In Parliament – Session 2021 - 2022

HS2

# High Speed Rail (Crewe – Manchester) Environmental Statement

## Volume 5: Appendix SV-001-OR002

### Sound, noise and vibration

Off-route works: Carlisle Station

Baseline and construction sound, noise and vibration report

M257

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Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

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## Tables

# 1 Introduction

1.1.1 This report is an appendix to the sound, noise and vibration assessment. It provides details of the sound, noise and vibration baseline data and construction sound, noise and vibration assessment relevant to the Proposed Scheme in relation to the off-route works in the Carlisle Station area.

1.1.2 This appendix should be read in conjunction with Volume 4, Off-route effects.

1.1.3 An introduction to policy relevant to sound, noise and vibration and the assessment methodology can be found in Volume 5, Appendix SV-001-00000.

# 2 Baseline and construction

## 2.1 Regional and local policy guidance

2.1.1 As part of the engagement with local authorities where the Proposed Scheme would operate, information regarding any specific local planning guidance in respect of noise and vibration was requested. The guidance within the Carlisle District Local Plan 2015-2030 (2016)[1], has been considered when applying the impact and significance criteria set out in the Environmental Impact Assessment Scope and Methodology Report (SMR), (see Appendix CT-001-00001).

## 2.2 Engagement

2.2.1 Details of engagement on a route-wide basis with the local and county authorities' Environmental Health Practitioners is set out in Volume 1.

2.2.2 A meeting[2] has been held with representatives of Carlisle City Council (CaCC) regarding the approach taken to baseline monitoring within this area, the identification of noise and vibration sensitive receptors, the selection of assessment locations and the development of the mitigation to be included in the Proposed Scheme.

2.2.3 Changes suggested during these meetings have influenced the assessment locations used and the monitoring undertaken and are reported in this appendix. CaCC officers were also invited to attend baseline sound measurements in this area and witness the measurement procedures used.

2.2.4 Local engagement provided opportunities for local stakeholders to suggest appropriate baseline sound monitoring locations, to confirm building uses and to review the draft list of non-residential properties to be considered in the assessment.

## 2.3 Methodology

2.3.1 The methodology used for the assessment of airborne sound, ground-borne sound and vibration impacts and the determination of significant effects is defined in the SMR. Further information is contained in Volume 5, Appendix SV-001-00000.

[1] Carlisle City Council (2016), *Carlisle District Local Plan 2015-2030.* Available online at: https://www.carlisle.gov.uk/Portals/24/Documents/Local_Plan/Carlisle%20District%20Local%20Plan%202015-2030/Carlisle%20District%20Local%20Plan%202015-2030.pdf?timestamp=1481284170512.

[2] Meeting held on 27 July 2020.

## 2.4 Assumptions

2.4.1 Route-wide assumptions are outlined in Volume 1, Section 8, and are further detailed in Volume 5, Appendix SV-001-00000. Local assumptions that apply to the assessment of construction sound noise and vibration at the Carlisle Station area are set out in Volume 4, Off-route effects.

## 2.5 Limitations

2.5.1 The route-wide limitations and the approach adopted to ensure that they will not compromise the robust assessment of sound, noise and vibration are presented in Volume 5, Appendix SV-001-00000 and Volume 4.

# 3 Baseline

## 3.1 Existing baseline data collection methodology

3.1.1 The overall approach to baseline data collection for sound noise and vibration is described in Volume 5, Appendix SV-001-00000. In summary, the approach to defining baseline levels includes a combination of sound monitoring in proximity of Carlisle Station, and elsewhere baseline noise levels have been assumed to be sufficiently low such that the construction sound and noise assessment can use Category A of the BS5228-1[3] 'ABC Method' (described as all other locations in Table 1).

3.1.2 The area around Carlisle Station is characterised by a mix of residential, non-residential and industrial buildings within a predominantly urban setting. The sound environment is generally dominated by local and distant road and rail traffic, including the West Coast Main Line and local lines serving Carlisle Station. Local neighbourhood sources of sound from commercial facilities and nature (such as bird song and trees) also contribute to sound levels in the area. There are several main roads within the Carlisle Station area, including the A6 Roman Road/Carleton Road/London Road/Botchergate. Other main roads that contribute to the sound environment are the A595 Castle Way, the A7 Spencer Street/Georgian Way/Victoria Place/Lowther Street, and the A69 Rotary Way/Warwick Road/Victoria Place. In proximity to the station existing sound levels are typically between 50dB – 55dB during the daytime, and typically 50dB during the night-time.

## 3.2 Future baseline methodology

### Construction

3.2.1 The assessment of noise from construction activities assumes a future baseline year of 2026. As a conservative assumption it has been assumed that no change in baseline sound levels will occur between the existing baseline year of 2018 and the future baseline year of 2026.

## 3.3 Baseline sound levels

3.3.1 Baseline sound levels have been ascertained for each assessment location within this area. Baseline sound levels are presented in terms of the following key sound indicators:

- baseline levels used for the construction sound assessment:
  - daytime $L_{pAeq}$ sound pressure level (Monday to Friday 07:00 – 19:00; Saturday 07:00 – 13:00);

[3] British Standards Institute (2009), *BS 5228-1:2009: Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (+A1:2014)*. BSI, London, UK.

- evening/weekend $L_{pAeq}$ sound pressure level (Monday to Friday 19:00 – 23:00, Saturday 13:00 – 23:00 and Sunday 07:00 – 23:00); and
- night-time $L_{pAeq}$ sound pressure level (Monday to Sunday 23:00 – 07:00).

3.3.2 These values are presented in Table 1. All values are free-field. The data source coding included within this table details how the baseline sound levels allocated to each assessment location have been derived. This coding is summarised in Table 2 and explained in detail in Volume 5, Appendix SV-001-00000. Codes contained within brackets relate to the derivation of night-time baseline noise levels where they are different to the daytime derivation method.

**Table 1: Baseline sound levels**

| Assessment location | | Measurement location | Baseline sound levels (dB) | | | | | | | Data source coding |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | For construction sound assessment (2026) | | | For operational sound assessment (2038) | | | | |
| Reference | Area represented | | Daytime $L_{pAeq}$ | Evening / weekend $L_{pAeq}$ | Night-time $L_{pAeq}$ | Daytime $L_{pAeq,16hr}$ | Night-time $L_{pAeq,8hr}$ | Arithmetic average $L_{pAFmax,5min}$ | Highest night-time $L_{pAFmax,5min}$ | |
| 619000 | The Hallmark Hotel, Court Square, Carlisle | ML712001 | 55 | 53 | 51 | - | - | - | - | 2,A,ii,b |
| | All other assessment locations | | <40 | <35 | <30 | - | - | - | - | -,C,i,b |

**Table 2: Data source coding key**

| Code | Data source type |
|---|---|
| 1 | Long-term measurement location (typically seven days). |
| 2 | Short-term (typically unattended 24 hours or attended measurements of several hours). |
| 3 | Specific road traffic validated prediction. |
| 4 | Specific rail traffic validated prediction. |
| 5 | Specific combined road and rail traffic validated prediction. |
| 6 | Levels adopted from nearby assessment location. |
| 7 | Predictions from other sources (e.g. Defra noise maps). |
| **Code** | **Corrections applied** |
| A | Data from above source applied directly. |
| B | Correction applied based upon location of assessment location. |
| C | Minimum level cut-off applied. |
| **Code** | **Distance from measurement** |
| i | Data applied from a measurement / prediction at or very close to the assessment location. |
| ii | Data applied from a local measurement location at a greater distance but noted to have equivalent acoustic climate. |
| iii | Data applied from a distant measurement location where sound levels would be expected to be similar. |
| **Code** | **Uncertainty** |
| a | Data are considered highly representative of the prevailing sound climate. |
| b | Data are considered representative of the prevailing sound climate, but uncertainties and/or variations in measured levels indicate that there may be a higher degree of uncertainty than for (a). |
| c | Data are considered to be an estimate of the sound climate due to assumptions made. |

# 4 Construction

## 4.1 Introduction

4.1.1 This section provides a quantitative assessment of construction noise and vibration impacts/effects and a qualitative assessment of likely significant effects, based on the impacts/effects identified and other local context information consistent with the scope and methodology defined for the Proposed Scheme.

## 4.2 Evaluation of impacts and effects

4.2.1 Indirect effects arising from temporary changes in traffic patterns on the existing road network as a consequence of constructing the Proposed Scheme are reported where they are likely to occur within the study area as defined in Volume 5, Appendix SV-001-00000.

4.2.2 In undertaking the assessment of sound, noise and vibration, consistent with the Environmental Impact Assessment Directive[4] and planning practice and guidance on noise[5] a differentiation between impacts, effects, adverse effects and significant effects is made. Further information is provided in Volume 5, Appendix SV-001-00000.

4.2.3 The assessment of impacts and effects has been undertaken at assessment locations that are representative of a number of dwellings or other sensitive receptors. The construction assessment locations employed in this assessment are presented on Volume 5, Map Book, Sound, noise and vibration Map Series SV-03.

4.2.4 Baseline sound level data has been collected at locations representative of the airborne sound-sensitive receptors and presented in Table 1.

## 4.3 Effects during construction

### Introduction

4.3.1 The assessment is reported first for ground-borne sound and vibration and then for airborne sound. Under each of these headings, the results of the identification of impacts, effects and significant effects are presented. The significant effects and the evidence used to support these conclusions are presented in Volume 4, Off-route effects, Section 3.

[4] *Directive 85/337/EEC, as amended by 97/11/EC, 2003/35/EC, 2011/92/EC and 2014/52/EU ('the EIA Directive') of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment.* Strasbourg, European Parliament and European Council.

[5] Ministry of Housing, Communities & Local Government (2019), *National Planning Practice Guidance – Noise*. Available online at: https://www.gov.uk/guidance/noise--2.

# Avoidance and mitigation measures

4.3.2 These are set out in Volume 4, Off-route effects, Section 4.

# Identification of impacts and effects

4.3.3 Assessment locations defined for the quantitative assessment of impacts are shown on Volume 5, Sound, noise and vibration Map Book: Map Series SV-03.

4.3.4 For each assessment location, the assessment results are presented in Table 4 and Table 5. Explanation of the information within Table 4 and Table 5 is provided in Volume 5: Appendix SV-001-00000, with the following additional notes in Table 3.

**Table 3: Explanatory notes for assessment results – direct construction effects**

| Symbol | Explanation |
|---|---|
| | Where the significant effect column is highlighted in pink, then a significant effect is identified at the referenced residential community area. |
| | For residential receptors yellow denotes a minor ground-borne vibration impact. |
| | For residential receptors orange denotes a moderate ground-borne vibration impact. |
| | For residential receptors red denotes a major ground-borne vibration impact. |
| * | For residential receptors this indicates a potentially significant effect where the quantitative impact methodology has identified an impact at this receptor which, based upon further qualitative receptor information, (see assessment text) does not give rise to a significant effect.<br>For non-residential receptors this indicates the predicted noise levels are above screening criteria which, based upon further qualitative receptor information, (see assessment text) does not give rise to a significant effect. |
| ~ | When considered under the significance criteria set out in Volume 5: Appendix SV-001-00000, Annex A, Section 1.3, these adverse effects are not considered to be significant on a community basis. |
| A | For residential Assessment Locations (AL) - Construction sound or vibration levels from the Proposed Scheme exceed Lowest Observed Adverse Effect Level (LOAEL): the significance criteria set out in Volume 5: Appendix SV-001-00000, Annex A, Section 1.3 are considered when establishing significant effects.<br>For non-residential AL and external amenity spaces - Construction sound or vibration levels from the Proposed Scheme exceed the screening criteria in the SMR Section 18. |
| S | Sound levels from the Proposed Scheme exceed Significant Observed Adverse Effect Level (SOAEL): noise insulation (or temporary rehousing at higher noise levels) therefore provided. |
| NA | Sound or vibration levels from the Proposed Scheme do not exceed LOAEL, therefore generally no adverse effect. |
| R | Type of receptor – residential. |
| A1 – A4 | Type of receptor (airborne sound) - (A1) large and small auditoria; concert halls, sound recording and broadcast studios and theatres, (A2) places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls, (A3) schools; colleges; hospitals, hotels and libraries, (A4) offices and amenity spaces. |
| V1 – V4 | Type of receptor (ground-borne vibration) – (V1) vibration sensitive research and manufacturing; hospitals with vibration sensitive equipment/operations; universities with vibration sensitive research equipment/operations, (V2) hotels, hospital wards and education dormitories, (V3) offices, schools and places of worship, (V4) workshops. |

| Symbol | Explanation |
|---|---|
| T | Receptor design – typical. |
| SP | Receptor design – special. |
| + | The use and sensitivity of this non-residential receptor or land use is very sensitive to noise and has been included in the detailed assessment (presented in Volume 4) where there is a change less than 3dB. In each case specific information is presented in an associated footnote. |
| $ | The impact methodology for non-residential receptors includes a screening criterion for A2 building use of 50dB$L_{pAeq,07:00-23:00}$, A3 building use of 50dB$L_{pAeq,07:00-23:00}$, and 45dB$L_{pAeq,23:00-07:00}$ and for A4 building use 55dB$L_{pAeq,07:00-23:00}$ (except for A4 buildings containing lower sensitivity offices, in which case the relevant A and B categories from the BS5228 ABC method will be used to assess the noise impact). At the receptor denoted, the screening criteria is met but a change of 3dB or greater has not been identified and therefore no impact is identified. Further information is provided in Volume 5: Appendix SV-001-00000. |
| H | Existing environment – high existing airborne ambient noise levels, day >75dB, evening >65dB or night >55dB$L_{pAeq}$ at the façade. |
| L | Existing environment – low existing airborne ambient noise levels, day and evening ≤45dB, or night ≤35dB$L_{pAeq}$ at the façade. |
| D,E,N | Impact duration (months) – duration of impact during the day (D), evening (E) or night (N). |
| O, CT, V | Combined impact: If noise or vibration impacts from other construction activities occur at this location: onsite activities (O), off-site construction traffic activities (CT), or construction vibration (V). |
| NI | Mitigation effect - identified as likely to qualify for noise insulation under the draft Code of Construction Practice (CoCP) Volume 5: Appendix CT-002-00000. |
| TR | Mitigation effect - identified as likely to qualify for temporary rehousing under the draft CoCP. |

## Ground-borne sound and vibration

4.3.5 There are no activities associated with the construction phase of the Proposed Scheme which will generate ground-borne sound and vibration. Therefore significant direct effects are unlikely to occur on residential or non-residential receptors in this area.

## Airborne sound: direct impacts and effects

4.3.6 Activities associated with the construction phases of the Proposed Scheme will generate airborne noise. The assessment of the likely impacts and significant effects as a result of the construction noise has considered the effects on:

- residential receptors, both as individual dwellings and communities; and
- non-residential receptors, including quiet areas.

4.3.7 For each type of receptor, the typical and highest monthly $L_{Aeq,T}$ noise levels from construction activities have been calculated at the façade of all assessment locations. This is subject to the screening distances identified and based upon supplied plant information from engineers.

4.3.8 The results, impact criteria and significance criteria for the assessment of the scheme at residential and non-residential receptors are presented in Table 4 and Table 5 respectively.

Explanation of the information within Table 4 and Table 5 is provided in Volume 5, Appendix SV-001-00000, with the additional notes presented in Table 3.

**Table 4: Assessment of construction noise at residential receptors**

| Assessment location | | Impact criteria | | | | Significance criteria | | | | | | | | | Significant effect |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference | Area represented | Typical/highest monthly outdoor $L_{pAeq}$ [dB] at the facade [Assessment category A/B/C] | | | Construction activity resulting in highest forecast noise levels | Type of effect | Number of properties represented | Type of receptor | Receptor design | Existing environment | Unique feature | Impact duration (Months) | Combined impact | Mitigation effect | |
| | | Day 07:00 – 19:00 | Evening 19:00 – 23:00 | Night 23:00 – 07:00 | | | | | | | | | | | |
| 619003 | The Crescent, Carlisle | 49/53[A] | -/-[B] | -/-[C] | Day: General site works | NA | 9 | R | T | H | - | - | - | - | |
| 619005 | Botchergate, Carlisle | 56/61[A] | -/-[B] | -/-[C] | Day: General site works | NA | 4 | R | T | H | - | - | - | - | |
| 619012 | The Picture House | 61/65[A] | -/-[B] | -/-[C] | Day: General site works | NA | 40 | R | T | H | - | - | - | - | |
| 619013 | Albion Street | 52/54[A] | -/-[B] | -/-[C] | Day: General site works | NA | 13 | R | T | H | - | - | - | - | |
| 619017 | St Nicholas Street | 50/55[A] | -/-[B] | -/-[C] | Day: General site works | NA | 11 | R | T | H | - | - | - | - | |
| 619028 | Regent Street | 45/50[A] | -/-[B] | -/-[C] | Day: General site works | NA | 7 | R | T | H | - | - | - | - | |
| 619038 | Esther Street | 43/48[A] | -/-[B] | -/-[C] | Day: General site works | NA | 8 | R | T | H | - | - | - | - | |
| 619041 | Harrison Street | 37/42[A] | -/-[B] | -/-[C] | Day: General site works | NA | 14 | R | T | H | - | - | - | - | |
| 619051 | Currock Street | 52/57[A] | -/-[B] | -/-[C] | Day: General site works | NA | 14 | R | T | H | - | - | - | - | |
| 619054 | Sheffield Street | 51/54[A] | -/-[B] | -/-[C] | Day: General site works | NA | 52 | R | T | H | - | - | - | - | |

| Assessment location | | Impact criteria | | | | Significance criteria | | | | | | | | | Significant effect |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference | Area represented | Typical/highest monthly outdoor $L_{pAeq}$ [dB] at the facade [Assessment category A/B/C] | | | Construction activity resulting in highest forecast noise levels | Type of effect | Number of properties represented | Type of receptor | Receptor design | Existing environment | Unique feature | Impact duration (Months) | Combined impact | Mitigation effect | |
| | | Day 07:00 – 19:00 | Evening 19:00 – 23:00 | Night 23:00 – 07:00 | | | | | | | | | | | |
| 619062 | Milbourne Court | 45/52[A] | -/-[B] | -/-[C] | Day: General site works | NA | 32 | R | T | H | - | - | - | - | |
| 619069 | Abbey Street | 45/48[A] | -/-[B] | -/-[C] | Day: General site works | NA | 25 | R | T | H | - | - | - | - | |
| 619086 | West Walls | 45/49[A] | -/-[B] | -/-[C] | Day: General site works | NA | 3 | R | T | H | - | - | - | - | |
| 619105 | Tait Street | 47/54[A] | -/-[B] | -/-[C] | Day: General site works | NA | 20 | R | T | H | - | - | - | - | |
| 619107 | Cecil Street | 46/50[A] | -/-[B] | -/-[C] | Day: General site works | NA | 7 | R | T | H | - | - | - | - | |
| 619109 | Botchergate | 60/60[A] | -/-[B] | -/-[C] | Day: General site works | NA | 12 | R | T | H | - | - | - | - | |
| 619115 | South Street | 52/57[A] | -/-[B] | -/-[C] | Day: General site works | NA | 5 | R | T | H | - | - | - | - | |
| 619117 | Close Street | 44/47[A] | -/-[B] | -/-[C] | Day: General site works | NA | 15 | R | T | H | - | - | - | - | |
| 619126 | Regent Street, Carlisle and committed development (Mapbook ref.: CSTN/012) | 40/44[A] | -/-[B] | -/-[C] | Day: General site works | NA | 10 | R | T | H | - | - | - | - | |

| Assessment location | | Impact criteria | | | | Significance criteria | | | | | | | | | Significant effect |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference | Area represented | Typical/highest monthly outdoor $L_{pAeq}$ [dB] at the facade [Assessment category A/B/C] | | | Construction activity resulting in highest forecast noise levels | Type of effect | Number of properties represented | Type of receptor | Receptor design | Existing environment | Unique feature | Impact duration (Months) | Combined impact | Mitigation effect | |
| | | Day 07:00 – 19:00 | Evening 19:00 – 23:00 | Night 23:00 – 07:00 | | | | | | | | | | | |
| 619128 | Tyne Street, Carlisle, committed development (Mapbook ref.: CSTN/148) | 43/46[A] | -/-[B] | -/-[C] | Day: General site works | NA | 30 | R | T | H | - | - | - | - | |

**Table 5: Assessment of construction noise at non-residential receptors**

| Assessment location | | Impact criteria | | | | | Significance criteria | | | | | | | | Significant effect |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference | Area represented | Typical/highest monthly outdoor $L_{pAeq}$ [dB] at the façade | | Change during month with highest noise level | | Construction activity resulting in highest forecast noise levels | Number of properties represented | Type of receptor | Receptor design | Existing environment | Unique feature | Impact duration (months) | Combined impact | Mitigation effect | |
| | | Day 07:00 – 19:00 | Night 23:00 – 07:00 | Day 07:00 – 19:00 | Night 23:00 – 07:00 | | | | | | | | | | |
| 619000 | The Hallmark Hotel, Court Square, Carlisle | 65/70 | -/- | 12 | - | Day: General site works | 1 | A3 | T | H | - | D15 | - | - | CSTN-C-N4 |
| 619001 | The Citadel (Offices), English Street, Carlisle | 60/64 | -/- | 7 | - | Day: General site works | 1 | A4 | T | H | - | D9 | - | - | CSTN-C-N2 |
| 619002 | The County Hotel | 51/53 | -/- | 1 | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619007 | Ibis Hotel, Botchergate | 42/45 | -/- | - | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619008 | System Training (Office), Botchergate | 45/49 | -/- | 1 | - | Day: General site works | 1 | A4 | T | H | - | - | - | - | |
| 619009 | Vue Cinema | 61/66 | -/- | 9 | - | Day: General site works | 1 | A2 | T | H | - | D9 | - | - | $ |
| 619010 | Studio A Dance Company | 69/70 | -/- | 12 | - | Day: General site works | 1 | A4 | T | H | - | D6 | - | - | CSTN-C-N5 |
| 619011 | Hebron Evangelical Church | 64/64 | -/- | 7 | - | Day: General site works | 1 | A2 | T | H | - | D6 | - | - | CSTN-C-N6 |
| 619018 | Little Jems Nursery | 48/52 | -/- | 1 | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619022 | Abbey Court Hotel | 49/53 | -/- | 1 | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |

| Assessment location | | Impact criteria | | | | | Significance criteria | | | | | | | | Significant effect |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference | Area represented | Typical/highest monthly outdoor $L_{pAeq}$ [dB] at the façade | | Change during month with highest noise level | | Construction activity resulting in highest forecast noise levels | Number of properties represented | Type of receptor | Receptor design | Existing environment | Unique feature | Impact duration (months) | Combined impact | Mitigation effect | |
| | | Day 07:00 – 19:00 | Night 23:00 – 07:00 | Day 07:00 – 19:00 | Night 23:00 – 07:00 | | | | | | | | | | |
| 619026 | Wendy House Nursey | 46/51 | -/- | 1 | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619052 | Carlisle Enterprise Centre | 64/66 | -/- | 9 | - | Day: General site works | 1 | A4 | T | H | - | D21 | - | - | CSTN-C-N3 |
| 619057 | Carlisle Christian Fellowship | 45/49 | -/- | 1 | - | Day: General site works | 1 | A2 | T | H | - | - | - | - | |
| 619061 | Bourne Business Centre | 44/50 | -/- | 1 | - | Day: General site works | 1 | A4 | T | H | - | - | - | - | |
| 619068 | Carlisle City Hostel | 46/48 | -/- | - | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619071 | Tullie House Museum and Art Gallery | 39/42 | -/- | - | - | Day: General site works | 1 | A2 | T | H | - | - | - | - | |
| 619073 | The Guild (Offices) | 38/40 | -/- | - | - | Day: General site works | 1 | A4 | T | H | - | - | - | - | |
| 619074 | BBC Radio Cumbria | 36/39 | -/- | - | - | Day: General site works | 1 | A1 | T | H | - | - | - | - | |
| 619075 | Carlisle Business Interaction Centre (Offices) | 37/39 | -/- | - | - | Day: General site works | 1 | A4 | T | H | - | - | - | - | |
| 619077 | Carlisle Cathedral | 40/43 | -/- | - | - | Day: General site works | 1 | A2 | T | H | - | - | - | - | |

| Assessment location | | Impact criteria | | | | | Significance criteria | | | | | | | | Significant effect |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference | Area represented | Typical/highest monthly outdoor $L_{pAeq}$ [dB] at the façade | | Change during month with highest noise level | | Construction activity resulting in highest forecast noise levels | Number of properties represented | Type of receptor | Receptor design | Existing environment | Unique feature | Impact duration (months) | Combined impact | Mitigation effect | |
| | | Day 07:00 – 19:00 | Night 23:00 – 07:00 | Day 07:00 – 19:00 | Night 23:00 – 07:00 | | | | | | | | | | |
| 619078 | Stocklund House | 37/39 | -/- | - | - | Day: General site works | 1 | A4 | T | H | - | - | - | - | |
| 619081 | CityReach (Office) | 35/38 | -/- | - | - | Day: General site works | 1 | A4 | T | H | - | - | - | - | |
| 619085 | St George's United Reform Church | 44/47 | -/- | - | - | Day: General site works | 1 | A2 | T | H | - | - | - | - | |
| 619087 | Crown and Mitre Hotel | 39/42 | -/- | - | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619088 | West Walls Theatre | 36/39 | -/- | - | - | Day: General site works | 1 | A1 | T | H | - | - | - | - | |
| 619090 | Carlisle City Church | 41/45 | -/- | - | - | Day: General site works | 1 | A2 | T | H | - | - | - | - | |
| 619091 | Broadgate House (Office) | 41/45 | -/- | - | - | Day: General site works | 1 | A4 | T | H | - | - | - | - | |
| 619095 | Carlisle Crown Court | 46/51 | -/- | 1 | - | Day: General site works | 1 | A2 | T | H | - | - | - | - | |
| 619099 | Travelodge Carlisle Central | 39/41 | -/- | - | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619100 | Bupa Dental Care | 37/40 | -/- | - | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |

| Assessment location | | Impact criteria | | | | | Significance criteria | | | | | | | | Significant effect |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference | Area represented | Typical/highest monthly outdoor $L_{pAeq}$ [dB] at the façade | | Change during month with highest noise level | | Construction activity resulting in highest forecast noise levels | Number of properties represented | Type of receptor | Receptor design | Existing environment | Unique feature | Impact duration (months) | Combined impact | Mitigation effect | |
| | | Day 07:00 – 19:00 | Night 23:00 – 07:00 | Day 07:00 – 19:00 | Night 23:00 – 07:00 | | | | | | | | | | |
| 619108 | Cumbria County Council | 57/58 | -/- | 3 | - | Day: General site works | 1 | A4 | T | H | - | - | - | - | |
| 619116 | St John the Evangelist Church | 47/52 | -/- | 1 | - | Day: General site works | 1 | A2 | T | H | - | - | - | - | |
| 619118 | Viaduct House (Offices), Victoria Viaduct, Carlisle | 63/69 | -/- | 11 | - | Day: General site works | 1 | A4 | T | H | - | D9 | - | - | CSTN-C-N1 |
| 619119 | Dental Practice | 38/41 | -/- | - | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619121 | Carlisle Family Chiropractic Centre | 42/44 | -/- | - | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619122 | DaCE Cumbria (Office) | 51/56 | -/- | 2 | - | Day: General site works | 1 | A4 | T | H | - | - | - | - | |
| 619124 | Water Street Women's and Families' Hostel, Water Street, Carlisle | 48/51 | -/- | 1 | - | Day: General site works | 1 | A3 | T | H | - | - | - | - | |
| 619125 | Vasey and Sons (Lower Sensitivity Offices), Lancaster Street, Carlisle | 68/68 | -/- | 10 | - | Day: General site works | 1 | A4 | T | H | - | D6 | - | - | CSTN-C-N7 |

| Assessment location | | Impact criteria | | | | | Significance criteria | | | | | | | | Significant effect |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference | Area represented | Typical/highest monthly outdoor $L_{pAeq}$ [dB] at the façade | | Change during month with highest noise level | | Construction activity resulting in highest forecast noise levels | Number of properties represented | Type of receptor | Receptor design | Existing environment | Unique feature | Impact duration (months) | Combined impact | Mitigation effect | |
| | | Day 07:00 – 19:00 | Night 23:00 – 07:00 | Day 07:00 – 19:00 | Night 23:00 – 07:00 | | | | | | | | | | |
| 619127 | Unit 16, St Nicholas Estate (Lower Sensitivity Offices), Lancaster Street, Carlisle and committed development (Mapbook ref.: CSTN/146) | 63/66 | -/- | 9 | - | Day: General site works | 1 | A4 | T | H | - | D6 | - | - | * |

## Airborne sound: indirect effects

4.3.9 The assessment of construction noise and vibration indicates that significant indirect effects are unlikely to occur on residential or non-residential receptors in this area.

# Airborne sound levels used in other assessments

4.3.10 The construction sound results contained in this document have been used by other disciplines, namely heritage and socio economics, in their assessments.

**Table 6: Construction airborne sound levels for use in cross discipline assessments**

| Assessment location ID | | Impact information | | | | | Discipline | |
|---|---|---|---|---|---|---|---|---|
| Reference | Area represented | Typical/highest monthly outdoor $L_{pAeq}$ [dB] at the façade | | Change during month with highest noise level | | Construction activity resulting in highest forecast noise levels | Socio-economic | Heritage |
| | | Day 07:00 – 19:00 | Night 23:00 – 07:00 | Day 07:00 – 19:00 | Night 23:00 – 07:00 | | | |
| 619024 | Roadhouse Hotel | 48/53 | -/- | 1 | 0 | Day: General site works | - | Y |
| 619079 | Quality Solicitors (Office) | 35/37 | -/- | 0 | 0 | Day: General site works | - | Y |
| 619083 | St Cuthbert Church | 40/42 | -/- | 0 | 0 | Day: General site works | - | Y |
| 619092 | Cumbria Chamber of Commerce (Office) | 41/44 | -/- | 0 | 0 | Day: General site works | - | Y |
| 619120 | The Halston Hotel | 41/44 | -/- | 0 | 0 | Day: General site works | - | Y |
| 619123 | Cumbria Biodiversity Data Centre | 36/39 | -/- | 0 | 0 | Day: General site works | - | Y |

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