

5. Noise & vibration

5.1 Introduction

- 5.1.1 This chapter provides an assessment of the likely significant noise and vibration effects of the Moorside Project.
- 5.1.2 The applicable National, Regional and Local planning policies relating to noise and vibration matters are discussed, together with the relevant legislative and policy context. Baseline noise levels in the areas around the Moorside Project Sites are considered and there then follows a discussion of the spatial, temporal and technical scope of the assessment, including the identification of noise sensitive receptors.
- 5.1.3 A preliminary assessment of the likely significant noise and vibration impacts from the Moorside Project as a whole is provided. This assessment incorporates designed-in mitigation measures and evaluates noise and vibration impacts arising during site preparation, construction and operation of the Moorside Project Sites. Whilst decommissioning of the MPS is not dealt with within this PEIR, it will be addressed within the ES.
- 5.1.4 The implications of noise and vibration effects on other technical subjects are discussed in the following chapters:
- Historic Environment (**Chapter 12**);
 - Marine ecology (**Chapter 17**); and
 - Terrestrial ecology (**Chapter 18**).

5.2 Limitations

- 5.2.1 The scale and complexity of the Moorside Project means that it is continuing to evolve at this preliminary stage, which presents limitations in terms of programme and phasing. In addition survey work has yet to be undertaken, or fully completed for certain project locations. These limitations have meant that this PEIR chapter has focussed on the Moorside Site, the Accommodation Sites and the Corkickle to Mirehouse Railway and St Bees Railway Sites as there is a greater amount of information available for these locations. As such the following Highways Improvements are not considered in the PEIR, but will be included in the ES for DCO submission:
- A66/A595 Roundabout Improvement Site, Cockermouth;
 - A66 Ramsay Brow Improvement Site, Workington;
 - A596 Hall Brow Improvement Site, Workington;
 - A595 Parton Junctions Improvement Site;
 - Coach Road/Station Road Improvement Site;

- Coach Road/B5345 Improvement Site;
- A595/A5094 Inkerman Terrace/B5295 Ribton Moorside Improvement Site, Whitehaven;
- A595 Homewood Road Roundabout Improvement Site, Whitehaven;
- A595/Moor Row Improvement Site; and the
- A595/The Crescent, Thornhill Improvement Site.

5.2.2 In addition, the assessment has focussed on the construction and operational phases of each site considered, and decommissioning has not been assessed within the PEIR as it remains uncertain at this point which elements would be decommissioned and when. Each of the Accommodation Sites and Additional Sites may see some element of decommissioning activity undertaken once the construction phase of the MPS itself is complete (demolition or removal of certain features) and these will be assessed in the ES that will be submitted with the application for a DCO in 2017. As discussed in paragraph 5.1.2, decommissioning of the MPS itself will also be included within the ES, but at a high level given that these activities will take place around 60 years after operations commence, and they will be covered by a discrete EIA of the activities at that time. In addition, any noise and vibration emitted from decommissioning activities is not expected to be any worse than that associated with the construction and commissioning activities.

Technical

- 5.2.3 The assessments of significance contained within this chapter are made in the absence of quantitative supporting analysis (e.g. numerical modelling) as this work is being progressed over the course of 2016. Instead, the assessments rely on expert professional judgment at this time. These judgements may be revised within the Environmental Statement (to be submitted as part of the application for a DCO for the Moorside Project in 2017), following more detailed analysis and refinements in engineering design.
- 5.2.4 The full extent and location of the infrastructure is yet to be finalised and, as such, the noise and vibration impact assessment is still in its preliminary stages. Based on the information available, preliminary assessments of the potential impacts of noise and vibration which may arise from the construction, operational and decommissioning activities of the Moorside Site and Accommodation Sites are included within this PEIR, however, assessment of some of the Additional Sites (e.g. Highway Improvements) are not possible, pending further design details.

5.3 Policy and legislative context

Policy context

- 5.3.1 The following planning policy and guidance will be used to inform this assessment:

- National Policy Statement for Energy (NPS EN-1) (Reference 1, Department of Energy and Climate Change) Section 5.11:
 - This describes how noise and vibration can have impacts on human life and health, and on wildlife and biodiversity, and sets out the factors that will determine noise impacts. It describes what should be included in the applicant's assessment and how the decision making process, along with mitigation, should aim for health and quality of life to: avoid significant adverse impacts, mitigate and minimise other adverse impacts; and where possible, contribute to improvements through the effective management and control of noise.
 - It also describes how in-direct impacts such as associated increases in road and traffic should be considered.
- National Policy Statement for Nuclear Power Generation (NPS EN-6) (Reference 2, Department of Energy and Climate Change), Section 3.9 and Section 3.12:
 - Section 3.9 describes how the impact on biodiversity and geological conservation should be considered which includes disturbance events such as noise and Section 3.12 does the same for human health and well-being. This section explains how the construction and operation of new nuclear sites could create significant noise or vibration impacts but that appropriate mitigation is likely to mean that the subsequent effects on human health are not likely to be significant. It also advises that the beneficial effects on human health and well-being from employment or socio-economic impacts should also be included in the assessment.
- Noise Policy Statement for England (NPSE) (Reference 3, Department for Environment, Food and Rural Affairs):
 - The Statement sets out the high level vision and aims for dealing with noise (except for workplace/occupational noise), which are consistent with the aims for noise as presented in NPS EN-1.
- National Planning Policy Framework (NPPF) (Reference 4, Department for Communities and Local Government) Paragraph 109:
 - The NPPF states that new development should contribute to and enhance the environment by preventing new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.
- National Planning Practice Guidance (NPPG) (Reference 5, Department of Communities and Local Government) Paragraph 005 of the web-based document which explains when noise could be a concern.

5.3.2 The following local planning policy and guidance has been used to inform this assessment:

- Cumbria County Council (CCC) Minerals and Waste Development Framework documents 2009 which provide guidance for mineral working and waste management development planning applications (Reference 6, CCC);
- Copeland Borough Council (CBC) Local Plan (2013-2028), however, there are no noise specific policies applicable to this type of development (Reference 7, CBC);
- Allerdale Borough Council (ABC) Local Plan (Part 1) adopted July 2014. The most relevant policy applicable to this development is that 'safeguarding amenity' where noise is mentioned as one of several issues to be considered when maintaining or improving the environment and amenity (Reference 8, ABC); and
- Lake District National Park (LDNP) Local Development Framework - Core Strategy including Proposals Map contains a policy on sustainable development principles (Policy CS11) which requires developments to minimise noise which is relevant to the development. In addition, Policy CS24 refers to minimisation of increases in traffic noise in relation to the delivery of sustainable tourism (Reference 9, LDNP).

Legislative context

5.3.3 Relevant legislation includes:

- The Control of Pollution Act (CoPA) 1974 (particularly Sections 60 and 61) (Reference 10, CoPA);
- The Environmental Protection Act (EPA) 1990 (as amended by the Noise and Statutory Nuisance Act 1993) (particularly Section 79) (Reference 11, EPA);
- The Environmental Permitting (England and Wales) Regulations (EPR) 2010 (Reference 12, EPR);
- The Noise Insulation Regulations (NIR) 1975 (Reference 13, NIR);
- The Noise Insulation (Railways and Other Guided Transport Systems) (Amendment) (NIRR) Regulations 1998 (Reference ¹⁴, NIRR);
- The Noise Act (TNA) 1996 (Reference 15, TNA).

Technical guidance

5.3.4 The following guidance and Standards are of specific relevance to defining the scope of the noise and vibration surveys (and the relevant assessments):

- Construction noise - British Standard (BS) 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1: Noise (Reference 16, BS5228-1:2009+A1:2014). This document provides a recommended scope for construction noise assessment (the ABC Method) as presented in Annex E, BS 5228-1:2009+A1:2014, and which also gives example threshold values for potential significant effects at noise sensitive

receptors based upon the results of ambient sound monitoring. Similar examples for long term earthworks are also provided.

- Construction vibration - BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration (Reference 17, BS 5228-2:2009+A1:2014), presents guidance on the assessment of ground-borne vibration associated with activities such as demolition and construction.
- Road and rail traffic vibration - BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting (Reference 18, BS 6472-1:2008) presents an assessment approach to determining adverse impacts from road and rail traffic vibration within residential buildings.
- Highways England (formerly the Highways Agency) Design Manual for Roads and Bridges (DMRB) (Reference 19, Highways Agency) presents a methodology for determining impacts at noise sensitive receptors from increases and decreases in road traffic movements.
- Road traffic noise - Calculation of Road Traffic Noise (CRTN) (Reference 20, Department of Transport) provides a calculation methodology for road traffic noise.
- Rail traffic noise - within the Calculation of Railway Noise (CRN) (Reference 21, Department for Transport) methodology for evaluating noise from existing or proposed railways is outlined.
- Operational noise - BS4142:2014 Methods for rating and assessing industrial and commercial sound (Reference 22, BS4142:2014) presents guidance on the monitoring and assessment of industrial and commercial sound sources, and is particularly designed to assess sound from factories, industrial premises, fixed installations or sources of an industrial nature in commercial premises affecting sensitive receptors.
- Operational noise - BS8233:2014 Guidance on sound insulation and noise reduction for buildings (Reference 23, BS8233:2014) presents guidance on the control of noise in buildings.
- Operational noise - Horizontal Guidance Note IPPC H3 Part 1 - Regulation and Permitting (Reference 24, Environment Agency), stipulates the type of information that should be included in an Environmental Permit application. Horizontal Guidance Note IPPC H3 Part 2 Noise Assessment and Control describes the principles of noise and vibration prediction and measurement, in addition to suggested methods of noise control. IPPC H3 Part 2 recommends that whenever possible, an assessment of noise and vibration should follow a recognised method of assessment, such as the methods presented within the relevant British Standards e.g. BS 4142:2014.
- Operational noise - Acoustics - Attenuation of sound during propagation outdoors: Part 2 General Method of Calculation (Reference 25, ISO 9613-2 1996) specifies a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at distances from a source.

- Institute of Environmental Management and Assessment Guidelines for Environmental Noise Impact Assessment (Reference 26, IEMA) presents guidelines on how the assessment of noise effects should be presented within the Environmental Impact Assessment (EIA) process. The IEMA guidelines cover aspects such as; scoping, baseline, prediction and example definitions of significance criteria.

5.4 Data gathering methodology

Study area

- 5.4.1 The Study Area for the noise and vibration assessment is defined by the extent of the potential significant effects (in terms of EIA), the potential adverse effects (in terms of Government Policy) arising from the construction and operation of the Moorside Site, the Accommodation Sites and the Additional Sites, and through consultation with the relevant consultees (see **Table 5.1**).
- 5.4.2 Whilst the Study Areas applicable to specific Moorside Project locations are expected to be refined for the DCO EIA and ES, for the purposes of this PEIR the following parameters have been used to define the study areas applicable to each location:
- For the Moorside Site, a 2 km (as measured from the site boundary) study area has been adopted, as this area will contain a large number of noise sources including some at height, such as roof mounted fans for the operational Moorside Power Station (MPS). The noise sources have the potential to propagate over large distances and operate during sensitive periods, such as the night-time when background sound levels are lower than the day-time.
 - For the Accommodation Sites a 500 m distance from the boundary of each of the sites has been assumed to constitute the relevant study area, since these sites will contain a lower number of noise sources than the Moorside Site, and none of the noise sources are likely to be at a height of greater than 15 m from the ground. Noise sources during the night-time period are likely to be limited to traffic ingress and egress and low level sources such as heating, ventilating and air conditioning (HVAC) plant items. Potential noise impacts are therefore likely to be more localised than for the Moorside Site.
 - For the Additional Sites related to railway upgrade works, namely the: Corkickle to Mirehouse Railway Site; and the St. Bees Railway Site the study area will be determined based upon professional judgement which is likely to conclude that a distance of 500 m from the boundary of the sites would be appropriate to envelope worst case noise effects. Each of these sites are likely to provide localised noise sources at or near ground level which are unlikely to propagate noise over large distances.
 - For Highways Improvements Sites and route segments where traffic flows may be subject to significant change, a study area of 600 m either side of any new transport corridor(s) or road segments will be considered.

Desk study

- 5.4.3 A desk study has been undertaken to collate existing data to inform the EIA process and to provide a basis for the design of the noise and vibration baseline survey work. Existing data from the following sources were utilised to inform the EIA Scoping Report:
- aerial photography resources (Google Earth Pro version 6.2.2.6613, 2012);
 - British Nuclear Fuels Plc (BNFL) NGS_SS_4332 - Sellafield - Noise and Vibration Study - Assessment (1994) (Reference 27, BNFL), which includes baseline noise level measurements at locations representative of the closest noise sensitive receptors in the area surrounding the (then) proposed Sellafield Nuclear Power Station as at October 1991, August 1992 and November 1993;
 - BNFL, NGS_SS_4333 - Sellafield - Noise and Vibration Study - Traffic Noise Assessment (1994) (Reference 28, BNFL), this assessment presents traffic flow and measured noise level data for routes to the (then) proposed Sellafield nuclear new build site in 1994;
 - Sellafield Ltd., PPC Environmental Noise Monitoring Survey - separate annual reports detailing the noise monitoring survey results for periods 2009-2012 (Reference 29, Sellafield Ltd), as required by the permit issued for the Sellafield PPC Installation;
 - Sellafield Ltd., Strategic Environmental Assessment - Site Specific Baseline Sellafield (2012) (Reference 30, Sellafield Ltd) - With regards to vibration, the Strategic Environmental Assessment (SEA) states that there are no significant sources of vibration from the Sellafield Site and therefore no vibration monitoring has been carried out;
 - Sellafield Ltd., Strategic Environmental Assessment - Site Specific Baseline Sellafield (2013) (Reference 31, Sellafield Ltd). This document provides an update of the December 2012 SEA and includes a discussion of the Environmental Permit noise monitoring surveys for 2011 and 2012;
 - Calder Hall Nuclear Power Station Environmental Management Plan (2013) (Reference 32, Calder Hall Nuclear Power Station). This document presents an annual Environmental Management Plan (EMP) covering the on-going mitigation measures to prevent, reduce, and, if possible, offset any significant adverse environmental effects, including noise and vibration impacts, during the decommissioning of the Calder Hall Nuclear Power Station; and
 - Copeland Borough Council has provided a log of noise complaints made to the authority between 1 March 2008 and 2 December 2014. In total there were 86 logs relating to noise and these logs included the date and postcode applicable to the complaint. A general description of the type of complaint is given broken down into various categories such as agricultural activities, industrial heavy manufacturing, light industrial, construction/demolition, other vehicle noise, etc.

- 5.4.4 Consultation with stakeholders (see paragraph 5.4.5 below) has also been carried out in order to discuss and agree baseline monitoring requirements.

Survey work

- 5.4.5 The desk study identified that no recent baseline or background sound or vibration data were available for the Moorside Project Sites, therefore it was agreed with the stakeholders (Allerdale Borough Council (ABC), Copeland Borough Council (CBC) and Cumbria County Council (CCC)) that noise and vibration surveys would be undertaken at certain receptors, as detailed below and shown in **Figures 5.1 - 5.8**.
- 5.4.6 The surveys undertaken thus far and those proposed to be undertaken in the future have been and will continue to be undertaken in accordance with the relevant standards, guidance and best practice.
- 5.4.7 To date, the monitoring undertaken for the Moorside Project is as follows:

Moorside Site

- Long-term noise monitoring at ten locations (as shown in **Figure 5.1**, with the relevant locations indicated by yellow dots and text) in and around the Moorside Site during two fortnightly periods, i.e. 12 June 2015 - 25 June 2015 and 2 July 2015 - 17 July 2015.
- Short-term road traffic noise monitoring at nine locations adjacent to the A595, A5058, Sellafield Access Road and Egremont Road (as shown in **Figure 5.1**, with the relevant locations indicated with blue dots and text) in the locality of the Moorside Site between 9 and 25 June 2015.
- Currently, one rail traffic noise monitoring location adjacent to the Cumbrian Coast Line (as shown in **Figure 5.1**, with its location indicated by a green dot and text - Location 2 Lantern Moss Caravan Site) in the vicinity of the Moorside Site has been subject to short-term monitoring on 9 and 10 June 2015; and rail vibration surveys have been undertaken at three locations adjacent to the Cumbrian Coast Line to determine vibration levels from rail traffic using the line at grade, in a cutting and above a tunnel (as shown in **Figure 5.1**, with the relevant locations indicated by green dots and text).

Accommodation Sites

- Long-term noise monitoring at four locations for fortnightly periods at the Corkickle Site between 1 - 15 October 2015 and 21 October - 9 November 2015 (as shown in **Figure 5.2**, with the relevant locations indicated by yellow dots and yellow surround and text).
- Long-term noise monitoring at nine locations for fortnightly periods at the Mirehouse Site between 1 - 15 October 2015 and 21 October - 9 November 2015 (as shown in **Figure 5.2**, with the relevant locations indicated by yellow dots with a red surround and yellow text).

- Long-term noise monitoring at seven locations for fortnightly periods at the Egremont Site between 1 - 15 October 2015 and 21 October - 9 November 2015 (as shown in **Figure 5.3**, with the relevant locations indicated by yellow dots and text).
- A total of seven short-term road traffic noise locations adjacent to the Accommodation Sites (as shown in **Figure 5.2** and **Figure 5.3**, with the relevant locations indicated by blue dots and text).

Additional sites

Corkickle to Mirehouse Railway Site

- Long-term noise monitoring at three locations for fortnightly periods at the Corkickle to Mirehouse Railway Site, commenced on 30 November 2015 (as shown in **Figure 5.2**, with the relevant locations indicated with yellow dots with an orange surround and yellow text).

Outstanding survey work

5.4.8 The following noise and vibration survey work is scheduled to take place in April 2016, and has been formally agreed with Copeland Borough Council (through Arup):

Moorside Site

- long-term noise monitoring at a location within Lantern Moss, to verify the results of the survey undertaken 12 June 2015 - 25 June 2015;
- rail noise and vibration measurements associated with existing passenger and freight train movements on the Cumbrian Coast Line. The proposed monitoring locations were determined in consultation with Copeland and Allerdale Borough Councils and are shown in **Figure 5.4** (with the relevant locations indicated by green dots and text); and
- ground-borne noise measurements associated with train movements within the Whitehaven rail tunnel in order to calculate ground-borne noise effects. The proposed locations are indicated by green dots and text shown in **Figure 5.5**.

Accommodation Sites

- Rail noise and vibration measurements associated with existing passenger and freight train movements on the Cumbrian Coast Line. The two proposed monitoring locations are shown in **Figure 5.6**.

Additional sites

St. Bees Railway Site.

- Long-term noise monitoring at four locations for a fortnightly period. The proposed monitoring locations are shown in **Figure 5.7**.

Highway Improvements Sites

- Short-term road traffic noise monitoring at four locations adjacent to the Highways Improvement sites, as shown in **Figure 5.8**, (with the relevant locations indicated with blue dots and text).

Consultation

- 5.4.9 Further to the details outlined in **Chapter 3** regarding the consultation that has taken place to date, it should be noted that consultation responses received from the following organisations have been used to inform the scope of the assessment. This consultation has included the responses to the regular meetings and discussions held on the Survey and Monitoring Plans, quarterly update meetings relating to baseline surveys, the EIA Scoping Report, and the discussion drafts of this PEIR:
- Environment Agency;
 - Copeland Borough Council (and their supporting advisors, Arup);
 - Allerdale Borough Council;
 - Sellafield Limited; and
 - Cumbria County Council.
- 5.4.10 The main consultation to date has concerned agreement over noise monitoring locations and strategies for the Moorside Project. Agreement was reached prior to the undertaking of the noise surveys around the Moorside Site and the Accommodation Sites with the main consultees (CBC and ABC). Agreement was reached following meetings and joint site visits with representatives of these consultees to view and agree monitoring specific locations.
- 5.4.11 **Table 5.1** provides details of the issues which have been raised during these consultations, and a response on how they are being considered as part of the ongoing EIA process.

Table 5.1 Consultation responses received

Issue raised	Response
DCO Stage 1 Consultation	
Copeland Borough Council (through Arup) - Adequacy of the CRTN methodology	To be investigated by examination of the 24 hour measurement locations, agreed with Copeland Borough Council (through Arup).
Copeland Borough Council (through Arup) -Potential blasting assessment for power block platform construction	Use of BS6472-2 methodologies if required, agreed with Copeland Borough Council (through Arup).
Copeland Borough Council (through Arup) -Zone of Influence for construction vibration queried	Once construction details are available this can be determined more accurately.
Copeland Borough Council (through Arup) -Monitoring required at 'Middlebank'	Access denied and proxy location, agreed with Copeland Borough Council (through Arup).
Copeland Borough Council (through Arup) -Consistency with Ecological Assessment	Noise and vibration predictions will be provided where necessary for interpretation under the relevant topic chapters (i.e. Chapter 17 - Marine ecology; and Chapter 18 - Terrestrial ecology).
Assessment to be based on 'realistic worst case assumptions'	The assessment will be based upon best practice prediction and assessment methodologies.
Copeland Borough Council (through Arup) -Magnitude criteria do not in all circumstances directly correlate with NPSE additional assessment	Agreed to undertake additional assessments, where necessary, to identify potentially significant adverse effects on health and quality of life which will also be addressed by the Health Impact Assessment (HIA). Methodologies included in this PEIR.
Copeland Borough Council (through Arup) -Rail vibration including that from freight movements should be included in the assessment	Agreed and now included within this PEIR.
Copeland Borough Council (through Arup) -Scope of operational vibration	Agreed to be considered within the EIA if any significant sources of operational vibration are identified.

Issue raised	Response
Environment Agency - Complaints re Fellside Combined Heat and Power (CHP) plant	Investigation underway.
Allerdale Borough Council - Noise & Vibration monitoring required at same Railside locations as the AQ monitoring	Agreed and included within this PEIR.
Copeland Borough Council (through Arup) - Clarification of assessment criteria and methodologies required	Agreed and addressed in this PEIR.
Copeland Borough Council (through Arup) - clarification on the type of freight trains to be used for construction and how vibration will be assessed.	Vibration assessment methodologies addressed in this PEIR. Information on freight trains will be provided when it becomes available.
Copeland Borough Council (through Arup) - receptors to include tranquillity areas/potential effects on 'health & quality of life'	Potential tranquillity areas to be provided by CBC. Potential effects on 'quality of life' now addressed in this PEIR

5.5 Scope of the assessment

Potential receptors

- 5.5.1 There are three main categories of receptor to be considered within the PEIR and EIA with respect to the potential for noise and vibration effects namely existing human, potential future human and ecological receptors.
- 5.5.2 Existing Human Receptors which have been identified to date, and which are included within this PEIR, are as follows:
- **Moorside Site:** Existing residential and other inhabited buildings (e.g. schools, hospitals, care homes, places of worship and community facilities) within the associated Study Areas. For the Moorside Site these receptors are mainly located within the villages of: Beckermeth; Blackbeck; Braystones; Calder Bridge; Moss Side and near to the Sellafield Site. There are also hamlets and scattered isolated receptors around the Moorside Site.
 - **Corkickle Site:** Existing residential and other inhabited buildings (e.g. schools, hospitals, care homes, places of worship and community facilities) within 500 m of the Corkickle Site boundary.
 - **Mirehouse Site:** Existing residential and other inhabited buildings (e.g. schools, hospitals, care homes, places of worship and community facilities) within 500 m of the Mirehouse Site boundary.
 - **Egremont Site:** Existing residential and other inhabited buildings (e.g. schools, hospitals, care homes, places of worship and community facilities) within 500 m of the Egremont Site boundary.
 - **Railway Traffic:** Properties alongside the Cumbrian Coast rail line between the Port of Workington in the north and Barrow-in-Furness in the south, which may experience effects as a result of increases in rail freight and passenger to and from the Moorside Site. These include properties in the town of Workington and its suburb Harrington, and villages including: St Bees; Nethertown; Braystones; Seascale; Drigg; Ravenglass; Bootle; Silecroft; the town of Millom; Foxfield; Kirkby-in-Furness; Askam-in-Furness; and Barrow-in-Furness. There are also isolated properties along the length of this rail line which lie outside defined settlement boundaries.
 - **Road traffic:** Properties adjacent to route sections where traffic flows may be subject to significant change and which may experience effects as a result of changes to road traffic to and from the Moorside Project, including (but not necessarily restricted to) the A595(T), the A5068 and other main highway links.
 - **Corkickle to Mirehouse Railway Site:** Existing residential and other inhabited buildings (e.g. schools, hospitals, care homes, places of worship and community facilities) within 500 m of the Corkickle to Mirehouse Railway Site boundary.

- St Bees Railway Site: Existing residential and other inhabited buildings (e.g. schools, hospitals, care homes, places of worship and community facilities) within 500 m of the St Bees Railway Site boundary.
- 5.5.3 Existing Human Receptors which have been identified to date, and which are not included within this PEIR but will be considered in the final ES, are as follows:
- Highway Improvements: Properties within 600 metres of the relevant carriageways of the Highways Improvement sites, including (but not necessarily restricted to) the A595(T), the A5068 and other main highway links; and
 - designated quiet areas or areas of tranquillity will also be considered (and may also be considered for the Accommodation and Additional Sites if necessary).
- 5.5.4 Ecological and historic environment receptors are identified in **Chapters 12 (Historic Environment), 17 (Marine Ecology) and 18 (Terrestrial and Freshwater Ecology)** of this PEIR.

Spatial and temporal scope

- 5.5.5 The geographical extents of the noise and vibration assessment have been defined above and are shown in **Figures 5.1 - 5.9**.

Potentially significant effects

- 5.5.6 Potential effects that could be significant upon existing and potential future sensitive receptors, and which are preliminary assessed in this PEIR, are summarised below.

Moorside Site: construction

- Noise and vibration effects during the construction phase of the Moorside Site due to the operation of fixed and mobile plant, including any temporary access arrangements, laydown areas and infrastructure upgrade works. This phase would include consideration of the major excavation and earthworks element as well as the construction of the Moorside Power Station itself.
- Noise and vibration effects during construction (and also operation) of the CWS and MOLF during the construction phase of the Moorside Project.
- Noise and vibration effects during the construction phase due to changes in road traffic noise levels caused by additional road traffic which may occur on those parts of the road network that are to be used for access to the Moorside Site. Any road infrastructure upgrade works would also be assessed where necessary.
- Noise and vibration effects due to changes in rail traffic flows as a result of additional freight and passenger movements affecting existing residential

areas and other relevant human receptor locations in the vicinity of the Cumbrian Coast railway line during the construction the Moorside Site. Any rail infrastructure upgrade and connection works would also be assessed.

Moorside Site: operation

- Noise and vibration effects due to potential increases in noise and vibration levels from the operation of fixed plant on the Moorside Site related mainly to the MPS, including any short-term and intermittent noise effects which may occur as a result of emergency operations, such as the operation of back-up diesel generators.
- Noise and vibration effects during operation of the MOLF to support the operation of the Moorside Project, which are anticipated at this time to be limited and of short duration.
- Noise and vibration effects during the operational phase due to changes in road traffic noise levels caused by additional road traffic which may occur on those parts of the road network that are to be used for access to the Moorside Site.
- Noise and vibration effects due to changes in rail traffic flows as a result of additional freight and passenger movements affecting existing residential areas and other relevant human receptor locations in the vicinity of the Cumbrian Coast railway line generated during the operation of the Moorside Site.

Accommodation Sites: construction

- Noise and vibration effects during the construction phase of the Accommodation Sites due to the operation of fixed and mobile plant, including any temporary access arrangements, laydown areas and infrastructure upgrade works This would also include consideration of any earthworks element of this phase as well as the construction of the accommodation, landscaping and other infrastructure works.
- Noise and vibration effects during the construction phase due to changes in road traffic noise levels caused by additional road traffic which may occur on those parts of the road network that are to be used for access to the Accommodation Sites. Any localised road infrastructure upgrade works would also be assessed.
- Noise and vibration effects due to changes in rail traffic flows as a result of additional freight and passenger movements affecting existing residential areas in the vicinity of the Cumbrian Coast railway line generated during the construction of the Corkickle Site and the Mirehouse Site. Any localised rail infrastructure upgrade works would also be assessed.

Accommodation Sites: operation

- Noise and vibration effects due to potential increases in noise and vibration levels from the operation of fixed and mobile plant/machinery on the Accommodation Sites.
- Noise and vibration effects during the operational phase due to changes in road traffic noise levels caused by additional road traffic which may occur on those parts of the road network that are to be used for access to the Accommodation Sites.
- Noise and vibration effects due to changes in rail traffic flows as a result of additional freight and passenger movements affecting existing residential areas in the vicinity of the Cumbrian Coast railway line generated during the operation of the Corkickle Site and the Mirehouse Site.

Additional Sites - Corkickle to Mirehouse Railway and St. Bees Railway Sites

- Noise and vibration effects during the construction phase of these sites due to the operation of fixed and mobile plant, including any temporary access arrangements, laydown areas and infrastructure upgrade works. This would also include consideration of any earthworks elements as well as the construction of any buildings and associated infrastructure.
- Noise and vibration effects during the construction phase due to changes in road traffic noise levels caused by additional road traffic which may occur on those parts of the road network that are to be used for access to the various Additional Sites. Any road infrastructure upgrade works would also be assessed.
- Noise and vibration effects due to changes in rail traffic flows as a result of additional freight and passenger movements affecting existing residential areas in the vicinity of the Cumbrian Coast railway line generated during the construction the Additional Sites. Any rail infrastructure upgrade works would also be assessed.
- Corkickle to Mirehouse Railway Site and St Bees Railway Site: noise and vibration effects due to potential increases in noise and vibration levels from the operation of mobile and fixed plant on these sites.
- Noise and vibration effects during the operational phase due to changes in road traffic noise levels caused by additional road traffic which may occur on those parts of the road network that are to be used for access to these sites.
- Noise and vibration effects due to changes in rail traffic flows as a result of additional freight and passenger movements affecting existing residential areas in the vicinity of the Cumbrian Coast railway line generated during the operation of these sites.

5.5.7 Potential effects that could be significant upon existing and potential future sensitive receptors, and which are not preliminary assessed in this PEIR but will be included in the final ES, are summarised below.

Additional Sites - Highways Improvements

- Noise and vibration effects during the construction phase of these sites due to the operation of fixed and mobile plant, including any temporary access arrangements, laydown areas and infrastructure upgrade works. This would also include consideration of any earthworks elements as well as the construction of any buildings and associated infrastructure.
- Noise and vibration effects due to potential increases in noise and vibration levels from the operation of mobile and fixed plant on these sites.
- Noise and vibration effects during the operational phase due to changes in road traffic noise levels caused by additional road traffic which may occur on those parts of the road network that are to be used for access to these sites.

Decommissioning of Moorside Site

- 5.5.8 The final ES will consider the potential effects from decommissioning of the Moorside Project, including whole project effects and impacts upon ecological receptors, however this has not been included within this PEIR. Any noise and vibration emitted from decommissioning activities are not expected to be any worse than those associated with the construction and commissioning activities.
- 5.5.9 The impacts of the decommissioning upon the ecological receptors will be undertaken in liaison with the biodiversity specialists. Ecological receptors would be identified and if necessary noise (and vibration) levels which may affect such receptors would be predicted and then used by the biodiversity specialists to enable their assessment to be undertaken.

5.6 Environmental measures incorporated into the proposed development

- 5.6.1 Details of environmental measures that have been incorporated into the overall design of the Moorside Project are set out in **Chapter 2**. Specific measures relating to this environmental topic and how these have been targeted to the identified noise and vibration receptors at each of the Moorside Project Sites are set out in **Table 5.2**. Where environmental measures are currently unknown, or uncertain, they are not included within **Table 5.2**. Further measures will be included in the ES as they are identified and confirmed.

Table 5.2 Rationale for incorporation of environmental measures

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites		
All sensitive human receptors including those used for educational, commercial and leisure purposes (noise from construction)	Increase in ambient sound levels due to on-site construction activities, and road and rail traffic movements	Use of screening bunds/acoustic fences; Use of best practice, as outlined within BS5228-1 e.g.:) use of quieter plant where possible;) use of appropriate silencers and enclosures around plant where possible;) avoid unnecessary revving of engines;) switch off plant when not required;) use of broadband reverse warning systems where applicable;) good maintenance of internal haul roads;) minimise materials drop heights;) use of hydraulic/continuous flight auger and/or 'soft start' piling techniques;) avoid metal to metal impacts during erection of steelwork; and) agreed traffic routing to sites to avoid where possible sensitive areas of population.
All sensitive human receptors including those used for educational, commercial and leisure purposes (vibration from construction)	Increased in ground borne vibration levels due to use of construction plant on site	Use of best practice, as outlined within BS5228-2 e.g.:) use low vibration plant such as hydraulic piling or continuous flight auger piling techniques;) use of low vibration compaction techniques;) good maintenance of haul road surfaces;) vibration isolation of plant from structural elements, where possible;) locate vibrating plant as far away from sensitive receptors as possible;) use of rock and concrete crushing techniques rather than pneumatic hammers for any demolition/break out activities;) use of cut off trenches where appropriate and HSE dictates;) use of continuous flight auger and/or 'soft start' piling techniques; and) agreed traffic routing to sites to avoid where possible sensitive areas of population.
All sensitive human receptors including those used for educational, commercial and leisure purposes (operational noise & vibration)	Increased noise and vibration impacts during the operational phase	Use of best practice including:) use of quieter plant where possible;) locating noisy plant within buildings or designed enclosures;) acoustic attenuators on exhaust stacks, ventilation intakes and discharge points;) use of vent silencers;) lagging of exposed pipework and valves; and) agreed traffic routing to sites to avoid where possible sensitive areas of population.

5.7 Assessment methodology

Methodology for prediction of effects

- 5.7.1 **Table 5.3** gives a summary of the methodologies to be used within the final ES to quantitatively assess potential noise and vibration effects for various phases of the Moorside Project upon human and ecological receptors.

Table 5.3 Summary of assessment methodologies

Activities	Proposed Assessment Methodology
<p><u>Construction (fixed and mobile plant)</u> Noise and vibration from construction activities due to the operation of fixed and mobile plant on the Moorside Project Sites.</p>	<p>A fully-quantitative numerical assessment of potential effects, using the guidance within BS5228:2009+A1:2014 Parts 1 and 2 (noise and vibration respectively), which involves identification of sources of noise and vibration on the construction sites and their respective noise and vibration emissions; distributing these sources across the sites in accordance with the respective construction method statements for relevant worst case enveloping phases of the construction lifetime; prediction of the noise levels at agreed receptors from this plant and equipment using proprietary modelling software and assessment using the methodologies within BS5228-1:2009+A1:2014. Vibration levels would be predicted and assessed using BS5228-2:2009+A1:2014.</p>
<p><u>Construction and Operation (traffic)</u> Potential increases in road traffic noise due to additional road traffic on those parts of the road network that are to be used for access during the construction and operational phases of the Moorside Project Sites.</p>	<p>Subject to a preliminary DMRB screening exercise, a fully-quantitative numerical assessment of potential effects, using the guidance in the CRTN and DMRB. Calculations undertaken in accordance with CRTN methodologies within a proprietary 3D modelling software environment to allow determination of the predicted change in noise emissions as a result of additional project related traffic for road network route sections affected by the Moorside Project.</p>
<p><u>Construction & Operation (rail traffic)</u> Potential increases in rail traffic noise and vibration due to additional rail traffic on, for example, the Cumbrian Coast Railway Line that are to be used during the construction and operational phases of the Moorside Project Sites.</p>	<p>A fully-quantitative numerical assessment of potential effects, using the methodology within CRN. Calculations to be undertaken in accordance with CRN methodologies within a proprietary 3D modelling software environment to allow determination of the predicted change in noise emissions as a result of the additional project related rail traffic. The potential for increased vibration at the nearest receptors would also be assessed using the results of vibration measurements made from the existing range of rail vehicles using the line including freight and assessed against BS 6472-1:2008.</p>
<p><u>Construction & Operation (MOLF)</u> Potential increases in noise and vibration due to the construction and operation of a MOLF and/or other port facilities.</p>	<p>A fully-quantitative numerical assessment of potential effects, involving construction noise modelling within software using methodologies derived from BS5228-1:2009+A1:2014 to predict and assess noise emissions due to construction activities for the proposed MOLF. Potential changes in noise levels due to the operation of the MOLF associated with the proposed Moorside Project will be predicted and assessed using methodologies derived from ISO 9613-2 1996 and BS4142:2014, respectively. Vibration levels would be predicted and assessed using BS5228-2:2009+A1:2014 and BS 6472-1:2008, respectively.</p>

Activities	Proposed Assessment Methodology
<p><u>Operation (fixed plant)</u> Potential increases in noise and vibration due to the operation of fixed (and mobile) plant during the operational phases of the Moorside Project Sites.</p>	<p>A fully-quantitative numerical assessment of potential commercial fixed plant noise emissions effects, involving operational noise modelling to calculate break-out noise through building envelopes and propagation to receptors. Potential changes in noise levels due to the operation of any commercial fixed plant related to the proposed Moorside Project will be assessed using methodologies derived from and BS4142:2014. Vibration levels would be predicted and assessed using BS5228-2:2009+A1:2014 and BS 6472-1:2008, respectively.</p>
<p><u>Construction and Operation* (ecological assessment)</u> Potential increases in noise and vibration at ecological receptors due to all of the above activities during the construction and operational phases of the Moorside Project Sites.</p>	<p>The assessment will consider ecological receptors during the construction and operational phases. In liaison with the biodiversity specialists, ecological receptors would be identified and if necessary noise levels which may affect such receptors would be calculated using the most appropriate methodology of those described above. The predicted noise levels would be used by the biodiversity specialists to enable the assessment to be undertaken. The assessment of effects on biodiversity receptors will be provided within the relevant topic chapters.</p>

* The impact on ecological receptors will be contained within the ecology chapter(s) of the final ES (Chapter 17 (Marine Ecology) and Chapter 18 (Terrestrial and Freshwater Ecology) and, the impact on historic environment sites will be contained within Chapter 12 (Historic Environment) of the final ES supported by the required noise and vibration data.

Assessment approach

- 5.7.2 The EIA Regulations require that assessments identify ‘likely significant effects’. Whereas, government policy, namely that provided by the Department of Communities and Local Government (DCLG), requires that noise and vibration assessments identify impacts that would result in significant adverse impacts on health and quality of life. Therefore, the assessment of noise or vibration effects upon receptors or communities may result in significant effects in EIA terms, but not in terms of relevant government policy.
- 5.7.3 Whilst the assessment criteria set out are relevant for the assessment of significance in EIA terms, they do not, in all circumstances, directly correlate with the requirement of government noise policy (namely, NPPF, NPPG and NPSE). It is considered appropriate to adopt the EIA criteria in the same format (Low - Medium - High) and for those that do align, a subsection is included outlining the relationship (see paragraphs 5.7.4 - 5.7.7 below). For those that do not align with government policy an additional assessment shall be undertaken simultaneously with the EIA assessment to identify significant adverse impacts on health and quality of life, in terms of the Significant Observed Adverse Effect Level (SOAEL). The output from this assessment will be further addressed by the Health Impact Assessment (HIA).

Significance evaluation methodology

- 5.7.4 The determination of significance for each potentially significant effect is largely based upon relevant assessment criteria for the specific noise or vibration issue being addressed, as presented in relevant British Standards and

other relevant guidance documents. Although it should be noted that these assessment criteria are not directly related to the categories of ‘Significant’ or ‘Not Significant’ that underpin the Environmental Impact Assessment (EIA) process but have been used to aid the determination of both the magnitude of the effect (determined based on relevant assessment criteria) and the sensitivity of the receptor(s) which will be used to determine significance. Significance will only be determined for human receptors as ecological receptors will be evaluated as part of the biodiversity assessment process which will use the assigned magnitudes from this noise and vibration assessment to identify the and assess the relevant effects.

Sensitivity

- 5.7.5 Defining sensitivity recognises that receptors have differing sensitivities to noise. National noise policy and British Standards documents generally focus on residential properties as being sensitive to the effects of noise, although land uses such as offices, hospitals and schools are often also cited as containing buildings and/or activities that are potentially noise sensitive. The World Health Organisation (WHO) Guidelines for Community Noise (Reference 33 , WHO) introduces the concept of differentiating between these uses in terms of the degree of sensitivity to noise effects. Residences (both proposed and existing) will be considered, for the purposes of this assessment, to be of Medium sensitivity, as well as environments requiring suitable conditions for work requiring concentration (e.g. offices, schools etc.). High sensitivity receptors will include sensitive buildings and/or activities related to health facilities such as hospitals, and low sensitivity receptors will include commercial buildings.

Magnitude

- 5.7.6 The magnitude of effect will be based on the noise and vibration predictions that will be undertaken and the comparison to noise levels and limits outlined in the relevant guidance documents as detailed below.

Significance Matrix

- 5.7.7 The relationship between the significance assessment methodology and the receptor sensitivities are related within a significance evaluation matrix, detailing the High, Medium and Low magnitudes shown in **Table 5.4****Error! Reference source not found.** below.

Table 5.4 Significance Matrix

Magnitude	Sensitivity		
	High	Medium	Low
High	Major (Significant)	Major (Significant)	Moderate (Potentially Significant)
Medium	Major (Significant)	Moderate (Potentially Significant)	Minor (Not Significant)
Low	Moderate (Potentially Significant)	Minor (Not Significant)	Negligible (Not Significant)

Long term earthworks - Construction noise (fixed and mobile plant)

- 5.7.8 *Annex E of BS5228-1:2009+A1:2014 states that “where construction activities involve large scale and long term earth moving activities, then this is more akin to surface mineral extraction than to conventional construction activity. In this situation, the guidance contained within the Technical Guidance to the National Planning Policy Framework needs to be taken into account when setting criteria for acceptability”.*
- 5.7.9 Based on the above, BS5228-1:2009+A1:2014 suggests a day-time limit of 55 dB $L_{Aeq, 1h}$ which is adopted for such works but only where the works are likely to occur for a period in excess of six months. Since the excavation and earthmoving operations at the Moorside Site will involve the use of large scale earth moving plant and are likely to take up to three years to complete the advice within the online National Planning Practice Guidance: Minerals (NPPG: M) (Reference 34, Department for Communities and Local Government) is also relevant.
- 5.7.10 The NPPG: M states that the principal environmental issues of minerals working that should be addressed by mineral planning authorities, including (among others) noise associated with the operations. The main noise guidance from the NPPG: M states that:
- 5.7.11 *“Mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise-sensitive property that does not exceed the background sound level ($L_{A90,1h}$) by more than 10dB(A) during normal working hours (0700-1900). Where it will be difficult not to exceed the background level by more than 10dB(A) without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the operations should not exceed 55dB $L_{Aeq, 1h}$ (free field). For operations during the evening (1900-2200) the noise limits should not exceed the background sound level ($L_{A90,1h}$) by more than 10dB(A) and should not exceed 55dB $L_{Aeq, 1h}$ (free field). For any operations during the period 22.00 - 07.00 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral*

operator. In any event the noise limit should not exceed 42dB $L_{Aeq,1h}$ (free field) at a noise sensitive property”.

- 5.7.12 The NPPG: M also acknowledges that mineral operations can often incorporate some particularly noisy short-term activities, which may not meet the limits described above. Such activities may include: soil-stripping; the construction and removal of baffle mounds; soil storage mounds and spoil heaps; construction of new permanent landforms; and aspects of site road construction and maintenance. For such activities the NPPG: M states that:
- 5.7.13 *“Increased temporary day-time noise limits of up to 70dB $L_{Aeq,1h}$ (free field) for periods of up to eight weeks in a year at specified noise-sensitive properties should be considered to facilitate essential site preparation and restoration work and construction of baffle mounds where it is clear that this will bring longer-term environmental benefits to the site or its environs. Where work is likely to take longer than eight weeks, a lower limit over a longer period should be considered. In some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits. Within this framework, the 70 dB $L_{Aeq,1h}$ (free field) limit referred to above should be regarded as the normal maximum”.*
- 5.7.14 Using the above, the classification of magnitude of effect used will be transposed into a three tiered system (Low, Medium, High), derived from the magnitude of impact criteria defined by the NPPG: M for both the longer term ‘normal’ and shorter term ‘temporary’ operations as indicated in **Table 5.5**. The magnitude criterion also sets separate day-time, evening and night-time noise criteria based on the NPPG: M.

Power block and infrastructure - construction noise (fixed and mobile plant)

- 5.7.15 In accordance with the ‘ABC Method’ presented in Annex E of BS5228-1:2009+A1:2014, the determination of magnitude criteria for the construction phase noise effects for the construction of the power block will be based upon pre-existing levels of ambient sound at the receptors. The ‘ABC Method’ indicates that where existing ambient sound levels are below 65dB $L_{Aeq, T}$ (when rounded to the nearest 5dB), a noise threshold level of 65dB $L_{Aeq, T}$ (07:00-19:00hrs Monday-Friday and 07:00-13:00hrs Saturday) is considered appropriate for noise levels arising from construction activities at nearby noise sensitive receptors.
- 5.7.16 Based upon the findings of a preliminary site reconnaissance of the areas surrounding the Moorside Project in August 2014, the current level of ambient sound in residential areas are likely to be below the 65dB $L_{Aeq, T}$ noise threshold level. Hence 65dB $L_{Aeq, T}$ (07:00-19:00hrs Monday-Friday and 07:00-13:00hrs Saturday) is considered an appropriate limit to adopt for the assessment for all existing residential receptors. It should be noted that this is the most stringent threshold limit applicable under the guidance.

- 5.7.17 Using the above, the three tier system (Low, Medium, High), derived from the magnitude of impact criteria defined by BS5228-1:2009+A1:2014 is shown in **Table 5.5**.
- 5.7.18 As the threshold levels set out within the ‘ABC’ method act as an indicator of potential significant effect, they are also considered appropriate for identifying significant adverse impacts on health and quality of life, as per government policy. The most stringent threshold limits defined by BS5228-1:2009+A1:2014, and shown as the ‘Low’ EIA significance criteria in **Table 5.5**, are considered to be representative of the Lowest Observed Affect Level (LOAEL).
- 5.7.19 The ‘high’ EIA significance criteria have been assumed to directly correlate with government policy for the identification of significant adverse impacts on health and quality of life (SOAEL). The day-time ‘high’ threshold of 75 dB $L_{Aeq, \tau}$ is taken from the Committee on the Problem of Noise: Noise report (Reference 35, Wilson) and was set to avoid inference with normal speech indoors.
- 5.7.20 The night-time ‘high’ EIA significance criteria of 55 dB $L_{Aeq, 8hr}$ is consistent with advice presented within the World Health Organisation *Night Noise Guidelines for Europe* (WHO NNG) (Reference 36, WHO). The evening ‘high’ EIA significance criteria is set at 10dB lower than the day-time criteria, based upon advice presented within the Department of the Environment *Advisory Leaflet 72 - Noise Control on Building Sites* (AL 72) (Reference 37, Department of the Environment). This approach to setting SOAEL is consistent with other major projects, including Thames Tideway Tunnel, Crossrail, and HS2.
- 5.7.21 Where noise exposure is shown to be between LOAEL and SOAEL, i.e. not a significant effect but shown to have an adverse observed effect in government policy terms, there may still be a significant effect where the impact is upon a community area.

Table 5.5 Summary of construction noise (fixed and mobile plant) - magnitude of effect criteria

Noise/Vibration Sources	Period	Low	Medium	High
Construction noise (fixed and mobile plant) - Normal Operations - Earthworks Increase in ambient sound due to construction (fixed and mobile plant on site), affecting	Day-time (0700-1900)	Background sound level, $L_{A90, \tau}$ Or 10dB below 55dB $L_{Aeq, 1h}$	More than 1 dB below $L_{A90, \tau} + 10dB$ subject to duration effects Or More than 1dB above 55dB $L_{Aeq, 1h}$ (if appropriate) subject to duration effects	More than 1 dB above $L_{A90, \tau} + 10dB$ subject to duration effects Or More than 1dB above 55dB $L_{Aeq, 1h}$ (if appropriate) subject to duration effects
	Evening (1900-2200)	Background sound level, $L_{A90, T}$ Or	More than 1 dB below $L_{A90, T} + 10dB$ subject to duration effects Or	Greater than 55dB $L_{Aeq, 1h}$

Noise/Vibration Sources	Period	Low	Medium	High
existing noise sensitive receptors		10dB below 55dB $L_{Aeq, 1h}$	More than 1dB above 55dB $L_{Aeq, 1h}$ (if appropriate) subject to duration effects	
	Night-time (22:00-07:00)	Less than 32dB $L_{Aeq, 1h}$	Between 32 - 42dB $L_{Aeq, 1h}$	Greater than 42dB $L_{Aeq, 1h}$
Construction noise (fixed and mobile plant) Temporary Earthworks Increase in ambient sound due to construction (fixed and mobile plant on site), affecting existing noise sensitive receptors	Day-time (07:00-19:00)	Less than $L_{A90, T} + 10$ Or 55 dB $L_{Aeq, 1h}$ (if appropriate)	Above $L_{A90, T} + 10$ dB (or the 55dB $L_{Aeq, 1h}$ if appropriate) and less than 70 dB $L_{Aeq, 1h}$ for a period of less than 8 weeks Or Above 70 dB $L_{Aeq, 1h}$ for less than 1 week	Above $L_{A90, T} + 10$ dB (or the 55dB $L_{Aeq, 1h}$ if appropriate) and less than 70 dB $L_{Aeq, 1h}$ for a period exceeding 8 weeks Or Above 70 dB $L_{Aeq, 1h}$ for more than 1 week
	Evening (19:00-22:00)	Less than $L_{A90, T} + 10$ Or 55 dB $L_{Aeq, 1h}$ (if appropriate)	Above $L_{A90, T} + 10$ dB (or the 55dB $L_{Aeq, 1h}$ if appropriate) and less than 70 dB $L_{Aeq, 1h}$ for a period of less than 8 weeks Or Above 70 dB $L_{Aeq, 1h}$ for less than 1 week	Above $L_{A90, T} + 10$ dB (or the 55dB $L_{Aeq, 1h}$ if appropriate) and less than 70 dB $L_{Aeq, 1h}$ for a period exceeding 8 weeks Or Above 70 dB $L_{Aeq, 1h}$ for more than 1 week
	Night-time (22:00-07:00)	N/A	N/A	N/A
Construction noise (fixed and mobile plant) - Power Block Increase in ambient sound due to construction (fixed and mobile plant on site), affecting existing noise sensitive receptors	Day-time (07:00-19:00)	Less than 65dB $L_{Aeq, 12h}$	Greater than or equal to 65dB $L_{Aeq, 12h}$ and less than 75dB $L_{Aeq, 12h}$	Greater than or equal to 75dB $L_{Aeq, 12h}$
	Evening (19:00-23:00)	Less than 55dB $L_{Aeq, 4h}$	Greater than or equal to 55dB $L_{Aeq, 4h}$ and less than 65dB $L_{Aeq, 4h}$	Greater than or equal to 65dB $L_{Aeq, 4h}$
	Night-time (23:00-07:00)	Less than 45dB $L_{Aeq, 8h}$	Greater than or equal to 45dB $L_{Aeq, 8h}$ and less than 55dB $L_{Aeq, 8h}$	Greater than or equal to 55dB $L_{Aeq, 8h}$

Ground-borne vibration - residential impact criteria

5.7.22 BS 6472-1:2008 covers vibration sources other than those associated with blasting. The standard provides guidance on predicting human response to vibration over the frequency range 0.5 Hertz (Hz) to 80 Hz. The standard uses typical human responses to whole-body vibration in order to determine a Vibration Dose Value (VDV) which may be used to determine the potential for

unfavourable reaction and adverse comment to vibration from residential occupants.

- 5.7.23 The response of the human body to vibration is very complex and depends on many different factors, one of which (but not necessarily the most important), is the magnitude of vibration. Once an individual has perceived a vibration then it is possible for concern to be raised about the source of that vibration. This concern is usually expressed, as fear of the vibration’s potential to cause damage to the occupant’s property and that further damage may occur from repeated vibration events.
- 5.7.24 BS 6472-1:2008 discusses the fact that structural vibration within buildings can be detected by the occupants and examines how the occupant’s quality of life and/or working efficiency may be reduced. Tentative guidance is given on the various magnitudes of vibration at which adverse comment by the occupants may begin to arise. The standard also discusses how and where to measure vibration and gives the factors which influence human response.
- 5.7.25 The standard discusses the possible effects that various types of vibration may have on the inhabitants of any building. BS6472-1:2008 at Section 6 describes methods for the evaluation of such vibration and indicates levels that might possibly give rise to adverse comment under a given range of circumstances. **Table 5.6** below, presents a summary of these values.

Table 5.6 Summary of Vibration Dose Values (VDV) above which various degrees of adverse comment may be expected from the residents of dwellings

Time Period	Satisfactory VDV ($\text{ms}^{-1.75}$)		
	Low Probability of Adverse Comment	Adverse Comment Possible	Adverse Comment Probable
Day-time 07:00-23:00hrs	0.2 - 0.4	0.4 - 0.8	0.8 - 1.6
Night-time 23:00-07:00hrs	0.1 - 0.2	0.2 - 0.4	0.4 - 0.8

- 5.7.26 In terms of human responses, how the vibration dose values (VDV) in **Table 5.6** have been applied to the EIA significance is shown in **Table 5.7** below. The ‘high’ EIA significance criteria set out within **Table 5.7** below is considered to directly correlate with the Government Policy for the identification SOAEL.
- 5.7.27 Exposures relating to the LOAEL are considered to occur when they are equal to or less than those shown in **Table 5.6** for ‘Low Probability of Adverse Comment’ i.e. day-time $\leq 0.2 \text{ VDV ms}^{-1.75}$ or night-time $\leq 0.1 \text{ VDV ms}^{-1.75}$.

Table 5.7 Summary of ground-borne vibration magnitude of effect criteria

Noise/Vibration Sources	Period	Low	Medium	High
Vibration (residential impact criteria) Levels of vibration affecting residential sensitive receptors	Day-time (16 h) - (for offices and workshops a multiplying factor of 2 and 4, respectively, should be applied to these VDV's for a 16 h day)	Vibration levels do not exceed VDV of $0.4 \text{ ms}^{-1.75}$	Vibration levels do not exceed VDV of $0.8 \text{ ms}^{-1.75}$	Vibration levels exceed VDV of $0.8 \text{ ms}^{-1.75}$
	Night-time (8 h)	Vibration levels do not exceed VDV of $0.2 \text{ ms}^{-1.75}$	Vibration levels do not exceed VDV of $0.4 \text{ ms}^{-1.75}$	Vibration levels exceed VDV of $0.4 \text{ ms}^{-1.75}$

- 5.7.28 Where it is not possible to determine the vibration dose value (VDV), an assessment of whether the vibration would be perceptible can be based upon advice presented within BS5228-2:2009+A1:2014, which states that the threshold of perception is typically in the Peak Particle Velocity (PPV) range of 0.14 mms^{-1} to 0.3 mms^{-1} . Vibrations above these values can disturb or interfere with work activities. At higher levels they can be described as unpleasant or even painful.
- 5.7.29 BS5228-2:2009+A1:2014 Annex B Table B.1 also provides guidance on effect of vibration levels in terms of Peak Particle Velocity (PPV measured in millimetres per second). Table B.1 (replicated in Table 5.8 below) sets out typical effects at certain levels of vibration which are used to establish the magnitude of effect.

Table 5.8 Guidance on effects of vibration levels (taken from Table B.1 of BS5228-2:2009+A1:2014)

Vibration Level (PPV)	Effect
0.14 mms^{-1}	Vibration might be just perceptible in the most sensitive of situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mms^{-1}	Vibration might be just perceptible in residential environments.
1.0 mms^{-1}	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mms^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Ground-borne vibration - cosmetic damage

5.7.30 The assessment criteria for the likelihood of cosmetic damage to buildings are based upon guidance presented within BS 7385 Evaluation and measurement for vibration in buildings: Part 2 Guide to damage levels from ground-bourne vibration (Reference 38, BS 7385-2: 1993). An exceedance of the values in Table 5.9 below would indicate, in terms of EIA a significant adverse effect.

Table 5.9 Assessment criteria for likely cosmetic damage to buildings

Building Category	Transient vibration guide values for cosmetic damage in buildings	
	Transient vibration mms^{-1}	Continuous vibration mms^{-1}
Structurally sound and non-protected buildings	12	6
Protected or potentially vulnerable buildings	6	3

Road traffic noise

5.7.31 The guidance document DMRB includes guidance on the interpretation of changes in road traffic noise levels ($L_{A10, 18hr}$) for determining the potential magnitude of impact arising from changes in traffic flows. The document suggests differing criteria for short term (i.e. within the short term, i.e. 15 years of development opening) and long term effects, as outlined in Table 5.10 and Table 5.11, respectively.

Table 5.10 DMRB Classification of Magnitude of Noise Impacts in the Short Term

Noise Change in $\text{dB } L_{A10, 18hr}$, dB	Magnitude of Impact
0	No Change
0.1 - 0.9	Negligible
1 - 2.9	Minor
3 - 4.9	Moderate
5+	Major

Table 5.11 DMRB Classification of Magnitude of Noise Impacts in the Long Term

Noise Change in $\text{dB } L_{A10, 18hr}$, dB	Magnitude of Impact
0	No Change
0.1 - 2.9	Negligible

Noise Change in dB $L_{A10,18hr}$, dB	Magnitude of Impact
3 - 4.9	Minor
5 - 9.9	Moderate
10+	Major

5.7.32 Using the above, the classification of magnitude of effect used will be transposed into a three tier system (Low, Medium, High), derived from the magnitude of impact criteria defined by DMRB over both the short and long term. The magnitude criterion is also based upon the guidance values set out within WHO Guidelines for Community Noise (WHO, 1999) and the Noise Insulation (Amendment) Regulations (1988), and sets separate day-time and night-time noise criteria as indicated in Table 5.12 below.

Table 5.12 Summary of road traffic noise - magnitude of effect criteria

Noise/Vibration Sources	Period	Low	Medium	High
Construction Road traffic noise Increase in ambient sound due to additional construction traffic on local routes, affecting existing noise sensitive receptors	Day-time (07:00-23:00)	≤ 55 dB $L_{Aeq, 16hr}$ OR ≥ 55 dB $L_{Aeq, 16hr}$ and $a \leq 1$ dB change	≥ 55 dB $L_{Aeq, 16hr}$ and $\geq 1-5$ dB change OR Newly exposed to ≥ 55 dB $L_{Aeq, 16hr}$ and ≤ 1 dB change	≥ 63 dB $L_{Aeq, 16hr}$ and ≥ 1 dB change OR ≥ 55 dB $L_{Aeq, 16hr}$ and ≥ 5 dB change
	Night-time (23:00-07:00)	≤ 40 dB $L_{Aeq, 8hr}$ OR ≥ 40 dB $L_{Aeq, 16hr}$ and $a \leq 1$ dB change	≥ 40 dB $L_{Aeq, 8hr}$ and $\geq 1-5$ dB change OR Newly exposed to ≥ 40 dB $L_{Aeq, 8hr}$ and ≤ 1 dB change	≥ 63 dB $L_{Aeq, 8hr}$ and ≥ 1 dB change OR Newly exposed to ≥ 55 dB $L_{Aeq, 8hr}$ OR ≥ 40 dB $L_{Aeq, 8hr}$ and ≥ 10 dB change
Operational Road traffic noise Increase in ambient sound due to additional operational traffic on local routes, affecting existing noise sensitive receptors	Day-time (07:00-23:00)	≤ 55 dB $L_{Aeq, 16hr}$ OR ≥ 55 dB $L_{Aeq, 16hr}$ and $a \leq 3$ dB change	≥ 55 dB $L_{Aeq, 16hr}$ and $\geq 3-10$ dB change OR Newly exposed to ≥ 55 dB $L_{Aeq, 16hr}$ and ≤ 3 dB change	≥ 63 dB $L_{Aeq, 16hr}$ and ≥ 1 dB change OR ≥ 55 dB $L_{Aeq, 16hr}$ and ≥ 10 dB change
	Night-time (23:00-07:00)	≤ 40 dB $L_{Aeq, 8hr}$ OR ≥ 40 dB $L_{Aeq, 16hr}$ and $a \leq 3$ dB change	≥ 40 dB $L_{Aeq, 8hr}$ and $\geq 3-10$ dB change OR Newly exposed to ≥ 40 dB $L_{Aeq, 8hr}$ and ≤ 3 dB change	≥ 63 dB $L_{Aeq, 8hr}$ and ≥ 1 dB change OR

Noise/Vibration Sources	Period	Low	Medium	High
				Newly exposed to ≥ 55 dB $L_{Aeq, 8hr}$ OR ≥ 40 dB $L_{Aeq, 8hr}$ and ≥ 10 dB change

5.7.33 The day-time ‘high’ EIA significance criteria of 63 dB $L_{Aeq, 16hr}$ free-field (equivalent to 68 dB $L_{A10, 18hr}$ at façade level) indicates where noise insulation treatment under the Noise Insulation (Amendment) Regulations (1988) is required. This is considered to be representative of the SOAEL level. The night-time ‘high’ EIA significance criteria of 55 dB $L_{Aeq, 8hr}$ is considered to be representative of SOAEL and is consistent with advice presented within the Night Noise Guidelines for Europe (World Health Organisation, 2009).

Rail traffic noise

5.7.34 The magnitude criteria associated with the assessment of rail traffic noise is based upon a similar methodology to that proposed for the road traffic noise study, but will makes reference to the Noise Insulation (Railways and Other Guided Transport Systems) Regulations (1998). The magnitude criteria is shown in Table 5.13 below and presents separate criteria for the day-time and night-time periods.

Table 5.13 Summary of rail traffic noise - magnitude of effect criteria

Noise/Vibration Sources	Period	Low	Medium	High
Rail traffic noise Increase in ambient sound due to additional construction and operational rail traffic, affecting existing noise sensitive receptors	Day-time (07:00-23:00)	≤ 55 dB $L_{Aeq, 16hr}$ OR ≥ 55 dB $L_{Aeq, 16hr}$ and $a \leq 3$ dB change	≥ 55 dB $L_{Aeq, 16hr}$ and $\geq 3-10$ dB change OR Newly exposed to ≥ 55 dB $L_{Aeq, 16hr}$ and ≤ 3 dB change	≥ 65 dB $L_{Aeq, 16hr}$ and ≥ 1 dB change OR ≥ 55 dB $L_{Aeq, 16hr}$ and ≥ 10 dB change
	Night-time (23:00-07:00)	≤ 40 dB $L_{Aeq, 8hr}$ OR ≥ 40 dB $L_{Aeq, 16hr}$ and $a \leq 3$ dB change	≥ 40 dB $L_{Aeq, 8hr}$ and $\geq 3-10$ dB change OR Newly exposed to ≥ 40 dB $L_{Aeq, 8hr}$ and ≤ 3 dB change	≥ 65 dB $L_{Aeq, 8hr}$ and ≥ 1 dB change OR Newly exposed to ≥ 55 dB $L_{Aeq, 8hr}$ and ≥ 10 dB change

- 5.7.35 The EIA significance criteria shown in **Table 5.13** are not considered by Amec Foster Wheeler to directly correlate with the requirement of government noise policy, namely the NPSE. Therefore, an additional assessment against SOAEL shall be undertaken within the final ES, to determine properties at which a day-time free-field limit of 65 dB $L_{Aeq, 16hr}$ free-field or a night-time free-field limit of 55 dB $L_{Aeq, 8hr}$ may be exceeded.
- 5.7.36 The day-time level of 65 dB $L_{Aeq, 16hr}$ free-field is consistent with the trigger level set out within the Noise Insulation (Railways and Other Guided Transport Systems) Regulations (1998). The night-time level of 55 dB $L_{Aeq, 8hr}$ is consistent with advice presented within the Night Noise Guidelines for Europe (World Health Organisation, 2009).

Operational noise (fixed plant)

- 5.7.37 BS 4142:2014 is used to rate and assess sound of an industrial and commercial nature including, but not necessarily limited to assessing sound from proposed, new, modified or additional sources of sound. BS 4142:2014 contains guidance on the monitoring and assessment of industrial and commercial sound sources, and is particularly designed to assess sound from factories, industrial premises, fixed installations or sources of an industrial nature in commercial premises affecting sensitive receptors.
- 5.7.38 Methodology is detailed in BS 4142:2014 for determining the effects of new or existing sound sources by comparing the operational rating level with the background sound level, $L_{A90,T}$ (i.e. the level that would occur without the development). In summary, the methodology states that the rating level, $L_{Ar,Tr}$ during particular activities should be compared with the background sound level, $L_{A90,T}$ over a representative time period. The representative time period depends on the time period that the sound source operates, i.e. 1 hour during the day-time and 15 minutes during the night-time.
- 5.7.39 BS 4142:2014 provides guidance on appropriate methodology and criteria for assessing the impacts of a new or existing sound source by comparing the operational sound level (rating sound level) with the sound level that is present without development (background/residual sound level) i.e. the existing acoustic environment. BS 4142:2014 also introduces the concept of 'context', whereby the significance of impact is based upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. Factors that are taken into account when defining the assessment context include: the absolute level of sound; how distinguishable the specific sound would be in the acoustic environment; and the sensitivity of the receptor.
- 5.7.40 As shown in **Table 5.14** below, the greater the rating level is above the background sound level, $L_{A90,T}$ the greater the significance of noise impact.

Table 5.14 BS 4142:2014 Assessment guidance

Guidelines	Comment
Rating level from site operations of around +10 dB or more above the existing L _{A90} background sound level.	An indication of significant adverse impact, depending on the context.
Rating level from site operations of around +5 dB above the existing L _{A90} background sound level.	An indication of an adverse impact, depending on the context.
Rating level from site operations does not exceed the existing L _{A90} background sound level.	An indication of a specific sound source having a low impact, depending on the context.

5.7.41 The scoping section of BS 4142:2014 provides details of the limitations of the methodology described within the document. For the purposes of this Standard the methodology is not suitable for assessing sound measured inside buildings or when the background sound levels and rating levels are measured within 10 dB above the noise floor of the sound measuring equipment.

Acoustic feature corrections

5.7.42 The rating level is equal to the specific sound level but can incorporate a rating penalty for sound based on a subjective or objective assessment of its characteristics. The subjective method is appropriate where a new sound source cannot be measured because it is only proposed at the time of assessment and not operational in order to conduct measurements. Some of the proposed items have been measured but the majority are based on manufacturer’s data without the level of detail required to conduct an objective assessment in line with BS 4142:2014.

5.7.43 The BS 4142:2014 penalties allow for, as an absolute worst case, a cumulative + 15dB correction to be applied to the specific sound level. The overall penalties include:

- tonality - up to + 6 dB penalty;
- impulsivity - up to + 9 dB penalty;
- other sound characteristics (i.e. neither tonal nor impulsive, but still distinctive); and
- intermittency - up to + 3 dB penalty.

5.7.44 It is noted that in theory all the respective penalties can be summed together i.e. up to 18 dB, however in practice, total penalties greater than + 9 dB are rare.

5.7.45 Using the above, the EIA significance assessment has followed the three tier system (Low, Medium, High), derived from the magnitude of impact criteria defined by BS4142:2014. The assessment criteria are shown in **Table 5.15** below.

Table 5.15 Summary of operational noise - magnitude of effect criteria

Noise/Vibration Sources	Period	Low	Medium	High
Industrial sound emissions Sound emissions from operations affecting existing (and future) residential receptors in the vicinity	All Periods	Industrial sound rating levels are equal to or less than existing background sound levels.	Industrial sound rating levels are 0-10dB above existing background sound levels.	Industrial sound rating levels are greater than 10dB above existing background sound levels.

- 5.7.46 The EIA significance criteria for day-time operational noise shown in **Table 5.15** are considered to directly correlate with the requirement of government noise policy, namely the NPSE whereby the ‘high’ magnitude of change is considered to be SOAEL.
- 5.7.47 For the night-time period, the EIA significance criteria are not considered to directly correlate to the requirement of government noise policy, therefore an additional assessment against a SOAEL of 55 dB $L_{Aeq, 8hr}$ free-field shall be undertaken. The night-time level of 55 dB $L_{Aeq, 8hr}$ is consistent with advice presented within NNG WHO (2009).
- 5.7.48 The day-time and night-time LOAEL are set at 50dB $L_{Aeq, 16hr}$ and 40dB $L_{Aeq, 8hr}$ respectively, based upon advice set out within WHO (1999) and NNG WHO (2009).

5.8 Preliminary assessment of residual effects

Baseline conditions

The Moorside Site

- 5.8.1 In order to establish representative baseline conditions at the closest human receptors to the Moorside Site, monitoring was undertaken at ten locations within and near to the villages of: Beckermet; Blackbeck; Braystones; Calder Bridge; and Moss Side, in addition to locations close to the Sellafield Site. These locations are shown in **Figure 5.1**. In several circumstances, monitoring was undertaken at more than one location within each of the villages close to the Moorside Site.
- 5.8.2 The summary of the monitoring data is presented in **Table 5.16** and indicates day-time ambient sound levels at a majority of the monitoring locations were in the range 50-55dB L_{Aeq} , with slightly lower day-time ambient sound levels measured at M3 - The Spinney, M7 - Fell View, and M10 - Pelham House.
- 5.8.3 The measured ambient sound levels at M2 - Lantern Moss Caravan Site were relatively constant throughout the day-time and night-time periods. During

visits to the monitoring location it was noted that a dominant contributor to the background sound environment was from the lapping of waves from the seafront, which would remain relatively constant regardless of the time period.

- 5.8.4 The quietest noise environment occurred at M7 - Fell View, which is located to the north-east of Beckermet. At this location, peaks in ambient sound levels correspond with peaks in road traffic flows, which indicates that road traffic noise is the dominant contributor to the noise environment at this location.

Accommodation Site

- 5.8.5 A summary of the results of the ambient and background sound monitoring at each of the monitoring locations associated with the assessment of potential noise effects with the Accommodation Sites is presented in **Table 5.16**. The results have been analysed the same way as for the Moorside Site survey receptors.
- 5.8.6 In order to establish representative baseline conditions at the developments associated with the Moorside Project, monitoring was also undertaken at four locations close to the Corkickle Site; nine locations close to the Mirehouse Site and seven locations close to the Egremont Site. These locations are also shown in **Figure 5.2** and **Figure 5.3**.
- 5.8.7 A summary of the baseline noise levels measured within the areas surrounding the Moorside Site and Accommodation Sites are presented in **Table 5.16** below. This summary sets out the range of sound levels measured at monitoring locations within the six receptor areas closest to the Moorside Site, and also the monitoring locations surrounding the Corkickle Site, Mirehouse Site and Egremont Site.

Table 5.16 Baseline noise conditions - summary

Receptor Area	Representative Monitoring Locations	Construction Day-time Mon-Fri 07:00-19:00 & Sat 07:00-13:00 L _{Aeq,T} (dB)	Operational Night-time Mon-Sun 23:00-07:00 L _{A90,T} (dB) [mean average]	Operational Night-time Mon-Sun 23:00-07:00 L _{A90,T} (dB) [modal average]*
Moorside Site				
Beckermet	From Fig 5.1: 1, 5, 7	44.7 - 52.3	32.8 - 34.9	30 - 35
Blackbeck	From Fig 5.1: 9	55.4	41.1	36
Braystones	From Fig 5.1: 2, 6	51.3 - 58.9	33.1 - 45.9	32 - 44
Moss Side	From Fig 5.1: 4	56.5	30.9	29
Calder Bridge	From Fig 5.1: 8, 10	44.9 - 55.9	36.2 - 42.0	33 - 40
Sellafield	From Fig 5.1: 3	48.4	40.1	39

Receptor Area	Representative Monitoring Locations	Construction Day-time Mon-Fri 07:00-19:00 & Sat 07:00-13:00 L _{Aeq,T} (dB)	Operational Night-time Mon-Sun 23:00-07:00 L _{A90,T} (dB) [mean average]	Operational Night-time Mon-Sun 23:00-07:00 L _{A90,T} (dB) [modal average]*
Accommodation Sites				
Corkickle Site	From Fig 5.2 - all	52.0 - 57.3	33.2 - 34.0	30 - 36
Mirehouse Site	From Fig 5.2 - all	44.7 - 57.8	27.3 - 40.2	22 - 45
Egremont Site	From Fig 5.3 - all	51.1 - 61.5	32.7 - 41.0	27 - 38

* Modal averages rounded to the nearest whole number to one decimal place accuracy.

Corkickle Site

5.8.8 In general day-time ambient sound levels fell within the range 52-57dB L_{Aeq}, with the highest ambient levels occurring at M2 - No. 46 Esk Avenue. The highest measured levels at this location are likely to be influenced by rail traffic movements due to the proximity of the sound level meter (SLM) to the Cumbrian Coast rail line. Night-time measurement results at each of the four monitoring locations do not vary significantly, i.e. the modal (i.e. the level which is most common) night-time background sound levels range between 30-36dB L_{A90}. At each of the monitoring locations, road and rail traffic noise were noted as being the dominant contributors to the sound environment during equipment deployment and collection. This sound environment is considered to be typical of a semi-urban environment.

Mirehouse Site

5.8.9 A majority of the day-time ambient sound levels at locations close to the Mirehouse Site fell within the range 44-55dB L_{Aeq}, and were generally dominated by road traffic noise. The highest day-time ambient sound levels (approximately 58dB L_{Aeq}) were measured at M4 - Mirehouse Road and M5 - No. 44 Gable Road, to the north-west of the site boundary. At these locations, the day-time sound environment was dominated by road traffic, in particular traffic noise from the A595, which lies approximately 250 m to the west of M5 - No. 44 Gable Road.

5.8.10 The modal night-time background sound level for a majority of the monitoring locations ranged between 25-38dB L_{A90}. Higher night-time modal levels of 42-45dB L_{A90} occurred at monitoring locations within the southern part of the site boundary i.e. M8 - Site Boundary - Proxy for Sunny Brow and M9 - Low Hall. At these locations during the night-time period there was a greater range of sound pressure levels measured, therefore the background sound level may be better characterised by the mean (i.e. the sum of the levels divided by the number of levels considered), which was 40.2dB L_{A90} and 34.2dB L_{A90} for M8 - Site Boundary - Proxy for Sunny Brow and M9 - Low Hall respectively.

Egremont Site

- 5.8.11 Day-time ambient sound levels at locations close to the Egremont Site fell within the range 50-61dB L_{Aeq} . The dominant contributor to the levels at a majority of the monitoring locations was from road traffic movements on the A595 and the surrounding local road network.
- 5.8.12 The night-time background sound level modal averages for a majority of the locations fell within the range 27-31dB L_{A90} . At M5 - Dent Road and M7 - Proxy location for Scurgill Terrace. Modal night-time background sound levels of 39dB L_{A90} and 38dB L_{A90} respectively have been calculated. At each location, the SLM was positioned with an unobstructed view of the A595, i.e. angle of view in the region of 160 degrees.

Predicted residual effects and their significance

- 5.8.13 A summary of the preliminary assessment of the predicted residual effects is provided, with respect to the effects that might influence each of the key receptors or receptor groups at each Moorside Project Site, in **Table 5.19** to **Table 5.24**. Where insufficient development, and/or baseline information, is available to undertake a prediction of the magnitude of change, and therefore draw conclusions regarding the significance of effects, the respective column has been populated by an asterisk (*) only.
- 5.8.14 In the absence of precise detail regarding the design and layout of the Moorside Project quantitative assessment of many of the development phases has not been possible and therefore a high level qualitative assessment has been undertaken based on Amec Foster Wheeler's experience of other nuclear new build projects and large scale mineral extraction developments.
- 5.8.15 To support the conclusions of the construction noise assessment, a preliminary and indicative quantitative assessment of likely noise impacts at receptors during earthworking operations has been undertaken utilising Stapelfeldt's LimA noise modelling software. The construction activities associated with the earthworking are considered likely to have the greatest impact upon sensitive receptors close to the Moorside Site, therefore the assessment is considered worse case. This assessment relates to the Moorside Site only where it is known that substantive excavations and earthworks of prolonged duration are planned to occur.
- 5.8.16 The initial noise calculations have been based upon the likely construction earthworking operations, in particular activities to take place during the earth bund construction and topsoil replacement. The construction activities and associated plant considered during this phase are based upon Amec Foster Wheeler's experience of similar projects where substantial excavation and earthworking have been required, and it has been assumed that plant would be operating in the closest approach working areas to the receptors. A summary of the plant used, and associated on-times (percentage of time the equipment is considered to be fully operational) are listed in **Table 5.17** below.

Table 5.17 Plant Complement and Associated Sound Power Levels

Plant	Sound Power Level, dB(A)	No. of plant	% On-Time
40t Articulated Dump Trucks - CAT 740B	108	3	85%
Cat D6H Dozer	108	3	50%
Komatsu PC3000 300t Excavator	117	3	85%
Cat 777G 100t Dump Trucks	115	18	85%
100t Excavator - CAT 390DL	108	2	85%
Dozer CAT D9T with Ripper Attachment	113	2	50%

Noise model

- 5.8.17 Noise modelling of the earthworks component of the wider construction phase activities for the Moorside Site has been undertaken using the Stapelfeldt's LimA noise modelling software, which allows a 3-dimensional environmental model to be constructed using digital mapping and topographic data. LimA can implement a number of methodologies for the calculation of noise levels, including that set out in BS 5228-1:2009+A1:2014, which is used for the calculation of noise from minerals operations.
- 5.8.18 As part of this assessment, 3-dimensional models have been constructed for the selected phase of the development (earthworks), using data obtained from the Ordnance Survey (OS) and Amec Foster Wheeler's current understanding of potential outer bund and bulk earthworks requirements. This has allowed the assessment to incorporate changes in the topography of the site and its surroundings as well as changes in the location, nature and characteristics of noise sources.
- 5.8.19 It should be noted that whilst based Amec Foster Wheeler's experience on similar projects, the assumed plant list and development terrain could change significantly from that assumed within the noise model. Therefore the noise levels calculated should be considered as indicative only and subject to change.

Bund Construction and Topsoil Replacement

- 5.8.20 **Table 5.18** presents the range of noise levels calculated to occur during the earthworks component of the construction activities associated with the outer bund construction and topsoil replacement within the receptor areas of Beckermert; Blackbeck; Braystones; Calder Bridge; and Moss Side, and those locations close to the Sellafield Site.
- 5.8.21 Given a majority of the noise sources associated with the construction phase are moving sources, the likely highest (when the source is closest to the receptor) and the lowest (when the source is furthest from the receptor) have

been calculated. This allows the range of predicted potential noise levels to be presented.

Table 5.18 Bund Construction and Topsoil Replacement - Range of Predicted Noise Levels

Receptor Area	Minimum Likely L _{Aeq, 1hr} (dB)	Maximum Likely L _{Aeq, 1hr} (dB)
Beckermeth	35.6	71.7
Blackbeck	36.8	57.6
Braystones	40.3	54.4
Calder Bridge	32.3	57.9
Moss Side	36.2	74.6
Sellafield	38.6	57.8

- 5.8.22 The noise modelling prediction locations, considered to be representative of receptors within the associated receptor group, are shown in **Figure 5.9**. The results of the noise modelling are not exhaustive and should not be considered to be final predictions for EIA purposes given ongoing project design. Therefore the predictive calculations have not been undertaken for each of the receptors within the receptor groups. Accordingly, the results presented in this PEIR are indicative at this stage. It is noted that the predictive calculations undertaken for the purposes of this PEIR have considered the likely noise impacts from earthworks only, i.e. earth bund construction and topsoil replacement. It should be noted that noise impacts from other construction sources will be considered within the final ES once relevant design information becomes available.
- 5.8.23 At this stage the evaluation tables only deal with the construction and operational phases of the development at each Moorside Project Site.
- 5.8.24 With respect to the decommissioning of the Moorside Project, potential effects associated with decommissioning are likely to be similar or less than the effects arising from the construction phase of this PEIR. It is not anticipated that additional receptors would be affected beyond those identified for the construction phase assessment as this assessment has assumed a reasonable worst case. It is anticipated that the decommissioning works would be of shorter duration and would occupy more limited footprints than those currently assumed for construction of the relevant facilities. Subject to further design and delivery details, and for the purposes of this PEIR, a worst case scenario has been applied, i.e. it has been assumed that the effects would be the same (rather than less) as those identified for the construction phase. Decommissioning is therefore not considered further in the assessment tables below that address the construction and operational phases.

- 5.8.25 Please note that the assessment tables have been completed for the Corkickle to Mirehouse and St. Bees Rail Loop Site Railway sites, however, the conclusions are considered high-level as the collection of relevant baseline characterisation data and/or the associated analysis is on-going.
- 5.8.26 Assessment tables for the associated Highway Improvement Sites have not been completed as sufficient baseline characterisation data is yet to be collected.

Accommodation Sites

- 5.8.27 In the absence of precise detail regarding the design, layout and construction methodologies for the Accommodation Sites quantitative assessment of many of these developments has not been possible and therefore a high level qualitative assessment has been undertaken based on Amec Foster Wheeler's experience of other nuclear new build projects along with a list of assumptions regarding the construction methodologies and operations on each site.

Assumptions used to undertaken preliminary assessments

- 5.8.28 The following assumptions have been made for the purposes of making the qualitative assessments reported in **Table 5.19** to **Table 5.22**, below:

Corkickle and Mirehouse Sites

- 5.8.29 Assumptions made for the purposes of qualitatively assessing the construction noise and vibration:
- in the absence of a finalised Construction Environmental Management Plan (CEMP), construction working hours including deliveries are assumed to be 07:00-19:00 hrs weekdays, and 07:00 - 13:00 hrs Saturdays with no evening or night-time working and no working on Sundays;
 - substantial earthworks required to create formation levels for site. No material taken off-site, all material stored in landscaping bunds around periphery of site boundary;
 - all earthworks compaction operations undertaken at distances greater than 50 m from the closest receptors;
 - construction road traffic to be no greater than existing road traffic levels;
 - main earthmoving plant to comprise but not limited to: 360° excavators; articulated dumptrucks; bulldozers; and towed vibrating rollers;
 - typical construction plant to include, but not limited to: concrete mixers; scaffolding erection; site dumpers; site forklifts; shuttering erection/dismantling; and concrete pours;
 - impact piling required for all building foundations including station platform in Corkickle to Mirehouse Railway Site;
 - batching concrete plant to be located on site, to reduce mixer truck deliveries;

- station car park construction to require sub-base compaction and laying of tarmacadam; and
- temporary power supplied by onsite generators and compressors located in compounds with suitable acoustic screening.

5.8.30 Assumptions made for the purposes of qualitatively assessing the operational noise and vibration:

- all accommodation to be fully occupied during construction phase of Moorside Site;
- roof mounted Heating, Ventilation and Air Conditioning (HVAC) plant with appropriate silencing enabling operational noise to be less than 10 dB(A) above backgrounds);
- construction workers to travel between Accommodation site and Moorside construction site by rail. The number of additional rail movements per day is no more than 23; and
- operational road traffic no more than existing road traffic levels.

Egremont Site

5.8.31 Assumptions made for the purposes of qualitatively assessing the construction noise and vibration:

- in the absence of a finalised CEMP, construction working hours including deliveries are assumed to be 07:00-19:00 hrs weekdays, and 07:00 - 13:00 hrs Saturdays with no evening or night-time working and no working on Sundays;
- substantial earthworks required to create formation levels for site. No material taken off-site, all material stored in landscaping bunds around periphery of site boundary;
- all earthworks compaction operations undertaken at distances greater than 50 m from the closest receptors;
- construction road traffic to be no greater than existing road traffic levels;
- main earthmoving plant to comprise but not limited to: 360° excavators; articulated dumptrucks; bulldozers; and towed vibrating rollers;
- typical construction plant to include, but not limited to: concrete mixers; scaffolding erection; site dumpers; site forklifts; shuttering erection/dismantling; and concrete pours;
- impact piling required for all building foundations;
- batching concrete plant to be located on site, to reduce mixer truck deliveries; and
- temporary power supplied by onsite generators and compressors located in compounds with suitable acoustic screening.

- 5.8.32 Assumptions made for the purposes of qualitatively assessing the operational noise and vibration:
- all accommodation to be fully occupied during construction phase of Moorside Site;
 - roof mounted Heating, Ventilation and Air Conditioning (HVAC) plant with appropriate silencing enabling operational noise to be less than 10 dB(A) above backgrounds); and
 - operational road traffic no more than existing road traffic levels.

Additional Sites

- 5.8.33 In the absence of precise detail regarding the design, layout and construction methodologies for the Additional Sites quantitative assessment of many of these developments has not been possible and therefore a high level qualitative assessment has been undertaken based on Amec Foster Wheeler's experience of other nuclear new build projects.
- 5.8.34 The quantitative assessments for the Corkickle to Mirehouse and St. Bees Rail Loop Site Railway sites are reported in **Table 5.23** and **Table 5.24**.

Table 5.19 Moorside Site: Summary of predicted residual effects

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Construction					
Receptor 1 Residential properties in southern part of Beckermet - Sellafield Road, Kirkbeck Drive and Nursery Road					
Fixed and mobile plant (noise)	Likely	Medium	High	Major (Significant)	Noise impacts from the noise model, based upon earthworks, are 71.7 - 56.0 dB $L_{Aeq, 1hr}$ from large earth moving plant operating to the south of the southern fringes of the village near to Kirkbeck Drive. For properties on Nursery Road and Sellafield Road indicative calculations are 64.6 - 46.2 dB $L_{Aeq, 1hr}$. These values correspond to a High magnitude of change (as a worst case). The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time. It is noted that measured day-time ambient sound levels are approximately 15dB greater than night-time levels.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	A Medium magnitude of change is likely for a majority of the receptors on Nursery Road and Sellafield Road, where, e.g., earthworks compaction operations are proposed in excess of 50 m of the receptor). This may also occur at properties on Glenholme, Kirkbeck Drive and the southern part of Nursery Road.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised in the Quarter 3 period of 2016 and will be used to undertake further detailed assessment for the ES to be submitted with the DCO application in 2017.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements would occur. For these receptors the magnitude of change is likely to be Low given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Moorside Site, however this would need to be confirmed when the relevant routing information is confirmed during the Quarter 3 period of 2016.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change, due to large separation distances between receptors and the MOLF but also dependent upon the hours of construction (and operation) of the MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the MOLF.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Receptor 2 Residential properties in the centre of Beckermet - Morass Road, Station Crescent and Braystones Road					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Noise impacts from the noise model, based upon earthworks are 56.6 - 49.6 dB $L_{Aeq, 1hr}$ from large earth moving plant operating on the southern fringes of the village. These values correspond to a Medium magnitude of change (as a worst case). The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time. It is noted that measured day-time ambient sound levels are approximately 15dB greater than night-time levels.
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely for the receptors within this receptor group. A Medium or High magnitude of change is considered unlikely given the distances between receptors and the closest construction activities, i.e. earthworks compaction operations would be much greater than 50 m away.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements would occur. For these receptors the magnitude of change is likely to be Low given the relatively large separation distances from the railway line.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Moorside Site, however this would need to be confirmed when the relevant routing information becomes available in 2016.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change, due to large separation distances between receptors and the MOLF but also dependent upon the hours of construction (and operation) of the MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the MOLF.
Receptor 3 Residential properties in northern Beckermeth - Morass Road North, Mill Lane, Lowry Close, Fleming Drive, Beck Rise, Hunter Rise, Bankfield and The Millfields.					
Fixed and mobile plant (noise)	Likely	Medium	Low	Minor (Not Significant)	Noise impacts from the noise model, based upon earthworks are approximately 50 dB $L_{Aeq, 1hr}$ from large earth moving plant operating to the south of the southern fringes of the village. These values correspond to a Low magnitude of change. The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time. It is noted that measured day-time ambient sound levels are approximately 15dB greater than night-time levels.
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely for the receptors within this receptor group. A Medium or High magnitude of change

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
					is considered unlikely given the distances between receptors and the closest construction activities, i.e. earthworks compaction operations would be much greater than 50 m away.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be between Low given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Moorside Site, however this would need to be confirmed when the relevant routing information becomes available in 2016.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change, due to large separation distances between receptors and the MOLF but also dependent upon the hours of construction (and operation) of the MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the MOLF

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Receptor 4 Residential properties in Braystones - Beck Close, Nethertown Road and Egremont Road					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Noise impacts from the noise model, based upon earthworks are 54.4 - 50.1 L _{Aeq, 1hr} . These noise impacts are dominated by large earth moving plant operating on the fringes of the mound footprints to the east of the receptors. These values correspond to a Medium magnitude of change. The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of vibration generally expected because activities would be occurring at distance on the fringes of the mound footprints to the east of the receptors.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be Medium given the relatively short separation distances from the railway.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
					from rail traffic vibration from any potential rail spurs into the Moorside Site, however this would need to be confirmed when the relevant routing information becomes available in 2016.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change, due to large separation distances between receptors and the MOLF but also dependent upon the hours of construction (and operation) of the MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to the distances from the MOLF.
Receptor 5 Residential properties in Blackbeck - alongside the A595(T)					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Noise impacts from the noise model, based upon earthworks are 57.6 - 54.4 dB L _{Aeq, 1hr} . These noise impacts are dominated by large earth moving plant operating on the fringes of the mound footprints to the south and south west of the receptors. These values correspond to magnitude of change of Medium (as a worst case). The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time. It is noted that measured day-time ambient sound levels are approximately 20dB greater than night-time levels.
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change likely for a majority of the receptors in Blackbeck near to the A595(T).
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
					construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be Low given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Moorside Site, however this would need to be confirmed when the relevant routing information becomes available in 2016.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change, due to large separation distances between receptors and the MOLF but also dependent upon the hours of construction (and operation) of the MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the MOLF.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Receptor 6 Residential properties in Moss Side - High Croft and High Godderthwaite					
Fixed and mobile plant (noise)	Likely	Medium	High	Major (Significant)	Some of the highest calculated noise impacts, based upon earthworks, are shown to occur at residential properties in Moss Side. Worst case noise impacts are in the range 74.6 - 65.7 dB L _{Aeq, 1hr} . These noise impacts are dominated by large earth moving plant working on the fringes of the mound footprints to the south west of the receptors and would correspond to a High magnitude of change category (as a worst case). The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time. It is noted that measured day-time ambient sound levels are approximately 20dB greater than night-time levels.
Fixed and mobile plant (vibration)	Likely	Medium	High	Major (Significant)	A High magnitude of change (as a worst case) where earthworks compaction operations may be proposed in close proximity to properties, such as within 50 m such as may occur at properties at High Croft and Nursery Cottages.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to larger separation distances from Cumbrian Coast railway line but also dependent on type and time of day of train movements.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change, due to large separation distances between receptors and the railway.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the MOLF.
Receptor 7 Residential properties in Calder Bridge - alongside the A595(T)					
Fixed and mobile plant (noise)	Likely	Medium	Low	Minor (Not Significant)	Noise impacts from the noise model, based upon temporary earthworks are 53.9 - 39.7 dB $L_{Aeq, 1hr}$. These values correspond to a magnitude of change of Low. The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of vibration generally expected because activities occurring at distance on the fringes of the mound footprints to the west of the receptors.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
					receptors the magnitude of change is likely to be Low given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Moorside Site, however this would need to be confirmed when the relevant routing information becomes available in 2016.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change, due to large separation distances between receptors and the MOLF but also dependent upon the hours of construction (and operation) of the MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the MOLF.
Receptor 8 Sella Park House Hotel, The Spinney and two semi-detached houses to north of Sella Park House Hotel					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Noise impacts from the noise model, based upon earthworks are 57.8 - 57.6 dB L _{Aeq, 1hr} . These values correspond to a Medium magnitude of change. The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of vibration generally expected because activities occurring at distance on the fringes of the mound footprints to the north and north west of the receptors

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be Low given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Moorside Site, however this would need to be confirmed when the relevant routing information becomes available in 2016.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change, due to large separation distances between receptors and the MOLF but also dependent upon the hours of construction (and operation) of the MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the MOLF.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Receptor 9 Sellafield Receptors					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Noise impacts from the noise model, based upon earthworks are 46.6 - 44.8 dB L _{Aeq, 1hr} . These values correspond to a Medium magnitude of change (as a worst case). The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely for the majority of receptors within the Sellafield Site.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be Low given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Moorside Site, however this would need to be confirmed

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
					when the relevant routing information becomes available in 2016.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change, due to large separation distances between receptors and the MOLF but also dependent upon the hours of construction (and operation) of the MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the MOLF.
Operation					
Receptor 1 Residential properties in southern part of Beckermet - Sellafield Road, Kirkbeck Drive and Nursery Road					
Fixed plant (noise)	Likely	Medium	*	*	Magnitude of significance is based upon measured background sound levels, and the proposed operational hours of the fixed plant and associated emissions. This information is to be finalised in 2016.
Fixed plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Operation of fixed plant 24 hours/day, 7 days/week, therefore Low magnitude of change expected at all times, due to large separation distance(s) in terms of vibration propagation.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from main access route(s) to the Moorside Site as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change expected, due to larger separation distances from the Cumbrian Coast railway line but will also be dependent on type and time of day of train movements

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distance from the railway line but will also be dependent on type and time of day of train movements.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to larger separation distances from the operational MOLF but also dependent on time of day of operations, e.g. if night-time activities then could be Medium magnitude of change.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distances from the operational MOLF.
Receptor 2 Residential properties in the centre of Beckermet - Morass Road, Station Crescent and Braystones Road					
Fixed plant (noise)	Likely	Medium	*	*	Magnitude of significance is based upon measured background sound levels, and the proposed operational hours of the fixed plant and associated emissions. This information is to be finalised in 2016.
Fixed plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Operation of fixed plant 24 hours/day, 7 days/week, therefore Low magnitude of change expected at all times, due to large separation distance(s) in terms of vibration propagation.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from main access route(s) to the Moorside Site as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change expected, due to larger separation distances from the Cumbrian Coast railway line but will also be dependent on type and time of day of train movements.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distance from the railway line but will also be dependent on type and time of day of train movements.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to larger separation distances from the operational MOLF but also dependent on time of day of operations, e.g. if night-time activities then could be Medium magnitude of change.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distances from the operational MOLF.
Receptor 3 Residential properties in northern Beckermat - Morass Road North, Mill Lane, Lowry Close, Fleming Drive, Beck Rise, Hunter Rise, Bankfield and The Millfields.					
Fixed plant (noise)	Likely	Medium	*	*	Magnitude of significance is based upon measured background sound levels, and the proposed operational hours of the fixed plant and associated emissions. This information is to be finalised in 2016.
Fixed plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Operation of fixed plant 24 hours/day, 7 days/week, therefore Low magnitude of change expected at all times, due to large separation distance(s) in terms of vibration propagation.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from main access route(s) to the Moorside Site as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change expected, due to larger separation distances from the Cumbrian Coast railway line but will also be dependent on type and time of day of train movements.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distance from the railway line but will also be dependent on type and time of day of train movements.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to larger separation distances from the operational MOLF but also dependent on time of day of operations, e.g. if night-time activities then could be Medium magnitude of change.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distances from the operational MOLF.
Receptor 4 Residential properties in Braystones - Beck Close, Nethertown Road and Egremont Road					
Fixed plant (noise)	Likely	Medium	*	*	Magnitude of significance is based upon measured background sound levels, and the proposed operational hours of the fixed plant and associated emissions. This information is to be finalised in 2016.
Fixed plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Operation of fixed plant 24 hours/day, 7 days/week, therefore Low magnitude of change expected at all times, due to large separation distance(s) in terms of vibration propagation.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from main access route(s) to the Moorside Site as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	*	*	Low - High magnitude of change, entirely dependent on separation distances from the railway line but will also on the type and time of day of any train movements, e.g. any movements at night will be more sensitive.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (vibration)	Likely	Medium	*	*	Low - High magnitude of change, entirely dependent on separation distances from the railway line but will also on the type and time of day of any train movements, e.g. any movements at night will be more sensitive.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distances from the operational MOLF but also dependent on time of day of operations.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distances from the operational MOLF
Receptor 5 Residential properties in Blackbeck - alongside the A595(T)					
Fixed plant (noise)	Likely	Medium	*	*	Magnitude of significance is based upon measured background sound levels, and the proposed operational hours of the fixed plant and associated emissions. This information is to be finalised in 2016.
Fixed plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Operation of fixed plant 24 hours/day, 7 days/week, therefore Low magnitude of change at all times, due to larger separation distance(s) in terms of vibration propagation.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from main access route(s) to the Moorside Site as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distances from the railway line but will also be dependent on type and time of day of train movements.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distance from the railway line but will also be dependent on type and time of day of train movements.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the operational MOLF but also dependent on time of day of operations, any night-time activities may have to be mitigated further.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distances from the operational MOLF.
Receptor 6 Residential properties in Moss Side - High Croft and High Godderthwaite					
Fixed plant (noise)	Likely	Medium	*	*	Magnitude of significance is based upon measured background sound levels, and the proposed operational hours of the fixed plant and associated emissions. This information is to be finalised in 2016.
Fixed plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Operation of fixed plant 24 hours/day, 7 days/week, therefore Low magnitude of change at all times, due to larger separation distance(s) in terms of vibration propagation.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from main access route(s) to the Moorside Site as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the railway line.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the railway line.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the operational MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the operational MOLF.
Receptor 7 Residential properties in Calder Bridge - alongside the A595(T)					
Fixed plant (noise)	Likely	Medium	*	*	Magnitude of significance is based upon measured background sound levels, and the proposed operational hours of the fixed plant and associated emissions. This information is to be finalised in 2016.
Fixed plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Operation of fixed plant 24 hours/day, 7 days/week, therefore Low magnitude of change at all times, due to larger separation distance(s) in terms of vibration propagation.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from main access route(s) to the Moorside Site as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the railway line.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the operational MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the operational MOLF.
Receptor 8 Sella Park House Hotel, The Spinney and two semi-detached houses to north of Sella Park House Hotel					
Fixed plant (noise)	Likely	Medium	*	*	Magnitude of significance is based upon measured background sound levels, and the proposed operational hours of the fixed plant and associated emissions. This information is to be finalised in 2016.
Fixed plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Operation of fixed plant 24 hours/day, 7 days/week, therefore Low magnitude of change at all times, due to larger separation distance(s) in terms of vibration propagation.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from main access route(s) to the Moorside Site as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the railway line.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the operational MOLF.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the operational MOLF.
Receptor 9 Sellafield Receptors					
Fixed plant (noise)	Likely	Medium	*	*	Magnitude of significance is based upon measured background sound levels, and the proposed operational hours of the fixed plant and associated emissions. This information is to be finalised in 2016.
Fixed plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Operation of fixed plant 24 hours/day, 7 days/week, therefore Low magnitude of change at all times, due to larger separation distance(s) in terms of vibration propagation.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from main access route(s) to the Moorside Site as well as the time of day. This information is to be finalised in 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the railway line.
MOLF (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the operational MOLF.
MOLF (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to large separation distances from the operational MOLF.

Note: * Denotes where the assessment is incomplete and ongoing at this time.

Table 5.20 Corkickle Site: Summary of predicted residual effects

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Construction					
Corkickle Site Residential Receptors - Esk Avenue, Station Road, Calder Avenue, Pow Avenue, Irt Avenue, Ehen Avenue, The Gardens and St Begh's School					
Fixed and mobile plant (noise)	Likely	Medium	High	Major (Significant)	Potentially large earth moving plant operating on the fringes of the site therefore likely High magnitude of change.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Likely Medium magnitude of change. Medium magnitude of change considered likely given activities such as earthworks compaction operations are proposed at distances greater than 50 m from the closest receptor.
Road traffic (noise and vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. Likely to be a Medium magnitude of change.
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	A Medium magnitude of change based upon the likely noise emissions from the type of train (freight or passenger) and the time of day when the movements would occur. A medium magnitude of change is likely given the relatively small separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	A Medium magnitude of change is likely given some of the separation distances between receptors and the Cumbrian Coast railway line.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Corkickle Site Residential Receptors - Meadow View and Ellisons Place					
Fixed and mobile plant (noise)	Likely	Medium	High	Major (Significant)	Potentially large earth moving plant operating on the fringes of the site therefore likely High magnitude of change.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Likely Medium magnitude of change. Medium magnitude of change considered likely given activities such as earthworks compaction operations are proposed at distances greater than 50 m from the closest receptor.
Road traffic (noise and vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. Likely to be a Medium magnitude of change.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change based upon the likely noise emissions from the type of train (freight or passenger) and the time of day when the movements would occur. A low magnitude of change is likely given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Corkickle Site.
Corkickle Site Residential Receptors - Monkway Brow and Monkway Junior School					
Fixed and mobile plant (noise)	Likely	Medium	High	Major (Significant)	Potentially large earth moving plant operating on the fringes of the site therefore likely High magnitude of change.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Likely Medium magnitude of change. Medium magnitude of change considered likely given activities such as earthworks compaction operations are proposed at distances greater than 50 m from the closest receptor.
Road traffic (noise and vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. Likely to be a Medium magnitude of change.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change based upon the likely noise emissions from the type of train (freight or passenger) and the time of day when the movements would occur. A low magnitude of change is likely given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Corkickle Site.
Operation					
All above receptors in the vicinity of the Corkickle Site					
Noise & Vibration from fixed and mobile plant; Noise from Road Traffic; Noise and Vibration from Rail Traffic	Likely	Medium	Medium	Moderate (Potentially Significant)	Given nature of new noise sources, extent of development, and time of the day of operation.

Note: * Denotes where the assessment is incomplete and ongoing and this time.

Table 5.21 Mirehouse Site: Summary of predicted residual effects

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Construction					
Mirehouse Site - West Cumberland Hospital					
Fixed and mobile plant (noise)	Likely	High	Low	Moderate (Potentially Significant)	Potentially large earth moving plant operating on the fringes of the site, Low magnitude of change given relatively large distances between source and receptors.
Fixed and mobile plant (vibration)	Likely	High	Low	Moderate (Potentially Significant)	Likely Low magnitude of change. High magnitude of change considered unlikely given activities such as earthworks compaction operations are proposed at distances of more than 50 m from the closest receptor.
Road traffic (noise and vibration)	Likely	High	Low	Moderate (Potentially Significant)	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. Likely to be a Low magnitude of change.
Rail traffic (noise)	Likely	High	Low	Moderate (Potentially Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be Low given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	High	Low	Moderate (Potentially Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Mirehouse Site.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Mirehouse Site Residential Receptors - Rutland Avenue, High Low Hall, Cardewlee and Bank House					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Potentially large earth moving plant operating on the fringes of the site, plus adjacent the railway line, therefore likely Medium magnitude of change. The greatest impacts are likely to occur at properties on the southern end of Rutland Avenue, Cardewlee and Bank House.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change likely for a majority of the receptors on Rutland Avenue as earthworks compaction operations are proposed in close proximity to properties.
Road traffic (noise and vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, due to separation distances from ingress and egress route(s) to the construction site and any associated laydown areas (as used by construction traffic), dependent on time of day of traffic movements.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change based upon the likely noise emissions from the type of train (freight or passenger) and the time of day when the movements would occur. A low magnitude of change is likely given the relatively large separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the Cumbrian Coast railway line. A Low magnitude of change is also likely from rail traffic vibration from any potential rail spurs into the Mirehouse Site.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Mirehouse Site Residential Receptors - Mirehouse Road, Yewbarrow Close, Kirkstone Road, Gable Road, Chapel Close, Dent Road, Bow Fell Road, Link Road, Stanley View, Melbreak Close, Skiddaw Road and Borrowdale Road					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change as activities such as earthworks compaction operations are proposed in close proximity of the receptor.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change likely for a majority of the receptors listed, given likely distances between properties and activities such as earthworks.
Road traffic (noise and vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change, due to separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic).
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change given the relatively short separation distances from the railway.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the separation distances between receptors and the Cumbrian Coast railway line.
Mirehouse Site Residential Receptors - Low Hall, Home Meadow and Lane End					
Fixed and mobile plant (noise)	Likely	Medium	High	Major (Significant)	High magnitude of change given the close proximity of activities such as earthworks compaction operations.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change given piling activities are likely to take place at distances as close as 50 m from the closest receptor.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Road traffic (noise and vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change given separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic).
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	The magnitude of change is likely to be Low given the potential separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given some of the larger separation distances between receptors and the Cumbrian Coast railway line.
Mirehouse Site Residential Receptors - Lake View and Woodend Gardens					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change as activities such as earthworks compaction operations are proposed in close proximity of the receptor.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change likely for a majority of the receptors listed, given likely distances between properties and activities such as earthworks.
Road traffic (noise and vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, given high separation distances from ingress and egress route(s) to the construction site.
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	A Medium magnitude of change based upon the likely noise emissions from the type of train (freight or passenger) and the time of day when the movements would occur. A medium magnitude of change is likely given the relatively small separation distances from the railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	A Low magnitude of change is likely given the large separation distances between receptors and the main Cumbrian Coast railway line.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Operation					
All above receptors in the vicinity of the Mirehouse Site					
Noise & Vibration from fixed and mobile plant; Noise from Road Traffic; Noise and Vibration from Rail Traffic	Likely	Medium	Medium	Moderate (Potentially Significant)	Given nature of new noise sources, extent of development, and time of the day of operation.

Note: * Denotes where the assessment is incomplete and ongoing and this time.

Table 5.22 Egremont Site: Summary of predicted residual effects

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Construction					
Egremont Site Residential Receptors - Dent Road, Thorny Road, The Knoll, High Road, Woodow Road and The Crescent					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Potentially large earth moving plant operating on the fringes of the site therefore likely initial Medium magnitude of change.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change likely for a majority of the receptors listed, given likely distances between properties and activities such as earthworks.
Road traffic (noise and vibration)	Likely	Medium	Low	Minor (Not Significant)	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. Likely to be a Low magnitude of change due to the distances to the site entrance and accommodation area.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, as very large separation distance from the Cumbrian Coast railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, as very large separation distance from the Cumbrian Coast railway line.
Egremont Site Residential Receptors - Uldale View, Dale View Gardens and Pickett How Farm					
Fixed and mobile plant (noise)	Likely	Medium	Low	Minor (Not Significant)	Potentially large earth moving plant operating on the fringes of the site therefore likely initial Low magnitude of change given the relatively large distances between the receptors and the site boundary.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change given the relatively large distances between these receptors and the site boundary.
Road traffic (noise and vibration)	Likely	Medium	Low	Minor (Not Significant)	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. Likely to be a Low magnitude of change due to the distances to the site entrance and accommodation area.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, as very large separation distance from the Cumbrian Coast railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, as very large separation distance from the Cumbrian Coast railway line.
Egremont Site Residential Receptors - Scurgill to the east of the A595(T) and Parkhead Inn					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Likely Medium magnitude of change given the relatively large distances between the receptors and the site boundary.
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Likely Low magnitude of change given the relatively large distances between the receptors and the site boundary.
Road traffic (noise and vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. Likely to be a Medium magnitude of change due to the distances to the proposed site entrance and accommodation area.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, as very large separation distance from the Cumbrian Coast railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, as very large separation distance from the Cumbrian Coast railway line.
Operation					
All above receptors in the vicinity of the Egremont Site					
Noise & Vibration from fixed and mobile plant; Noise from Road Traffic; Noise and Vibration from Rail Traffic	Likely	Medium	Medium	Moderate (Potentially Significant)	Given nature of new noise sources, extent of development, and time of the day of operation.

Note: * Denotes where the assessment is incomplete and ongoing and this time.

Table 5.23 Corkickle to Mirehouse Railway Site: Summary of predicted residual effects

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Construction					
Corkickle to Mirehouse Railway Site Residential Receptors - Esk Avenue, Snebro Road and Scafell Close					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Potentially medium plant operating on the fringes of the site, therefore likely at least Medium magnitude of change. The greatest magnitude of change impacts would likely occur at receptors close to the site boundary such as those in Esk Avenue and Snebro Road. The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur if activities were to take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change likely when activities such as any ballast compaction operations are proposed within 50 m of receptors, such as those in Esk Avenue and Snebro Road.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change likely, however dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised and considered in detail in the final ES.
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be a minimum of Medium, given the relatively short separation distances from the railway.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the vibration emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be a minimum of Medium given the relatively short separation distances from the railway.
Corkickle to Mirehouse Railway Site Residential Receptors - Whinlater Road, Grisedale Close, Bowfell Road and Stanley View					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Potential for plant to be operating on the fringes of the site, therefore likely Medium magnitude of change. The greatest magnitude of change impacts would likely occur at receptors close to the site boundary such as those on Grisedale Close. The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur if activities were to take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	A Medium magnitude of change likely, when activities such as any ballast compaction operations are proposed within 50 m of receptors, such as those on Grisedale Close.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised and considered in detail in the final ES.
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
					the magnitude of change is likely to be a minimum of Medium, given the relatively short separation distances from the railway.
Rail traffic (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the vibration emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be a minimum of Medium given the relatively short separation distances from the railway.
Corkickle to Mirehouse Railway Site Residential Receptors - Burnmoor Avenue, Uldale Road, Croasdale Avenue, Seathwaite Avenue, Newlands Avenue, Wasdale Close, Latrigg Road, The Oval, Meadow Road, Melbreak Close and The Cottage					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Potential for plant to be operating on the fringes of the site, therefore a Medium magnitude of change is considered likely. The greatest magnitude of change impacts would likely occur at receptors close to the site boundary such as those on Wasdale Close. The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur if activities were to take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	A Medium magnitude of change likely when activities such as any ballast compaction operations are proposed within 50 m of receptors, such as those on Wasdale Close and The Oval.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
					information is to be finalised and considered in detail in the final ES.
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be a minimum of Medium, given the relatively short separation distances from the railway.
Rail traffic (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the vibration emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be a minimum of Medium given the relatively short separation distances from the railway.
Corkickle to Mirehouse Railway Site Receptors - Valley Primary School and Nursery					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Potential for plant to be operating on the fringes of the site, therefore a Medium magnitude of change is considered likely. The greatest magnitude of change impacts would likely occur at the western part of the receptor close to the site boundary. The final magnitude of change category whilst being dependent upon what part of the day the noise impact occurs, however, it is assumed that the most sensitive part of the day at this receptor would be during the normal school day.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	A Medium magnitude of change likely when activities such as any ballast compaction operations are proposed within 50 m of the western part of the receptor.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised and considered in detail in the final ES.
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For this receptor it is assumed that the most sensitive part of the day would be during the normal school day. The magnitude of change is likely to be a minimum of Medium, given the relatively short separation distances from the railway.
Rail traffic (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the vibration emissions from the type of train (freight or passenger) and the time of day when the movements occur. For this receptor it is assumed that the most sensitive part of the day would be during the normal school day. The magnitude of change is likely to be a minimum of Medium, given the relatively short separation distances from the railway.
Operation					
All above receptors in the vicinity of the Corkickle to Mirehouse Railway Site					
Noise & Vibration from fixed and mobile plant; Noise from Road Traffic; Noise and Vibration from Rail Traffic	Likely	Medium	Medium	Moderate (Potentially Significant)	Preliminary assessed as being Medium magnitude of change, however, the final extent of the development is currently under consideration and therefore the assessment is ongoing.

Note: * Denotes where the assessment is incomplete and ongoing and this time.

Table 5.24 St Bees Railway Site: Summary of predicted residual effects

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Construction					
St Bees Railway Site Residential Receptors - to east of site including Seacroft Drive, Main Street (B5345) and Finkle Street					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Medium magnitude of change given the potential for plant operating on the fringes of the site. The greatest magnitude of change impacts would likely occur at receptors close to the site boundary such as those on the eastern side of Seacroft Drive and Main Street (B5345). The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur if activities were to take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	At least Medium magnitude of change likely, when activities such as any ballast compaction operations are proposed within 50 m of receptors, such as those on the western side of Seacroft Drive and Main Street (B5345).
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised and considered in detail in the final ES.
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be a minimum of Medium,

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
					given the relatively short separation distances from the railway.
Rail traffic (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the vibration emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be a minimum of Medium given the relatively short separation distances from the railway.
St Bees Railway Site Residential Receptors - to west of site including Station Road, the B5345 and Peckmill					
Fixed and mobile plant (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	Potential for plant to be operating on the fringes of the site, therefore a Medium magnitude of change is considered likely. The greatest magnitude of change impacts would likely occur at receptors close to the site boundary such as those on Station Road. The final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	A Medium magnitude of change likely when activities such as any ballast compaction operations are proposed within 50 m of receptors, such as those on Station Road.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from ingress and egress route(s) to the construction site and associated laydown areas (as used by construction traffic) as well as the time of day. This information is to be finalised and considered in detail in the final ES.

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
Rail traffic (noise)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the noise emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be a minimum of Medium, given the relatively short separation distances from the railway.
Rail traffic (vibration)	Likely	Medium	Medium	Moderate (Potentially Significant)	The magnitude of change is dependent upon the vibration emissions from the type of train (freight or passenger) and the time of day when the movements occur. For these receptors the magnitude of change is likely to be a minimum of Medium given the relatively short separation distances from the railway.
St Bees Railway Site Receptors - St Bees Primary School (and other receptors along Wood Lane), St Bees Priory Church and Library on B5345					
Fixed and mobile plant (noise)	Likely	Medium	Low	Minor (Not Significant)	Potential for plant to be operating on the fringes of the site, but because of the greater separation distances from these receptors to the site boundary it is therefore likely that a Low magnitude of change will occur. However, the final magnitude of change category would be dependent upon when the noise impact occurs i.e. a greater magnitude of impact would occur when activities take place during more sensitive periods, such as the evening, weekend or night-time.
Fixed and mobile plant (vibration)	Likely	Medium	Low	Minor (Not Significant)	Magnitude of change likely to be Low even when activities such as any ballast compaction operations are proposed since separation distances are well in excess of 50 m to these receptors.
Road traffic (noise and vibration)	Likely	Medium	*	*	Magnitude of change is dependent upon individual receptor separation distances from access route(s) to the construction site and associated laydown areas (as used by construction

Receptor and summary of predicted effects	Probability	Sensitivity/value of receptor	Magnitude of change	Significance of effect	Rationale
					traffic) as well as the time of day. This information is to be finalised early 2016.
Rail traffic (noise)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, as there is a large separation distance between these receptors and the Cumbrian Coast railway line.
Rail traffic (vibration)	Likely	Medium	Low	Minor (Not Significant)	Low magnitude of change, as there is a large separation distance between these receptors and the Cumbrian Coast railway line.
Operation					
All above receptors in the vicinity of the St Bees Railway Site					
Noise & Vibration from fixed and mobile plant; Noise from Road Traffic; Noise and Vibration from Rail Traffic	Likely	Medium	Medium	Moderate (Potentially Significant)	Preliminary assessed as being Medium magnitude of change, however, the final extent of the development is currently under consideration and therefore the assessment is ongoing.

Note: * Denotes where the assessment is incomplete and ongoing and this time.

5.9 Preliminary assessment of the Moorside Project as a whole

- 5.9.1 An assessment of the Moorside Project as a whole will be included in the ES. For the purposes of this PEIR, due to the limitations set out above, the PEIR has looked at the Moorside Site, the Accommodation Sites and some of the Additional Sites together and whether there would be any additional, “*accumulated effects*” on specific environmental receptors. The ES will include the other Additional Sites (Highway Improvement) in this assessment once the data becomes available.
- 5.9.2 In terms of the spatial scope of the assessment of accumulated effects, the principles have been set out in **Section 3.4** and summarised in **Table 3.8**. With respect to noise and vibration, the Zones of Influence (Zol) around each Moorside Project site vary, with the Moorside Site being subject to a number of different Zols (see **Figure 5.10** and **Figure 5.11**) because of the nature and scale of the development. For example, noise emissions from activities on the Moorside Site during site preparation and clearance, construction and operation have a Zol extending to 2 km from the site boundary, but for activities on the Accommodation Sites, the Zol is 500 m. For road traffic noise effects, DMRB guidance states a study area of 600 m from the road centreline of routes where there is a predicted 25% increase or 20% decrease in traffic flows.
- 5.9.3 The following paragraphs contain a preliminary high-level accumulated effects assessment of the noise and vibration arising from the whole Moorside Project, taking into account the preliminary residual effects assessments for the individual project elements contained in **Table 5.19** to **Table 5.24** above. However, it should be noted that it is not possible at this stage to determine the magnitude of change and therefore the significance of whole Moorside Project noise and vibration effects because of the absence of the required detailed design information. Full detailed assessments will be carried out subsequently and reported in the ES that is due to be submitted in 2017.
- 5.9.4 As shown in **Figure 5.10** and **Figure 5.11** there are Zol overlaps for receptors relevant to the Moorside and Egremont sites. There are also Zol overlaps for those receptors close to the Corkickle to Mirehouse Railway Site and the Corkickle and Mirehouse Accommodation Sites. Therefore there is a potential for significant accumulated effects to occur.
- 5.9.5 It is evident that the greatest potential for significant whole Moorside Project effect will be at receptors within the Zol of affected road and rail routes that are also within the Zol of the Moorside, Accommodation and Additional Sites. The accumulated effects are a result of increased road and rail movements are likely to be greatest during the construction phase of the Moorside Site.
- 5.9.6 As mentioned above, the level of detailed design and programme information on the Moorside Project that is available at the time that the PEIR has been produced has not allowed a detailed assessment of the accumulated effects of the Moorside Project as a whole. However, it has been possible to analyse the

noise and vibration effects predicted in relation to individual Moorside Project developments to identify which receptors may have the potential to experience whole project effects. A summary of this analysis is set out in **Table 5.25** below, where a preliminary assessment is made of the accumulated effects that are expected to arise during the construction and operational phase, for those Moorside Project Sites where interactions are predicted at this stage occur.

Table 5.25 Summary of predicted noise and vibration effects - whole project, construction phase

Receptors	Whole Project accumulated effects/Significance of effects*							
	Moorside Site	Corkickle Site	Mirehouse Site	Egremont Site	Corkickle to Mirehouse Railway Site	St. Bees Railway Site	Affected roads and railway	Whole Moorside Project
Receptors within 2 km of the Moorside Site	Significant	No effects	No effects	Potentially Significant	No effects	No effects	Potentially Significant	Significant
Receptors within 500 m of the Corkickle Accommodation Site	No effects	Significant	Potentially Significant	No effect	Potentially Significant	No effects	Potentially Significant	Significant
Receptors within 500 m of the Mirehouse Accommodation Site	No effects	Potentially Significant	Significant	No effect	Potentially Significant	No effect	Potentially Significant	Significant
Receptors within 500 m of the Egremont Accommodation Site	Potentially Significant	No effects	No effects	Potentially Significant	No effects	No effects	Potentially Significant	Potentially Significant
Receptors within 600 m of the Corkickle to Mirehouse Railway Site	No effects	Potentially Significant	Significant	No effects	Potentially Significant	No effects	Potentially Significant	Significant

Receptors	Whole Project accumulated effects/Significance of effects*							
	Moorside Site	Corkickle Site	Mirehouse Site	Egremont Site	Corkickle to Mirehouse Railway Site	St. Bees Railway Site	Affected roads and railway	Whole Moorside Project
Receptors within 600 m of the St. Bees Railway Site	No effects	No effects	No effects	No effects	No effects	Potentially Significant	Potentially Significant	Potentially Significant
Receptors within 600 m of the affected roads and railways	Potentially Significant	Potentially Significant	Potentially Significant	Potentially Significant	Potentially Significant	Potentially Significant	Potentially Significant	Potentially Significant

* The preliminary effects summarised under each Moorside Project Site by receptor are subject to change for individual receptors and groups of receptors as more project design information becomes available and will be reported in the ES that is to be submitted in 201

5.10 Preliminary assessment of cumulative effects with other developments

Scope of the assessment

- 5.10.1 As outlined in **Section 3.4**, an exercise has been undertaken to determine which other (non-Moorside) developments should be considered in the context of their ability to result in cumulative adverse environmental effects with the Moorside Project.
- 5.10.2 Of the other developments described in **Section 3.4**, listed in **Table 3.4** and considered in the context of **Table 3.9** in terms of noise & vibration effects, it is considered appropriate at this stage not to consider the following projects on the basis that they are located out with the Zones of Influence of the Moorside Project Sites:
- 4. LLW Repository Ltd, Drigg;
 - 5. West Cumbria Water Supply Pipeline (United Utilities);
 - 6. Walney Extension Wind Farm (Dong Energy);
 - 7. Barrow-in-Furness Site (BAE Systems);
 - 8. Ulverston Biopharmaceutical Manufacturing Facility (GSK);
 - 9. Heysham New Nuclear Power Station (EDF Energy); and
 - 10. Tidal Lagoon West Cumbria (Tidal Lagoon Power).
- 5.10.3 However, it should be noted that the situation with respect to the above sites will be kept under review during the preparation of the EIA, pending the availability of information from the respective developers regarding their own noise and vibration Zols.
- 5.10.4 Of the remaining other developments considered in **Table 3.9**, these are briefly discussed in the context of their likely interaction with respect to noise and vibration in the sub-sections below.

1. Sellafield Site Decommissioning (Sellafield Ltd/Nuclear Decommissioning Authority)

- 5.10.5 The Sellafield Site Decommissioning project has the potential to interact with the Moorside Project, particularly with respect to the Moorside Site itself. This would notably occur during the construction phase of the Moorside Site, when potentially significant cumulative effects could occur with respect to noise and vibration from earthworks/power block construction (including use of the MOLF) and construction and operational road and rail traffic.

2. North West Coast Connections (NWCC), West Cumbria (National Grid)

- 5.10.6 The North West Coast Connections Project is intimately related to the Moorside Project, since it would provide the connection to the UK national electricity grid for the power generated and therefore the local works would

partially take place within the boundary of the Moorside Site and within the Mirehouse and Egremont Zols and that of the Corkickle to Mirehouse Railway Site Zol.

- 5.10.7 It is therefore anticipated that there could be potentially significant cumulative noise and vibration effects particularly associated with the construction element(s) of the NWCC project generated during the construction phase of the Moorside Project, notably with respect to construction noise and vibration emissions; and road and rail traffic noise and vibration emissions.

3. Whitehaven Coking Coal Project (West Cumbria Mining)

- 5.10.8 Given that the timescales for the construction of the West Cumbria Mining Project precede the construction of the Moorside Project, it is considered that it is the operational phase of the former, and notably the operation of the proposed railhead, which would be located on the south-western part of the Mirehouse Accommodation Site, that has the capacity to have potentially significant cumulative noise and vibration effects with the Moorside Project. Specifically, the type of effects would relate to noise and vibration emissions from the coal loading operations, together with similar emissions from rail traffic movements associated with the coal transportation. It is also understood that waste rock material from the mining and coal processing is to be transported from the proposed Marchon minehead site by road and this proposed operation could potentially lead to potentially significant cumulative effects in terms of road traffic noise (and possibly vibration) emissions.

5.11 Consideration of additional mitigation

- 5.11.1 At this stage, all of the mitigation measures, which are anticipated will be required, are incorporated into the development proposals and are considered in the assessment of effects outlined in **Section 5.8**. However, if it emerges during the preparation of the Environmental Statement that additional, non-incorporated measures, need to be considered, the relevant details will be presented in the ES.

5.12 References

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