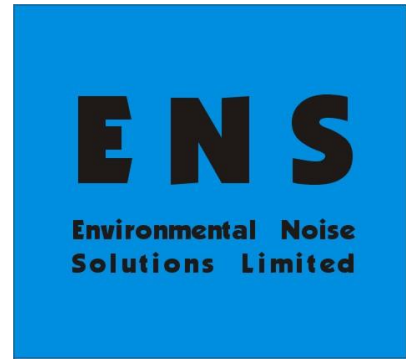




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Huddersfield Southern Corridors Phase 1 Lockwood Bar, Huddersfield Noise Impact Assessment

**For:
Pegasus Group Ltd**

21 August 2020

Ref: NIA/9094/20/9125/v1/Lockwood Bar, Hudds
Issue: Draft
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1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by Pegasus Group Ltd to undertake an operational noise impact assessment for a new link road between Lockwood Road and Albert Road in Huddersfield (hereafter referred to as ‘the scheme’).

The objectives of the noise impact assessment were to:

- Identify the noise-sensitive receptors (NSRs) likely to be affected by the Scheme
- Determine the noise impact of the Scheme with reference to pertinent guidelines

This report details the methodology and results of the assessment.

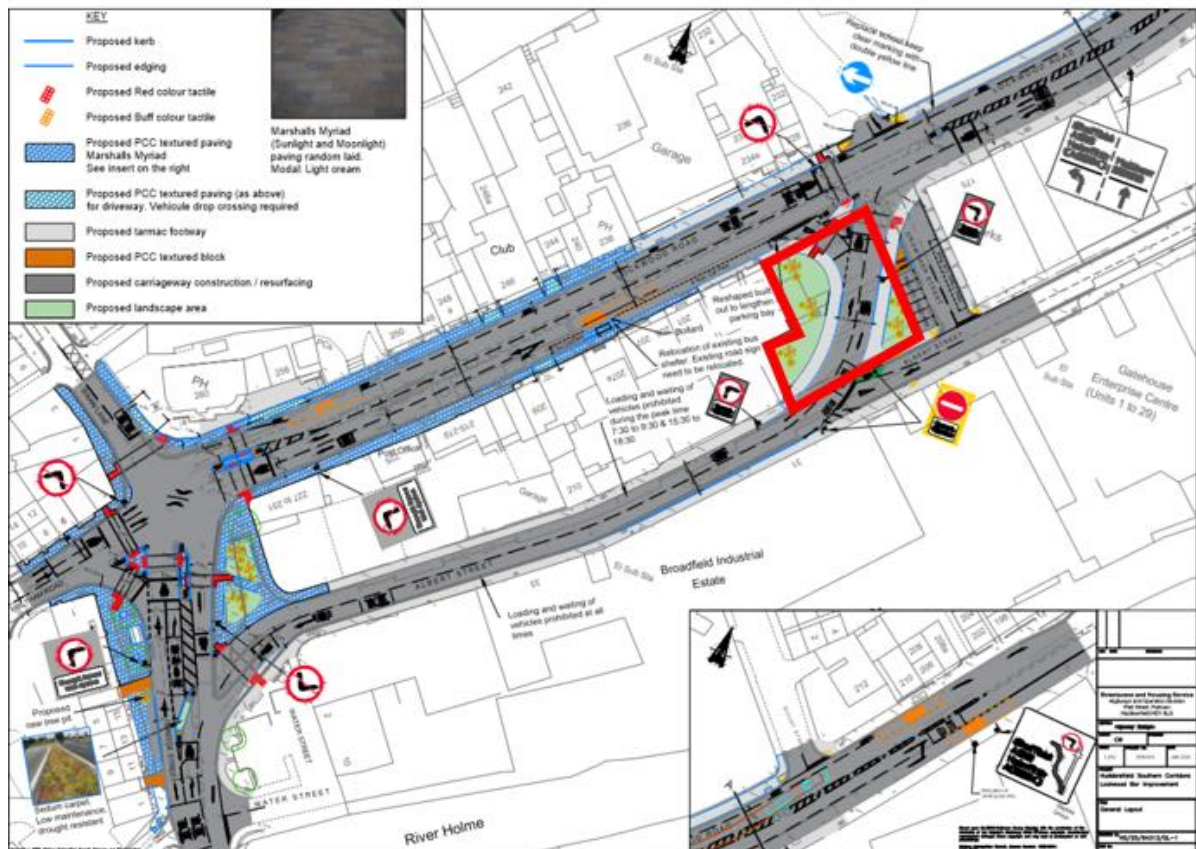
The report has been prepared for Pegasus Group Ltd for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to the report should consult Pegasus Group and ENS as to the extent to which the findings may be appropriate for their use.

A glossary of acoustic terms used in the main body of the text is contained in Appendix A.

1.2 Site Description

The proposed Scheme comprises a new link between Lockwood Road and Albert Road, as shown (highlighted in red) in Figure 1.1.

Figure 1.1: Scheme Location

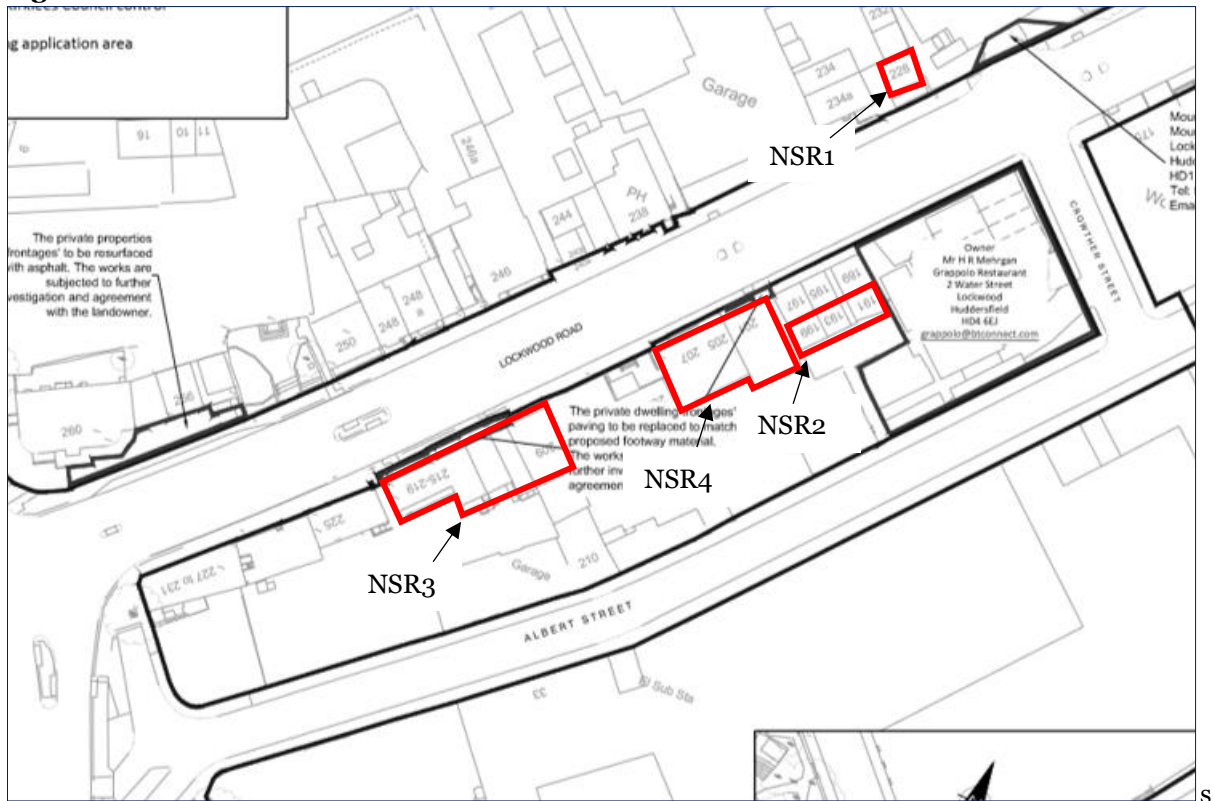


The nearest noise sensitive receptors which have the potential to be affected by the scheme are considered to be:

- A first-floor apartment to the north of the Scheme (opposite) at 228 Lockwood Road (NSR1)
- Single aspect (facing Albert Street) dwellings to the west of the Scheme at 191 – 199 Lockwood Road (NSR2)
- Rear elevations of dwellings at 209 - 219 Lockwood Road (NSR3)
- Rear elevations of dwellings at 201 – 207 Lockwood Road (NSR4)

Figure 1.2 shows the locations of the NSRs identified above.

Figure 1.2: NSR Location



In addition to the above, the assessment has also considered a fifth receptor (NSR5), Mount Pleasant Primary School (not shown on the above image), to the north of Lockwood Road.

2 Policy Context and Assessment Guidance

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)¹ sets out the Government's planning policies for England and how these are expected to be applied.

Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 170 where it states that planning policies and decisions should contribute to and enhance the natural and local environment by:

'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of.....noise pollution'.

Paragraph 180 advises that:

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

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

2.2 Noise Policy Statement for England

The Noise Policy Statement for England² (NPSE) sets out the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This long-term vision is supported by the following aims:

- Avoid significant adverse impacts on health and quality of life
- Mitigate and minimise adverse impacts on health and quality of life
- Where possible, contribute to the improvement of health and quality of life

The NPSE describes the following levels at which noise impacts may be identified:

- NOEL – No Observed Effect Level. This is the 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
- SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur

According to the explanatory notes in the statement, where a noise level falls between the lowest observable adverse effect level (LOAEL) and a level which represents a significant observable adverse effect level (SOAEL):

¹ National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2019)

² Noise Policy Statement for England. Government Department for Environment, Food and Rural Affairs (2010)

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

2.3 Planning Practice Guidance on Noise

Planning Practice Guidance³ (PPG) is an online resource which provides additional guidance and elaboration on the NPPF. It advises that the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur
- Whether or not an adverse effect is occurring or likely to occur
- Whether or not a good standard of amenity can be achieved

In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

‘...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation’.

Table 2.1 summarises the PPG noise exposure hierarchy.

³ Planning Practice Guidance on Noise: <http://planningguidance.planningportal.gov.uk/blog/guidance/noise/> (last updated 2019)

Table 2.1: PPG Noise Exposure Hierarchy

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

The PPG also provides general advice on the typical options available for mitigating noise, suggesting that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

'Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed'.

With regard to the mitigation of extant environmental noise at a proposed residential development, the guidance states that:

'... consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations'.

The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. The following guidance documents provide some meaningful context.

2.4 Noise Assessment Guidance

Design Manual for Roads and Bridges

Section 3 (Assessment Methodology) of the 2020 Design Manual for Roads and Bridges (DMRB) ⁴ sets out procedures for categorising the magnitude of noise impact due to a new road scheme. The principles of the approach contained within the document can also be applied to the assessment of changes in road traffic flows on existing roads and noise from road traffic in general.

⁴ Design Manual for Roads and Bridges, Sustainability & Environment Appraisal LA111, Noise and Vibration, Revision 1. Highways England (2020)

The DMRB requires comparisons of the following sets of data:

- Do-Minimum scenario (without the Scheme) in the opening year (DMOY) against Do-Something scenario (with the Scheme) in the opening year (DSOY)
- Do-Minimum scenario in the opening year (DMOY) against Do-Something scenario in the future assessment year (DSFY)
- Do-Minimum scenario in the opening year (DMOY) against Do-Minimum scenario in the future year (DMFY)

DMRB suggests that the magnitude of noise changes from a project should be classified into levels of impact and provides detailed consideration to how impact magnitude will be affected by noise level changes in the short term (e.g. as a result of a sudden opening of a scheme) and/or changes in the long term (e.g. gradually over time, such as that associated with natural traffic growth).

The 'magnitude of change' classifications are replicated in Tables 2.2 and 2.3 below.

Table 2.2: Classification of Magnitude of Noise Effects in the Short Term

Noise Change, $L_{A10, 18h}$, dB	Magnitude of Change
Less than 1.0	Negligible
1.0 to 2.9	Minor
3.0 to 4.9	Moderate
5.0+	Major

Table 2.3: Classification of Magnitude of Noise Effects in the Long Term

Noise Change, $L_{A10, 18h}$, dB	Magnitude of Change
Less than 3.0	Negligible
3.0 to 4.9	Minor
5.0 to 9.9	Moderate
10.0+	Major

The above scales refer to the impact magnitude rather than the impact significance. The impact significance will depend upon both the impact magnitude and the sensitivity of the receiving environment. To aid in the determination of significance, DMRB sets out operational noise LOAELs and SOAELs as follows:

Table 2.4: DMRB Operational Noise LOAELs and SOAELs

Time Period	LOAEL	SOAEL
Day (0600–2400)	55 dB L_{A10} (18 hour) façade	68 dB L_{A10} (18 hour) façade
Night (0000–0600)	40 dB L_{night} , outside (free field)	55 dB L_{night} , outside (free field)

The initial assessment of likely significant effect on noise sensitive buildings shall be determined using Table 2.5.

Table 2.5: Initial Assessment of Operational Noise Significance

Significance	Short Term Magnitude of Change
Significant	Major
Significant	Moderate
Not Significant	Minor
Not Significant	Negligible

Where the magnitude of change in the short term is negligible at noise sensitive buildings, it shall be concluded that the noise change will not cause changes to behaviour or response to noise and as such, will not give rise to a likely significant effect.

For noise sensitive receptors where the magnitude of change in the short term is minor, moderate or major at noise sensitive buildings, the guidance set out in Table 3.60 of DMRB (as replicated in Table 2.6) shall be used, together with the output of Table 2.5 to determine final significance.

Table 2.6: Determining Final Operational Significance on Noise Sensitive Buildings

Local Circumstance	Influence on Significance Judgement
Noise level change (is the magnitude of change close to the minor/moderate boundary?)	- Noise level changes within 1 dB of the top of the 'minor' range can indicate that it is more appropriate to determine a likely significant effect. - Noise level changes within 1 dB of the bottom of a 'moderate' range can indicate that it is more appropriate to consider a change is not a likely significant effect.
Differing magnitude of impact in the long term and/or future year to magnitude of impact in the short term	- Where a greater impact in the long term and/or future year is predicted, it can be more appropriate to consider that a smaller change is a likely significant effect. - A lower impact in the long-term and/or future year over the short-term can indicate that it is more appropriate to consider that a larger change is not significant. - A similar change in the long term and non-project noise change can indicate that the change is not due to the project and not an indication of a likely significant effect.
Absolute noise level with reference to LOAEL and SOAEL (by design this includes sensitivity of receptor)	- A noise change where all do-something absolute noise levels are below SOAEL requires no modification of the initial assessment. - Where any do-something absolute noise levels are above the SOAEL, a noise change in the short term of 1.0dB or over results in a likely significant effect.
Location of noise sensitive parts of a receptor	- If the sensitive parts of a receptor are protected from the noise source, it can be appropriate to conclude a moderate or major magnitude change in the short term and/or long term is not a likely significant effect. An example of this would be where no windows of sensitive rooms face the road, and outdoor spaces are protected from the road by buildings. - Conversely, if the sensitive parts of the receptor are exposed to the noise source, it can be more appropriate to conclude a minor change in the short term and/or long term is a likely significant effect. An example of this would be when a house has many windows of sensitive rooms and outdoor spaces facing the road. - It will only be necessary to look in detail at individual receptors in terms of this circumstance where the decision on whether the noise change gives rise to a significant environmental effect is marginal.
Acoustic context	If a project changes the acoustic character of an area, it can be appropriate to conclude a minor magnitude of change in the short term and/or long term is a likely significant effect.
Likely perception of change by residents	- If the project results in obvious changes to the landscape or setting of a receptor, it is likely that noise level changes will be more acutely perceived by the noise sensitive receptors. In these cases, it can be appropriate to conclude that a minor change in the short term and/or long term is a likely significant effect. - Conversely, if the project results in no obvious changes for the landscape, particularly if the road is not visible from the receptor, it can be appropriate to conclude that a moderate change in the short term and/or long term is not a likely significant effect.

Where significant adverse effects occur, DMRB outlines example measures to mitigate and manage operational noise, including, but not limited to:

- Vertical or horizontal alignment of the road
- Earth bunds to act as a noise barrier
- Noise barriers
- Low noise road surfacing
- Speed limits
- Restrictions on noisy vehicle types

Calculation of Road Traffic Noise (CRTN)

The 'Calculation of Road Traffic Noise' (CRTN)⁵ 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 $L_{A10,18hr}$ noise level (the level exceeded for 10% of any 18-hour period between 06:00 – 24:00 hrs) or the $L_{A10,1hr}$ (depending on available traffic flow data) for any receptor point at a given distance, up to 300 metres, from the road.

Noise Insulation Regulations 1975 (as amended 1988)

With respect to altered highways, Regulation 4 of the Noise Insulation Regulations 1975, as amended 1988 (NIR) provides authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings, subject to meeting certain criteria given in the Regulation.

The noise level parameters used in the NIR are described below:

- Prevailing Noise Level (PNL) is the level of noise, expressed as a level of $L_{10(18-hour)}$, one metre in front of the most exposed of any windows and doors in a façade of a building caused by traffic using any highway immediately before works for the construction of a highway or additional carriageway, or for the alteration of a highway, as the case may be, were begun.
- Relevant Noise Level (RNL) is the level of noise, expressed as a level of $L_{10(18-hour)}$, one metre in front of the most exposed of any windows and doors in a façade of a building caused or expected to be caused by traffic using or expected to use the new or modified highway (immediately after opening/completion).

The Regulations apply only to dwellings (or buildings used for residential purposes) which are ≤ 300 metres from the nearest point of the altered highway, and the criteria outlined in the NIR are as follows:

- The RNL must not be less than 67.5 dB $L_{A10,18hr}$.
- The RNL is at least 1.0 dB(A) more than the PNL.
- The contribution to the increase in the RNL from the altered highway must be at least 1.0 dB(A).

⁵ Calculation of Road Traffic Noise. Department of Transport and the Welsh Office (1998).

3 Existing Noise Levels

3.1 Overview

In order to assist with the determination of existing noise levels affecting the site, noise monitoring was carried out on Wednesday 6th May, Thursday 7th May and Monday 11th May 2020.

Following a government announcement regarding the mitigation of COVID-19 virus spread, restrictions on travel in the UK were imposed from Monday 23rd March 2020 onwards. Therefore, the noise data acquired on the above dates cannot be relied upon as being wholly representative of typical prevailing external noise conditions. Nevertheless, the noise data acquired during the survey is considered useful when used in conjunction with other available data sources such road traffic flows on primary routes in the immediate vicinity.

3.2 Noise Survey

The adopted noise monitoring positions (shown in Appendix B) were as follows:

- 1 – 2 metres from the nearside kerb of Lockwood Road, at a height of 3 metres above ground, representing NSR1 and NSR5
- 2 – 1.5 metres from the nearside kerb of Albert Street, at a height of 3 metres above ground, representing NSR2 and NSR4
- 3 – 1 metre from the southern façade of the ‘Albert Motors’ building, at a height of 3 metres above ground, representing NSR3

Noise measurements were undertaken using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. The meter was connected to a windshield covered microphone positioned at the locations detailed above.

Positions 1 and 2 were in ‘free-field’ conditions. Position 3 was a ‘façade’ measurement.

The calibration of each measurement system was verified immediately before and after the survey period using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration levels greater than 0.5 dB was noted.

Weather conditions were cloudy and dry with wind speeds circa 1 – 3 m/s. Conditions were therefore considered appropriate for baseline noise monitoring.

Table 3.1 presents a summary of the noise data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1: Summary of Noise Measurement Data

Position	Date	Time (hh:mm)	L _{Aeq} (dB)	L _{A10} (dB)	Comment
1	06/05/2020	13:47 – 17:00	71	74	Road traffic on Lockwood Road dominant; observed average of 924 no. vehicles per hr with 6% HGVs; some audible contributions from MOT garage opposite
2	07/05/2020	10:30 – 13:30	65	68	Road traffic on Albert Street dominant; observed average of 192 no. vehicles per hr with 9% HGVs; some occasional audible contributions from nearby car wash
3	11/05/2020	13:31 – 16:31	66	68	Road traffic on Albert Street dominant; observed average of 243 no. vehicles per hr with 4% HGVs; some occasional audible contributions from neighbouring commercial unit

Factoring in corrections (where appropriate) for distance attenuation, angle of exposure, barrier attenuation and façade effect, the following existing road traffic noise levels have been determined at the facades of the nearest NSRs:

- 75 dB $L_{A10,3hr}$ at NSR1
- 64 dB $L_{A10,3hr}$ at NSR2
- 64 dB $L_{A10,3hr}$ at NSR3
- 64 dB $L_{A10,3hr}$ at NSR4
- 67 dB $L_{A10,3hr}$ at NSR5

The measured $L_{A10,3hr}$ relates to the $L_{A10,18hr}$ parameter as follows:

$$L_{A10,18hr} = L_{A10,3hr} - 1 \text{ dB}$$

Based on the above, the following existing road traffic noise levels have been determined:

- 74 dB $L_{A10,18hr}$ at NSR1
- 63 dB $L_{A10,18hr}$ at NSR2
- 63 dB $L_{A10,18hr}$ at NSR3
- 63 dB $L_{A10,18hr}$ at NSR4
- 66 dB $L_{A10,18hr}$ at NSR5

3.3 ‘Typical’ Noise Levels

In Section 3.2 measured noise levels were presented based on conditions observed in May 2020 (i.e. during COVID-19 travel restrictions) when traffic flows were not considered to be typical.

To determine L_{A10} (18 hour) levels at the façades of the nearest NSRs to the Scheme during ‘typical’ conditions in 2020, noise levels have been calculated in accordance with the procedure contained in CRTN using 18-hour AAWT traffic flows, % HDVs and vehicle speeds provided by Jacobs for 2020.

The calculations have incorporated the following assumptions:

- Generally neutral gradient
- Impervious / bituminous road surface
- Unobstructed propagation from road to receiver position
- Hard (urban) intervening ground cover between the Scheme and the dwellings

Table 3.2 presents traffic flow data and corresponding calculated noise levels for 2020, factored up from 2014 survey data using appropriate growth factors; thus representing 2020 traffic flows without the effects of COVID-19 travel restrictions.

Table 3.2: ‘Typical’ 2020 – Traffic Flows and Noise Levels

NSR	Elevation	Link I.D.	Year 2020			
			18hr AAWT	%HDV	Speed (kph)	dB $L_{A10,18hr}$
1	Facing Lockwood Road	10542 – 10541 10543 – 10542	23140	4.8	36	74.6
2	Facing Albert Street	34112 – 40004	6447	4.8	36	64.4
3	Facing Albert Street	34112 – 40004	6447	4.8	36	63.4
4	Facing Albert Street	34112 – 40004	6447	4.8	36	64.4
5	Facing Lockwood Road	10542 – 10541 10543 – 10542	23140	4.8	36	66.5

It can be seen that the calculated $L_{A10,18hr}$ noise levels set out in Table 3.2 (based on ‘typical’ 2020 traffic flows) are generally slightly higher than those derived from the survey data (summarised in Section 3.2). This is to be expected due to the lower than usual traffic flows present in the May 2020 survey as result of COVID-19 travel restrictions.

4 Noise Impact Assessment

4.1 Overview

For the various assessment scenarios L_{A10} (18 hour) levels at the façades of the nearest NSRs to the Scheme have been calculated in accordance with the procedure contained in the CRTN, using traffic flow data prepared by Jacobs.

The calculations have incorporated the following assumptions:

- Generally neutral gradient
- Impervious / bituminous road surface
- Unobstructed propagation from road to receiver position
- Hard (urban) intervening ground cover between the Scheme and the dwellings

18-hour AAWT traffic flows, % HDVs and vehicle speeds have been provided by Jacobs for:

- 2022 – the opening year of the Scheme (OY)
- 2037 – the future assessment year (FY) i.e. 15 years after Scheme opening

For each assessment year, data have been provided for the following scenarios:

- ‘Do Minimum’ (DM) – i.e. anticipated flows without the Scheme
- ‘Do Something’ (DS) – i.e. anticipated flows with the Scheme

4.2 DMOY to DSOY Short Term Assessment

Table 4.1 presents traffic flow data and corresponding calculated noise levels for 2022 ‘Do Minimum’ and 2022 ‘Do Something’ scenarios.

Table 4.1: DMOY and DSOY – Traffic Flows and Noise Levels

NSR	Elevation	Link I.D.	2022 DM				2022 DS			
			18hr AAWT	%HDV	Speed (kph)	dB L _{A10,18hr}	18hr AAWT	%HDV	Speed (kph)	dB L _{A10,18hr}
1	Facing Lockwood Road*	10542 - 10541	22923	4.6	36	74.4	14827	4.6	36	72.7
		10543 - 10542	22923	4.6	36		26793	4.8	36	
2	Facing Albert Street**	34112 - 40004	6201	5.0	36	64.3	13156	5.2	27	69.2
		34112 - 10542	N/A	N/A	N/A		13880	5.4	30	
3	Facing Albert Street***	34112 - 40004	6201	5.0	36	63.7	13156	5.2	27	66.5
		40004 - 10540	16677	3.3	36		10675	2.0	36	
4	Facing Albert Street**	34112 - 40004	6201	5.0	36	64.3	13156	5.2	27	67.9
		34112 - 10542	N/A	N/A	N/A		13880	5.4	30	
5	Facing Lockwood Road	10543 - 10542	22923	4.6	36	65.1	26793	4.8	36	65.9

* This elevation will be exposed to both Lockwood Road links positioned either side of the junction with the proposed new link road, the angle of exposure is greater to 10542-10541 than 10543-10542. Calculated noise levels are derived from the cumulative contribution of both links

** This elevation will be exposed to both Albert Street and the new link road (34112-10542) in the Do Something scenario. Calculated noise levels are derived from the cumulative contribution of both links

*** This elevation is exposed to both Albert Street and Bridge Street (with increased distance and reduced angle of exposure to the latter). Calculated noise levels are derived from the cumulative contribution of both links

Based on the above, Table 4.2 summarises the short-term magnitude of impact for the Scheme.

Table 4.2: DMOY to DSOY – Short Term Changes

NSR	Elevation	2022 DM	2022 DS	Change L _{A10,18hr}	Magnitude of Change
1 (228 Lockwood Rd)	Facing Lockwood Road	74.4 dB L _{A10,18hr}	72.7 dB L _{A10,18hr}	-1.7 dB	Minor (beneficial)
2 (191 – 199 Lockwood Rd)	Facing Albert Street	64.3 dB L _{A10,18hr}	69.2 dB L _{A10,18hr}	+4.9 dB	Moderate
3 (209 – 219 Lockwood Rd)	Facing Albert Street	63.7 dB L _{A10,18hr}	66.5 dB L _{A10,18hr}	+2.8 dB	Minor
4 (201 – 207 Lockwood Rd)	Facing Albert Street	64.3 dB L _{A10,18hr}	67.9 dB L _{A10,18hr}	+3.6 dB	Moderate
5 (Mount Pleasant Primary School)	Facing Lockwood Road	65.1 dB L _{A10,18hr}	65.9 dB L _{A10,18hr}	+0.8 dB	Negligible

It can be seen that, in the short term:

- A minor beneficial impact is expected at NSR1
- Moderate impacts are expected at NSR2 and NSR4
- A minor impact is expected at NSR3
- A negligible impact is expected at NSR5

The initial assessment suggests that effects would not be significant at NSR1, NSR3 and NSR5 and that effects in the short term would be significant at NSR2 and NSR4. Please see Section 4.5 ('Significance of Effects') of this report for a final determination of significance once all relevant factors are taken into consideration.

4.3 DMOY to DSFY Long Term Assessment

Table 4.3 presents traffic flow data and corresponding calculated noise levels for 2022 ‘Do Minimum’ and 2037 ‘Do Something’ scenarios.

Table 4.3: DMOY and DSFY – Traffic Flows and Noise Levels

NSR	Elevation	Link I.D.	2022 DM				2037 DS			
			18hr AAWT	%HDV	Speed (kph)	dB L _{A10,18hr}	18hr AAWT	%HDV	Speed (kph)	dB L _{A10,18hr}
1	Facing Lockwood Road*	10542 - 10541	22923	4.6	36	74.4	15121	3.4	36	72.3
		10543 - 10542	22923	4.6	36		27522	3.9	36	
2	Facing Albert Street**	34112 – 40004	6201	5.0	36	64.3	15026	4.3	27	69.4
		34112 - 10542	N/A	N/A	N/A		15944	4.5	30	
3	Facing Albert Street***	34112 – 40004	6201	5.0	36	63.7	15026	4.3	27	66.7
		40004-10540	16677	3.3	36		12826	1.9	36	
4	Facing Albert Street**	34112 – 40004	6201	5.0	36	64.3	15026	4.3	27	68.1
		34112 - 10542	N/A	N/A	N/A		15944	4.5	30	
5	Facing Lockwood Road	10543 - 10542	22923	4.6	36	65.1	27522	3.9	36	65.7

* This elevation will be exposed to both Lockwood Road links positioned either side of the junction with the proposed new link road, the angle of exposure is greater to 10542-10541 than 10543-10542. Calculated noise levels are derived from the cumulative contribution of both links

** This elevation will be exposed to both Albert Street and the new link road (34112-10542) in the Do Something scenario. Calculated noise levels are derived from the cumulative contribution of both links

*** This elevation is exposed to both Albert Street and Bridge Street (with increased distance and reduced angle of exposure to the latter). Calculated noise levels are derived from the cumulative contribution of both links

Based on the above, Table 4.4 summarises the long-term magnitude of impact for the Scheme.

Table 4.4: DMOY to DSFY – Long Term Changes

NSR	Elevation	2022 DM	2037 DS	Change L _{A10,18hr}	Magnitude of Change
1 (228 Lockwood Rd)	Facing Lockwood Road	74.4 dB L _{A10,18hr}	72.3 dB L _{A10,18hr}	-2.1 dB	Negligible (beneficial)
2 (191 – 199 Lockwood Rd)	Facing Albert Street	64.3 dB L _{A10,18hr}	69.4 dB L _{A10,18hr}	+5.1 dB	Moderate
3 (209 – 219 Lockwood Rd)	Facing Albert Street	63.7 dB L _{A10,18hr}	66.7 dB L _{A10,18hr}	+3.0 dB	Minor
4 (201 – 207 Lockwood Rd)	Facing Albert Street	64.3 dB L _{A10,18hr}	68.1 dB L _{A10,18hr}	+3.8 dB	Minor
5 (Mount Pleasant Primary School)	Facing Lockwood Road	65.1 dB L _{A10,18hr}	65.7 dB L _{A10,18hr}	+0.4 dB	Negligible

It can be seen that, in the long term:

- A negligible beneficial impact is expected at NSR₁
- A moderate impact is expected at NSR₂
- Minor impacts are expected at NSR₃ and NSR₄
- A negligible impact is expected at NSR₅

Please see Section 4.5 ('Significance of Effects') of this report for a final determination of significance once all relevant factors are taken into consideration.

4.4 DMOY to DMFY Long Term Assessment

DMRB requires a comparison of DMOY against DMFY, in order to demonstrate how noise levels will vary in the long-term, irrespective of the Scheme.

Table 4.5 presents traffic flow data and corresponding calculated noise levels for 2022 'Do Minimum' and 2037 'Do Minimum' scenarios.

Table 4.5: DMOY and DMFY – Traffic Flows and Noise Levels

NSR	Elevation	Link I.D.	2022 DM				2037 DM			
			18hr AAWT	%HDV	Speed (kph)	dB L _{A10,18hr}	18hr AAWT	%HDV	Speed (kph)	dB L _{A10,18hr}
1	Facing Lockwood Road	10542 – 10541 10543 – 10542	22923	4.6	36	74.4	25085	3.8	36	74.5
2	Facing Albert Street	34112 – 40004	6201	5.0	36	64.3	6738	4.3	36	64.4
3	Facing Albert Street	34112 – 40004	6201	5.0	36	63.7	6738	4.3	36	63.8
		40004 – 10540	16677	3.3	36		18268	3.1	36	
4	Facing Albert Street	34112 – 40004	6201	5.0	36	64.3	6738	4.3	36	64.4
5	Facing Lockwood Road	10543 – 10542	22923	4.6	36	65.1	25085	3.8	36	65.2

Based on the above, Table 4.6 summarises the long-term magnitude of impact for NSRs without the Scheme.

Table 4.6: DMOY to DMFY – Long Term Changes

NSR	Elevation	2022 DM	2037 DM	Change L _{A10,18hr}	Magnitude of Change
1 (228 Lockwood Rd)	Facing Lockwood Road	74.4 dB L _{A10,18hr}	74.5 dB L _{A10,18hr}	+0.1 dB	Negligible
2 (191 – 199 Albert St)	Facing Albert Street	64.3 dB L _{A10,18hr}	64.4 dB L _{A10,18hr}	+0.1 dB	Negligible
3 (209 – 219 Lockwood Rd)	Facing Albert Street	63.7 dB L _{A10,18hr}	63.8 dB L _{A10,18hr}	+0.1 dB	Negligible
4 (201 – 207 Lockwood Rd)	Facing Albert Street	64.3 dB L _{A10,18hr}	64.4 dB L _{A10,18hr}	+0.1 dB	Negligible
5 (Mount Pleasant Primary School)	Facing Lockwood Road	65.1 dB L _{A10,18hr}	65.2 dB L _{A10,18hr}	+0.1 dB	Negligible

It can be seen that negligible impacts in the long term are expected at all NSRs without the Scheme.

4.5 Significance of Effects

In Section 4.2 of this report, it was determined that negligible to moderate impacts are expected at the nearest NSRs in the short term. The initial assessment suggests that moderate effects would be significant at NSR2 and NSR4. Effects at the other receptors would not be significant.

With reference to the guidance set out in Table 3.60 of DMRB, consideration of various local circumstances has been undertaken, as summarised in Table 4.7.

Table 4.7: Determination of Significance

Local Circumstance	Comment	More Likely to Indicate a Significant Effect?
Noise level change (is the magnitude of change close to the minor/moderate boundary?)	Noise level changes comfortably indicate a moderate effect at NSR2, (i.e. changes are not 'marginal/borderline' minor-moderate).	Yes
Differing magnitude of impact in the long term and/or future year to magnitude of impact in the short term	Impact magnitudes at NSR2 are moderate in both the short term and long term	Yes
Absolute noise level with reference to LOAEL and SOAEL (by design this includes sensitivity of receptor)	Noise levels are above the SOAEL and increase by more than 1 dB at NSR2	Yes
Location of noise sensitive parts of a receptor	Receptors appear to have windows to habitable rooms (e.g. living rooms or bedrooms) facing the primary noise sources	Yes
Acoustic context	Project is not expected to change the acoustic character of an area as it is already characterised by road traffic noise	No
Likely perception of change by residents	At NSR2 and NSR4, the changes to the road network are expected to be visible from the elevation facing Albert Road	Yes

Table 4.7 shows that there are more local circumstances that would suggest effects are more likely to be a significant effect than not significant. On this basis, there is no reason to reconsider the initial assessment; therefore, the overall impact on the nearest NSRs is considered to be **significant**.

Where significant adverse effects occur, DMRB outlines example measures to mitigate and manage operational noise, including, but not limited to:

- Vertical or horizontal alignment of the road
- Earth bunds to act as a noise barrier
- Noise barriers
- Low noise road surfacing
- Speed limits
- Restrictions on noisy vehicle types

It is therefore recommended that the client and/or design team consider the potential mitigation measures outlined above before the Scheme is commissioned.

4.6 Noise Insulation Regulations

It is noted that dwellings comprising NSR2 (191 – 199 Lockwood Road, single aspect dwellings facing Albert St only) and NSR4 (rear elevations of 201 – 207 Lockwood Road) fulfil the criteria detailed in the NIR, and are therefore eligible for a discretionary grant in respect of the cost of undertaking noise insulation work, due to the following:

- The RNL at these properties is expected to exceed 67.5 dB L_{A10} (18 hour) (see Table 4.1).
- The Scheme is predicted to increase the RNL at these properties by 3.6 – 4.9 dB relative to the PNL (see Table 4.2).
- The properties are within 300 metres of the nearest point of the altered highway.

5 Summary and Conclusions

An operational noise impact assessment has been performed for a proposed new link road between Lockwood Road and Albert Road in Huddersfield.

Road traffic noise levels at the façades of the nearest noise sensitive receptors (NSRs) to the Scheme have been calculated using supplied traffic flow data for the opening year and future year with and without the proposals.

The assessment has determined that negligible to moderate impacts are expected at the nearest NSRs in the short term and long term. The overall impact on the nearest NSRs is considered to be **significant**. Section 4.5 outlines potential mitigation measures for the client and/or design team to consider before the Scheme is commissioned.

The assessment has also determined that dwellings comprising NSR2 (191 – 199 Lockwood Road, single aspect dwellings facing Albert St only) and NSR4 (rear elevations of 201 – 207 Lockwood Road) fulfil the criteria detailed in the Noise Insulation Regulations, and are therefore eligible for a discretionary grant in respect of the cost of undertaking noise insulation work, due to the following:

- The Relevant Noise Level (RNL) at these properties is expected to exceed 67.5 dB $L_{A10(18\text{ hour})}$ following implementation of the Scheme.
- The Scheme is predicted to increase the RNL at these properties by 3.6 – 4.9 dB relative to the Prevailing Noise Level (PNL).
- The properties are within 300 metres of the nearest point of the altered highway.

Appendix A – Abbreviations and Definitions

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μ Pa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 μ Pa).

A-weighting

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T , has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T . $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T . L_{A90} is typically taken as representative of background noise.

$L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Single Event Level / Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, regardless of the event duration. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_w)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_w is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix B – Measurement Positions

