaskoningDHV

- *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending upon the context.*
- *A difference of around +5dB is likely to be an indication of an adverse impact, depending upon the context.*
- *The lower the rating level is to the measured background sound level, the less likely it is that the specific sound 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 upon the context.*"

Based on the above descriptions, the LOAEL is taken to be a *rating level* which does not exceed the *background sound level*, depending on the context. The SOAEL is an exceedance of 10dB, depending on the context.

As indicated above, BS 4142 requires that the *rating level* of the sound source under assessment be considered in the context of the environment when defining the overall significance of the impact. The standard suggests that in assessing the context, all pertinent factors should be taken into consideration, including the following:

- "*The absolute level of sound;*
- *The character and level of the residual sound compared to the character and level of the specific sound; and*
- *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions*."

2.3.2 World Health Organization (WHO) Guidelines for Community Noise (1999)[7]

The WHO 'Guidelines for Community Noise' set out guideline values for noise levels for different environments. On outdoor noise during the daytime, the document states that "*To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB L_{Aeq}. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.*" Based on this guidance, 50dB $L_{Aeq,16h}$ is considered a LOAEL for daytime noise in gardens.

2.3.3 British Standard (BS) 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings[8]

This Standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999). These guideline noise levels are shown in **Table 2-2**.

Table 2-2: BS 8233 Desirable Internal Ambient Noise Levels for Dwellings

Activity	Location	07:00hrs to 23:00hrs	23:00hrs to 07:00hrs
Resting	Living room	35dB $L_{Aeq,16h}$	-
Dining	Dining room / area	40dB $L_{Aeq,16h}$	-

[7] *World Health Organisation, Guidelines for Community Noise, London: WHO, 1999.*
[8] *British Standards Institution (BSI) (2014). BS 8233 Sound Insulation and Noise Reduction for Buildings. BSI, London.*

Royal HaskoningDHV

Activity	Location	07:00hrs to 23:00hrs	23:00hrs to 07:00hrs
Sleeping / daytime resting	Bedroom	35dB $L_{Aeq,16h}$	30dB $L_{Aeq,8h}$

In Annex G, it is suggested that a partially open window offers a sound insulation performance value of 15dB from an external free-field sound level.

2.3.4 Code of Practice on Environmental Noise Control at Concerts (1995)[9]

The Code of Practice on Environmental Noise Control at Concerts gives general guidance on concert definitions and terminology, noise guidelines and noise control procedures. The recommended noise limits relevant to this element of the development are summarised in Table 2-3 below.

Table 2-3: Code of Practice Guideline Noise Limits

Concert days per calendar year, per venue	Venue Category	Guidelines
1 to 3	Urban and Rural Venues (excluding stadia and arenas)	The MNL* should not exceed 65dB(A) over a 15-minute period
4 to 12	All Venues	The MNL should not exceed the background noise level** by more than 15dB(A) over a 15-minute period
Up to about 30	Indoor	The MNL should not exceed the background noise level** by more than 5dB(A) over a 15-minute period

*The Music Noise Level (MNL) value is the L_{Aeq} due to music measured at 1m from the façade of a noise sensitive receptor.
**The background noise level is the arithmetic average of the hourly L_{A90} measured when no music is being played, at an equivalent time to the proposed event.

2.3.5 Consultation

Consultation was undertaken with the WSC Environmental Health Officer via email[10] and telephone[11] to agree on the methodologies for determination of the existing noise environment and the noise assessment.

A summary of the agreed approach and scope of the assessment is as follows:

Short-term attended and long-term unattended measurement positions were agreed prior to attending site, with acknowledgement that flexibility on measurement positions was needed due to the nature of the survey. (In this case, the position of the long-term unattended measurement was changed to better represent the closest noise sensitive receptors.)

Due to the lack of available information at this stage, it is not possible to predict the noise emissions from fixed plant associated with the proposed development. Hence, it was agreed that noise limits based on the measured background noise levels (L_{A90}) would be presented and noise impacts from fixed plant could be controlled by a further planning condition.

[9] Noise Council, 'Code of Practice on Environmental Noise Control at Concerts (1995)
[10] Email conversation between Royal HaskoningDHV and WSC EHO, dated 7th May 2024.
[11] Telephone conversation between Royal HaskoningDHV and WSC EHO, dated 28th May 2024.

Royal HaskoningDHV

3 Baseline Environmental Noise Survey

3.1 Methodology and Procedure

To establish the baseline conditions, long-term unattended and short-term attended noise measurements were conducted at two locations on the 9th to 14th May 2024. The site location and measurement positions are shown in **Figure 1** of **Appendix B**.

The following were observed to be the dominant noise sources at the proposed development site:

- Road traffic on Haverhill Road (A143); and
- Aircraft movements associated with Cambridge City Airport and London Stansted Airport.

The measurement locations are detailed in **Table 3-1**.

Table 3-1: Baseline noise survey locations

Measurement ID	Location Co-ordinates	Description
LT1	52.091841, 0.451489	Unattended measurement on the northern border of the site, overlooking Zone A16 and with direct line of sight to Haverhill Road and English Way.
ST1	52.091442, 0.452917	Attended measurement to the southeast of the site, overlooking English Way.

The noise measurements were undertaken using the instrumentation detailed in Error! Reference source not found..

Table 3-2: Noise survey instrumentation

Instrument	Measurement ID	Type	Serial number
Sound Level Meter (SLM)	LT1	Rion NL-52	00864983
Sound Level Meter	ST1	Rion NL-52	00864982
Calibrator	All	Rion NC-75	35081041

The SLMs were fully calibrated, traceable to UKAS standards and satisfy the requirements for a 'Class 1' Sound Level Meter (SLM) as defined in BS EN 61672-1:2013 – *Electroacoustics – Sound level Meters Part 1: Specifications*[12].

The SLMs were set to record L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} data with a 'fast' time constant in contiguous 15-minute intervals. Equivalent average sound pressure levels were also measured every 1s.

Each SLM microphone was mounted on a tripod at heights between 1.2m and 1.5m above ground level and at least 3.5m away from any reflecting surface other than the ground, i.e. in free-field conditions (as specified in BS 7445-2:1991 *'Description and measurement of environmental noise — Part 2: Guide to the acquisition of data pertinent to land use'*[13] and BS 4142).

[12] British Standards Institution (2013) BS EN 61672-1:2013 Electroacoustics - Sound level Meters Part 1: Specifications. BSI, London.
[13] British Standards Institution (1991) BS 7445-2: 1991 'Description and measurement of environmental noise — Part 2: Guide to the acquisition of data pertinent to land use'. BSI, London.

Royal HaskoningDHV

The instrument was calibrated before and after the survey using the portable calibrator with a maximum drift of 0.1dB noted.

A weather station (located at LT1) was programmed to log temperature, humidity, air pressure, average and gust wind speed and direction, and rainfall in 15-minute intervals. The weather station was positioned at approximately 1.5 m above ground level.

Additional measurement data from the baseline survey are available on request.

3.2 Weather Conditions

Good practice detailed in BS 4142 recommends that representative environmental noise measurements should be undertaken during favourable weather conditions, i.e. with windspeed <5 m/s and no precipitation. Therefore, data recorded during periods with precipitation or wind speeds in exceedance of 5 m/s were excluded from the analysis.

Weather conditions at the measurement locations were observed during the attended measurements, as well as during setup and collection of the unattended instrumentation. The weather was observed to be compliant with the requirements of BS 4142 during the attended measurements.

3.3 Measured Baseline Noise Data

Table 3-3 summarises the BS 4142 weather compliant data measured at location LT1. This measurement was undertaken from 19:45 PM on 9th May to 07:45 AM on 14th May 2024. Note that average levels for the combined day and night periods are weighted according to the number of useable data samples for each component period (e.g. to place less emphasis on component periods where some data has been removed due to poor weather).

Table 3-3: Baseline Noise Summary – Measurement Location LT1

Start date (dd/mm/yy)	End date (dd/mm/yy)	Period	L_{Aeq} (dB)			$L_{AFmax,15min}$ (dB)			$L_{A90,15min}$ (dB)		
			Max	*Average[1]*	*Min*	*Max*	*Typical[2]*	*Min*	*Max*	*Average[3]*	*Min*
09/05/24	09/05/24	Day	47	40	33	64	53	42	38	33	30
	10/05/24	Night	52	42	30	82	60	35	43	33	25
10/05/24		Day	52	44	34	81	75	43	42	35	30
	11/05/24	Night	47	41	27	68	59	40	42	30	23
11/05/24		Day	56	47	34	87	81	45	38	35	30
	12/05/24	Night	50	41	31	74	59	41	41	32	28
12/05/24		Day	57	46	32	82	74	43	38	35	29
	13/05/24	Night	48	41	29	69	57	38	44	32	26

Start date (dd/mm/yy)	End date (dd/mm/yy)	Period	L_{Aeq} (dB)			$L_{AFmax,15min}$ (dB)			$L_{A90,15min}$ (dB)		
			Max	*Average*[1]	*Min*	*Max*	*Typical*[2]	*Min*	*Max*	*Average*[3]	*Min*
13/05/24		Day	45	42	34	69	63	44	42	37	31
	14/05/24	Night	52	42	31	69	61	38	42	32	27
Combined		**Day**	**57**	**45**	**32**	**87**	**73**[4]	**42**	**42**	**35**[4]	**29**
		Night	**52**	**41**	**27**	**82**	**59**[4]	**35**	**44**	**32**[4]	**23**

Note BS4142; Daytime period 07:00hrs to 23:00hrs, Night-time period 23:00hrs to 07:00hrs. Daytime data from 14/05/24 has been excluded as measurements ceased at 07:45hrs.
1 Logarithmic mean over period
2 4th highest $L_{AFmax,15min}$ over the relevant time period, which is a reasonable estimate of the 10th highest L_{AFmax}, when sampled at a resolution at which sequential sleep disturbances could occur i.e. 1 to 3 minutes
3 Arithmetic mean over period
4 Arithmetic mean of values for all relevant time periods.

During the attended survey period, the noise sources noted to be contributing to the baseline sound climate at ST1 were road traffic and aircraft. **Table 3-4** presents the 15-minute attended measurement results between 00:00 (midnight) and 00:30 AM, and 11:00 AM and 11:30 on 10th May 2024 (Friday) at location ST1.

Table 3-4: Baseline Noise Summary – Measurement Location ST1

Date (dd/mm/yy)	Start time (hh:mm)	End time (hh:mm)	$L_{Aeq,15mins}$ (dB)	L_{AFmax} (dB)	L_{A10} (dB)	L_{A90} (dB)
10/05/24	00:00	00:15	34	56	42	28
	00:15	00:30	34	46	43	28
	11:00	11:15	41	57	49	34
	11:15	11:30	37	50	44	32

Road traffic noise and overhead aircraft movements were observed to be the dominant source of high maximum noise levels at ST1 and LT1, with a typical maximum noise level (for each day/night period taken to be the 4th highest $L_{AFmax,15min}$) of 73dB L_{AFmax} during the daytime and 59dB L_{AFmax} during the night-time at LT1.

Statistical analysis of the baseline *background sound level* (L_{A90}) was undertaken following guidance detailed in BS 4142. As suggested in BS 4142, histograms of the measured $L_{A90,15min}$ levels during the day and night-time at LT1 are provided in **Figure 2** and **Figure 3** of **Appendix B**. These histograms have been used to identify representative *background sound level*s of 36dB L_{A90} during the daytime (07:00hrs to 23:00hrs) and 28dB L_{A90} during the night-time (23:00hrs to 07:00hrs).

The measurement results at LT1 have also been analysed to identify baseline sound levels over the time periods when the café/workspace and nursery are anticipated to be open (07:30 to 18:00 on a weekday). The average ambient sound level ranges between 44dB $L_{Aeq,15min}$ and 49dB $L_{Aeq,15min}$, with a typical level of 44dB $L_{Aeq,15min}$. The representative *background sound level* is taken to be 36dB L_{A90}. Maximum noise level events (L_{AFmax}) range from 42dB L_{AFmax} to 87dB L_{AFmax}.

4 Impact Assessment

4.1 Modelling

A 3-D model of the proposed development and surroundings was created in SoundPLAN noise modelling software. The 3-D model has been used to predict proposed development noise emissions, with calculations undertaken in accordance with ISO 9613-2:1996 '*Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation'*. The proposed residential properties in Zone A16 on the northeastern boundary of the site will be the closest to the proposed development. While the exact positioning of the closest property is unknown, sketch drawings suggest dwellings will be set back at least 5m from the site boundary. Noise levels have been predicted at this location, referred to as R1, at a height of 1.5m above ground level. The model assumes the receptors are simultaneously downwind of all noise sources which is worst-case. The 3-D model includes the screening, reflections and ground absorption that will be present once the proposed development is operational.

4.2 Proposed External Nursery Terrace Play Area

The proposed development includes a nursery and outdoor terrace play area at first floor level. The nursery terrace has a maximum capacity of 60 children and key times of use would be between 08:00hrs to 09:00hrs, 12:00hrs to 13:00hrs and 16:00hrs to 18:00hrs.

Noise data to represent the play area has been taken from published data included in the *Development of Noise Assessment Method for School Playground Noise* (2006)[14], which predicts a worst-case sound level of 71 dB $L_{Aeq,T}$ at the boundary of a playground.

The noise level from the proposed nursery terrace play area is predicted to be 39dB $L_{Aeq,T}$ at R1. As discussed in Section 2.3.2, 50dB L_{Aeq} is considered a LOAEL for daytime noise in gardens. The predicted level of 39dB $L_{Aeq,T}$ is below the LOAEL, demonstrating compliance with the aims of the NPSE.

4.3 Proposed Community Centre Deliveries

Deliveries to the proposed community centre are anticipated to be up to 2 deliveries (one HGV and one van) in a one hour period. This is likely to include stationary deliveries for the nursery/ workspace, catering supplies for the café and ad hoc deliveries.

The sound levels associated with deliveries by HGVs were established using third party measurement data[15] of a delivery for a food store. This data is considered to represent a worst-case scenario with noise levels being in excess of what is anticipated for the proposed community centre. **Table 4-1** presents this data in terms of sound exposure level (SEL) and maximum individual noise event levels (L_{AFmax}) at a nominal distance of 10m.

Table 4-1 Reference noise data for delivery activities (at 10m)

Noise Source	SEL (dB(A))	L_{AFmax} (dB)
Lorry arrival	69	61
Lorry reversing ("traditional" beepers) & manoeuvring into loading bay	65	58
Door open/close	60	68

[14] *Weixiong Wu, Inter-Noise and Noise-Con Congress and Conference Proceedings (2006) Development of Noise Assessment Method for School Playground Noise. Institute of Noise Control Engineering*
[15] *Noise Solutions Ltd (March 2021) 9442/NIA Refurbishment and Extension of Homebase Unit to Provide Two Retail Units.*

Cage and pallet movement	51	59
Engine starts and lorry departs	74	71

The delivery/refuse collection point is approximately 20m from the nearest noise sensitive receptor (R1). The data provided in **Table 4-1** was used to calculate the $L_{Aeq,1hr}$ at R1, assuming 2 deliveries (one HGV and one van) in a one hour period, between 08:00hrs and 18:00hrs (the opening hours of the café/workspace). The $L_{Aeq,1hr}$ has been determined using the following formula:

$L_{Aeq,T}$ = SEL + 10log(1/T)+ 10log(N)

Where:
SEL is the L_{Aeq} over a one second period, and represents the noise energy from an event compressed into one second;
T is the reference time period in seconds; and
N is the number of movements in the time period, T.

The predicted *specific sound level* from delivery noise is 36dB L_{Aeq}. This level is significantly below the average ambient sound level during the opening hours of the café (44dB L_{Aeq}); hence, any tonality or impulsivity is considered unlikely to be audible and no rating penalties have been applied.

Hence, the *rating level* of the specific sound is equal to the *background sound level*, which, according to BS 4142, is an indication of the specific sound source having a low impact. As discussed in Section 2.3.1, the LOAEL is taken to be a *rating level* which does not exceed the *background sound level*. The impact does not exceed the LOAEL, demonstrating compliance with the aims of the NPSE without the need for further mitigation.

Predicted maximum noise level events associated with deliveries range between 52dB L_{AFmax} to 65dB L_{AFmax}. This range sits within the typical range of maximum noise level events during the daytime; hence, maximum instantaneous noise from the deliveries is unlikely to disturb occupants of a residential property at R1.

4.4 Proposed Courtyards (Café and Pelly Square)

The proposed development includes two courtyard style areas, one adjacent to the sports hall (Pelly Square) and another adjacent to the café. The capacity of these areas is approximately 50 people per area and the proposed uses include occasional events such as kids clubs, local markets and spill out use from the sports hall.

The 3D model was used to predict the noise impact of the use of these spaces at R1. The total sound power level has been determined from the following formula taken from '*Prediction of Noise from Small to Medium Sized Crowds' M.J.Hayne et al Proceedings of ACOUSTICS 2011, November 2011*, which approximates the sound power level of a group based on a series of measurements of crowds:

L_{WAeq} = 15log(N)+64dB(A) where N is the number in the group.

Assuming the same occupancy in both areas, the predicted noise levels from the Pelly Square at R1 are at least 4dB above those from the café area as Pelly Square is significantly closer to R1 than the café area. While it is not anticipated that both spaces would be used simultaneously at full occupancy, the modelling has been based on a worst-case scenario in which both spaces are fully occupied. The predicted level at R1 is 44dB L_{Aeq} which is below the LOAEL of 50 dB L_{Aeq}. The current design includes a

Royal HaskoningDHV

barrier around Pelly Square, the top of which is 2.1m above the Pelly Square floor level; this barrier has been included in the calculations. The LOAEL has not been exceeded; hence, complies with the aims of the NPSE and the potential for further mitigation has not been considered.

4.5 Proposed Events – Music Noise Breakout

It is proposed the that the community centre will be able to host occasional community events such as parties, kids clubs and weddings, which commonly use amplified music. It is expected that events would end at around 23:00hrs on a Saturday. The baseline noise level survey indicates that *background sound levels* drop to around 32dB L_{A90} between 2100hrs and 23:00hrs. The noise level limit relating to these uses will depend on the frequency of the events.

The Code of Practice on Environmental Noise Control at Concerts (1995), as detailed under Section 2.3.4, recommends the MNL should not exceed the background noise level by more than 15dB(A) over a 15-minute period for outdoor events with a frequency of 4 to 12 times per annum. If the number of events associated to the proposed development is unlikely to exceed 12 per year, based on this guidance, an appropriate limit would be 47dB L_{Aeq}.

The guidance states that for more regular indoor events (up to around 30 per calendar year) finishing no later than 23:00hrs, noise levels should not exceed the background noise level by more than 5dB(A) over a 15-minute period. Hence, if more than 12 events per year are anticipated, the limit would be 37dB L_{Aeq}.

Based on experience of similar projects, typical internal noise levels for live music at a wedding or similar style event are around 90dB L_{Aeq}. Initial modelling calculations show that sound transmission through the glazing is likely to be the dominant contributor to music noise levels at R1. With very high-performance glazing (50dB R_w), music noise levels at R1 are predicted to be around 52dB L_{Aeq}. It is highly unlikely that the building fabric could be used to reduce music noise levels further at R1; hence, any further reduction is likely to require reduced music noise levels, typically achieved using a noise limiter. Assuming the final acoustic performance of the building fabric achieves the calculated noise level reduction, internal noise levels would need to not exceed 75dB L_{Aeq} if more than 12 events are proposed per annum but could be up to 85dB L_{Aeq} if this is not the case. Internal music noise levels of 85dB L_{Aeq} are considered reasonable for a venue, but a limit of 75dB L_{Aeq} is likely to be too quiet for the proposed usage.

As details of the operations and construction materials of the local centre become known, and the layout of the residential development in Zone A16 is finalised, further assessment of music noise can be conducted. These impacts can be controlled via a suitably worded condition.

4.6 Proposed Fixed Commercial Plant

As discussed in Section 2.3.4, at the time of writing this report, sufficient information on the proposed fixed plant associated with the development were not available, therefore noise emissions from external mechanical plant cannot be accurately predicted at the positions of nearby residential properties at this stage. The measured background noise levels have therefore been used to develop limits for plant noise emissions from the proposed development at the boundary of the site in accordance with the BS4142 assessment methodology. It is recommended that, in accordance with the requirements of the standard, the *rating level* of the noise from the commercial development does not exceed the *background sound level* at residential properties. The derived noise limits are 36dB $L_{Ar,Tr}$ during the daytime and 28dB $L_{Ar,Tr}$ at night.

As discussed under Section 4.1, the exact positioning of the nearest noise sensitive receptor is unknown, therefore R1 represents the closest noise sensitive receptor based on available sketch drawings.

It was agreed with the WSC Environmental Health that these impacts could be controlled via a suitably worded condition in the absence of details. The selection and design of external mechanical plant will be reviewed as project information becomes available to ensure that the BS 4142 noise limits are achieved.

5 Summary and Conclusions

A noise assessment has been undertaken to assess the potential noise impacts of the proposed development at Zone D1, Great Wilsey, Haverhill on surrounding noise sensitive receptors. The closest noise sensitive receptor is the proposed residential development known as Zone A16.

A baseline survey was undertaken in May 2024 to establish the existing noise levels at the nearest noise sensitive receptor.

Separate assessments were undertaken of noise from the following aspects of the proposed development:

- Nursery terrace play area – children playing
- Deliveries – HGVs and goods movement
- Courtyards – people talking
- Events – live music
- Fixed plant

Calculations and 3-D noise modelling were used, where possible, to predict noise levels from the different noise sources associated with the proposed development at the nearest noise sensitive receptor. The predicted noise levels were compared with the measured noise levels and fixed limits as appropriate, in accordance with guidance relevant to the identified noise source.

The proposed measurement and assessment method was discussed and agreed with the Local Authority EHO.

The assessments indicate that, with mitigation as required, which would include suitably worded conditions of planning consent, the noise impact from each of the identified sources can be controlled to be compliant with relevant planning policy. Hence, there is no noise-related reason for refusal of the planning application for the proposed development.

Royal HaskoningDHV

Appendix A

Noise and Vibration Terminology

This Appendix provides a layperson's explanation of the acoustics terms that commonly appear in reports. It is not intended to give full scientific definitions or explain why these terms are as they are. Some obsolete terms and abbreviations have been included as they still appear in documents from time to time.

Table A-1 Common acoustic terms

Term	Description
Sound	the physical phenomenon of the transmission of energy through gaseous or liquid media via rapid fluctuations in pressure.
Level	values measured in decibels
Loudness	the human perception of the level of sound
Noise	no strict definition and is often used interchangeably with sound however it is usually taken to mean unwanted sound
Index	a value based on the mathematical processing of raw data
Indicator	a value used to indicate the likelihood of a particular response of effect e.g. $L_{10,18hr}$ is an index based on statistical processing of sound pressure data that is used as an indicator for road traffic noise response.
Weighted	spectral values have been modified to reflect a frequency sensitivity.
Directivity	the amount by which a source radiates more sound in one direction than another.
Decibels dB	a logarithmic ratio of two values of a variable. The decibel is not a true measurement unit nor is it exclusive to acoustics. Decibels are used because they can represent very wide ranges of ratios (from trillionths and billionths to billions and trillions) with a small range of decibel values. Decibels can be used to represent measured values by using a known reference value in the ratio. When using decibels to measure something it is therefore important to specify what variable is being measured and what reference level has been used. This is done by adding a reference value statement in the form "dB re x units", where the units indicate the variable being measured and x is the reference value. Decibels are used in acoustics because the human ear responds to sound pressure in a logarithmic way and the quantities measured in acoustics vary over wide ranges. As the decibel is used in acoustics to represent a range of sound level parameters, there is a standardised notation system. This takes the form of an italic capital letter 'L' (referring to 'level') and subscript characters which give specific details of what is being represented. Because decibels are logarithmic, they must be added, subtracted, multiplied, divided and averaged using different techniques from normal numbers.
Sound Pressure Level L_p obsolete – SPL	the basic measure of how much sound there is at a given location. It is a measure of the size of the pressure fluctuations in the air that we perceive as sound. Sound Pressure Level is expressed in decibels with a reference level of $20x10^{-6}$ Pa (L_p in dB re 20 µPa)

Term	Description
Sound Power Level L_W obsolete – SWL	is the total amount of sound produced by a source. It cannot be measured directly but it can be calculated from Sound Pressure Level measurements in known conditions. It can be used to predict the Sound Pressure Level at any point. Sound Power Level is expressed in decibels with a reference level of $1x10^{-12}$ W (L_W in dB re 1 pW).
A-weighting L_A or L_{pA}, L_{WA}, similar – C-weighting L_C or L_{pC}, L_{WC}	is an electronic filter which is equal to the frequency sensitivity of the human ear. Our sensitivity is at a maximum at around 2 kHz and steadily decreases above and below. Below 20 Hz and above about 20 kHz we can't hear at all. Within its operating limits a precision measurement microphone measures all frequencies the same so the output it produces does not reflect what we would hear. When considering impacts on humans, it is therefore often necessary to apply an A-weighting to the measured sound frequency spectrum. When A-weighted, the Sound Pressure Level L_p becomes L_{pA} (or L_A) and the Sound Power Level L_W becomes L_{WA}. The response of the human ear varies depending on how loud the sound is. A-weighting matches the response of a sound level meter to human hearing at low levels (~ 40-90dB). For higher levels there are other weightings, the most common of which is the C-weighting.
Near and far-fields	are the regions of the radiation field of a sound source. In the near field, the sound pressure and acoustic particle velocity are not in phase and there is no simple relationship between sound pressure level and distance from the source. The near field is limited to a distance from the source of around a wavelength of sound or three times the largest dimension of the sound source (whichever is the larger). The far field is the region of the sound field in which sound pressure level decreases predictably with distance. For a point source, the sound pressure level decreases by 6dB for each doubling of distance. It extends from the near field to infinity.

Table A-2 Different types of decibels commonly used in acoustics

Term	Description
L_p L_{pA} (or L_A) L_{AF}, L_{AS}	*The instantaneous sound pressure level* (L_p) *The A-weighted instantaneous sound pressure level* (L_{pA} or L_A) This is the root mean square size of the pressure fluctuations in the air. This level can fluctuate wildly even for seemingly steady sounds. To make sound level meters easier to read the values on the display are smoothed or damped out. This is effectively done by taking a rolling average of the previous 0.125 s (FAST time constant) or the previous 1 s (SLOW time constant). The letters F or S are added to the subscripts in the notation to indicate when the FAST or SLOW time constant has been used. These are often omitted but it is good practice to include them.
L_{max} L_{Amax} L_{AFmax}	*The maximum instantaneous sound pressure level* (L_{max}), *The A-weighted maximum instantaneous sound pressure level* (L_{Amax}) *The A-weighted maximum instantaneous sound pressure level with a FAST time constant* (L_{AFmax}). This is the highest instantaneous sound pressure level reached during a measurement period.

Term	Description
L_{min} , L_{Fmin}	The opposite of the L_{max} is the *minimum instantaneous sound pressure level* or L_{min} etc. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{N,T}$ $L_{AN,T}$ $L_{AFN,T}$ $_N$ = %age value, 0-100 $_T$ = measurement time e.g. L_{A90}, L_{A10}, $L_{AF90, 5 min}$	*The percentage exceedance sound pressure level ($L_{N,T}$),* *The A-weighted percentage exceedance sound pressure level ($L_{AN,T}$), the A-weighted percentage exceedance sound pressure level with a FAST time constant ($L_{AFN,T}$).* This is the sound pressure level exceeded for *N*% of the time *T*. e.g. If an A-weighted level of xdB is exceeded for a total of 6 minutes within one hour, the level will have been above xdB for 10% of the measurement period. This is written as $L_{A10,1hr}$ = xdB. L_{A0} (the level exceeded for 0 % of the time) is equivalent to the L_{Amax} and L_{A100} (the level exceeded for 100 % of the time) is equivalent to the L_{Amin}. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{eq,T}$ $L_{Aeq,T}$ $_T$ = measurement time e.g. $L_{Aeq,5min}$	The *equivalent continuous sound pressure level over period T ($L_{eq,T}$),* *The A-weighted equivalent continuous sound pressure level over period T ($L_{Aeq,T}$).* This is effectively the average sound pressure level over a given period. As the decibel is a logarithmic quantity the L_{eq} is not a simple arithmetic mean value. The L_{eq} is calculated from the raw sound pressure data. It is not appropriate to include a reference to the FAST and SLOW time constants in the notation

Appendix B

Figure 1 Location of Proposed Development and Measurement Positions

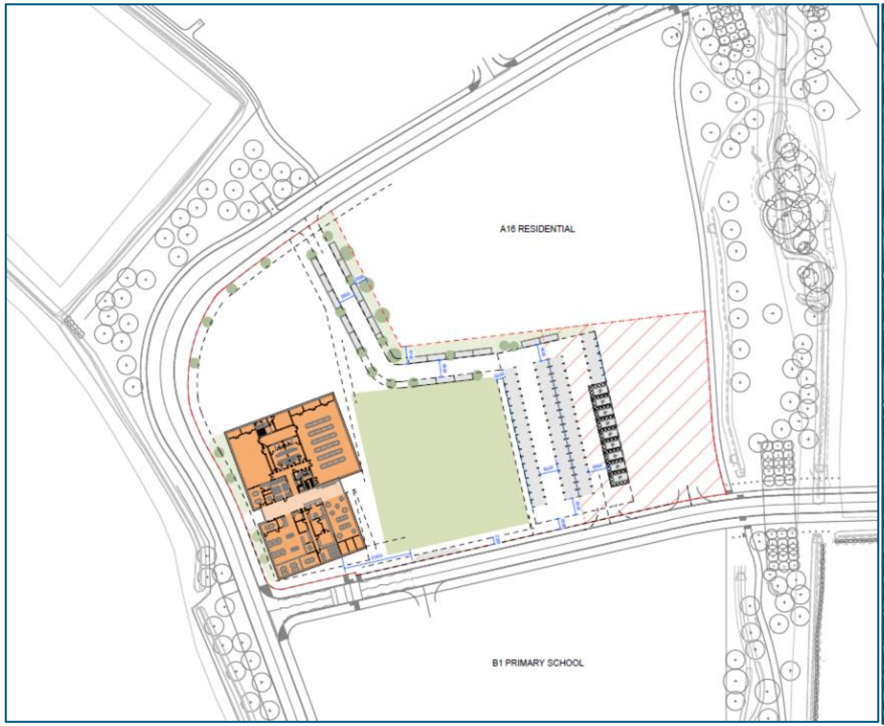

Figure 2 LT1 Daytime L_{A90} Analysis

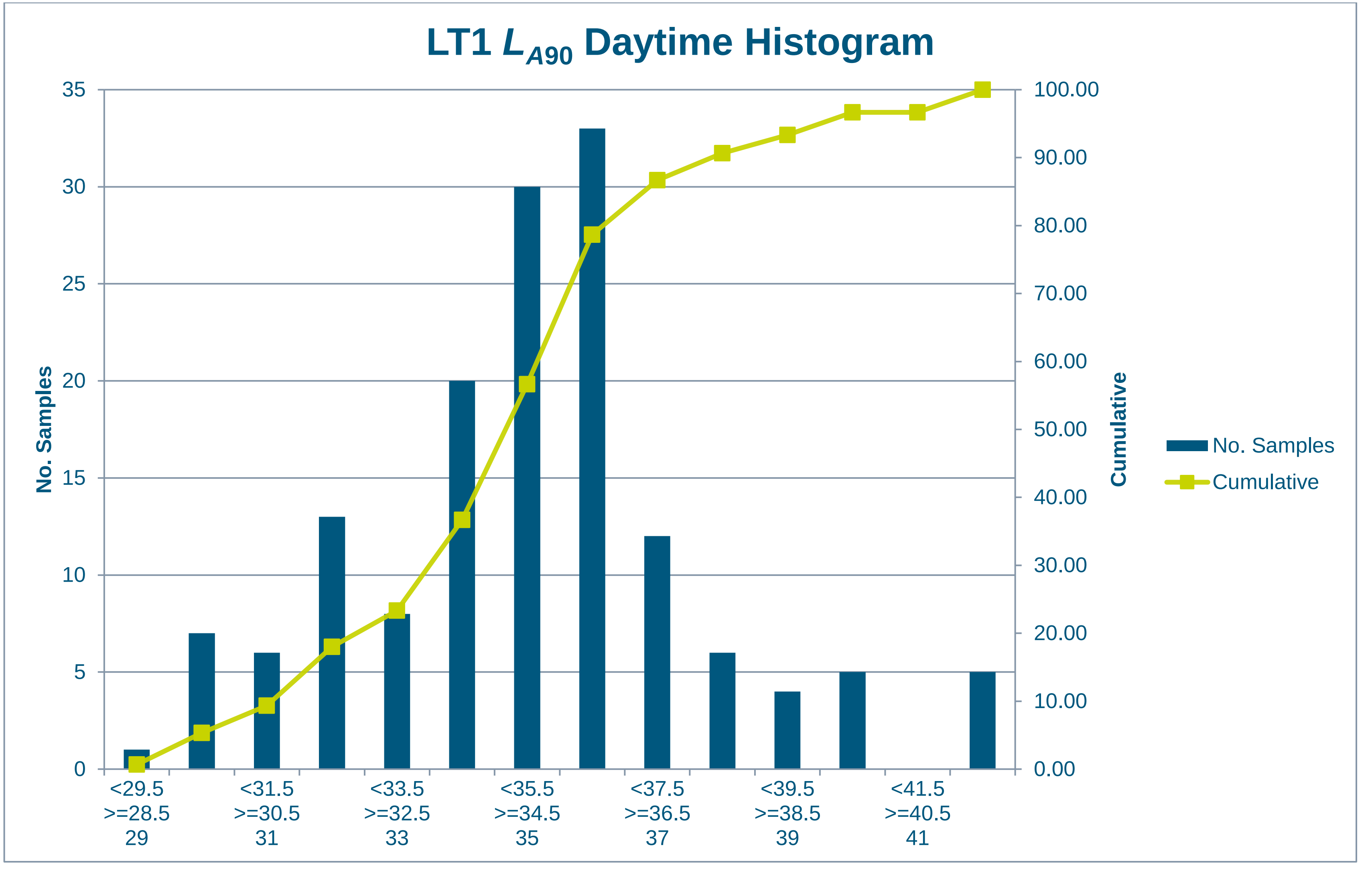

Figure 3 LT1 Night-time L_{A90} Analysis