A12. Noise and Vibration

A12.1 This chapter of the ES addendum relates to the changes in scheme design, policy, guidance and technical assessment methodology since the July 2016 ES, and addresses comments from Kirklees Council regarding the July 2016 ES Noise and Vibration Chapter.

A12.2 This Chapter is prepared by AECOM

A12.3 Since the July 2016 ES, changes to the layout of the site have been made and are now being assessed. The new scenario takes into consideration Highways England's land requirements for potential improvements to the M606 and M62 Junction (Junction 26), removal of the residential element and increase in the size of the proposed employment zone of the proposed scheme.

A12.4 To support the July 2016 ES, baseline sound surveys were undertaken at a number of locations in March and April 2014 and July 2015. Further baseline surveys were conducted between February – March 2017 to undertake further assessment of the residential elements of the scheme. Although the residential elements have been removed, the results of the further baseline surveys will be used where appropriate in this addendum.

A12.5 A list of acoustic abbreviations and definitions can be found in Section 8.

A12.6 In this Chapter comments are made with regards to each section of the Noise and Vibration Chapter of the July 2016 ES in order to clarify whether the information presented remains valid of whether the revised scheme would result in changes to the assessment.

Summary of Assessment to Date

A12.7 The previous noise assessments undertaken as part of the July 2016 ES considered both the temporary construction noise effects on existing Noise Sensitive Receptors (NSRs) and the effects of noise from existing and proposed new noise sources after completion of the development on existing and proposed new NSRs. The suitability of the Application Site for residential led development was also assessed.

A12.8 Baseline noise surveys were undertaken in 2014 at multiple off-site locations close to NSRs on Bradford Road and Cliff Hollins Lane, and at an on-site location along the western boundary of the application site in 2015 in order to inform the July 2016 ES.

Updated Standards and Legislation

A12.9 Since the July 2016 ES, Local Planning Policy guidance has been updated with the document West Yorkshire Planning Consultation Guidance (WYPCG), May 2016. The WYPCG makes direct reference to the Noise Policy Statement for England, which has also been included below as an introduction to effect level terminology used throughout this Addendum.

Noise Policy Statement for England (2010) [Ref 12.1]

A12.10 The Noise Policy Statement for England (NPSE) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

A12.11 The statement sets out the long term vision of the government's noise policy, which is to "promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development".

This long term vision is supported by three aims:

- "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 improvements of health and quality of life."

A12.12 The long term policy vision and aims are designed to enable decisions to be made regarding what is an acceptable noise burden to place on society.

A12.13 The 'Explanatory Note' within the NPSE provides further guidance on defining 'significant adverse effects' and 'adverse effects' using the concepts:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The three aims can therefore be interpreted as follows:

- The first aim is to avoid noise levels above the SOAEL.
- The second aim considers situations where noise levels are between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However this does not mean that such adverse effects cannot occur.
- The third aim seeks, where possible, to positively improve the health and quality of life through the pro-active management of noise whilst also taking account of the guiding principles of sustainable development.

A12.14 The NPSE recognises that it is not possible to have single objective noise-based measures that define the SOAEL, LOAEL and NOEL that are applicable to all sources of noise in all situations. The levels are likely to be different for different noise sources, different receptors and at different times of the day.

Kirklees Council Guidance

West Yorkshire Planning Consultation Guidance [Ref 12.2]

A12.15 Paragraphs 12.52 – 12.55 (Consultation) of the July 2016 ES, have been superseded by the WYPCG as detailed below. The following is additional Local Policy Guidance.

A12.16 The WYPCG is intended to "provide a condensed guide to developers and Environmental Health Professionals when reviewing planning applications and making recommendations to Planning Services on matters relating to noise and vibration".

A12.17 When assessing planning applications, the document states that the Planning Authority will have due regard to the aims of the NPSE (see above) and National Planning Policy Framework, 2012. It is stated that:

- "The Planning Authority will normally support refusal where the noise impact on sensitive receptors exceeds SOAEL, however mitigating factors such as the local authority's on-going support of local regeneration will be taken into consideration.
- The Planning Authority will normally recommend conditions to mitigate noise impacts where the noise levels exceed the LOAEL, but are lower than the SOAEL criterion."

A12.18 Section 5 of the *WYPCG* presents guidance on consideration of noise at proposed developments containing noise sensitive users. Appendices 1 and 2 of the document present guideline *"Absolute" and "Relative"* sound level criteria and set out how these equate to NOELs, LOAELs and SOAELs.

A12.19 This document supplements the Kirklees Unitary Development Plan (2007).

Kirklees Council Publication Local Plan (Draft) November 2016 [Ref 12.3]

Section 3 of the Kirklees Council Publication Draft Local Plan discusses the Issues facing Kirklees, Issue 8 relating to noise pollution and the Kirklees Councils draft response has been included below:

"*What opportunities can be provided to improve quality of life, health and well-being to ensure that environmental quality be sustained and improved especially where standards are not met?*

Environmental quality can be affected by air, noise, light, odour and other forms of pollution that impact on quality of life, well-being of people and the environment…Other forms of pollution also impact on the environment and quality of life. Noise in particular can be an issue for Kirklees residents as noise from traffic and nearby industry can be a problem. Again policies are in place to protect residents from elevated noise levels."

Bradford Metropolitan District Council (BMDC) Guidance

Core Strategy – Environment, July 2017 [Ref 12.4]

Section 5.4, Planning for Places – Environment, of the BMDC Core Strategy states the following in relation to noise nuisance:

"Nuisance issues, for example, noise, dust, odour and lighting can have a significant impact on quality of life, community cohesion, health and amenity. These issues are also material planning considerations. When identifying land for future development and responding to

developer's proposals, account needs to be taken of existing land uses in the vicinity of the site e.g. proposed residential development adjacent to existing factory operating 24 hours per day and when new developments may create additional noise. Every effort must be made to ensure that nuisance problems are not generated during construction or operation."

Policy EN8: Environmental Protection within the same document states:

In order to protect public health and the environment the Council will require that:

"Proposals which are likely to cause pollution or are likely to result in exposure to sources of pollution (including noise, odour and light pollution) or risks to safety, will only be permitted if measures can be implemented to minimise pollution and risk to a level that provides a high standard of protection for health, environmental quality and amenity. The following issues require particular attention:

Nuisance Proposals for development must identify potential nuisance issues (including noise, vibration, odour, light and dust) arising from the nature of the proposal and address impacts on that development from existing land uses."

Consultation

A12.20 A consultation response to the July 2016 ES was received from Richard Hume (Kirklees Council) in September 2016. The majority of the comments related to use of the Application Site for residential development. However, this addendum still takes into consideration the comments relating to the operation of the proposed commercial development.

A12.21 Telephone consultation was undertaken between Nathan Green (AECOM) and Richard Hume in January 2017, to discuss baseline measurement locations in relation to further monitoring for the residential element of the scheme.

A12.22 Since the removal of the residential element from the Proposed Scheme, additional email consultation has been undertaken between Nathan Green and Richard Hume in October 2017, more specifically to agree the BS 4142:2014 *rating level* criterion. It was agreed that criteria established within the WYPCG would be the most suitable when assessing sound from industrial sources.

Updated Assessment Methodology

A12.23 Paragraphs 12.11 – 12.18, 12.24-122.29 (including Table 12.6) and 12.33 -12.37 of the July 2016 ES have been retained. Paragraphs 12.19 to 12.23 (including Table 12.3) are no longer relevant. Paragraphs 12.30 to 12.31 and Table 12.7 have been replaced.

Impact of Industrial Sound Sources on Noise Sensitive Receptors

A12.24 Suitable criteria are proposed within this Addendum based upon the guidance in BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound'. (Ref 12.5)

A12.25 A key aspect of the BS 4142 assessment procedure is a comparison between the background sound level in the vicinity of residential locations and the rating level of the sound 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 for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels';

- Specific sound level – Ls ($L_{Aeq,Tr}$) – the 'equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr'; and

- Rating level – $L_{Ar,Tr}$ – the 'specific sound level plus any adjustment made for the characteristic features of the sound'.

A12.26 Whereas the previous version of BS 4142:1997 allowed for a single correction of +5 dB to be made to the specific noise level if one or more of the distinguishable, impulsive or irregular features were considered to be present, BS 4142: 2014 allows for corrections to be applied based upon the presence or expected presence of the following:

- Tonality: up to +6 dB penalty

- Impulsivity: up to +9 dB penalty (this can be summed with tonality penalty)

- Other sound characteristics (neither tonal or impulsive but still distinctive) :+ 3 dB penalty

A12.27 Once any adjustments have been made, the *background sound levels* and the *rating levels* are compared. The standard states that:

- 'Typically, the greater the 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 upon the context.*

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

- *The lower the rating level is compared 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.'*

A12.28 Table A12.1 illustrates the adopted magnitude of impact scale for BS 4142:2014 assessments based upon the numerical level difference between the *rating level* and *background sound level*. For indicative assessment purposes the SOAEL is set at a *rating level* above *background sound level* of +10 dB, and the LOAEL at +5 dB.

Table A12.1: Magnitude of Impact for Industrial Sound

Magnitude of Impact	BS 4142 Descriptor	*Rating level – Background sound level* (dB)
High	No BS 4142 descriptor for this magnitude level	>15
Medium	Indication of a significant adverse impact, depending upon context	+10 approx.
Low	Indication of an adverse impact, depending upon context	+5 approx.
Very Low	Indication of low impact, depending upon context	≤ 0

A12.29 Section 4.2 of the WYPCG, *Proposed Developments Containing Noise Sensitive users: Noise from Industrial Sources*, provides the following criteria for suitable noise levels.

- The *rating level* (calculated in accordance to BS 4142:2014) is at least 10 dB below the existing *ambient sound level* (L_{Aeq});
- The *rating level* (calculated in accordance to BS 4142:2014) does not exceed the existing *background sound level* (L_{A90});
- Between the hours of 19:00 and 07:00, the maximum noise levels (L_{AFmax}) shall not exceed the L_{A90} by more than 10 dB; however, where the existing *background sound level* is 45 dB L_{A90} or less, the maximum noise levels shall not exceed 60 dB L_{AFmax}.

A12.30 The assessment will take account of these recommendations provided by the West Yorkshire Combined Authority.

Sensitivity of Receptors

A12.31 *Paragraph 12.38 and Table 12.9 of the July 2016 ES has been updated with the following:*

A12.32 In accordance with the principles of environmental impact assessment, the sensitivity of receptors (existing and proposed) to noise or vibration impacts during either construction or operational phases have been defined in Table A12.2.

Table A12.2: Sensitivity/Value of Receptor

Sensitivity/Value of Resource/Receptor	Description	Examples of Receptor Usage
Very High	Receptors where noise or vibration will significantly affect the function of a receptor	Auditoria/studios; Specialist medical/teaching centres, or laboratories with highly sensitive equipment; and
High	Receptors where people or operations are particularly susceptible to noise or vibration. Sensitive ecological receptors known to be vulnerable to the effects of noise or vibration.	Residential; Quiet outdoor areas used for recreation; Conference facilities; Schools/educational facilities in the daytime; Hospitals/residential care homes; Libraries; and Ecologically sensitive areas for example Special Protection Areas (SPAs)
Medium	Receptors moderately sensitivity to or vibration where it may cause some distraction or disturbance	Offices; Restaurants; and Sports grounds when spectator or noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf).
Low	Receptors where distraction or disturbance of people from noise or vibration is minimal	Residences and other buildings not occupied during working hours; Factories and working environments with existing high noise levels; and Sports grounds when spectator or noise is a normal part of the event.

Significance Criteria

A12.33 The following terminology has been used in the assessment to define effects:

- Adverse – detrimental or negative effects to an environmental resource or receptor;
- Negligible – imperceptible effects to an environmental resource or receptor; or
- Beneficial – advantageous or positive effect to an environmental resource or receptor.

A12.34 Where adverse or beneficial effects have been identified, these have been assessed against the following significance scale:

- Minor – slight, very short or highly localised effect of no significant consequence;
- Moderate – limited effect (by extent, duration or magnitude), which may be considered significant; or
- Major – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

Table A12.3: Classification of Effects

Sensitivity/Value of Resource/Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Very Low**
Very High	Major	Major	Moderate	Minor
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible

Significance of effects

A12.35 The 'Significance of Effects' Section replaces Paragraph 12.56 and Table 12.11 of the July 2016 ES.

A12.36 The significance of effect resulting from each individual potential impact type above is derived from the magnitude of the impact and the sensitivity or value of the affected receptor using the matrix presented in Table A12.3 below.

A12.37 With respect to the Classification of Effects outcomes from Table A12.3, effects of negligible and minor adverse (or beneficial) are considered to be not significant, whereas effects of moderate and major adverse (or beneficial) are considered to be significant.

Study Area

A12.38 The third bullet point of paragraph 12.39 in the July 2016 ES should be removed.

Surveys

A12.39 Paragraphs 12.40 to 12.51 are replaced with the following.

A12.40 The location of existing residential NSRs in close proximity to the Application Site have been considered when assessing the effects associated with noise and vibration levels from the construction and operational phases of the Development.

A12.41 Monitoring locations were selected in early 2017 which were considered to be representative of the nearest and potentially most noise sensitive receptors to the Development, and also the closest residential NSRs within the Development to existing noise sources. It is considered that, if noise and vibration levels are suitably controlled at the key NSR identified, then noise and vibration levels will be suitably controlled at other sensitive NSR in the surrounding area.

A12.42 Whilst the development no longer contains a proposed residential area, some of the data collected during the 2017 surveys are still considered applicable to the current Development proposals and have therefore been presented within this addendum.

A12.43 Unattended ambient sound monitoring was undertaken at two locations (ML1 and ML2) between the 17th - 19th February 2017 and between 10th – 15th March 2017. Both locations were selected due to their proximity and exposure to road traffic noise from the surrounding road network, which includes the M606, M62 and Bradford Road (running north-south to/from Oakenshaw to the west of the M606). Data collected at Monitoring Location (ML1) remains of use in this assessment.

A12.44 Additional daytime and night-time manned measurements were undertaken at two positions near to existing NSRs. The manned measurements were recorded between 00:00 – 02:15 hours and 12:00 – 14:30 hours on Tuesday 21 February 2017.

A12.45 Table A12.4 describes the monitoring locations that were selected for the 2017 sound monitoring; the locations can are also presented in Appendix AA.1.

Table A12.4: Monitoring Locations

Location	Description
ML1 (Unattended)	Located along the eastern boundary of the Application Site, adjacent to the existing water treatment works access road, and approximately 45 metres from the water treatment works entrance.
ML3 (Attended)	Located to the north of the Application Site on the pedestrian footpath near to the existing residential properties on Cliff Hollins Lane.
ML4 (Attended)	Located to the west of Bradford Road south of the existing residential properties.

A12.46 The microphones were located approximately 1.5 meters above ground level and considered to be in free-field conditions (i.e. the microphone was positioned far enough from any reflecting surface (other than the ground) in order to avoid significant reflected sound) at all measurement locations.

A12.47 In addition to the sound monitoring surveys, listening tests were also carried out at the northern boundary on Cliff Hollins Lane and to the west of the Application Site on Bradford Road between 00:00 – 02:15 and 12:00 – 14:30 on Tuesday 21st February 2017.

Sound Survey Instrumentation

A12.48 Information relating to the measurement equipment during the survey is presented in Table A12.5 below.

Table A12.5: 2017 Sound Monitoring Equipment

Instrument	Manufacturer	Model	Serial Number
Class 1 Sound Level Meter ML1	Rion	NL52	01021279
Class 1 Sound Level Meter ML2	Rion	NL52	011443567
Class 1 Sound Level Meter ML3 & ML4	B&K	2250	2827269
Calibrator 1	B&K	4231	2217877

A12.49 During calibration no significant deviation from the reference value was noted. Full calibration details are available upon request. The sound level meters were programmed to log a number of parameters including L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} values, in 15-minute contiguous intervals at all of the monitoring locations.

Meteorological Conditions

A12.50 During attended periods night-time weather conditions on-site were observed as being relatively still and clear, with a temperature of 3°C. Traffic movements on the M606 and Bradford Road were significantly reduced compared to daytime flows although noise from the M606 remained dominant. Daytime conditions on-site were observed to comprise a north westerly wind with an average wind speed of 1.3 m/s and ambient temperatures were noted to be approximately 9°C.

A12.51 Meteorological conditions were within the limits specified in the relevant standards for acceptable sound measurements.

Limitations and Assumptions

A12.52 Paragraphs 12.57 to 12.60 of the July 2016 ES remain unchanged.

Baseline Conditions

A12.53 The following section supersedes Paragraphs 12.61 – 12.68 of the July 2016 ES.

A12.54 The Application Site is located on the Former Bierley Treatment Works, Cleckheaton. The M606 motorway is located to the west of the Application Site, and the M62 motorway is located to the south-east of the Application Site.

A12.55 The nearest NSRs are residential dwellings and schools along Bradford Road to the west of the Application Site, and along Mill Carr Hill Road/Cliff Hollins Lane to the north of the Application Site.

A12.56 During both attended surveys, the dominant source of noise affecting the Application Site was observed to be road traffic noise from the M606 motorway, as well as road traffic noise from the M62 and Junction 26 roundabout to the south of the Application Site. At the Bradford Road monitoring location (ML4), traffic comprised a mix of lorries, vans and cars. Traffic flows were intermittent due to the signalised M62 Junction 26 roundabout and traffic lights on the Oakenshaw junction. Additional noise sources included occasional aircraft flyovers.

A12.57 No noticeable levels of ambient ground borne vibration were observed on site during the site visits.

A12.58 A summary of the automated free-field ambient sound monitoring results are provided in Table A12.6. Sound level data at all locations are reported directly as measured for the given measurement period. Measurements undertaken during the period 07:00 and 23:00 hours are defined as daytime and measurements undertaken during the period 23:00 and 07:00 hours are defined as night-time by BS 8233.

Table A12.6: Summary of Sound Monitoring Results at ML1

Date	Time Period	$L_{Aeq,T}$ dB	Highest L_{Amax} dB	$L_{A10,T}$ dB	$L_{A90,T}$dB
Friday 17th February	12:45 – 23:00	65.1	78.7	68.5	57.1
	23:00 – 07:00	58.4	75.9	63.0	48.5
Saturday 18th February	07:00 – 23:00	63.4	81.7	67.3	55.7
	23:00 – 07:00	60.0	78.7	65.1	47.8
Sunday 19th February	07:00 – 23:00	64.1	84.0	67.6	57.5
	23:00 – 07:00	61.7	76.1	67.5	47.8
Friday 10th March	15:00 – 23:00	63.7	80.8	69.2	57.8
	23:00 – 07:00	59.4	77.3	64.2	48.5
Saturday 11th March	07:00 – 23:00	63.7	85.0	66.9	58.9
	23:00 – 07:00	59.6	75.4	65.2	47.9
Sunday 12th March	07:00 – 23:00	63.9	82.6	67.2	58.5
	23:00 – 07:00	61.7	82.2	67.9	48.7
Monday 13th March	07:00 – 23:00	66.2	89.6	69.7	59.5
	23:00 – 07:00	61.8	76.4	68.4	47.2
Tuesday 14th March	07:00 – 23:00	66.7	82.5	69.9	58.6
	23:00 – 07:00	60.8	83.0	67.9	48.8
Wednesday 15th March	07:00 – 14:00	64.8	79.3	67.8	60.9

A12.59 Results of the attended monitoring undertaken at ML3 and ML4 are presented in Tables A12.7 and A12.8 below.

Table A12.7: Summary of Attended Sound Monitoring at ML3

Date	Time Period	$L_{Aeq,T}$ dB	Highest L_{Amax} dB	$L_{A10,T}$ dB	$L_{A90,T}$dB
Tuesday 21st February 2017	00:00	58.9	78.1	61.0	52.2
	00:15	57.2	67.4	60.5	50.8
	00:30	56.9	78.2	59.1	50.6
	00:45	56.1	68.3	59.2	49.7
	13:15	61.2	80.1	61.8	57.7
	13:30	61.7	81.1	61.9	57.5
	13:45	62.4	85.4	61.9	56.9
	14:00	61.1	81.6	60.8	57.1
	14:15	62.5	86.8	61.7	57.7

Table A12.8: Summary of Attended Sound Monitoring at ML4

Date	Time Period	$L_{Aeq,T}$ dB	Highest L_{Amax} dB	$L_{A10,T}$ dB	$L_{A90,T}$dB
Tuesday 21st February 2017	01:15	55.3	73.6	56.0	42.3
	01:30	48.6	64.2	51.0	43.2
	01:45	54.3	75.0	52.3	43.2
	02:00	52.0	68.6	53.7	43.4
	12:00	62.8	76.9	65.6	56.7
	12:15	62.0	74.5	65.1	56.6
	12:30	62.3	77.1	65.1	56.4
	12:45	62.6	75.3	65.2	57.5

Representative Sound Levels

A12.30 Based upon the weekday sound level data presented within the Tables A12.6 – A12.9 above as an intended conservative approach to assessment of road traffic noise, the following values presented within Table A12.9 will be used within the assessment section of this Addendum report.

Table A12.9 Summary of Representative Sound Levels

Receptor	Sound Level (dB)					
	$L_{Aeq,T}$		L_{Amax}		L_{A90} *	
	Day	Night	Day	Night	Day	Night
ML1	61	54	-	82	52	45
ML2	67	60	-	83	59	48

Bradford Road (ML3)	62	53	-	75	57	43
Cliff Hollins Lane (ML4)	62	57	-	78	57	51

* Noise levels have been derived based upon the lowest 10th percentile of all of the 15-minute measurements within the 16hr day or 8hr night-time period, as an intended conservative approach.

Predicted Significant Effects

Construction

A12.31 Construction related noise and vibration impacts have not been reassessed and can be found within the July 2016 ES, Paragraphs 12.69 – 12.83. However, the ABC method threshold values (Table 12.15 of the July 2016 ES) have been updated to reflect the new baseline ambient sound levels.

A12.32 Table 12.15 of the July 2016 ES has been replaced by Table A12.10 (below) to reflect the updated ambient sound level data. Using the updated daytime ambient sound levels, an ABC category has been defined for the two off-site NSRs.

Table A12.10: BS 5228-1 ABC Method Threshold Values (Daytime) [Ref 12.6]

Location	BS 5228-1 ABC Method Threshold Values			
	Average Measured Ambient Weekday Daytime Noise Level dB $L_{Aeq,1\text{-}hr}$	Ambient Noise Level L_{Aeq} Rounded to Nearest 5 dB	ABC Category	Threshold Value (dB)
Dwellings along Bradford Road	62	60	A	65
Dwellings along Mill Carr Hill Road/Cliff Hollins Lane	62	60	A	65

A12.33 In order to avoid significant noise effects during construction, construction noise levels should remain below the Threshold Values at NSRs. Where construction works are intended at night or during the weekend, appropriate Threshold Values will need to be established based upon baseline noise levels at NSRs.

Effects During Operational Phase: Long Term

A12.34 Redevelopment of the Application Site has the potential to impact existing NSRs, therefore consideration has been given to:

- noise from operational activities and deliveries associated with the proposed employment zone; and
- assessment of the effects of operational noise due to changes in road traffic, on existing NSRs in the vicinity of the Application Site.

Noise from Operational Site Activities (comprising HGV Movements and Reversing Alarms within the Employment Zone)

A12.35 Paragraphs 12.84 – 12.92 of the July 2016 ES have been retained with the exception of Paragraph 12.88, which has been replaced by the following.

A12.36 Site HGV activity has been calculated by assuming that there will be the number of daily OGV/HGV vehicles associated with the employment zone presented in Table A12.11. Site operation has been assumed to be 24-hours and HGV movements are assumed as a consistent flow throughout both daytime and night-time periods, as a potential conservative approach.

Table A12.11: Number of Predicted HGV 2-way Movements Related to the Employment Zone

Link	Number of Predicted Daily OGV/HGV Movements	Approximate Average per 1-hour Period	Approximate Average per 15-minute Period
Site Access	358	15	4

A12.37 For the purposes of this assessment OGV and HGV reversing alarm sound source data have been assumed to be equivalent. The distances used in the assessments relate to the distances between the NSRs and the potential closest point within the employment zone (as an assumed vehicle manoeuvring location).

A12.38 Tables 12.20 and 12.21 of the July 2016 ES are no longer required given the removal of the proposed residential development. Tables A12.12 to A12.14 below are duplicates of Tables 12.18, 12.19 and 12.22 presenting the BS 4142 assessment in the July 2016 ES, but have been updated to reflect the 2017 *background sound level* data. In the absence of detailed information at this stage related to the future employment zone operations, a +3 dB character correction has been applied for a distinguishable sound that is neither tonal nor impulsive. However, following removal of the residential element and redesign of the employment zone, screening between the closest service yard and NSRs at Cliff Hollins Lane will be provided by a proposed earth bund around the service yard. The design of the earth bund at this stage is unknown but the calculations for this assessment assume partial screening with a 5 dB reduction. A 5 dB reduction would typically be achieved where the sound source is just visible at the NSR above the bund or barrier.

Table A12.12: BS 4142 Assessment – Dwellings along Bradford Road (ML4)

Assessment Scenario	Number of HGVs/OGVs	Sound Power Level L_{wA} (dB)	Total time of operation (minutes)	Time correction (dB)	Distance to Receptor (m)	Distance / Propagation Correction (dB)*	Attenuation by Building Screening and Land Features (dB)	Sound character correction (dB)	Predicted *Rating level* at NSR (dB)	*Background sound level* (dB L_{A90})	Difference (dB)
1-hour period, daytime	15	99	60	0	120	-50	-5	+3	47	57	-10
15-minute period, night-time	4	99	20	-5	120	-50	-5	+3	42	43	-1

*Assumes Hemi-spherical propagation

Table A12.13: BS 4142 Assessment – Dwellings along Mill Carr Hill Road/Cliff Hollins Lane (ML3)

Assessment Scenario	Number of HGVs/OGVs	Sound Power Level L_{wA} (dB)	Total time of operation (minutes)	Time correction (dB)	Distance to Receptor (m)	Distance / Propagation Correction (dB)*	Attenuation by Building Screening and Land Features (dB)	Sound character correction (dB)	Predicted *Rating level* at NSR (dB)	*Background sound level* (dB L_{A90})	Difference (dB)
1-hour period, daytime	15	99	60	0	200	-54	-5	+3	43	52	-9
15-minute period, night-time	4	99	20	-5	200	-54	-5	+3	38	45	-7

*Assumes Hemi-spherical propagation

Table A12.14: L_{Amax} Noise Level Assessment (based upon the use of a vehicle reversing alarm within the Employment Zone)

NSR	Sound Power Level L_{wA} (dB)	Distance to Receptor (m)	Distance / Propagation Correction (dB)*	Attenuation by Building Screening and Land Features (dB)	Predicted maximum level at NSR (dB L_{Amax})	WHO criteria (dB L_{Amax})	Difference (dB)
Bradford Road	105	120	-50	-5	45	60	-10
Cliff Hollins Lane	105	200	-54	-5	41	60	-14

*Assumes Hemi-spherical propagation

A12.39 In summary, Tables A12.12 to A12.14 present the following with respect to BS 4142:2014 assessments of operational noise resulting from HGV manoeuvring within the proposed employment zone:

- At existing dwellings along Bradford Road, the predicted *rating level* is 10 dB below the measured *background sound level* during the daytime and 1 dB below the measured *background sound level* during the night-time.

- At existing dwellings along Mill Carr Hill Road/Cliff Hollins Lane, the predicted *rating level* is 9 dB below the measured *background sound level* during the daytime, and 7 dB below the measured *background sound level* during the night-time.

- Night-time L_{max} noise levels from HGV reversing alarms have been calculated to be 10 dB and 14 dB below the 60 dB criterion at the nearest residential properties on Bradford Road and Cliff Hollins Lane respectively.

A12.40 During daytime periods, *rating levels* resulting from HGV manoeuvring within the employment zone are predicted to be sufficiently below representative measured *background sound levels* at nearby NSRs such that there is a *'very low impact'* in accordance with BS 4142:2014 guidance. In accordance with Tables A12.1, A12.2 and A12.3 above, the predicted *rating levels* are equivalent to a Very Low magnitude of impact with a resulting Negligible significance of effect (not significant).

A12.41 During night-time periods, at NSR on Cliff Hollins Lane, *rating levels* resulting from HGV manoeuvring within the employment zone are predicted to be slightly above the measured *background sound level* at nearby NSRs such that there is a *'low impact'* in accordance with BS 4142:2014 guidance. In accordance with Tables A12.1, A12.2 and A12.3 above, the predicted Rating levels are equivalent to a Low magnitude of impact with a resulting Minor significance of effect (not significant).

A12.42 During the night-time periods, at NSR on Bradford Road, *rating levels* resulting from HGV manoeuvring within the employment zone are predicted to be below the measured *background sound level* such that there is a predicted *'very low impact'* in accordance with BS 4142:2014 guidance. In accordance with Tables A12.1, A12.2 and A12.3 above, the predicted Rating levels are equivalent to a Very Low magnitude of impact with a resulting Negligible significance of effect (not significant).

A12.43 In accordance with BS 4142:2014 the uncertainty within the assessment should be considered. Future *background sound levels* may vary from those measured due to the additional acoustic screening provided by buildings within the development. However, conversely, traffic levels on the surrounding road network (the dominant noise source in the area) may increase, and therefore increase the *background sound level*. Both of these factors could influence the BS 4142 assessment outcome.

A12.44 Supplementary to the above assessment, the Kirklees Council requirements state that the *rating level* should be 0 – 5 dB below the *background sound level* and 10 dB below the *ambient sound level* (L_{Aeq}). This is achieved at both of the off-site NSRs.

Building Services and Fixed Plant Noise

A12.45 Paragraphs 12.100 – 12.101, Building Services and Fixed Plant Noise, from the July 016 ES are replaced with the following:

A12.46 In order to achieve a minor adverse significance of effect (or lower) as set out in Table A12.5, the magnitude of impact (calculated in accordance with BS 4142:2014) is required to be no higher than 5dB above the *background sound level* (L_{A90}), as set out in Table A12.3, for a high sensitivity residential receptor.

A12.47 Table 12.23 of the July 2016 ES has been superseded by Table A12.15 below and presents updated operational noise limits at existing off-site NSR**.**

Table A12.15: Recommended Operational Noise Limits for Off-Site Receptors

Location	Operational Noise Limits (*Rating Level*, dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Dwellings along Bradford Road	62	48
Dwellings along Mill Carr Hill Road/Cliff Hollins Lane	62	56

A12.48 However, should there be a desire to reduce noise levels to achieve the Kirklees BS 4142 criteria of a *rating level* between 0-5 dB below the background sound level, the above operational limits would need to be adjusted downwards accordingly.

A12.49 There are no known significant operational vibration sources associated with the proposed development, therefore vibration impacts would be considered to be of Negligible significance at this stage (not significant).

Impact of Traffic Movements on Access Road to Employment Zone

A12.50 Traffic movements associated with the Proposed Development along the access road (from Cliff Hollins Lane), have the potential to result in a significant noise effect at existing NSRs at Cliff Hollins Lane.

A12.51 In Table A12.16 noise levels from the access road have been calculated using the Basic Noise Level (BNL) calculation method described in CRTN (Ref 12.7). The BNL has then been corrected to L_{Aeq} so that it can be used in the further assessment.

Table A12.16: Calculated BNL from Access Road using Traffic Data

Link Name	2017 Traffic 18hr AAWT	Number of HGV's	% HGV	Speed of Traffic (kph)	Resulting Basic Noise Level (L_{A10} dB)	Corrected to L_{Aeq}
Access Road	1388	358	25.6	32	62.8	60.8

A12.52 Using the noise levels derived from the traffic data, movements along the employment zone access road can be predicted at the existing residential NSRs on Cliff Hollins Lane. Table A12.17 presents the predicted impact in accordance with the BS 4142:2014 methodology. A +3 dB character correction has been applied for a distinguishable sound that is neither tonal nor impulsive.

Table A12.17: Prediction of Impact from HGV Movements along Employment Zone Access Road

Receptor	Time Period	Calculated Noise level from Access Road (L_{Aeq})	Distance from Access Road to NSR	Sound character correction (dB)	Predicted *rating level* at NSR (dB)	*Back-ground sound level* (dB L_{A90})	Difference (dB)
Cliff Hollins Lane	Daytime	61	50 m (14 dB)	3	49	52	-3
	Night-time			3	49	45	+4

A12.53 In summary, the predicted rating level is 3 dB below the measured representative background sound level during the daytime, and 4 dB above the measured representative background sound level during the night-time.

A12.54 During the daytime period, the *rating level* resulting from traffic on the access road to the employment zone is predicted to be equal to the measured *background sound level* at nearby NSRs such that there is a *'very low impact'* in accordance with BS 4142:2014 guidance. During the night-time, the *rating level* is predicted to be 4 dB above the measured representative *background sound levels* at nearby NSRs such that there is a *'low impact'* in accordance with BS 4142:2014 guidance.

A12.55 In accordance with Tables A12.1, A12.2 and A12.3 above, the predicted *rating level* during the daytime is equivalent to a Very Low magnitude of impact with a resulting Negligible significance of effect (not significant).

A12.56 During the night-time period, in accordance with Tables A12.1, A12.2 and A12.5 above, the predicted *rating level* is equivalent to a Low magnitude of impact with a resulting Minor significance of effect (not significant).

Operational Traffic Flows on the Local Highway Network

A12.57 Paragraphs 12.102 – 12.104, Operational Traffic Noise, from the July 2016 ES have been replaced with the following:

A12.58 Relative changes in 18-hour traffic noise levels along the local road network have been calculated using methodologies in line with CRTN guidance. This has been carried out for the 2017 'without' scheme scenario, 2017 'with' scheme scenario and 2022 'with' scheme scenario. The project transport consultants (AECOM) have provided updated road traffic data in the form of 18-hour Annual Averaged Weekly Traffic (AAWT) for each road link.

A12.59 The relative change in road traffic noise levels based on the overall increase in traffic volume have been assessed using the short term and long term criteria set out in Table 12.8 of the July 2016 ES. Tables A12.18 and A12.19 present the operational traffic noise assessment.

Table A12.18: Operational Traffic Noise Assessment – Short Term

Link Name	2017 Without Develop-ment 18hr AAWT / HGV %	2017 With Develop-ment 18hr AAWT / HGV %	Difference 18hr AAWT / HGV %	Relative change in road traffic noise level dB	Magnitude of Impact	Significance of Effect (High Sensitivity Receptors)
Cliff Hollins Lane (east)	2426 / 1.2	2468 / 1.7	42 / 0.5	+0.3	Very Low	Negligible
Cliff Hollins Lane (west)	2426 / 1.2	3772 / 10	1346 / 8.8	+4.5	Medium	Moderate
Mill Carr Hill Road (east)	3553 / 0.8	3595 / 1.1	42 / 0.3	+0.2	Very Low	Negligible
Mill Carr Hill Road (west)	5619 / 0.6	6924 / 5.4	1305 / 4.8	+2.6	Low	Minor
Bradford Road (north)	15343 / 1.8	15621 / 9.6	278 / 7.8	+2.9	Low	Minor
Bradford Road (south)	14570 / 6.6	15597 / 10.7	1027 / 4.1	+1.2	Low	Minor

Table A12.19: Operational Traffic Noise Assessment – Long Term

Link Name	2017 Without Develop-ment 18hr AAWT / HGV %	2022 With Develop-ment 18hr AAWT / HGV %	Difference 18hr AAWT / HGV %	Relative change in road traffic noise level dB	Magnitude of Impact	Significance of Effect (High Sensitivity Receptors)
Cliff Hollins Lane (east)	2426 / 1.2	2624 / 1.7	198 / 0.5	+0.5	Very Low	Negligible
Cliff Hollins Lane (west)	2426 / 1.2	3929 / 10	1503 / 8.8	+4.6	Low	Minor

Mill Carr Hill Road (east)	3553 / 0.8	3824 / 1.1	271 / 0.3	+0.5	Very Low	Negligible
Mill Carr Hill Road (west)	5619 / 0.6	7287 / 5.4	1668 / 4.8	+2.7	Very Low	Negligible
Bradford Road (north)	15343 / 1.8	16609 / 9.6	1266 / 7.8	+3.1	Low	Negligible
Bradford Road (south)	14570 / 6.6	16536 / 10.7	1966 / 4.1	+1.4	Very Low	Negligible

A12.60 Table 12.18 above shows that during the short-term, negligible or minor magnitudes of impact are expected due to changes in traffic flows for the majority of roads in the vicinity of the Application Site. This is with the exception of Cliff Hollins Lane (west), which has been predicted to experience a medium magnitude of impact. For the majority of roads this would result in effects of negligible or minor significance of effect (not significant), but for Cliff Hollins Lane (west) this would result in a moderate significance of effect. However, it should be noted that the change in noise level on Cliff Hollins Road (west) would only form part of the road traffic noise contribution at adjacent NSRs. When combined with the traffic noise contribution from the M606, the predicted noise level change at the worst affected NSR would be approximately 1dB on the northern façade, and approximately 2dB on the eastern facade. These change values are classified as a low magnitude of impact, and a resulting minor adverse significance of effect (not significant).

A12.61 Table 12.19 above shows that during the long-term, negligible or minor magnitudes of impact are expected due to changes in traffic flows for all of the roads in the vicinity of the Application Site, this would result in effects of negligible or minor significance (not significant).

A12.62 Therefore for all NSRs affected by a change in operational traffic noise the magnitude of the change will be > 3 dB (short-term) and > 5 dB (long-term), which are classed as low or very low and below the LOAEL. As a result, no further mitigation measures are considered necessary.

Car Parking

A12.63 There are no changes to paragraphs 12.105 to 12.115.

Summary of operational effects (no mitigation)

Table A12.20: Operational Effects (without Mitigation) Assessment Summary Table

Potential Impact	Impact Area	Phase	Period	Permanent/ Temporary	Significance
Operational Site Activities#	Local: Nearby NSRs e.g. residential dwelling	Operation	Long Term	Permanent	Minor/ Negligible
Building services and plant noise*	Local: Nearby NSRs e.g. residential dwelling	Operation	Long Term	Permanent	Negligible
Operational Traffic on Access Road	NSR on Cliff Hollins Lane	Operation	Long Term	Permanent	Negligible - Minor
Operational Traffic on public roads	Local: Nearby NSRs e.g. residential dwellings	Operation	Long Term	Permanent	Negligible - Minor

#on the basis that the bund is designed and constructed to achieve a minimum 5dB reduction in noise levels associated with service yard activities.

* On the basis that the operational noise limits are met.

Scope of Mitigation

Mitigation during the construction phase: short to medium term.

A12.64 Paragraphs 12.117 – 12.127 of the July 2016 ES have been retained.

Mitigation during Operational Phase: Long Term

Ambient Noise Affecting the Existing NSRs

A12.65 Paragraphs 12.128 to 12.135 are no longer required.

A12.66 The following sections discuss the mitigation and design measures which will help to minimise the potential adverse effects during the operational phase of the development.

Noise from Operational Site Activities

A12.67 By careful design and specification at the detailed design stage, it should be possible to achieve the BS 4142 criteria adopted for this assessment and achieve levels equal to or lower than the LOAEL. This can be achieved by consideration of the following:

- Where possible, appropriate layout of the employment zone structures such that the structures themselves provide screening of noise from vehicular traffic and manoeuvring within the employment zone

- Where the northernmost employment buildings cannot be oriented to provide screening of the service yards, appropriate design of the proposed earth bund located between the employment zone and NSR on Cliff Hollins Lane, such that HGV movements are barely visible from the NSR on Cliff Hollins Lane and a minimum of 5dB sound reduction is achieved against noise from the service yards.

- Regular maintenance of fixed and mobile plant using the employment site;

- Reverse alarms on mobile plant to use 'broadband noise' types where possible and set to a low level but satisfying the requirements for Health and Safety;

- Appropriate scheduling of deliveries and dispatches to minimise vehicle movements during the night time hours, as far as practicable; and

- Implementation and regular reviews of operational procedures to ensure that noise mitigating measures are maintained.

A12.68 Once the final end uses of the employment zone are confirmed noise management plans, and/or BS 4142 assessments can be prepared/undertaken to minimise the noise impacts associated with the operation of the employment zone.

Building Services and Fixed Plant Noise

A12.69 By careful design and specification at the detailed design stage, it should be possible to achieve the BS 4142 criteria adopted for this assessment and achieve levels below the SOAEL, where necessary by accommodating appropriate noise attenuation measures. For example, breakout noise from refrigeration plant contained within plant rooms can be reduced using acoustic ventilation louvres, noise from fans housed within ducted intakes and exhausts can be reduced using in-duct attenuators and noise from boiler flue fans can be reduced by atmospheric-side boiler flue attenuators. Significant noise reduction can also be achieved by careful positioning and screening of plant and building services away from NSRs. Hence, the appropriate design, location and installation of any fixed plant, and associated mitigation where necessary, such that the noise criteria are met, should ensure that significant adverse impacts will not arise. Achieving *rating levels* of no greater than 5 dB above the prevailing *background sound levels* would result in levels equal to the LOAEL set for this assessment.

Traffic Movements on Access Road to Employment Zone

A12.70 Employment zone access road noise calculations and subsequent BS 4142 assessment presented within Table A12.18 indicated effects of minor adverse significance (not significant) during the night-time period at existing residential NSRs along Cliff Hollins Lane.

A12.71 However, should Kirklees Council require a criterion *rating level* between 0 – 5 dB below *background sound level (*WYPGC guidelines), a minimum reduction of 4dB would be required. In order to achieve this reduction an acoustic barrier between the existing NSRs on Cliff Hollins Lane and the employment zone access road should be considered. The height and length of the barrier should be such that the NSRs are adequately protected and acceptable night-time noise levels are achieved.

A12.72 A reduction of more than 4 dB should be readily achievable at the existing NSRs through the incorporation of an acoustic barrier. Based upon a barrier positioned 2m from the kerb edge, an acoustic barrier with a height of 2.5 m installed along the first 80 metres on the western side of the access road (closest to Cliff Hollins Lane) should achieve an approximate noise reduction of 4dB at the worst affected NSR. This would reduce the *rating level* so that it is equal to the *background sound level* and meet with the WYPCG criterion.

Residual Effects Assessment

Residual Effects During Construction Phase: Short to medium Term

A12.73 Paragraph 12.141 of the July 2016 ES is retained.

Residual Effects during Operational Phase: Long Term

Ambient Noise and Vibration affecting the Residential Zone

A12.74 Paragraph 12.142 to 12.143 of July 2016 ES is on longer required.

Noise from Operational Site Activities

A12.75 Paragraph 12.144 of the July 2016 ES is replaced with the following:

A12.76 HGV movements and reversing within the employment zone service yard areas are predicted to be limited to an effect of negligible significance based upon the assessment undertaken. Appropriate criteria have been provided in order to ensure any effect is minimised.

Building Services and Fixed Plant Noise

A12.77 Paragraph 12.145 of the July 2016 ES is retained

Impact of HGV Movements on Access Road to Employment Zone

A12.78 Without mitigation in place, for the daytime period, noise from HGV movements along the access road has been predicted to have an effect of negligible/minor adverse significance. If HGV deliveries are required to operate throughout the night-time period operational activities may result in a minor adverse significance at existing NSRs on Cliff Hollins Lane. However, should Kirklees council criterion of a *rating level* 0 – 5 dB below *background sound level*, the implementation of appropriate mitigation would reduce the significance of effect to negligible/minor adverse at nearby NSRs.

Operational Traffic and Car Park Noise

A12.79 Paragraph 12.146 of the July 2016 ES is retained.

Summary of residual effects

A12.80 **Table A12.21** summarises the potential impacts, mitigation measures, residual effects and significance of effects on receptors as a result of the Proposed Development.

Table A12.21: Summary of Residual Effects

Potential Impact	Impact Area	Phase	Significance of Effects without Mitigation	Mitigation	Period	Permanent/ Temporary	Residual Significance of Effects with Mitigation
Operational Site Activities	Local: Nearby NSRs e.g. residential	Operation	Minor/Negligible Adverse (Below LOAEL)	Non additional - Earth bund already incorporated into design (minimum sound reduction performance required)	Long Term	Permanent	Minor/Negligible Adverse (Below LOAEL)
Building services and plant noise	Local: Nearby NSRs e.g. residential dwelling	Operation	Negligible	Plant noise limits set based on existing background noise levels and Kirklees Council criteria	Long Term	Permanent	Negligible (Below LOAEL)
Operational Traffic on Access Road	Cliff Hollins Lane	Operation	Minor/Negligible Adverse (Below LOAEL)	Barrier along western side of access road	Long Term	Permanent	Negligible (Below LOAEL)
Changes in future road traffic noise (Short-term)	Cliff Hollins Lane (west)	Operation	Minor/Negligible Adverse (Below LOAEL)	none	Short Term	Permanent	Minor/ Negligible Adverse (Below LOAEL)
Changes in future road traffic noise (Long-term)	Local: Nearby NSRs e.g. residential dwellings	Operation	Minor/Negligible Adverse (Below LOAEL)	none	Long Term	Permanent	Minor/ Negligible Adverse (Below LOAEL)

Cumulative Effect Assessment

A12.81 Paragraphs 12.150 – 12.155 from the July 2-16 ES chapter have been retained.

References

A12.1 Department for Environment, Food & Rural Affairs (2010), Noise Policy Statement for England (NPSE)

A12.2 West Yorkshire Combined Authority (2002). West Yorkshire Planning Consultation Guidance.

A12.3 Kirklees Council (2016), Publication Draft Local Plan: Strategy & Policies

A12.4 Bradford Metropolitan District Council (2017), Bradford Core Strategy

A12.5 British Standards Institute (2014), BS 4142:2014 – Methods for Rating and Assessing Industrial and Commercial Sound.

A12.6 British Standards Institute (2014), BS 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 1: Noise.

A12.7 Department of Transport/Welsh Office (1998), Calculation of Road Traffic Noise (CRTN)