Kirklees Council

HECKMONDWIKE BUS HUB SCHEME

Environmental Noise Assessment

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JULY 2022

PUBLIC

Kirklees Council

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Environmental Noise Assessment

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1 INTRODUCTION

1.1.1 WSP UK Ltd have been appointed by Kirklees Council (KC) to carry out an environmental noise assessment for the proposed Heckmondwike Bus Station (hereafter referred to as the Proposed Scheme), proposed to redevelop the existing Heckmondwike Bus Hub. This assessment has been undertaken as part of the planning application for the Proposed Scheme and considers the suitability of the proposals in terms of the potential operational noise impacts which may be experienced at the nearest existing noise sensitive receptors.

1.1.2 In order to inform the assessment, an environmental baseline noise survey has been conducted to establish the prevailing acoustic environment representative of the nearest sensitive receptors to the Proposed Scheme. The results of the environmental noise survey have been used to determine appropriate plant noise level limits for the fixed mechanical plant in accordance with British Standard 4142:2014 + A1:2019: *Methods for rating and assessing industrial and commercial sound* (BS 4142).

1.1.3 The predicted noise levels at the closest existing noise sensitive receptors as a result of on-site bus movements associated with the Proposed Scheme have also been considered. Recommendations for mitigation are provided where appropriate.

1.1.4 The report is necessarily technical in nature and therefore a glossary of terms is presented in **Appendix A**.

2 DESCRIPTION OF THE PROPOSED SCHEME AND CLOSEST NOISE SENSITIVE RECEPTORS

2.1 SITE LOCATION AND EXISTING OPERATIONS

2.1.1 The Proposed Scheme is situated to the north of the A368 Westgate in Heckmondwike, West Yorkshire. The existing Heckmondwike Bus Hub includes 4 No. bus shelters with seating, spread along the inside of the circular access route, with 2 No. on the eastern side and 2 No. on the western side.

2.1.2 The site is bound by South George Street to the north-west, beyond which lies the service yard for the commercial premises located on Northgate including a Lidl supermarket, the Williams Automotive Engineering unit and dwellings on George Street. To the east, the site is bound by Royle Fold, beyond which lies further commercial premises, a Bupa Dental Care Practice and dwellings on Cemetery Road. Beyond Westgate to the south of the site there are premises with ground floor commercial uses and potential first floor dwellings. The B6117 Northgate is to the south-west, beyond which lies Green Park. The site setting and planning application boundary are presented in Figure 1 below.

Figure 1 - Development site boundary (in red outline) in context of its surroundings

2.2 DEVELOPMENT PROPOSALS

2.2.1 The Proposed Scheme comprises a new bus station to provide increased capacity for bus services, improved interchange opportunities and an improved waiting environment.

The Proposed Scheme includes the following:

- A new covered concourse with new bus stands.
- Five new Drive-in-Reverse-Out (DIRO) bus stands, one Drive-in-Drive-Out (DIDO) layover stand and one layover resting bus bay located off the carriageway on a new hard landscaped bus apron, replacing the existing 4 No. bus layover bays.
- A proposed building that will provide a fully enclosed waiting area with an accessible WC and Changing Places facility. This will also provide enclosed staff office space, rest areas, and plant rooms.

2.2.2 Bus movements associated with the existing bus hub typically run between 05:00 and 23:00 hours. The Proposed Scheme will increase capacity by increasing the number of bus services, but without extending the operating hours. A summary of the weekday bus timetable for the Proposed Scheme is set out in **Table 2-1** below.

Table 2-1 - Bus Timetable Movements

Day	Time	Existing Bus Movements	Proposed Bus Movements
Monday to Friday	07:00 to 23:00 hours	Up to 27 per hour	Up to 52 per hour
	05:00 to 07:00 hours	Up to 25 per hour	Up to 49 per hour
	Total per day	367	719
Saturday	07:00 to 23:00 hours	Up to 27 per hour	Up to 52 per hour
	05:00 to 07:00 hours	Up to 7 per hour	Up to 28 per hour
	Total per day	175	700
Sunday	07:00 to 23:00 hours	Up to 3 per hour	Up to 52 per hour
	05:00 to 07:00 hours	Up to 6 per hour	Up to 14 per hour
	Total per day	142	671

2.2.3 The Proposed Scheme layout prepared SGP Architects (drawing number 20233 – SGP – HEK-ZZ-DR-A- 021001 dated 21 June 2022 Revision 7) is included in **Appendix B**.

2.3 NOISE SENSITIVE RECEPTORS

2.3.1 The nearest existing residential properties to the Proposed Scheme are the dwellings on George Street to the north of the Site, the dwellings on Cemetery Road to the east and the first floor dwellings on Westgate to the south of the Site. The locations of these receptors are shown in the context of the planning application boundary in **Figure 1**.

2.3.2 The residential dwellings on Cemetery Road are screened from the Proposed Scheme by the commercial premises on the Royle Fold. The noise assessment has therefore focussed on the nearest noise sensitive receptors with a potential direct line of sight of the Proposed Scheme.

3 LEGISLATIVE FRAMEWORK, POLICY AND GUIDANCE

3.1 OVERVIEW

3.1.1 The noise assessment considers the potential impacts on the existing residential properties due to the Proposed Scheme. There is no specific all-encompassing guidance relating to the standards associated with these noise emissions/noise impacts. The noise assessment therefore draws upon the following national planning policies, British Standards and guidance documents:

- National Planning Policy Framework 2021 (NPPF);
- Noise Policy Statement for England, 2010 (NPSE);
- Planning Practice Guidance 2019 (PPG);
- British Standard 4142:2014 + A1:2019: Methods for rating and assessing industrial and commercial sound (BS 4142);
- British Standard 8233:2014: Guidance on sound insulation and noise reduction for buildings (BS 8233);
- World Health Organisation (WHO):1999: Guidelines for community noise; and
- Kirklees Council Noise Design Advice Note 2007.

3.2 PLANNING POLICY

NATIONAL PLANNING POLICY FRAMEWORK

3.2.1 The most recent version of the NPPF document was published in July 2021, which sets out the Government's planning policies for England. Whilst the reference to noise within the NPPF is minimal, there are references to noise in section 15 entitled Conserving and enhancing the natural environment.

3.2.2 Relevant to noise and the development proposals, the document states:

> *"185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life[65];*
>
> *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; …*
>
> *[65] See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."*

NOISE POLICY STATEMENT FOR ENGLAND

3.2.3 The Noise Policy Statement for England (NPSE) was published on 15 March 2010. It sets out the long-term vision for government noise policy, to promote good health and a good quality of life through the management of noise.

3.2.4 The policy ensures that noise issues are considered at the right time during the development of policy and decision making, and not in isolation. It highlights the underlying principles on noise management already found in existing legislation and guidance. Then NPSE should apply to all forms of noise, including environmental noise.

3.2.5 It sets out the long-term vision of Government noise policy as follows:

> *"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."*

3.2.6 This long-term vision is supported by the following aims:

> "*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
>
> - *Avoid significant adverse impacts on health and quality of life;*
> - *Mitigate and minimise adverse impacts on health and quality of life; and*
> - *Where possible, contribute to the improvement of health and quality of life."*

3.2.7 To assist in the understanding of the terms "significant adverse" and "adverse", the NPSE acknowledges that two concepts have been applied to noise impacts, for example, by the World Health Organisation. They are:

- NOEL – No Observed Effect Level: This is level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected.

3.2.8 The NPSE introduces a third concept:

- SOAEL – Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur.

3.2.9 However, the NPSE goes on to state that:

> *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

PLANNING PRACTICE GUIDANCE (PPG)

3.2.10 Last updated on 9 May 2019, this web-based resource was issued for use by the Department for Communities and Local Government (DCLG). The purpose of this guidance is to complement the NPPF and provide advice on how to deliver its policies.

3.2.11 The PPG section on noise includes a table that summarises "…*the noise exposure hierarchy, based on the likely average response*". This table offers 'Examples of Outcomes' relevant to the NOEL, LOAEL and SOAEL effect levels described in the NPSE. The guidance offers no numerical definition of the NOEL, LOAEL and SOAEL, or detailed advice regarding methodologies for their determination. The noise exposure hierarchy table is duplicated below in **Table 3-2**.

Table 3-2 – Noise Exposure Hierarchy Based on the Likely Average Response

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

3.3 GUIDANCE

BRITISH STANDARD 4142:2014 + A1:2019: METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

3.3.1 BS 4142 describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

3.3.2 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

3.3.3 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{Ar,Tr}$). The standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.

3.3.4 The standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source(s) in question operate(s) or is/are proposed to operate in the future.

3.3.5 Comparing the rating level with the background sound level, BS 4142 states:

- *"Typically, the greater this difference, the greater the magnitude of impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

3.3.6 The standard states that its assessment methodology is applicable to the assessment of industrial and/or commercial sound at proposed new dwellings. However, the guidance also states:

> *"NOTE Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation."*

BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

3.3.7 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels on occupants of an existing building.

3.3.8 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings exposed to steady external noise sources. It is stated that it is desirable that internal ambient noise levels do not exceed the following criteria set out in **Table 3-3**.

Table 3-3 – Summary of internal ambient noise levels to be achieved in habitable rooms when assessed in accordance with BS 8233

Activity	Location	Day (07:00 to 23:00)	Night (23:00 – 07:00)
Resting	Living room	35 dB $L_{Aeq,\ 16\ Hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,\ 16\ Hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,\ 16\ Hour}$	30 dB $L_{Aeq,\ 8\ Hour}$

3.3.9 Whilst BS 8233 recognises that a guideline value may also be set in terms of SEL or L_{AFmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Therefore, reference has also been made in this assessment to the World Health Organisation (WHO) 1999: Guidelines for Community Noise (see below).

3.3.10 With respect to external amenity spaces such as gardens and patios BS 8233 states that it is desirable that the noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres or urban areas, and locations adjoining the strategic network, where it may be necessary to compromise between elevated noise levels and other factors such as the convenience of living there, and efficient use of land resources.

WHO GUIDELINES FOR COMMUNITY NOISE 1999

3.3.11 The internal ambient L_{Aeq} noise level criteria in BS 8233 are concordant with the guidance contained within the WHO 1999: Guidelines for Community Noise. The WHO guidelines also provide guidance on suitable L_{Amax} noise levels during the night-time period. Specifically, it is stated that:

> *"Indoor guideline values for bedrooms are 30 dB L_{Aeq} for continuous noise and 45 dB L_{Amax} for single sound events."*

3.3.12 The L_{AFmax} criteria detailed within this document draws upon guidance from Vallet and Vemet, which states:

> *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night".*

CALCULATION OF ROAD TRAFFIC NOISE (CRTN)

Published by the then Department of Transport and the Welsh Office in 1988, this document sets out standard procedures for calculating noise levels from road traffic. The calculation methods use a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles, type of road surface, site geometry and the presence of noise barriers or acoustically absorbent ground. CRTN predicts the $L_{A10,18\ hour}$ or $L_{A10,1\ hour}$ noise level for any receptor point at a given distance from the road. At distances beyond 300m from the road there may be reduced accuracy in predicting absolute noise levels.

KIRKLEES COUNCIL NOISE DESIGN ADVICE 2007

KC outlines relevant assessment criteria for various scenarios in their 'Noise Design Advice' document. The scenario relevant to this assessment, i.e. new industrial or commercial use near to residential use, is outlined below:

> *"Developers should carry out an assessment in accordance with BS4142 to determine the rating level of the new development. It is recommended that during normal daytime hours (0700 to 2300 hours), the BS4142 rating level, measured over 1 hour, should be 5dB below the background (L_{A90}). During the night-time period (2300 to 0700 hours), the BS4142 rating level, measured over 5 minutes should be 5dB below the background (L_{A90}).*
>
> *The assessment should be carried out at the site boundary or at the nearest noise sensitive premises, depending on the circumstances. These noise levels are intended to ensure that existing noise sensitive premises and land which may be used for noise sensitive development in future does not become blighted by noise.*
>
> *To aid regeneration, in certain circumstances, a higher rating level may be accepted provided the need is justified.*
>
> *In addition, the levels specified in Appendix 1 should not be exceeded. These should be calculated assuming windows in noise sensitive premises are open for ventilation (see Appendix 1).*
>
> *Justification for advice*
>
> *PPG24 states that local planning authorities must ensure that development does not cause an unacceptable degree of disturbance, while at the same time not placing unreasonable restrictions on development and to allow for the creation of jobs and the construction and improvement of essential infrastructure. It accepts that development of this nature will generate noise. PPG24 also refers to the use of BS4142:1997 (where appropriate) to consider noise from industrial and commercial developments. This standard assesses the likelihood of complaints in relation to noise. PPG24 also states that acceptable internal noise levels are given in BS 8233. Levels in BS 8233 are used in this guidance."*

In summary, it requires that the new industrial or commercial developments shall be designed to achieve a noise level of 5dB(A) below the existing background sound level when measured at the nearest noise sensitive receptor.

The guidance in the Design Note requires that the rating level is based on a period of 1-hour during the daytime (07:00 to 23:00) and 5 minutes during the night-time (23:00 to 07:00) which is taken

directly from BS 4142:1997. It is noted that the BS 4142 document has been updated since 1997, with the latest issue BS 4142:2014+A1:2019 suggesting the rating level should be evaluated based on 1-hour periods during the day and 15 minute periods during the night (see Section 0). For the purpose of this assessment, the rating level has been evaluated against the assessment periods set out in BS 4142:2014+A1:2019.

The guidance in the Design Note does not state the period over which the L_{A90} shall be determined, and similarly BS4142:2014+A1:2019 advises that "*the measurement time interval is sufficient to obtain a representative value of the background noise level*".

Where the BS4142 methodology cannot be applied; noise levels presented in Appendix 1 of KC's Noise Design Advice document shall be used as the noise limit. These noise levels are based on BS 8233:1999 *Guidance on Sound Insulation and noise reduction for buildings*. This guidance has since been updated, as summarised in Section 0 and Table 3-3, although the noise criteria remain unchanged from those proposed above.

3.4 CONSULTATION WITH KC

In October 2021, consultation was undertaken with the Environmental Health Department of KC. This consultation was undertaken to agree the scope and duration of the baseline noise survey.

The dealing Environmental Health Officer confirmed their agreement with the proposed scope of the baseline noise survey and that it would be expected that a noise assessment be submitted as part of the planning application for the Proposed Scheme. This should comprise a noise survey which is representative of typical daytime and/or night-time noise levels and how the proposals may impact upon the nearest noise sensitive receivers.

4 ENVIRONMENTAL NOISE SURVEY

4.1 OVERVIEW

4.1.1 A baseline noise survey has been undertaken to quantify the prevailing daytime and night-time noise levels representative of the nearest sensitive receptors, i.e. the dwellings on George Street, Cemetery Road and first floor dwellings on Westgate. The survey comprised attended measurements carried out between 05:00 and 07:40 on 19 October 2021 and between 14:00 and 17:00 on 29 November 2021. Measurements were 15 minutes in length and a minimum of 8 were made at each position.

4.2 MEASUREMENT LOCATIONS AND SOUNDSCAPE PERIOD

4.2.1 The measurement locations are as follows and presented within **Figure 2**:

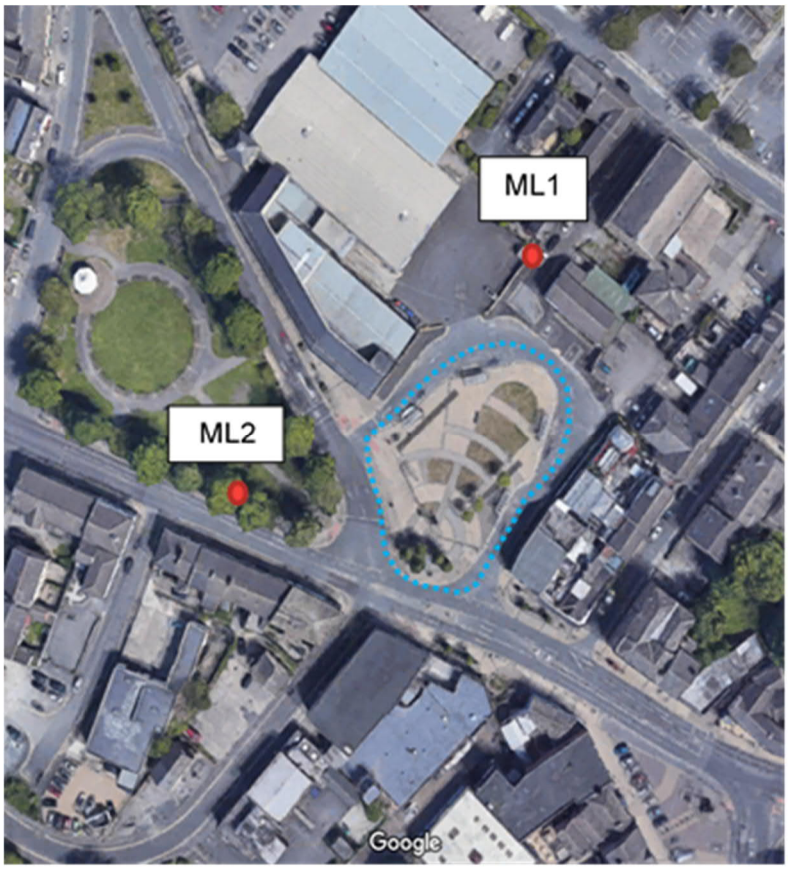
- **Measurement Location 1 (ML1):** Situated at the southern end of George Street overlooking the existing bus hub and vehicle repair shop. This position is representative of the prevailing noise levels at the dwellings on George Street and Cemetery Road.
- **Measurement Location 2 (ML2):** Situated in Green Park approximately 4 metres from the edge of the A638. This position is representative of the prevailing noise levels at dwellings on Westgate.

4.2.2 At both measurement locations the microphone was positioned at a height of 1.3m above local ground levels and in free-field condition.

4.2.3 Observations were made on the noise climate at each position:

- At ML1, the noise climate was dominated by road noise from the A638, with the addition of frequent bus movements around the existing bus hub. Although the measurement was directly opposite a vehicle repair shop, no noise was audible from this site throughout the measurement period despite the premises being open. Although observed to be operational, external plant outside the Lidl supermarket was not audible at the measurement position even during lulls in the road traffic.
- At ML2, the noise climate was dominated exclusively by road noise from the A638 (Westgate). The number of vehicles on the road steadily built from 05:00 onwards, although the traffic was frequently queuing due to the lights at the junction.

Figure 2 – Attended measurement locations



4.3 METEOROLOGICAL CONDITIONS

4.3.1 Over the measurement period of the 19 October 2021 the weather was cold and dry, with little to no wind measurable on-site. The measurements were stopped at 07:40 due to rain.

4.3.2 The weather over measurement period on the 29 November 2021 was cold and dry, although snow had fallen the day before (road clear but snow still on ground). Wind speeds were generally below 1m/s.

4.4 NOISE MONITORING EQUIPMENT AND PERSONNEL

4.4.1 Type 1 sound level meters were used to carry out the measurements on both occasions, as presented in **Table 4-1**.

Table 4-1 - Survey Equipment Details

Survey Date	Equipment description	Manufacturer & Type No.	Serial No.	Calibration Due Date
19 October 2021	Sound level meter	01 dB CUBE	10621	12 May 2023
	Pre-amplifier	Acoem PRE 22	10635	

Survey Date	Equipment description	Manufacturer & Type No.	Serial No.	Calibration Due Date
	Microphone	GRAS Type 40CD	207269	
	Calibrator	01dB-Metravib Cal 21	35293349	11 May 2022
29 November 2021	Sound level meter	01dB-Metravib Fusion	10797	20 October 2023
	Pre-amplifier	01dB PRE22	10870	
	Microphone	GRAS Type 40CD	207593	
	Calibrator	01dB-Stell Cal 21	34254631	10 August 2022

4.4.2 The monitoring was undertaken by Chris Clayden (WSP) who is an associate member of the Institute of Acoustics (AMIOA) and holds an IOA diploma in environmental noise measurement.

4.5 BASELINE MEASUREMENT RESULTS

4.5.1 A summary of the results is presented in **Table 4-2**. Full details of the measured noise levels during each 15-minute period are provided in **Appendix C**.

Table 4-2 – Summary of the Measured Noise Levels at ML1 and ML2, dB Free-Field

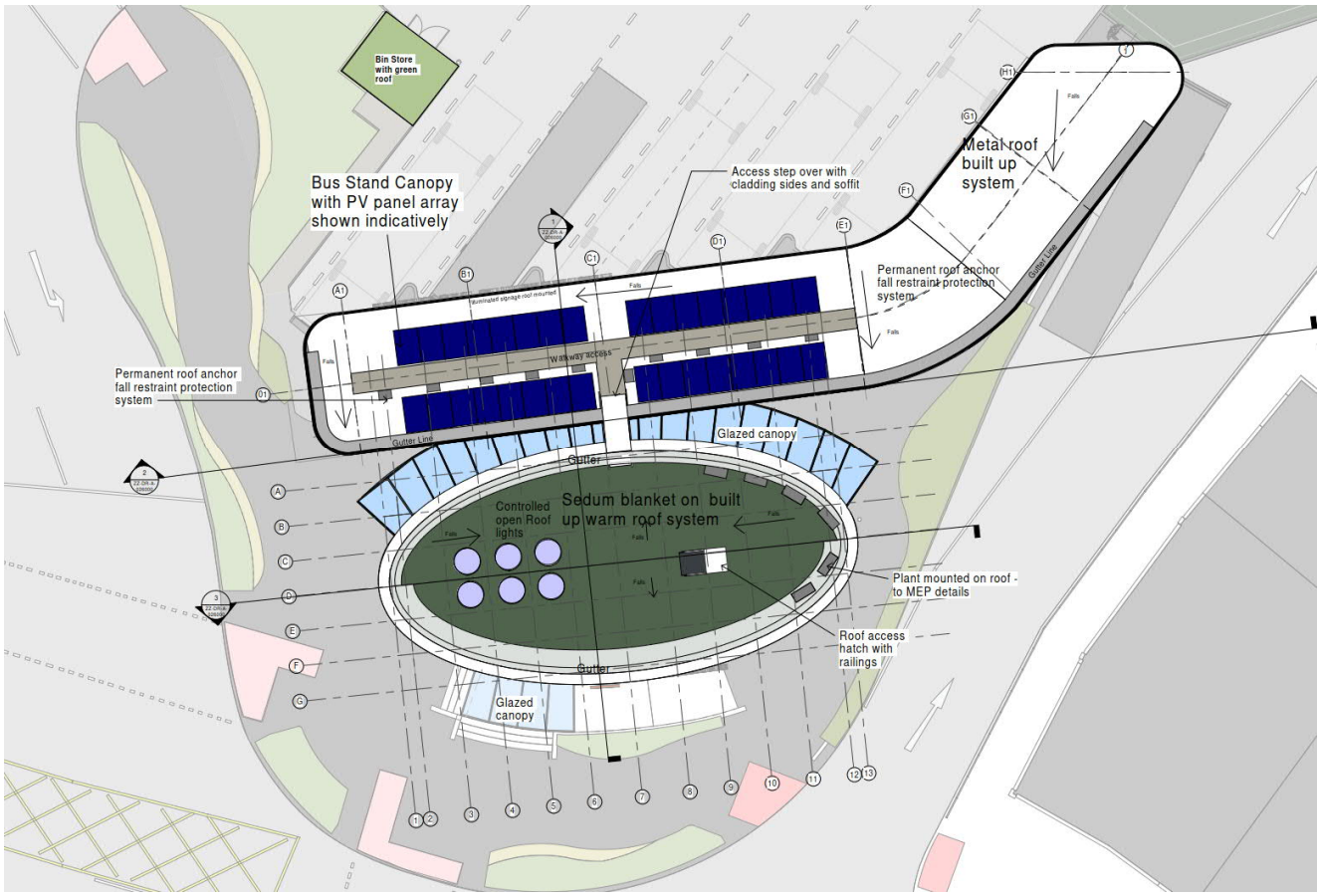
Measurement Location	Period	$L_{Aeq, 15\ mins}$	Range of L_{AMax}	Range of $L_{A90, 15\ mins}$	Range of $L_{A10, 5\ mins}$
ML1	Night-time (23:00 to 07:00)	58.1	64.6 – 82.2	41.3 – 48.9	56.3 – 61.0
	Daytime (07:00 to 23:00)	57.8	68.3 – 81.3	52.6 – 54.6	58.7 – 61.8
ML2	Night-time (23:00 to 07:00)	67.7	76.3 – 91.1	50.0 – 54.9	68.9 – 72.4
	Daytime (07:00 to 23:00)	68.6	78.7 – 89.9	59.1 – 60.2	71.0 – 73.2

5 NOISE ASSESSMENT

5.1 EXTERNAL FIXED AND MECHANICAL PLANT

5.1.1 The locations of plant associated with the Proposed Scheme are shown in **Figure 3**. All plant is assumed to operate 24 hours a day, seven days a week.

Figure 3 – Location of proposed noise-generating plant associated with the Proposed Scheme



5.1.2 Manufacturer plant noise data have been provided by the Project Team, to allow operational sound levels to be predicted at the nearest noise sensitive receptors. **Table 5-1** sets out the typical plant types, quantities and sound levels that have been used in the noise level predictions.

Table 5-1 – Proposed plant and associated noise levels

Plant/Equipment	Quantity	Sound Pressure Level at 1 metre[1]
Roof mounted condenser PUZ-ZM35VKA2	4	46dB L_{Aeq} @ 1m per fan
Roof mounted condenser Q-W040VA-TS20	1	45dB L_{Aeq} @1m
[1] Normalised to a distance of 1m from the source		

5.1.3 The predicted noise levels at the nearest noise sensitive receptors arising from plant associated with the Proposed Scheme have been calculated and are set out in **Table 5-2**. The calculations take into account the specific sound pressure level of each item of plant and the attenuation of the sound level over distance.

Table 5-2 – Predicted noise level at nearest receptors, dB $L_{Aeq,T}$

Plant/Equipment	Residential receptors on George Street	Residential Receptors on Westgate
Roof mounted condenser – PUZ-ZM35VKA2	15.7	22.5
Roof mounted condenser – Q-W040VA-TS20	8.7	15.5
Total predicted noise level, dB $L_{Aeq,T}$	16.5	23.2

5.1.4 The noise generated by the Proposed Scheme has been assessed at the nearest noise sensitive receptors in accordance with BS 4142:2014+A1:2019.

5.1.5 Drawing on the information available, a correction to the predicted specific noise levels due to tonality and /or intermittent activities is not considered warranted at this stage. However once the final plant has been selected it is recommended that this be reviewed and, where necessary, a correction applied to the specific noise levels.

5.1.6 For the purpose of this assessment, the lowest background sound levels measured during the daytime and night-time periods have been adopted as being representative of the typical background sound levels.

5.1.7 The results of the BS 4142 assessment for the operational activities of the Proposed Scheme are detailed in **Table 5-3**.

Table 5-3 – BS 4142 daytime and night-time assessment of plant at nearest receptors

Calculation Step	Residential receptors on George Street	Residential Receptors on Westgate	Commentary
Specific sound level, dB L_{Aeq}	17	23	Established from predictions, see Table 5-2
Acoustic feature correction	0	0	A correction is not warranted at this stage.
Rating level, dB $L_{Ar,Tr}$	17	23	-
Typical daytime background sound level, dB L_{A90}	53	59	Lowest measured levels during the daytime period, see Appendix C.
Typical night-time background sound level, dB L_{A90}	41	50	Lowest measured levels during the night-time period, see Appendix C.
Predicted exceedance over daytime background sound level	-37	-36	BS4142:2014 indicates the specific sound source will have a low impact.
Predicted exceedance over night-time background sound level	-25	-27	BS4142:2014 indicates the specific sound source will have a low impact.

5.1.8 In summary, Table 5-3 shows that the predicted rating level from the plant associated with the Proposed Scheme will be significantly below the prevailing background sound level. This is a strong indication that the plant will have a low impact at the nearest noise sensitive receptors and that complaints are unlikely. The predicted rating level from the plant also achieves the criteria set out in the KC Noise Design Advice note, i.e. 5dB below prevailing background sound levels.

5.2 BUS MOVEMENTS ASSOCIATED WITH THE PROPOSED SCHEME

OVERVIEW

5.2.1 The sound generated by future bus movements associated with the Proposed Scheme has been predicted at the nearest existing sensitive receptors. The predictions have taken into account the anticipated bus movements, including the regularity and timing of such events.

NOISE SOURCES

5.2.2 For the purposes of this assessment, and following consultation with the transport consultant, it is understood there would be up to 52 bus movements per hour during the day and up to 49 bus movements per hour during the night-time as per timetable information provided in **Table 2-1**. It should be noted that the majority of bus movements during the night-time period are between 05:00 and 07:00, with the peak movements taking place between 06:00 and 07:00.

5.2.3 In order to predict the contribution of sound from future bus movements, a 3D computer model was assembled using CadnaA and populated with measurement data previously obtained by WSP's Acoustics team. This data is provided in **Table 5-4**.

Table 5-4 – Source sound level data for bus movements

Activity	Sound pressure level normalised to a distance of 10m	Typical Duration
Arrival/departure of bus movements	64dB L_{Aeq} 71dB L_{Amax}	25 seconds for each arrival or each manoeuvrer/departure from the respective bus stands.
Bus movements including bus arrival, bus departure and general manoeuvres.	66dB L_{Aeq}	

5.2.4 For the daytime assessment, the prevailing road traffic noise levels at the nearest noise sensitive receptors during the daytime, i.e. in the absence of existing bus movements, have been predicted in accordance with CRTN and based on traffic flow data provided by the Project Team. For the night-time assessment, the prevailing road traffic noise levels have been based on the lowest ambient night-time noise level measured during the baseline noise survey.

5.2.5 The assessment of noise from Proposed Scheme has also taken into account operational assumptions which helped to reduce the impact of noise from the bus movements and should form the basis of any future planning consent; namely:

- Bus movements will be between 05:00 and 23:00, i.e. will avoid the quietest parts of the night-time.
- Drivers will not leave bus engines idling when parked up at the parking stands, layover stand and/or layover resting bus bay.
- The bus stand will provide screening for the residential receptors on George Street from the potential noise generated by customers of the Proposed Scheme waiting for their next available bus.
- The bus stand and building will provide screening for the nearest residential receptors on Westgate from the proposed bus movements and potential noise generated by customers of the Proposed Scheme waiting for the next available bus.

NOISE MODEL

5.2.6 This data was incorporated into CadnaA and on-time corrections applied to facilitate the prediction of the $L_{Aeq,1hr}$ during daytime and night-time periods at the nearest noise sensitive receptors.

5.2.7 The following approach was adopted in generating the noise model:

- The model was set up to apply the prediction methodology set out in the *International Standard ISO9613-2: 1996 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation* (ISO 9613-2) for the assessment of the bus movements.
- Topographical data supplied by the applicant has been incorporated into the model for the existing application site and surrounding area.
- Globally, ground absorption was set to G = 0 (100% acoustically reflective ground).

- Building facades are set to be acoustically reflective and the model includes second order reflections from solid structures.
- Existing buildings were incorporated based on Ordnance Survey (OS) mapping and aerial photography.
- The scheme layout was overlaid based on fixed Ordnance Survey six figure grid references. The receiver positions used in the model were representative of the nearest noise sensitive receptors. During the daytime periods, the receiver height is taken as 1.5m above local ground (i.e. ground floor) and during the night-time the receiver height is taken as 4.0m above the local ground height (i.e. first floor).
- The model was set up to apply the road traffic noise level prediction methodology set out in CRTN to predict baseline noise levels from road traffic on Westgate.
- The alignments and widths of road traffic noise sources were set based on Ordnance Survey MasterMap®, with the traffic flows, speeds and percentage HDVs based on the information provided by the Transport Consultants of the Project Team.

ASSESSMENT RESULTS AND DISCUSSION

5.2.8 A summary of the noise modelling results is provided in Table 5-5below.

Table 5-5 – Predicted Sound Levels from Proposed Bus Movements at Nearest Receptors, Free field

	Residential receptors on George Street	Residential Receptors on Westgate
Daytime (07:00 – 23:00)		
Existing Ambient Sound Level, dB $L_{Aeq,15\text{-}mins}$ [1] [A]	58	69
Daytime Sound Level from Proposed Scheme Only, dB $L_{Aeq,1hr}$ [B]	54	50
Predicted Ambient Sound Level with the Proposed Scheme, dB $L_{Aeq,1hr}$ [2] [C]	58	69
Change in sound levels [C-A]	+0	+0
Night-time (05:00 to 07:00)		
Existing Ambient Sound Level, dB $L_{Aeq,15mins}$ [1] [E]	58	68
Night-time Sound Level from Proposed Scheme, dB $L_{Aeq,1hr}$ [F]	54	49
Predicted Ambient Night-time Sound Level with the Proposed Scheme, dB $L_{Aeq,1hr}$ [2] [G]	56	68
Change in sound levels [G-E]	-2	+0

[1] Based on the measured ambient noise levels taken from Table 4-2.

[2] This does not account from potential commercial noise levels associated with the premises on Northgate.

5.2.9 The nearest noise sensitive receptors on George Street will benefit from there being a greater distance between the receptor and the route of buses using Stands 1 to 5 when compared to the existing bus route. Whilst the bus movements associated with the Proposed Scheme will be closer to the nearest noise sensitive receptors on Westgate, these receptors will benefit from the localised screening from the building and bus stand of the Proposed Scheme.

5.2.10 For the nearest noise sensitive receptors on George Street and Westgate, at worst, it can be seen from the assessment provided in that there would be no change from the existing ambient sound levels as a result of the Proposed Scheme. During the night-time there would be a 2dB decrease in the ambient noise levels for the nearest noise sensitive receptors on George Street. However, taking into consideration the prevailing noise levels in the absence of the bus movements a reduction in ambient noise levels may not be perceptible to these receptors.

5.2.11 For the noise sensitive receptors on George Street and Westgate, the predicted ambient sound levels exceed the BS 8233 upper guideline value for external amenity areas. However, it should be noted that the baseline noise survey results show that this guideline criterion is already exceeded.

5.2.12 In order to predict the likely internal noise levels, the 'simple calculation' method given in BS 8233 has been followed, whereby single figure values can be used in lieu of a full spectral noise break-in analysis. BS 8233 notes that the simple method can underestimate the sound insulation requirement by up to 5 dB, so a 5 dB allowance has been included in the calculations.

5.2.13 Based on the typical sound insulation performance of standard thermal double glazing (29 dB R_w), the predicted internal noise level at the nearest sensitive receptors on George Street would be 34 dB L_{Aeq} during the day and would therefore achieve the BS 8233 guideline value of 35 dB L_{Aeq}. The predicted internal noise level at the nearest sensitive receptors on George Street would at worst be 32 dB L_{Aeq} between 06:00 and 07:00 during the night. This is a minor exceedance of +2dB above the BS 8233 guideline value of 30 dB L_{Aeq}. However, from the results of the baseline noise survey it can be seen that that the night-time criterion is already being exceeded by up to 6dB during this period. The daytime and night-time guideline criteria are also already being exceeded at the nearest noise sensitive receptors on Westgate.

5.2.14 In summary, the predicted ambient noise levels with the Proposed Scheme in place are comparable with existing ambient noise levels measured during the survey as set out in **Table 4-2** and **Appendix C**. It is therefore concluded that any potential adverse impacts associated with the Proposed Scheme will be negligible.

MAXIMUM SOUND LEVELS AT NIGHT

5.2.15 Predictions have been carried out to determine the typical maximum levels generated by individual events associated with the bus movements associated with the Proposed Scheme. These were based on the measured sound levels of bus movements associated with the existing layover bus stands set out in **Table 5-4**. A summary of the predicted levels at each receptor is provided in **Table 5-6**.

Table 5-6 – Predicted maximum sound levels from proposed bus movements at nearest receptors

Receptor	Maximum Sound Level from Bus Movements associated with the Proposed Scheme, dB L_{AFmax} (Free-field)
Residential receptors on George Street	62
Residential receptors on Westgate	61

5.2.16 **Table 5-6** indicates that the highest external maximum noise level is predicted to be 62 dB L_{AFmax}, at worst, at the nearest noise sensitive receptors on George Street and Westgate. These levels are comparable to the typical values of $L_{Amax,f}$ already experienced at the receptors (see **Table 4-2**). The predicted internal sound level, based on an assumed performance for standard thermal double glazing, would be 33 dB $L_{Amax,f}$ for the receptors of George Street and 32 dB $L_{Amax,f}$ for the receptors of Westgate. These readily achieve the WHO internal guideline level of 45 dB $L_{Amax,f}$ in bedrooms at night with windows closed.

6 CONCLUSION

6.1.1 WSP UK Ltd is appointed by Kirklees Council (KC) to carry out an environmental noise assessment for the proposed Heckmondwike Bus Station Scheme. The assessment has been undertaken as part of the planning application for the Proposed Scheme and considers the suitability of the proposals in terms of the potential operational noise impacts which may be experienced at the nearest existing noise sensitive receptors.

6.1.2 The development proposals are for a new bus station to provide increased capacity for bus services, improved interchange opportunities and an improved waiting environment. The Proposed Scheme will increase capacity by increasing the number of bus services, but without extending the operating hours, i.e. bus movements will continue to run between approximately 05:00 and 23:00 during a typical weekday period.

6.1.3 The noise assessment has been based on the results of a baseline environmental noise survey at locations considered to be representative of the nearest noise sensitive receptors to the Proposed Scheme.

6.1.4 The BS 4142 assessment has considered the potential impact of noise arising from proposed building services plant on the nearest noise sensitive receptors. The assessment concluded that the specific sound level arising from plant associated with the Proposed Scheme is predicted to be significantly lower than the background sound levels at the nearest noise sensitive receptors during the daytime and night-time periods. This is a strong indication that the noise generated by plant of the Proposed Scheme will have a low impact at the nearest noise sensitive receptors and that complaints are unlikely.

6.1.5 Noise levels as a result of bus movements associated with the Proposed Scheme have been predicted at the nearest existing noise sensitive receptors., it is concluded that any potential adverse impacts associated with the Proposed Scheme will be negligible.

6.1.6 Limitations to this report are presented in **Appendix D**.

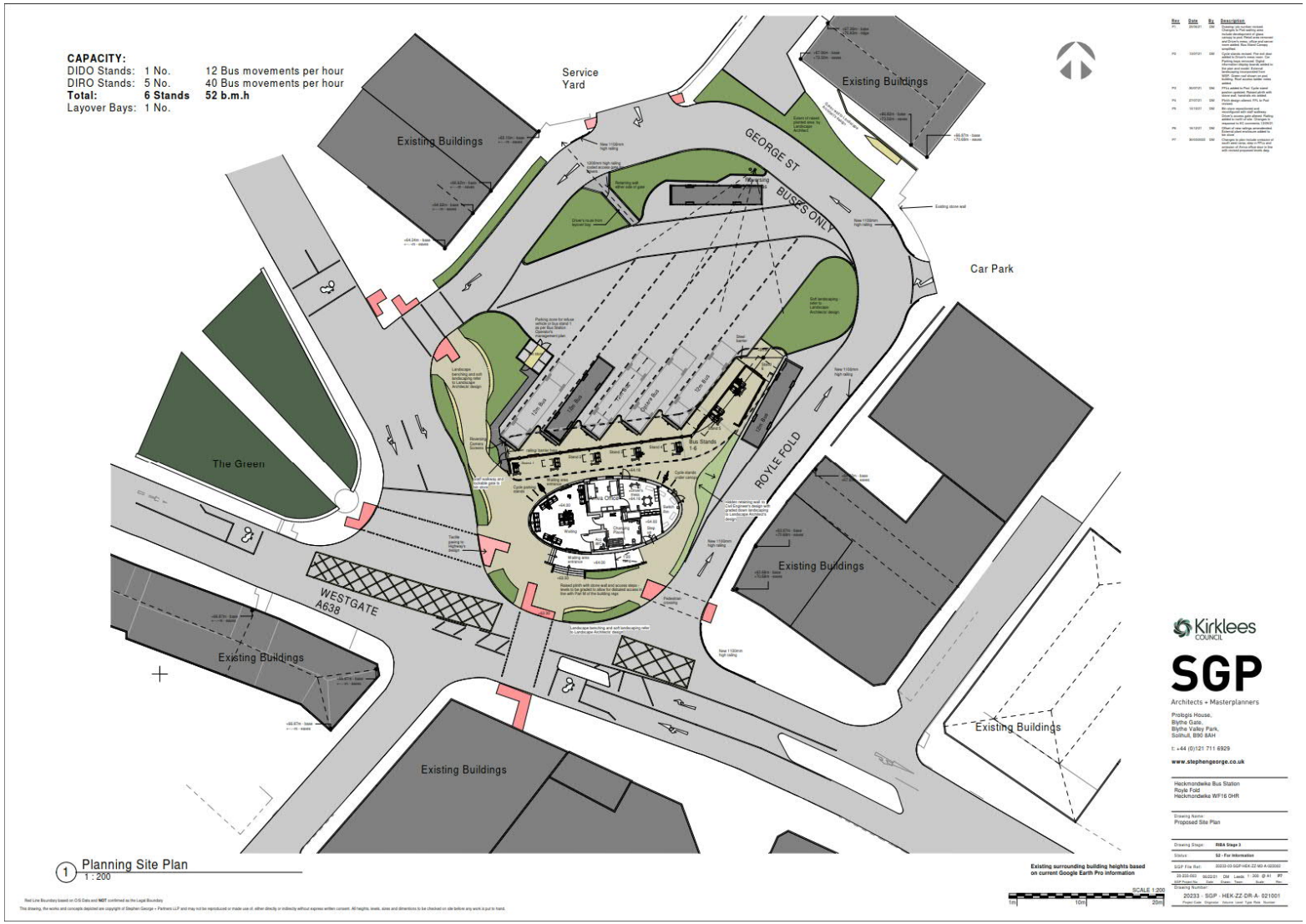
Appendix A

GLOSSARY OF ACOUSTIC TERMINOLOGY

Terminology	Meaning
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

Appendix B

PROPOSED SCHEME LAYOUT


CAPACITY:
DIDO Stands: 1 No. 12 Bus movements per hour
DIRO Stands: 5 No. 40 Bus movements per hour
Total: 6 Stands 52 b.m.h
Layover Bays: 1 No.
Service Yard
Existing Buildings
GEORGE ST
BUSES ONLY
Car Park
The Green
ROYLE FOLD
WESTGATE
A638
Bus Stands 1-6
Bus Office
Existing Buildings
Existing Buildings
Existing Buildings
Existing Buildings
Kirklees COUNCIL
SGP
Architects + Masterplanners
Prologis House,
Blythe Gate,
Blythe Valley Park,
Solihull, B90 8AH
t: +44 (0)121 711 6929
www.stephengeorge.co.uk
Heckmondwike Bus Station
Royle Fold
Heckmondwike WF16 0HR
Drawing Name:
Proposed Site Plan
Drawing Stage: RIBA Stage 3
Status: S2 - For Information
SGP File Ref: 20233-03-SGP-HEK-ZZ-M3-A-021002
20 233 003 16/22/21 DM Leeds 1 : 200 @ A1 P1
SGP Project No. Date Drawn Scale Rev.
Drawing Number:
20233 - SGP - HEK-ZZ-DR-A- 021001
Project Code Originator Volume Level Type Role Number
1 Planning Site Plan
1 : 200
Existing surrounding building heights based on current Google Earth Pro information
SCALE 1:200
1m 10m 20m

Appendix C

ENVIRONMENTAL NOISE SURVEY DATA

Table C1: Attended Measurement Results

Measurement Location	Date	Time	$L_{Aeq, 15\ mins}$	L_{AFMax}	$L_{A90, 15\ mins}$	$L_{A10, 5\ mins}$
ML1	19/10/2021	05:13	53.1	64.9	41.3	56.3
		05:48	55.6	64.6	48.6	58.4
		06:23	61.3	82.2	48.9	61.0
		07:04	57.1	68.3	52.6	59.4
	29/11/2021	14:38	57.0	70.3	53.3	58.7
		14:53	58.6	75.1	52.8	61.8
		15:28	58.0	79.4	54.5	60.0
		16:02	57.5	78.4	53.9	58.9
		16:36	58.2	81.3	54.6	59.6
ML2	19/10/2021	05:31	64.2	76.3	50.0	68.9
		06:05	65.6	76.9	50.6	70.4
		06:44	70.6	91.1	54.9	72.4
		07:22	70.2	87.3	60.2	73.2
	29/11/2021	14:04	67.4	81.9	60.1	71
		14:19	67.8	78.7	59.9	71.6
		15:10	68.8	89.9	59.1	71.6
		15:45	68.9	84.7	59.9	72.4
		16:19	67.9	83.5	60.1	71.4

Appendix D

LIMITATIONS

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