# 13 NOISE AND VIBRATION

## 13.1 Introduction

13.1.1 This chapter of the Environmental Statement considers the potential noise and vibration impacts associated with proposed development at Hope Cement works in the Hope Valley, Derbyshire.

13.1.2 This new facility would introduce new plant noise to the existing Cement works facility and would also increase rail importation of raw materials. It therefore has the potential to affect existing receptors near the Cement works and near to the branch line leading to the Cement works.

13.1.3 This Chapter details the results of baseline noise and vibration monitoring and associated assessment of the potential impact on Existing Sensitive Receptors (ESRs) in the vicinity of the Cement works site and railway branch line. The key topics covered are:

- Baseline noise and vibration monitoring
- Noise and vibration impact during construction
- Noise impact of unloading conveying and movements in the storage facility during operation
- Noise and vibration impact of additional trains during operation
- The effects of demolition are considered to be similar to construction.

13.1.4 Further details of the project, site description and working methods are available in the introductory Chapters 2 and 3 of the ES.

13.1.5 Since the original Environmental Statement was written, further work has been undertaken to limit noise emissions and the proposed operations have been amended. This chapter considers the changes in existing noise emissions and proposed operations as part of this application.

## 13.2 Legislation and policy context

13.2.1 This section provides a brief introduction to the noise policy, guidance and standards relevant to this assessment. The details of how these were applied for the assessment are included in the methodology section.

***National Planning Policy Framework***

13.2.2 The main national guidance document for Local Planning Authorities is the National Planning Policy Framework (NPPF). The NPPF came into force in 2012 and superseded

Planning Policy Guidance Note 24: 'Planning and Noise' (PPG24). It was updated in February 2019 and is the current planning policy guidance within England.

13.2.3 Paragraph 180 of the NPPF states:

*"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 heath, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impact that could arise from the development. In doing so they should:*

*a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development - and avoid noise giving rise to significant adverse impact on health and the quality of life;*

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

13.2.4 Paragraph 182 of the NPPF states:

*"Planning policies and decisions should ensure that new development can be integrated effectively with existing business and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."*

13.2.5 With regard to 'adverse impacts' the NPPF refers to the 'Noise Policy Statement for England' (NPSE), which defines three categories, as follows:

- 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.

13.2.6 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, this does not mean that such adverse effects cannot occur.

***Planning Practice Guidance – Noise (PPG Noise)***

13.2.7 In March 2014, the Department for Communities and Local Government (DCLG) launched the Planning Practice Guidance (PPG) web-based resource. It was updated in July 2019. This provides guidance on the approach to Noise and Vibration.

13.2.8 PPG Noise provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however, it has no adverse effect as it does not cause any change in behaviour or attitude. Once noise crosses the LOAEL threshold it begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. Table 13.1 summarises the noise exposure hierarchy.

**Table 13.1: Noise exposure hierarchy**

| Response | Examples of outcomes | Increasing effect Level | Action |
|---|---|---|---|
| **No Observed Effect Level** | | | |
| **Not present** | No Effect | No Observed Effect | No specific measures required |
| **No Observed Adverse Effect** | | | |
| **Present and not intrusive** | Noise can be heard but does not cause any change in behaviour or attitude or other physiological response. 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 |

| Table 13.1: Noise exposure hierarchy | | | |
|---|---|---|---|
| **Response** | **Examples of outcomes** | **Increasing effect Level** | **Action** |
| **Lowest Observed Adverse Effect Level** | | | |
| **Present and intrusive** | Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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** | | | |
| **Present and disruptive** | The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to close windows for most of the time. 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 |
| **Present and very disruptive** | Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress 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 |

13.2.9 Overall, PPG Noise summarises the approach to be taken when assessing noise. It accepts that noise can override other planning concerns, but states:

*"Neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement) expects noise to be considered*

*in isolation, separate from the economic, social and other environmental dimensions of proposed development"*

***British Standard 5228-1:2009 +A1:2014 (BS5228), Code of Practice for noise and vibration control on construction and open sites***

13.2.10 Guidance on the prediction and assessment of noise and vibration from construction sites is provided in British Standard 5228 2009 +A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise and Part 2 Vibration (BS5228). BS5228 provides recommended limits for noise and vibration from construction sites.

***British Standard 4142:2014+ A1 2019 (BS4142), Methods for rating and assessing industrial and commercial sound***

13.2.11 BS4142 is used to rate and assess sound of an industrial and/or commercial nature including:

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

13.2.12 The standard is applicable to the determination of the following levels at outdoor locations:

- Rating levels for sources of sound of an industrial and/or commercial nature.
- Ambient, background and residual sound levels, for the purposes of investigating complaints.
- Assessing sound from proposed, new, modified, or additional source(s) of sound of an industrial and/or commercial nature.
- Assessing sound at proposed new dwellings or premises used for residential purposes.

13.2.13 The purpose of the BS4142 assessment procedure is to assess the significance of sound of an industrial and/or commercial nature. BS4142 refers to noise from the

industrial source as the 'specific noise' and this is the term used in this chapter to refer to noise that is predicted to occur due to commercial activities. BS4142 assesses the significance of impacts by comparing the specific noise level to the background noise level ($L_{A90}$).

13.2.14 Certain acoustic features can increase the significance of impacts over that expected from a simple comparison between the specific noise level and the background noise level. BS4142 identifies that the absolute level of sound, the character, and the residual sound and the sensitivity of receptor should all be taken into consideration. BS4142 includes allowances for a rating penalty to be added if it is found that the specific noise source contains a tone, impulse and/or other characteristic, or is expected to be present. The specific noise level along with any applicable correction is referred to as the 'rating level'.

***BS8233 Guidance on sound insulation and noise reduction for buildings***

13.2.15 British Standard 8233 'Guidance on sound insulation and noise reduction for buildings' 2014 bases its advice on the WHO Guidelines for internal noise, which recommends 35dB $L_{Aeq,\ 16\text{-}hour}$ during the daytime period and 30dB $L_{Aeq,\ 8\text{-}hour}$ during the night-time period. In addition, for internal noise levels it states:

> *"Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."*

13.2.16 Furthermore, with regard to external noise, the Standard states:

> *"For traditional external areas that are used for amenity space such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$ with an upper guidance value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."*

***British Standard 6472-2:2008 Guide to evaluation of human exposure to vibration in buildings.***

13.2.17 Human perception of vibration is extremely sensitive. People can detect and be annoyed by vibration long before there is any risk of structural damage. Cases where damage to a building has been attributed to the effects of vibration alone are extremely rare, even when vibration has been considered to be intolerable by the occupants.

13.2.18 It is not possible to establish exact vibration damage thresholds that may be applied in all situations. The likelihood of vibration induced damage or nuisance would depend upon the nature of the source, the characteristics of the intervening solid and drift geology and the response pattern of the structures around the site. Most of these variables are too complex to quantify accurately and thresholds of damage, or nuisance, are therefore conservative estimates based on a knowledge of engineering.

13.2.19 Where ground vibration is of a relatively continuous nature, there is a greater likelihood of structural damage occurring, compared to transient vibration; for example, that caused by passing trains.

13.2.20 With regard to structural response to vibration it is known that actual damage to structures or their finishes due solely to vibration is rare, and that where damage is noted it is often incorrectly ascribed to vibration.

13.2.21 The response of a building to vibration depends upon the type of foundation the building has, the underlying ground conditions, the building construction and the state of repair of the building.

13.2.22 BS6472-2 (2008) provides guidance regarding the significance of Vibration Dose Value (VDV) within buildings in terms of human response, as detailed in Table 13.2.

**Table 13.2: Vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings**

| Place and time | Low probability of adverse comment $m/s^{-1.75}$ * | Adverse comment possible $m/s^{-1.75}$ | Adverse comment Probable $m/s^{-1.75}$** |
|---|---|---|---|
| Residential buildings 16-hour day | 0.2 to 0.4 | 0.4 to 0.8 | 0.8 to 1.6 |
| Residential buildings 8-hour night | 0.1 to 0.2 | 0.2 to 0.4 | 0.4 to 0.8 |
| *Below these ranges adverse comment is not expected<br>**Above these ranges adverse comment is very likely | | | |

## 13.3 Methodology

***Consultation***

13.3.1 A comprehensive Pre- application response was provided by the Peak District National Park (PDNP) on 30th August 2019 which includes Section 26.6 'Noise Impact Assessment', Section 29.12 'Considerations for Noise Impact Assessment' and Section 29.8 'General Considerations for Environmental Effects on the Human Population.'

13.3.2 The response from the PDNP asked for the assessment to address background noise levels (via noise monitoring), to provide details of proposed noise sources and to identify primary receptors (residential) and secondary receptors (footpaths and heritage assets). It also asked for consideration of mitigation measures for both the construction and operational phases. All are covered in the assessments except points raised in paragraphs 26.6.8 and 29.12.9 which are discussed below.

13.3.3 A point was raised in section 26.6.8 about assessing traffic noise around the storage building. This has not been assessed specifically as the proposed facility would use covered conveyors to move material within the site and into the storage building. There would however be a front loader inside the storage building, and this is assessed accordingly for the operational phase.

13.3.4 Also, paragraph 29.12.9 mentions noise from pumping fine particular material with compressed air through pipes and silos. This application is for the storage facility and all material would be moved inside covered conveyors with no use of compressed air, therefore this was not assessed. The current pneumatic unloading is part of a different planning permission and is part of the baseline.

13.3.5 The Environmental Health Officer (EHO) at Staffordshire Moorlands District Council / High Peak Borough Council was also consulted separately by e mail and over the phone. Wardell Armstrong (WA) e mailed a description of the proposal as well as methodology for a noise and vibration assessment on the 22nd of November 2019 and a response was received on 10th December 2019 agreeing with the receptors and criteria suggested but asking that the Council should be contacted to agree the details of the background noise survey. E mails and phone calls were then exchanged to provide information about the background noise survey.

13.3.6 The EHO agreed with the location of monitoring and had questions about the duration of the May 2019 survey. WA informed him that the survey included over 10 hours of recording in total which was judged to be sufficient and representative. Over that survey period, there was nearly no wind, and the noise levels were steady around 45dB $L_{A90}$ for the whole period (day and night), which is representative of that location due to the influence of the existing Cement works which is operating 24/7. The longer survey of one

week at the two other locations is not typical and WA only did such a long survey to establish a bigger picture of daytime noise levels due to passing trains which can vary day to day.

13.3.7 Whilst this was not requested during the consultation process, an assessment of rail noise and vibration on the branch line was also undertaken because of previous concerns expressed about rail noise by a local group referred to as HEARD.

13.3.8 The Pre application enquiry response at 29.13.2.7 also asked for assessment of noise disturbance that could result at the Earles sidings. This was done but is not reported here as the sidings are not in the control of Breedon.

***Criteria for significance of impact***

13.3.9 The potential noise effects associated with the proposed development have been assessed in accordance with the guidance to determine whether noise and vibration impacts occur at receptors. Where likely adverse effects are identified, appropriate mitigation measures are proposed to avoid, reduce, or compensate for the adverse effects.

13.3.10 The significance of an environmental impact is determined by both the sensitivity of the receptor and the magnitude of the impact which can be defined as shown in Table 13.3 and Table 13.4.

**Table 13.3: Sensitivity of a receptor**

| Sensitivity | Description |
|---|---|
| **High** | Receptors/resource which are highly susceptible to noise and vibration, have little ability to absorb change without fundamentally altering its present character or is of international or national importance. For example, residential, schools, hospitals, care homes, places of worship or SSSI. |
| **Moderate** | Receptors/resource which are moderately susceptible to noise and vibration, has moderate capacity to absorb change without significantly altering its present character or is of high importance. For example, offices and restaurants. |
| **Low** | Receptor/resource which are not susceptible to noise and vibration, are tolerant of change without detriment to its character, is of low or local importance. For example, industrial estates. |

**Table 13.4: Magnitude of impact**

| Magnitude of Impact | Definition |
|---|---|
| **Major** | Impact resulting in a considerable change in baseline noise and/or vibration conditions predicted either to cause statutory objectives to be significantly exceeded or to result in severe undesirable consequences on the receiving environment. |
| **Moderate** | Impact resulting in a discernible change in baseline noise and/or vibration conditions predicted |

| Table 13.4: Magnitude of impact | |
|---|---|
| **Magnitude of Impact** | **Definition** |
| | either to cause statutory objectives to be exceeded or to result in undesirable consequences on the receiving environment. |
| **Minor** | Impact resulting in a discernible change in baseline noise and/or vibration conditions with undesirable conditions that can be tolerated |
| **Negligible** | No perceptible change in the baseline noise and/or vibration conditions, within margins of error of measurement. |

13.3.11 An impact severity matrix as shown in Table 13.5 combines both the magnitude and sensitivity and was used in this assessment to establish the significance of the noise and vibration impact. An impact equal to or below moderate is considered to be not significant in EIA terms and above moderate is considered significant.

| Table 13.5: Impact severity matrix | | | | |
|---|---|---|---|---|
| **Magnitude** | **Sensitivity** | | | |
| | **High** | **Moderate** | **Low** | **Negligible** |
| **Major** | Substantial | Substantial | Moderate | Negligible |
| **Moderate** | Substantial | Moderate | Minor | Negligible |
| **Minor** | Moderate | Minor | Minor | Negligible |
| **Negligible** | Negligible | Negligible | Negligible | Negligible |

***Identification of existing sensitive receptors***

13.3.12 The Pre-application advice listed six Existing Sensitive Receptors (ESRs) as having the potential to be impacted by the proposed development. All six are residential dwellings and have been included in the assessment as ESR1 to ESR6. Two additional residential receptors, ESR7 and ESR8, which are adjacent to the Breedon branch line, have been added for the purpose of assessing ESRs further from the site and near the railway line, these are Castleton Road and Orlecar Cottage. These locations were chosen to be representative of the noise impact on the branch line.

13.3.13 The Pre-application advice also requested that other secondary receptors such as footpaths and heritage assets are considered for potential impact from the proposed development. The nearest of the residential receptors assessed is 80m from the proposed development (at its nearest point) and the furthest residential receptor considered (for the plant noise impact) is approximately 300m from the proposed development, therefore a search for any additional secondary receptors within 300m was undertaken. This

resulted in the inclusion of one Bridleway (ESR9) and two footpaths (ESR10 and ESR11) but no heritage assets. As heritage assets, bridleways and footpaths are of similar sensitivity, the impact at any existing heritage assets would be less than those predicted for the bridleway ESR9 and footpaths ESR10 and ESR11, and, therefore, have not been considered in this Chapter.

13.3.14 Throughout further investigation into the branch line and Earles sidings operations, an additional seven ESRs were added. These locations are residential dwellings in close proximity to the rail line and have the potential to be adversely impacted by the existing and proposed operations.

13.3.15 The co-ordinates of all existing sensitive receptor (ESR) identified for this assessment are listed below in Table 13.6 and also shown in Figure 13.1A.

**Table 13.6: Existing sensitive receptors**

| Existing sensitive receptors | Co-ordinates | | Sensitivity | Distance to proposed development (m) |
|---|---|---|---|---|
| | X | Y | | |
| ESR1-Black Rabbit Cottage | 416043 | 382397 | High | 300 |
| ESR2-Black Rabbit Barn | 416081 | 382413 | High | 265 |
| ESR3-Pindale Cottage | 416154 | 382441 | High | 185 |
| ESR4-Pindale Farm Outdoor Centre | 416259 | 382519 | High | 80 |
| ESR5-Pindale Farm | 416292 | 382555 | High | 80 |
| ESR6-Grange Cottage | 416293 | 382577 | High | 90 |
| ESR7-Castleton Road (for Rail) | 416536 | 383432 | High | 890 |
| ESR8-Orlecar Cottage (for Rail) | 416919 | 384126 | High | 1630 |
| ESR9-Hope BW 9 (Bridleway) | 416235 | 382359 | Low | 149 |
| ESR10-Castleton FP 47 (Footpath) | 416058 | 382451 | Low | 266 |
| ESR11-Hope FP 30 (Footpath) | 416769 | 382059 | Low | 303 |
| ESR15-Robin Hill Farm | 416862 | 384098 | High | 1577 |
| ESR16-Cartref | 416957 | 384116 | High | 1622 |
| ESR17-1-3 Oddfellows Cottages | 416943 | 384161 | High | 1669 |
| ESR18-Tobruk House | 416972 | 384138 | High | 1656 |

***Methodology for construction noise and vibration***

13.3.16 The activities associated with the earthworks and construction phase of the proposed development would have the potential to generate noise and create an impact on the surrounding area.

13.3.17 Guidance on the prediction and assessment of noise from development sites is given in British Standard 5228 -1:2009 +A1:2014 'Code of Practice for noise and vibration

control on construction and open Sites – Part 1: Noise' (BS5228-1), and BRE Controlling particles, vapour and noise pollution from construction Sites, Parts 1 to 5, 2003.

13.3.18 The Control of Pollution Act 1974 (COPA 1974) gives the local authority power to serve a notice under Section 60 imposing requirements as to the way in which works are to be carried out. This could specify times of operation, maximum levels of noise that may be emitted and the type of plant that should or should not be used.

13.3.19 However, it might be preferable for the chosen contractor to obtain prior consent under Section 61 of COPA 1974. Section 61 enables anyone who intends to carry out works to apply to the local authority for consent. Under Section 61 the local authorities and those responsible for construction work, have an opportunity to settle any problems, relating to the potential noise, before work starts.

13.3.20 In addition to COPA 1974, BS5228-1 provides guidance on significance criteria for assessing the potential noise impacts associated with the construction phase of large projects. For the purposes of this noise assessment, the noise likely to be generated by the earthworks and construction phase, have been assessed against significance criteria established, using the BS5228-1 ABC Method. The ABC method for determining a threshold requires the ambient noise levels at existing sensitive receptors to be determined. The ambient noise levels at each existing receptor location are then rounded to the nearest 5dB(A) to determine the appropriate threshold value in accordance with the category value, A B or C, as detailed in Table 13.7.

**Table 13.7: Thresholds for construction noise at residential receptors in accordance with the ABC method of BS5228-1**

| **Assessment category and threshold value period (LAeq)** | **Threshold value, in decibels (dB)** | | |
|---|---|---|---|
| | **Category A *** | **Category B **** | **Category C ***** |
| Daytime (0700 to 1900 hours) and Saturdays (0700 to 1300 hours) | **65** | **70** | **75** |
| * Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value. | | | |
| ** Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values. | | | |
| *** Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category B values. | | | |

13.3.21 The ambient noise levels near existing receptors have been established based on baseline surveys and noise modelling as described later in this chapter. The ambient levels have been used to set the category thresholds for a selection of existing receptors

that would be likely to be sensitive to construction noise.

13.3.22 Guidance on the assessment of vibration from development sites is given in British Standard 5228-2:2009 +A1 2014 'Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration' (BS5228-2). BS5228-2 indicates that vibration can have disturbing effects on the surrounding neighbourhood; especially where particularly sensitive operations may be taking place. The significance of vibration levels which may be experienced adjacent to a site is dependent upon the nature of the source.

13.3.23 BS5228-2 indicates that the threshold of perception is generally accepted to be between a peak particle velocity (PPV) of 0.14 and 0.3mm/sec. BS5228-2 also indicates that it is likely that vibration of 1.0 mm/s in residential environments would cause complaint but can be tolerated if prior warning and explanation have been given to residents. The standard also indicates that 10 mm/s is likely to be intolerable for any more than a very brief exposure to this level.

13.3.24 The Highways Agency Research Report No. 53 'Ground Vibration caused by Civil Engineering Works' 1986 suggests that, when vibration levels from an unusual source exceed the human threshold of perception, complaints may occur. The onset of complaints due to continuous vibration is probable when the PPV exceeds 3mm/sec.

13.3.25 British Standard BS6472: 2008 'Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting' (BS6472-1) suggests that adverse comments or complaints due to continuous vibration are rare in residential situations below a PPV of 0.8mm/sec. Continuous vibration is defined as "*vibration which continues uninterrupted for either a daytime period of 16 hours or a night-time period of 8 hours*". The proposed earthworks and construction work at the site would not cause continuous vibration as defined in BS6472-1.

13.3.26 BS5228-2 suggests that the onset of cosmetic damage is 15mm/sec (15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz for residential or light commercial type buildings).

13.3.27 The construction noise and vibration assessment considers BS5228 parts 1 and 2 and also sets out details of 'best practice' management and control measures to ensure that impacts are minimised as far as possible.

***Methodology for assessing ARM plant noise during operation***

13.3.28 The operational phase of the development would add new plant noise (from unloading and conveying) to the existing cement work facility, hence it has the potential to affect existing receptors near the Cement works. An assessment has been undertaken

to compare the existing background levels with predicted ARM plant noise.

13.3.29 A baseline noise survey was conducted at one of the closest receptors to the proposed development and this is described below in the baseline section.

13.3.30 Due to the current operations on site operating 24/7, it was not possible to take a background noise measurement at the nearest receptor in the absence of the existing plant noise. Therefore, an assessment has been undertaken to ensure that the noise emission from the proposed development would not significantly increase the ambient noise level at nearest receptors. It should be noted that a 3dB increase is considered by laboratory tests to be the limit of perceptible change and anything below this would likely be unperceivable.

13.3.31 The specific noise levels from the proposed plant have been predicted at all ESRs using 3D environmental noise modelling software SoundPLAN. It has been assumed that the site would operate 24/7.

13.3.32 To present a worst-case scenario the storage shed has been modelled with the doors open, see Figure 13.2A for operation noise contours during the daytime and Figure 13.3A for operational noise contours at night-time..

***Methodology for branch line rail noise and vibration during operation***

13.3.33 The operational phase of the development would increase rail importation of raw materials, hence has the potential to impact existing receptors near to the railway branch line leading to the Cement works.

13.3.34 As part of the ARM application dated (October 2020) the proposed operations included the introduction of 9 additional trains on the mainline, arriving at Earles sidings. However, during refinement of the proposed scheme the number of proposed movements on the main line have been reduced to 7. Whilst management of a reduced number of incoming trains increases operational risk management for the site, it was felt that a reduction in overall trains could be managed as a balance between sustaining site operations and mitigating impact.

13.3.35 During daytime hours, it is anticipated that there would be up to 7 new trains, (up to 14 train movements per week) on the Hope Valley railway line which equates to 56 new train movements per week[1] passing the properties along the Breedon branch line

[1] 1 train a day to the Earle sidings would be split into 2 strings thus would equate to 4 branch line movements. This a worst case as increase of the branch line usage by wagons would increase the back loads of light engine movements- see Chapter 3).

linking the Cement works and the Hope Valley line (where freight trains stop and are split into strings at the Earles sidings). This would be the equivalent of up to an additional 8 train movements during daytime hours per day, along the Breedon branch line, (however, it is likely this would average out closer to 7.25). There would be no additional trains in night-time hours and ARM trains would not displace any existing trains into the night-time.

13.3.36 To provide some context, based on detailed data for the year 2019 there are currently approximately 13 train movements per day and 3 movements per night on the branch line. This is calculated from a value of 4,579 train movements a year, 84% in the daytime and 16% in the night-time. The train timetable from 2019 has now been used as the train movements during 2020 and 2021 were not considered to be representative because of reduced rail activity due to the COVID-19 pandemic. Using 2019 data allows for a robust assessment to be undertaken.

13.3.37 Baseline noise and vibration surveys were conducted at one receptor, Orlecar Cottage (ESR8), close to the branch line and this is described below in the baseline section.

13.3.38 Following the survey, an analysis of sound recordings of passing trains was undertaken to establish a Sound Exposure Level (SEL) associated with an existing passing train event. The SEL was then used in combination with the number of existing and future train movements to calculate a daytime $L_{Aeq,16h}$ noise level associated with all train passes. The difference in levels between the scenario with only existing trains and the scenario with both existing and future trains has been used to provide an indication of the potential noise impact of increased trains movements in the daytime.

13.3.39 The existing vibration levels were also established for the daytime 16hour period, and a qualitative assessment provided on the likelihood of these levels to exceed thresholds from BS6472-2.

13.3.40 There are residential receptors to the northeast of the Earles sidings, along the Hope Valley Railway Line. The rail timetable for the railway line that connects Sheffield and Manchester has been sourced from Realtimetrains.co.uk. On average this line has in excess of 230 train movements per 24-hour period, and the proposed development would only add up to a maximum of 7 trains per week (14 movements in and out). Therefore, this would not cause a noticeable increase in daytime rail noise levels on the Hope valley line. The increase in rail movements on the Hope Valley line was not raised as an issue during consultation and has not been considered further. An assessment was undertaken for the Breedon branchline, which provides a worst-case scenario due to the proximity to the existing sensitive receptors and the additional number of movements being higher

than the main line, due to the trains being split at the Earles sidings before traveling down the branchline.

13.3.41 The Pre-application response, requests that noise disturbance due to horns, idling, and shunting at the Earles sidings is considered. However, the noise level at the existing sensitive receptor located to the east of the Earles sidings is unlikely to increase due to the additional activities proposed. This is because the noise from existing trains, passing and stopping at the Earles sidings would be significantly higher than that of the proposed movements. Operations associated with sidings are assessed by WA as an industrial noise source rather than by rail movements, therefore this would be assessed in respect to the existing background noise level in accordance with BS4142. Due to the existing train movements on the rail line it is unlikely that the background noise level would be exceeded due to the general noise of shunting, idling and use of train horns.

13.3.42 After the submission of the application the PDNP raised concerns regarding the noise emissions from Earles sidings and the potential noise impact from the existing and proposed trains idling, while waiting to go along the branch line.

13.1.1 An assessment was undertaken with the aim of considering potential mitigation options to reduce the noise impact from existing and future rail operations at Earles Sidings at the existing residential dwellings. The potential for a betterment of the acoustic environment was investigated. However, this is not reported here as Breedon has no control over the sidings. It is proposed that this would be the subject of a new liaison group.

## 13.4 Baseline conditions

***Monitoring locations***

13.4.1 WA carried out three separate baseline surveys, at three Noise Monitoring Locations (NMLs) as follows:

- Noise survey, May 2019: At Pindale Outdoor Centre (ML1), one of the closest receptors to the Cement works. Approximately 9 hours daytime and 1.5 hours night-time of noise monitoring were involved.
- Noise and vibration survey, October 2019: At a location within the Cement works (ML2) close to the railway and at Orlecar Cottage (ML3) approximately 22m from the railway and 1.6km north of the Cement works site. Approximately 1 full week of continuous noise and vibration monitoring was involved.
- Noise survey, June 2021: At The Homestead (ML4) approximately 95m from Earles

sidings, Croft Head farm (ML5) 263m from the sidings, Bleak House Farm (ML6) 239m from Earles sidings.

13.4.2 The five background noise monitoring locations (MLs) are shown in Figure 13.1A together with all ESRs and the proposed site boundary.

13.4.3 At ML1, the existing noise levels were measured between 13th May 2019 and 14th May 2019. Industrial noise from the existing Cement works was dominant at this location with occasional HGV and train movements also audible.

13.4.4 At NML2 and NML3, the existing noise and vibration levels were measured between 15th October 2019 and 22nd October 2019. Throughout these surveys a weather station fitted with a rain gauge and an anemometer was installed near ML2. At ML2, continuous industrial noise from the Cement works was dominant and train movements were occasionally audible. At NML3, distant road traffic noise was dominant with occasional passing trains clearly audible as this location was chosen to be exposed to rail noise and vibration.

13.4.5 The noise measurements were made using two Class 1, integrating sound level meters. The microphones were mounted on tripods 1.5m above the ground and more than 3.5 metres from any other reflecting surfaces, with the diaphragms horizontal.

13.4.6 The sound level meters were calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No drift in the calibration during the survey was noted.

13.4.7 A weighted[2] Leqs[3] were measured in accordance with the requirements of BS8233. The maximum and minimum sound pressure levels, A-weighted L90s[4] , A-weighted L10s[5] were also measured to provide additional information. Detailed results of the noise survey are provided in Appendix 13.1

13.4.8 The vibration monitor installed on site has been used to measure vibration in the X, Y and Z axes and was installed using 8cm ground spikes. Detailed results of the vibration survey are provided in Appendix 13.2

***Meteorological conditions***

[2] A' Weighting — An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.
[3] $L_{eqs}$ — Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.
[4] $L_{90}$ — The noise level which is exceeded for 90% of the measurement period.
[5] $L_{10}$ — The noise level which is exceeded for 10% of the measurement period.

13.4.9 The weather conditions between the 13th and 14th May 2019 were obtained from the Weather Underground ('Wunderground' www.wunderground.com) meteorological website and can be summarised as follows:

- Temperatures between 7 and 19°C.
- Wind up to 4 m/s.
- Dry weather conditions.

13.4.10 The weather conditions between the 15th and 22nd October 2019 were obtained from the weather station installed on the Hope Cement works site and details of the data are shown in Appendix 13.3. It can be summarised as follows:

- Temperatures between 1 and 12°C.
- Wind up to 4 m/s.
- Mostly dry weather condition with some rare occurrence of rain (shown in blue in Appendix 13.3), recordings during rain were discarded.

***Measured existing noise levels***

13.4.11 Detailed results of the original noise survey are provided in Appendix 13.1 and a summary is shown in **Error! Reference source not found.** below.

13.4.12 Table 13.8 shows the night-time noise level at NML 1 – Pindale Farm, exceeds the noise limitset in permission NP/HPK/0403/037, which is 55dB $L_{Aeq,1hour}$ daytime (free field), 42dB $L_{Aeq,1hour}$ (free field) at night time. Due to this exceedance, a further investigation into the existing noise levels was undertaken. Another permission NP/HPK/1205/1235, the 2006 Rail Infrastructure (condition 10), sets the night time limit at Pindale at 45dB $L_{Aeq,1hour}$ and the Environment Act review of permission NP/HPK/0403/037, in progress at time of writing, will address whether this permission should be amended to 45dB $L_{Aeq,1hour}$.

## 13.5 Existing noise level exceedance investigation

13.5.1 On the evening of the 14th of December 2020, Wardell Armstrong visited Pindale Farm to measure ambient noise levels. Observations were made to identify the characteristics and location of the main sources of noise from the Hope site.

13.5.2 A total of seven noise measurements were undertaken at Pindale Farm; six short term measurements and one longer measurement running through the night-time period (21:45 on the 14th December to 09:48 on the 15th December), the locations of which are shown in Figure 13.1A.

13.5.3 During the visit to Pindale from, one noise source from the Hope site was clearly audible and dominant. Ths observation indicated that, given the characteristics, the source is likely to be an extraction unit on the raw meal silo/ distribution house exhaust. It was noted that the noise was significantly quieter near the bund (on the boundary with Hope Cement Works) and became significantly louder and more noticeable when walking away from the bund towards the parking area at Pindale Farm. Using the laser pointer at Pindale Farm allowed for on-site observations to confirm that there is a direct line from receptor locations at Pindale Farm to an extraction silencer unit on the raw meal silo / distribution house exhaust.

***Survey results***

13.5.4 The measured sound levels used within this assessment are detailed in Table . Additional noise measurements were undertaken to allow for an investigation into the other sources on site if required. Because the noise from the extraction unit was the dominant noise source, the assessment focused on this source of noise and measurements that have not been used in the assessment have been excluded from Table 13.8.

**Table 13.8: Monitoring Results**

| Monitoring Location | Description | Measured $dB_{,LAeq,T}$ |
|---|---|---|
| ML4 | Spot Measurement at Pindale Farm at approximately 28m from the bund at a height of 1.5m. | 42.3 |
| ML5 | Measurement at Pindale Farm at approximately 38m from the bund at a height of 1.5m. This result was taken from the measurement between 21:15 - 07:00. | 43.0 |
| ML6 | Spot Measurement at Pindale Farm at approximately 44m from the bund at a height of 1.5m. | 44.0 |
| ML7 | Spot measurement at Pindale farm close at the wall diving parking area and grass. Location approximately 49m from the bund at a height of 1.5m. | 44.2 |
| ML8 | Spot measurement at wall diving parking area and grass. Location approximately 49m from the bund at a height on 1.6m. | 43.9 |
| ML9 | Spot measurement adjacent to the access road to Pindale Farm approximately 72m from the bund at a height of 1.5m. | 46.8 |
| ML10 | Corner of triangular building on access road. Main source of noise is extraction unit above the silos, alto other site noise audible. measured at a height of 1.5m. | 69.2 |
| ML22 | Spot measurements of the identified extraction unit above the silos. measurements undertaken at a height of 1.5m from the top of the silo. | 87.3 |
| ML23 | | 88.0 |
| ML24 | | 88.1 |
| ML25 | Spot measurements of the identified extraction unit above the silos. measurements undertaken at a height of 4m from the top of the silo. | 89.0 |
| ML26 | Noise model calibration point at a height of 1.5m. | 60.4 |
| ML27 | Noise model calibration point at a height of 1.5m. | 58.6 |

***Discussion***

13.5.5 During the on-site survey the extraction unit on top on the smaller silo, was identified

as the dominant noise source on site and at Pindale Farm. Due to the height of the extraction unit, screening from the bund is only achieved when a receptor is located close to the bund at Pindale Farm (ML4). As distance from the bund is increased, the screening provided by the bund is reduced (ML5 to ML10). Using the laser pointer on site confirmed that there is a direct line from receptor locations at Pindale Farm to the extraction unit.

13.5.6 Noise from the process buildings, external fans and the raw mill were not audible and are likely to be screened by the bund, (Hayward's Hill) as they are closer to ground level.

13.5.7 On site measurements, taken in close proximity to the extraction unit duct and outlet, have been used to calculate the approximate sounds power level of the extraction unit.

***Noise model***

13.5.8 Detailed noise modelling has been undertaken using the noise data captured during the site visit. The noise model confirms that the noise source identified on site is the cause of the exceedance at Pindale Farm and this allows for mitigation measures to be designed. The noise model takes into consideration the intervening buildings and topography of the site and its surroundings. Image 13.1 shows a 3D view of the noise model.

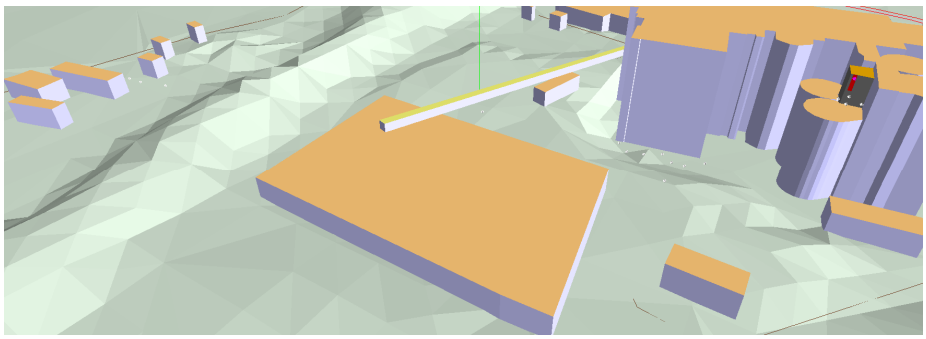

**Image 13.1: 3D Noise model of the Hope site and Pindale Farm, with the extraction unit's location shown in red.**

13.5.9 There is an existing conveyor unit that runs between the rail line and the process building. Modelling calculations have indicated that partial screening is provided by the conveyor and housing, and this confirms onsite observations. Therefore, including the conveyor and housing in the noise model increased its accuracy. The noise model was calibrated using monitoring locations on the Hope site and at Pindale Farm.

13.5.10 The noise modelling demonstrated that noise from the extraction unit is the dominant noise source at Pindale Farm and highly likely to be the source of the measured noise exceedance. Due to the height of the source, the existing bund does not provide any significant noise screening. Therefore, mitigation measures are required for the extraction unit . Section 4 of this report discusses potential noise mitigation measures which will be implemented.

***Mitigation***

13.5.11 It is intended that a minimum design target of a 10dB reduction in extraction noise at the receptor location is achieved. (See Figure 13.11). This means reducing the extraction noise emissions by a minimum of 10dB by implementing one of the following:

- Replace the existing extraction system (ducting/outlet) with an acoustically designed system to achieve the required reduction in noise levels. This would be undertaken in conjunction with a specialist company to ensure the minimum design target is met.
- Relocate the extraction unit to a position that is further away from the receptor. Ideally located on the south eastern façade of the building and screened from the receptor by the existing site buildings.
- Remediate the current extraction unit. This would include insulating the ducting and introducing a silencer to the system. This would be undertaken in conjunction with a specialist company to ensure all operating requirements of the system and the minimum design target are met.

13.5.12 In addition to the above, it was noted there was significant turbulent air at the outlet where there is a weather cowl, therefore, if the remediation approach is taken, this should be considered by the installation of a silencer system and insulating the ducting.

13.5.13 A noise model has been developed to confirm the above mitigation measures would be sufficient. In the example described here the extraction unit has been relocated to the south eastern façade of the building (as shown on Figure 13.11A) and 10dB has been subtracted from the sound power level of the extraction unit to simulate the minimum acoustic improvements to the system. The results of this noise model are shown in Figure 13.11A and Table 13.9 below:

| Table 13.9: Noise levels at Pindale Farm | |
|---|---|
| Monitoring Location | Existing and proposed operations with mitigation measures |
| | Night-time $L_{Aeq,1hr}$ dB |
| ML4 | 40.8 |
| ML5 | 39.7 |
| ML6 | 39.9 |
| ML7 | 39.4 |
| ML8 | 39.6 |
| ML9 | 40.3 |

13.5.14 Table **13.**13.10 demonstrates that with mitigation measures implemented, the predicted sound levels at Pindale Farm are significantly reduced and are below the night-time noise limit of 42dB, even when considering the future operations of the ARM scheme.

13.5.15 For the rest of this assessment an ambient noise level of 41dB LAeq,1hr is used for the existing noise level at Pindale farm as the mitigation detailed in this section will be implemented before the ARM project works are commenced.

***Measured existing vibration levels***

13.5.16 Detailed results of the vibration survey are provided in Appendix 13.2 and a summary is shown in Table 13.110 below.

| Table 13.10: Summary of measured vibration Levels | | | | |
|---|---|---|---|---|
| Monitoring location | Time period | X (ms-1.75 VDV) | Y (ms-1.75 VDV) | Z (ms-1.75 VDV) |
| VML2- Within Cement works, near rail | Daytime 16h | 0.03227 | 0.03213 | 0.17530 |
| | Night-time 8h | 0.03210 | 0.03199 | 0.17440 |
| VML3-Orlecar Cottage, near rail | Daytime 16h | 0.04499 | 0.04499 | 0.04517 |
| | Night-time 8h | 0.00027 | 0.00054 | 0.00032 |

## 13.6 Assessment of impacts

***Assessment of construction noise and vibration***

13.6.1 The existing sensitive receptors ESR1 to ESR6 are the most likely to be affected by the construction phases of the proposed development.

13.6.2 The hours of operation for the construction works would likely be between 07:00 – 18:00 Monday to Friday (excluding bank holidays) and 07:00 – 14:00 on Saturdays. No construction would take place outside of these hours except in cases of emergency or as otherwise agreed.

13.6.3 Based on the measured ambient noise levels at NML1 for the daytime period, the appropriate threshold has been determined for each of the construction noise sensitive receptors, as detailed in Table 13.11.

| Table 13.11: Construction noise assessment criteria | | | |
|---|---|---|---|
| **Receptor** | **Ambient noise level rounded to the nearest 5dB(A) (dB $L_{Aeq}$)** | **Appropriate category value A, B or C in accordance with BS5228-1** | **Noise level above which activities of the construction phase may cause a significant impact at the receptor (dB $L_{Aeq}$)** |
| ESR1 to ESR6 | 41 | A | 65 |

13.6.4 The construction phase activities have the potential to generate short term increases in noise levels during the approximately 18-month construction period, above those recommended in the above table. The levels of noise received at the receptors closest to the proposed development would depend on the sound power levels of the machines used, the distance to the properties, the presence of screening or reflecting surfaces and the ability of the intervening ground to absorb the propagating noise.

13.6.5 At this stage, detailed information regarding the nature and timescales of activities likely to take place during the earthworks and construction phase is not known. Activities on the site, which could give rise to construction noise impacts include:

- Site preparation i.e. ground excavation, levelling of ground, trenching, trench filling, unloading and levelling of hardcore and compacting filling.
- Construction of the proposed development including piling, construction of the proposed buildings, fabrication processes e.g. planing, sanding, routing, cutting, drilling and laying foundations.

13.6.6 Noise predictions for the proposed construction works have been undertaken in SoundPLAN 8.2 assuming that the work is being undertaken on the proposed storage building. This location has been chosen due to it being located closest to the existing sensitive receptors. The plant modelled and associated sound power and on time is detailed in Table 13.12.

| Table 13.12: Plant inventory | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Activity** | **Equipment** | **Example type** | **On-time** | **Movement speed Kph** | **Source Type** | **Number** | **Sound power level** |
| **Temporary Operations** | | | | | | | |
| Earthworks | Dozer | CAT D6 | 100% | 20 | Moving point source | 1 | 119[3] |
| Earthworks and Excavations | Excavator | JCB 330 | 100% | N/A | Point source | 2 | 120[3] |
| Drilling | Pneumatic Drill | Husqvarna DM 400 | 17% | N/A | Point source | 1 | 134[3] |

| Table 13.12: Plant inventory | | | | | | | |
|---|---|---|---|---|---|---|---|
| Vehicles | Reversing Alarms | SA-BBS-107 - Self-adjusting heavy-duty - 87-107 Decibels | 3% | 5 | Moving point source | All mobile kit | 107[3] |
| Earthworks and Excavations Moving materials | Wheeled loading shovel | CAT 966H or Volvo L150 | 100% | 20.00 | Moving point source | 2 | 107[3] |
| 1. Data based upon manufacturers' information<br>2. Data based upon equivalent plan obtained from BS5228<br>3. Data from SoundPLAN's Library | | | | | | | |

13.6.7 The resulting construction noise contours are provided in Figure 13.12A and it shows that construction noise levels are predicted to be between 51dB(A) and 56dB(A) at ESR1 to ESR6, with the highest prediction of 56dB(A) at ESR4 (Pindale Outdoor Centre). These levels are below the 65dB(A) threshold, (see Table 13.) therefore, indicate a negligible magnitude of noise impact.

13.6.8 The sensitivity of the existing residential receptors is high, and the magnitude of impact is minor. Therefore, the effects of noise during the construction of the proposed development is moderate and not significant in EIA terms. Notwithstanding this the use of best practice during construction should be employed to reduce the potential impact.

13.6.9 With regards to vibration, WA's archives contain field trial measurements of ground vibration associated with types of plant likely to be used at the proposed development. The representative, measured levels, recorded by WA using a Vibrock B801 Digital Seismograph, are set out in Table 13.13.

| Table 13.13: Measured vibration levels of plant under normal operating conditions | | | |
|---|---|---|---|
| **Plant type** | **Distance from source** | | |
| | **10m (mm/s)** | **20m (mm/s)** | **30m (mm/s)** |
| 25-30 tonne excavator | 0.175 | 0.075 | Background |
| 25 tonne dump truck (Volvo A25) | | | |
| Loaded | 1 | 0.15 | Background |
| Empty | 0.225 | 0.05 | Background |
| Dozer | 1.05 | 0.4 | Background |
| Vibrating roller Drum | | | |
| Vibrator on | 4.47 | 3.27 | 2.35 |
| Vibrator off | 0.5 | 0.15 | 0.05 |
| Loading shovel | 1.025 | 0.15 | Background |

13.6.10 As a worst-case scenario, earthworks and construction works may potentially take place at a distance of approximately 80m from the nearest residential property (ESR4-Pindale Outdoor Centre).

13.6.11 At a distance of approximately 80m to the closest residential structure, the vibration due to the construction of the development is very unlikely to be above the threshold of complaint. Similarly, the construction vibration levels at a distance of 80m would not be above the threshold of structural damage. Therefore, a negligible magnitude of vibration impact is predicted.

13.6.12 The sensitivity of the existing residential receptors is high, and the magnitude of impact is negligible. Therefore, the effects of vibration during the construction of the proposed development is negligible in accordance with BS5228-1 and not significant in EIA terms. Notwithstanding this the use of best practice during construction should be employed to reduce the potential impact.

13.6.13 The effects of construction traffic would be managed in accordance with the construction environmental management plan (CEMP) that would adopt good practice recommended in 'Construction Logistics and Community Safety Standard' – RTPI Practice Advice March 2019. This would be incorporated into the construction tender documents as a client requirement.

***Assessment of plant noise during operation***

13.6.14 It is typical that sources of industrial noise are assessed in accordance with BS4142. However, in the absence of suitable background sound levels and due to the current operating hours at Hope Cement works, it is considered more appropriate to assess any potential changes in noise levels at ESRs. The book 'Fundamentals of Acoustics' by Professor Colin H Hansen[6] explains that a 3dB increase in noise level is just perceptible, therefore this value has been adopted as the threshold of a minor impact. BS4142 is used to estimate rating levels.

13.6.15 Noise predictions have been carried out to support this assessment which consider the potential operational noise sources on the site. The predictions are based on published and/or measured sound power levels for the size and type of plant to be used in the proposed development.

13.6.16 The noise predictions have been undertaken using SoundPLAN version 8.2 environmental noise prediction software. This software calculates the propagation of noise to the procedures contained in International Standard ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors' for construction and operational phases.

[6] University of Adelaide 1951

13.6.17 The SoundPLAN model calculates the propagation of noise from source to receptor and accurately calculates the amount of attenuation provided by acoustic barriers such as buildings and the intervening topography. The site model has been created using site topographical survey data together with detailed 3-dimensional designs of the operational phases of the site. The topography at ESRs and the intervening ground has been constructed from a Digital Terrain Model (DTM) for the area, supplied by the Ordnance Survey.

13.6.18 4 identifies the items of plant modelled and associated noise source type and sound power levels.

**Table 13.84: Plant list**

| Noise Source | Quantity | $L_w$ dB (A) | Comment |
|---|---|---|---|
| **Gantry** | | | |
| Graber operating on frame of the gantry, unloading arriving material | 2 | 125 | Worst-case assumption of grabber operation in the absence of detailed information, sound power likely to be significantly less. No significant noise expected from material dropping as soft material |
| Train moving slowly under Graber | 1 | 102 | Assumed moving slowly at speed of 5km/h under grabber. |
| **Main conveyor** | | | |
| Conveyor Rollers | 1 | 91 | The rollers are a line source and drive unit a point source at the end. These two sources have been modelled within an enclosure (walls, floor and roof) composed of sheet steel. |
| Conveyor Drive Unit | 1 | 109 | |
| **Conveyor link (linking main and short)** | | | |
| Conveyor Rollers | 1 | 91 | The rollers are a line source and drive unit a point source at the end. These two sources have been modelled within an enclosure (walls, floor and roof) composed of sheet steel. |
| Conveyor Drive Unit | 1 | 109 | |
| **Short conveyor** | | | |
| Conveyor Rollers | 1 | 91 | The rollers are a line source and drive unit a point source at the end. These two sources have been modelled within an enclosure (walls, floor and roof) composed of sheet steel. |
| Conveyor Drive Unit | 1 | 109 | |
| **North conveyor and transfer** | | | |
| Conveyor Rollers | 1 | 91 | The rollers are a line source and drive unit a point source at the end. These two sources have been modelled within an enclosure (walls, floor and roof) composed of sheet steel. |
| Conveyor Drive Unit | 1 | 109 | |
| **Storage building** | | | |

| Table 13.84: Plant list | | | |
|---|---|---|---|
| Front Loader | 1 | 75 | The front loader is a moving point source[7]. It has been modelled within a building composed of sheet steel. |

13.6.19 Due to limitations in the modelling software the front loader within the building could not be modelled as a moving point source, however, calculations were undertaken within the modelling software to calculate the sound power corrected for speed (Lw') of the moving point source. This value was used as the sound power of a line source following the predicted movement path of the front loader.

13.6.20 The specific sound levels have been calculated based on the assumption of daytime activities and present a worst-case scenario, the same levels have been assumed for night-time. The predicted specific sound levels are shown in Figures 13.2 and 13.3, for daytime and night-time respectively, and are summarised in 4 at ESR1 to ESR6, which are the closest to the proposed facility.

13.6.21 The predicted operational noise levels at ESR1 to ESR6 (which are nearest to the proposed development), have been added to the existing ambient sound levels to calculate the increase in ambient level due to the proposed development. The results are shown in Table 13.95 for daytime and 13.16 for night-time.

| Table 13.95: Comparison of specific noise levels, daytime | | | | | | |
|---|---|---|---|---|---|---|
| **Description** | **Daytime $L_{Aeq,\ 1hour}$ (dB)** | | | | | |
| | **ESR1** | **ESR2** | **ESR3** | **ESR4** | **ESR5** | **ESR6** |
| Proposed Noise Level, $L_{Aeq}$ (dB) | 36 | 38 | 37 | 41 | 41 | 41 |
| Existing Ambient Sound Level $L_{Aeq}$ (dB) which includes existing industrial noise | 47 | 47 | 47 | 47 | 47 | 47 |
| Proposed + Existing Ambient (dB) | 47.3 | 47.5 | 47.4 | 48 | 48 | 48 |
| Calculated increase to ambient (dB) | 0.3 | 0.5 | 0.4 | 1 | 1 | 1 |

| Table 13.106: Comparison of specific noise levels, night-time | | | | | | |
|---|---|---|---|---|---|---|
| **Description** | **Night-time $L_{Aeq,\ 15min}$ (dB)** | | | | | |
| | **ESR1** | **ESR2** | **ESR3** | **ESR4** | **ESR5** | **ESR6** |
| Proposed Noise Level, $L_{Aeq}$ (dB) | 36 | 38 | 37 | 41 | 41 | 41 |
| Existing Ambient Sound Level $L_{Aeq}$ (dB) which includes existing industrial noise | 41 | 41 | 41 | 41 | 41 | 41 |
| Proposed + Existing Ambient | 42 | 43 | 43 | 44 | 44 | 44 |

| Table 13.106: Comparison of specific noise levels, night-time | | | | | | |
|---|---|---|---|---|---|---|
| **Description** | **Night-time $L_{Aeq, 15min}$ (dB)** | | | | | |
| | **ESR1** | **ESR2** | **ESR3** | **ESR4** | **ESR5** | **ESR6** |
| (db) | | | | | | |
| Calculated increase to ambient (dB) | 42 | 2 | 2 | 3 | 3 | 3 |

13.6.22 Noise from the proposed operations is likely to be similar in character to that of the existing operations. The ambient noise at ESR1 to ESR6 is already dominated by industrial noise from the current operations at the Cement works. The highest predicted specific noise of 41dB at ESR4 (Pindale Outdoor Centre) is at least 6dB below the existing daytime ambient noise of 47dB at the ESRs, therefore noise from the proposed ARM facility is unlikely to be readily distinguishable at ESRs.

13.6.23 The highest predicted increase in ambient noise is 3dB at ESR4 and ESR6. This is in the context that a 3dB increase in noise is considered to be the limit of perceptible change. In addition the proposed noise level is still below the existing noise limits for Hope cement works and therefore this is considered negligible.

13.6.24 The sensitivity of ESR1 to ESR6 is high and the magnitude of impact is negligible. Therefore, the effects of noise during the operational phase of the proposed development is moderate and not significant in EIA terms.

13.6.25 The predicted levels at the nearby bridleway (ESR9) and footpaths (ESR10 and ESR11) are 39dB, 36dB and 47dB respectively. The nearest receptor to the northwest of the proposed ARM facility is ESR9; this location is also representative of ESR10. The existing ambient noise levels at ESR9 are likely to be similar to those at ESR1-ESR6. While ESR 9 is at a greater distance from Pindale Road it is unlikely to have a significant impact on the existing $L_{Aeq}$. Road traffic movements on Pindale Road are infrequent and consist mainly of residents moving towards the dwelling. An $L_{Aeq}$ of 41dB has been adopted as a representative ambient noise level. Therefore, the increase in noise levels at ESR9 and ESR10 would be less than 3dB. At ESR11, the existing ambient noise level is expected to be higher than experienced at ESR9 and ESR10 as this location is closer to the current operations at the Cement works. The distance of ESR11 from the proposed development is greater. Therefore, the potential noise impact at ESR11 would be less than it is at ESR9 and ESR10, where a minor magnitude of impact is predicted.

Commented [KH1]: Simon please check

13.6.26 The sensitivities of ESR9 to ESR11 are low and the magnitude of impact is minor. Therefore, the effects of noise during the operational phase of the proposed ARM facility are negligible. This is categorised as LOAEL in accordance with NPPF and not

significant in EIA terms.

***Assessment of rail noise and vibration during operation – branch line***

*Noise*

13.6.27 The proposed additional daytime rail movements have the potential to affect ESR7 (Castleton Road) and ESR8 (Orlecar Cottage) which are located close to the branch line.

13.6.28 In the initial noise assessment rail movements were modelled using the most recent train timetable, however since then additional data has been collected. This new data has been used throughout the following assessment. The full details of average rail movements can be found in Appendix 13.6.

13.1.2 Breedon now proposes to introduce a total of seven additional train onto the mainline, arriving at Earles sidings, per week, instead of 9. As previously each train will be separated into strings of wagons at Earles sidings, which will be brought down the branch line individually. The locomotive then returns to the sidings to collect the next sting of wagons, resulting in a total of 8 movements per train including the loco movements, or an additional 56 movements on the branch line per week. This equates to an average of 8 additional movements per day on the branch line.

13.1.3 Currently, the branch line has approximately 13 existing rail movements on the branch line per day, with the introduction of the proposed rail movements, 8 per day, will increase to 20 movements per day on average.

13.6.29 Analysis of the original train schedule and noise levels during passing trains events at ML3 has been undertaken as shown in Appendix 13.4. The assessment was undertaken to establish a Sound Exposure Level (SEL) associated with passing trains at that location. The noise from the train pass clearly has two main components, the engine at a height of approximately 4m above the rail and the noise from the contact with the rail at 0.5m above ground level. Therefore, to ensure a robust assessment, the model considers two separate SEL levels for each component. This allows for a more accurate noise model to be created and therefore allows for the design of carefully targeted acoustic mitigation measures . In addition, it was noted that the different loads the locomotive is pulling has an impact on the noise emissions from both the engine and the rail, therefore the SELs used for each train type has been detailed in Table 13.17.

| **Table 13.17: Points Removal Assessment** |
|---|
| **Existing Rail Movements** |

| Table 13.17: Points Removal Assessment | | | |
|---|---|---|---|
| **Train Types** | **Existing Number of Movements** | **Existing SEL – Engine (dB)** | **Existing SEL – Tracks (dB)** |
| Light Engine Movements | 1674 | 77 | 66 |
| Coal | 142 | 83 | 70 |
| Cement Full | 1296 | 83 | 75 |
| Cement Empty | 592 | 79 | 84 |

***Existing train movements***

13.6.30 As part of this assessment, WA has refined the assumptions for all train movements. The initial assessment assumed a single level (80dB SEL) for all train movements. Since then, further investigations into the sources of the rail noise (engine/wheels on rail), and the noise emissions for the different types of train using the line have been undertaken.

13.6.31 In addition, the data used in the original assessment was based solely on the movements during the measurement period. The complete data set of rail movements for 2019, has now been used and this increases accuracy of modelling as it represents a reduction of 610 movements per annum. See Figure 13.13A for modelling of existing noise and Figure 13.14A for proposed operations.

| Table 13.18: Existing Rail Movements | | | |
|---|---|---|---|
| **Existing Rail Movements** | | | |
| **Train Types** | **Existing Number of Movements** | **Existing SEL – Engine (dB)** | **Existing SEL – Tracks (dB)** |
| Light Engine Movements | 1674 | 77 | 66 |
| Coal | 142 | 83 | 70 |
| Cement Full | 1296 | 83 | 75 |
| Cement Empty | 592 | 79 | 84 |
| **Façade Noise Level Existing Train Movements – Daytime – 1.5m Receiver heights** | | | |
| **Location** | **Existing Operations – Daytime $L_{Aeq,16hr}$** | | |
| ESR 15 – Robin Hill | 41 | | |
| ESR 8 – Orlecar Cottage | 43 | | |
| ESR 16 - Cartref | 43 | | |
| ESR 17 – 1-3 Oddfellows Cottages | 44 | | |
| ESR 18 – Tobruk House | 45 | | |

13.6.32 The combination of further refinement to the SEL and the number of train movements equates to a reduction of 5dB on the existing noise levels when compared to the initial ARM assessment. This is a positive result as it demonstrated that when using

more accurate train numbers, the noise levels throughout the daytime period are significantly lower than set out in the original ARM assessment.

***Proposed rail movements***

13.6.33 A summary of the SEL level and rail movements together with the findings of the noise model are detailed in Table 13.19.

| **Table 13.19: Points Removal Assessment** | | | |
|---|---|---|---|
| **Proposed Rail Movements** | | | |
| **Train Types** | **Proposed Number of Movements** | **Proposed SEL – Engine – Points Removed (dB)** | **Proposed SEL – Rail – Points Removed (dB)** |
| Light Engine Movements | 5988 | 76 | 66 |
| Full PFA and Cement Movements | 2351 | 83 | 74 |
| Empty PFA and cement Movements | 691 | 79 | 83 |
| Coal Movements | 142 | 83 | 64 |
| *Note - PFA and Cement movements have been combined as the carriages that will be used for both cement and PFA will be similar* | | | |
| **Location** | **Existing Operations – Daytime $L_{Aeq,16hr}$** | | |
| ESR 15 – Robin Hill | 44 (+3) | | |
| ESR 8 – Orlecar Cottage | 46 (+3) | | |
| ESR 16 - Cartref | 46 (+3) | | |
| ESR 17 – 1-3 Oddfellows Cottages | 47 (+3) | | |
| ESR 18 – Tobruk House | 48 (+3) | | |

13.6.34 The results in Table 13.19 demonstrate that when assessed over a 16 hour daytime period, noise levels at all ESRs are low and provide a good level of amenity to residents. The modelling of future rail movements identifies a potential increase of 3dB(A), which is at the level of perception. Therefore, residents may notice a slight increase in noise levels. However, even with the additional rail movements the total 16 hour noise levels remain low and not significant. See Figure 13.14A.

13.6.35 British Standard BS8233: Guidance on sound insulation and noise reduction for buildings states “external areas that are used for amenity spaces such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,t}$. Table 13.20

shows that the proposed operations are below the desirable noise level for external living areas at existing sensitive receptor locations, even with the future train movements.

***Vibration***

13.6.36 With regards to vibration, BS6472-2 (2008) provides guidance regarding the significance of VDV values in terms of human response. The threshold values from the standard are provided in Table 13.2 above and the calculated values from measurements at a receptor 22m from the railway (ML3) are presented in 9.

13.6.37 The highest calculated values at 22m from the railway were on the horizontal axis (X axis), with a value of 0.044 ms-1.75 for the daytime 16-hour period. The BS6472 daytime criterion for 'low probability for adverse comment' is in the range 0.2 to 0.4 ms-1.75 and the measured values are below this criterion. Even with the addition of the train movements per day it is very unlikely that this criterion would be exceeded and therefore a low probability for adverse comment is anticipated.

13.6.38 The sensitivity of the existing residential receptors along the railway line is high, and the magnitude of change before mitigation is negligible. Therefore, the effects of vibration due to additional trains on the railway line is likely to be negligible in accordance with BS6472-2, would have no observed effect in accordance with NPPF and would be not significant in EIA terms.

## 13.7 Mitigation measures

***Mitigation for construction noise and vibration***

13.7.1 Whilst guidance would be met, to reduce the impacts of noise and vibration levels generated by the construction phase of the proposed development, at existing receptor locations in the immediate vicinity of the site, best working practice would be adopted.

13.7.2 Best working practice can be implemented during each phase of the earthworks and construction works at the site. This can be set out within a Construction and Environment Management Plan (CEMP). The following measures may be put in place to minimise noise and vibration emissions:

- All machinery would be regularly maintained to control noise and vibration emissions, with particular emphasis on lubrication of bearings and the integrity of silencers.
- Site staff would be made aware that they are working adjacent to a sensitive area and avoid all unnecessary activities due to misuse of tools and equipment,

unnecessary shouting and radios.

- As far as possible, the occurrence of two noisy operations simultaneously in close proximity to the same sensitive receptor would be avoided.
- Any time limits imposed on noisy and vibration works by the local authority would be adhered to.
- Set working hours during the week and at weekends would be implemented.
- Engines would be turned off when possible.
- Should earthworks and/or construction activities need to be carried out during night-time hours, the local authority could include a planning condition which requests advance notice and details of any night working to provided.

***Mitigation for plant noise during operation***

13.7.3 There are embedded noise mitigation measures within the design of the development, as the conveyors are designed to be enclosed and no ARM would be transferred by road vehicles.

***Mitigation for rail noise and vibration during operation***

13.7.4 The benefits from these mitigation measures have not been included in this assessment to ensure a worst-case scenario is modelled. It is likely that once the mitigation measures have been implemented the impact on the ESRs would be further reduced.

***Mitigation for the branch line***

13.7.5 The noise modelling results for the existing operations, and noise attenuation provided by the mitigation options are detailed in Table 13.20.

**Table 13.20: Façade Noise Level Existing Train Movements – Daytime – 1.5m Receiver heights**

| Location | Existing Operations – Without Mitigation | Proposed Operations dB $L_{Aeq,16hour}$ (difference) | Proposed Operations – Points Removed dB $L_{Aeq,16hour}$ (difference) | Proposed Operations – Points Removed and 3m Acoustic Barrier dB $L_{Aeq,16hour}$ (difference) |
|---|---|---|---|---|
| ESR 15 – Robin Hill | 41 | 44(+3) | 44 (+3) | 43(+2) |
| ESR 8 – Orlecar Cottage | 43 | 46 (+3) | 46 (+3) | 45 (+2) |
| ESR 16 – Cartref | 43 | 46 (+3) | 46 (+3) | 46 (+3) |
| ESR 17 – 1-3 Oddfellows Cottages | 44 | 47 (+3) | 47 (+3) | 47 (+3) |
| ESR 18 – Tobruk House | 45 | 48 (+3) | 48 (+3) | 48 (+3) |

13.7.6 During the noise modelling it was identified that removing the points on the section of track close to the viaduct would not reduce the overall noise level at any of the

previously assessed sensitive receptor locations (see Figure 13.15). However, the installation of a 3m acoustic barrier would provide a 1dB reduction at Robin Hill and Orlecar Cottage but would not be sufficient to reduce noise below existing noise levels. This is due to direct line of sight being maintained between engines and properties on the section of track close to the viaduct, due to the limitation that an acoustic fence cannot be constructed on the viaduct. See Figure 13.16A.

13.7.7 While the removal of the points may not provide a reduction in the overall noise level of the train passing, it would, however, provide a significant reduction to the impulsive component of the train noise as it is passing over the points, specifically when the older coal trains cross the points, for which a 6dB reduction can be achieved, as shown in Table 13.23. This would be seen as a benefit as it will be likely to make the passing of a train less perceptible and reduce the overall impact on the residents.

13.7.8 The proposed operations will not introduce additional train movements during the night-time period and therefore the night-time noise levels will not increase. However, the removal of the points and introduction of the acoustic barriers along the branch line will reduce the noise impact from the existing night-time operations providing a betterment at the existing residential dwellings. Thus, Breedon is prepared to commit to delivering this mitigation.

13.7.9 It should be noted that the new wagons proposed for the branch line, which would have a double bogie arrangement, are likely to provide a further reduction in noise.

***Level and character of train noise***

13.7.10 On site observations indicate that train passes are noticeable above the general ambient sound levels at the receptor locations. Due to the proximity of the receptors to the branch line, noise from rail movements at the receptors is unavoidable. However, it has been determined that over a 16-hour daytime assessment period, the modelled noise is not significant in EIA terms. The likely cause of disturbance at the receptors is the character and level of sound during a train pass. Receptors do not experience a whole 16hour period of steady noise, instead they would have large periods of relative quiet, with short periods of higher noise levels when trains pass on the branch line. It is this perception of the trains passing, particularly the character and level of sound, that may be the likely cause of disturbance at the receptor locations.

13.7.11 The assessment of the removal of the points close to Orlecar Cottage has shown that a betterment in the average noise level LAeq can be achieved during the time

the waggons pass over the points, approximately -6dB for coal trains) and -1dB for all other trains, which is a betterment at the receptors during coal train passes. The data for the LAmax,f (maximum sound level when crossing the point has been reviewed. This has shown also shown a reduction of -6dB for coal trains without the points.

13.7.12 The review also found that the frequency of maximum noise events from all trains is reduced slightly without the points. The results are positive and indicate that the intrusive nature of the noise from the impulsive, screeching and metallic sounds as the trains cross the points can be reduced at receptors, further reducing the potential noise impact.

## 13.8 Residual effects

***Construction noise and vibration***

13.8.1 The sensitivity of the existing residential receptors is high, and the magnitude of change after mitigation (suggested as best practice,) would be minor to negligible. The construction phase of the operation would achieve the guideline noise values stated in BS5228. Therefore, the residual level of effects of noise and vibration during construction is likely to be of negligible and not significant in EIA terms.

***ARM plant noise during operation***

13.8.2 The sensitivity of the existing residential receptors near the proposed development is high, and the magnitude of change is negligible. Therefore, no further mitigation measures apart from those included in the design of the site are required for the operational phase. Therefore, the residual effect of plant noise during operation is likely to be negligible and not significant in EIA terms.

***Rail noise and vibration during operation***

13.8.3 The sensitivity of the existing residential receptors near the Breedon branch line and Earles sidings is high, and the magnitude of change would be negligible in EIA terms. Therefore, the effects of noise and vibration during the operation of the proposed additional trains is likely to be negligible and not significant in EIA terms. No ARM trains would operate during night-time hours.

## 13.9 Cumulative impacts

13.9.1 There are no cumulative impacts predicted as there are no other proposed developments. The assessment has shown that any additional noise from the proposed development would be below the level of perception when compared to the existing

ambient noise levels, which include the existing Cement works activities. Existing train movements have been considered as part of the baseline.

## 13.10 Limitations of study

13.10.1 To reduce the level of uncertainty within the assessment the following steps have been taken:

- The noise measurement locations were selected to be representative at the closest point of the receptors.
- In accordance with guidance, the sound level meters were mounted vertically 1.2m above the ground. Monitoring locations were also more than 3.5m from any other reflecting surfaces.
- The baseline noise measurements were undertaken during suitable weather conditions.
- Noise measurements were made using Class 1, integrating sound level meters.
- Branch line rail noise has been predicted from one representative receptor.
    - Measurements could not be taken without the existing operational noise from the Cement works as it operates 24/7. Instead, baseline measurement with existing noise present was monitored.

## 13.11 Summary and conclusions

13.11.1 A noise and vibration assessment has been undertaken for the proposed development's construction and operational phases, to assess the potential impact at nearby ESRs.

13.11.2 18 ESRs have been studied, comprising 15 residential receptors, one bridleway and two footpaths. All ESRs are either near to the proposed development or near the Breedon branch line linking to the Hope Valley railway.

13.11.3 Three separate baseline surveys, at five NMLs were undertaken. The first survey was a noise survey in May 2019 at one of the closest properties to the proposed development and the second survey was a noise and vibration survey at two locations close to the railway branch line. The third survey considered the existing sensitive receptors closest to Earles Sidings

13.11.4 The following potential impacts have been assessed:

- Noise and vibration impact during construction

- Noise impact of new ARM plant during operation
- Noise and vibration impact of additional trains during operation

13.11.5 Baseline data was used to establish a potential threshold for construction noise and construction noise predictions were undertaken. The effects of noise and vibration during construction was found to be not significant in EIA terms and no mitigation measures are required. However, the use of best practice during construction would be employed to reduce the potential impact and examples have been provided.

13.11.6 Noise predictions have been carried out for the potential noise sources at the proposed development during operation. The predicted daytime noise levels at receptors were compared to existing ambient levels, which includes noise from the existing Cement works, and the highest predicted increase in ambient noise is 3dB. However, the overall noise level from the cement works will still be below the existing noise limits. The effects of noise during operation of the proposed development is not significant in EIA terms.

13.11.7 There are embedded noise mitigation measures within the design of the development as the conveyors are designed to be enclosed and all ARM would be transferred between the sidings by enclosed conveyors. With the inclusion of the mitigation installed on the existing extraction unit, no further mitigation measures are required for the operational phase.

13.11.8 The maximum noise level due to train movements would not change as no additional trains would operate in closer proximity to the existing sensitive receptors during the night-time period.

13.11.9 The assessment has shown that both existing and proposed operations will not have a significant impact at receptors when assessed over a 16-hour daytime period.

13.11.10 This assessment has considered the installation of acoustic barriers between the branch line and the residential dwellings and the removal of the existing points.

13.11.11 The noise model shows that the installation of an acoustic barrier would provide a minor improvement to Red Hill cottage and Orlecar Cottage. However, the overall reduction is not significant. This is due to direct line of sight being maintained due to the limitation that an acoustic fence cannot be constructed on the viaduct.

13.11.12 The character of the noise from train passes is readily distinctive against the existing baseline sound levels, therefore, the character and level of the sound is an

important consideration. By removing the points, a significant reduction to intrusive sounds can be achieved, thus providing a betterment at receptors.

13.11.13 Other measures, such as introducing new waggons, smoothing out the bend, reducing flange squeal, control of train speed and maintenance, can all also reduce the character of the rail noise making it less intrusive at the receptors.

13.11.14 This assessment shows that removing the points would not provide a reduction in the *overall* noise level at the existing sensitive receptors, however it is likely the perceptibility of the *impulsive rail noise* as the train wheels pass over the point would be reduced. This is seen as a benefit to the local receptors as it would reduce the distinctive character of the rail noise.

13.11.15 It should be noted that the proposed operations will not introduce additional train movements during the night-time period and therefore the night-time noise levels will not change. However, the removal of the points and introduction of the acoustic barriers will reduce the noise impact from the existing night-time operations providing a betterment at the existing residential dwellings. The highest measured vibration values at 22m from the Breedon branch line were on the horizontal axis (X axis), with a value of 0.089 ms-1.75 for the daytime 16-hour period. The BS6472 daytime criterion for 'low probability for adverse comment' is in the range 0.2 to 0.4 ms-1.75 and the measured values are below this criterion. The addition of train movements per day is very unlikely to cause an exceedance of this criterion.

13.11.16 The effects of both noise and vibration due to additional trains on the branch line is likely to be moderate to negligible in accordance with BS6472-2 and BS8233. They would have no observed effect in accordance with NPPF and be not significant in EIA terms.

13.11.17 Breedon has decided to use different wagons for ARM, which would be quieter, to reduce noise nuisance. However, the benefits from the change of rolling stock have not been included in this assessment to ensure a robust, worst-case scenario.

13.11.18 Operational practices at Earles sidings should be reviewed to establish if the noise levels from the engines can be mitigated as source. This could include reducing waiting times at the sidings and or switching engines off when stationed at the sidings. This would have to be carried out by Freightliner and Breedon is prepared to work with the aforementioned organisation to assist with reviewing operations within Earles sidings to be discussed at the proposed additional liaison committee.

13.11.19 In accordance with current policy and guidance, noise and vibration should not

be unacceptable determining factors in the granting planning permission for the proposed scheme.