Tables

8. Noise & Vibration

8.1 Introduction

8.1.1 This chapter of the Environmental Statement (ES) addresses the potential effects of the construction, operation (including maintenance) and decommissioning of the proposed WBC gas fired generating station on the site of the West Burton Power Station (the Proposed Development) on noise and vibration receptors. The assessment considers:

- the present-day and future baseline conditions during construction and at opening;
- the effects of construction of the Proposed Development on Noise Sensitive Receptors (NSR) during the site clearance and construction works and predicted changes in road traffic noise levels on the local road network;
- the effects of noise and vibration resulting from operation of the Proposed Development; and
- the potential effects of the eventual decommissioning of the Proposed Development.

8.1.2 The cumulative effects of noise associated with the Proposed Development and other committed developments in the vicinity are described in **Chapter 16**: Cumulative and Combined Effects.

8.1.3 This chapter is supported by **Figure 8.1** (ES Volume III).

8.2 Legislation, Planning Policy and Guidance

Legislative Background

Environmental Protection Act 1990

8.2.1 The Environmental Protection Act 1990 (EPA) Part 3 (Ref 8-1) prescribes that noise (and vibration) emitted from premises (including land) can be prejudicial to health and amount to a nuisance as a statutory nuisance.

8.2.2 Local Authorities are required to investigate any public complaints of noise and if they are satisfied that a statutory nuisance exists, or is likely to occur or recur, they may serve a noise abatement notice. A notice is served on the person responsible for the nuisance. It requires either the abatement of the nuisance or works to abate the nuisance to be carried out, or it prohibits or restricts the activity. Contravention of a notice without reasonable excuse is an offence. Right of appeal to the Magistrates Court exists within 21 days of the service of a noise abatement notice.

8.2.3 In determining if a noise complaint amounts to a statutory nuisance, the Local Authority can take account of various guidance documents and existing case law; no statutory noise limits exist. Demonstrating the use of 'Best Practicable Means' (BPM) to minimise noise levels is an accepted defence against a noise abatement notice.

Control of Pollution Act 1974

8.2.4 Sections 60 and 61 of the Control of Pollution Act 1974 (CoPA) (Ref 8-2) provide the main legislation regarding demolition and construction site noise and vibration. If noise complaints are received, a Section 60 notice may be issued by the local planning authority with instructions to cease work until specific conditions to reduce noise have been adopted.

8.2.5 Section 61 of the CoPA provides a means for applying for prior consent to carry out noise generating activities during construction. Once prior consent has been agreed under Section 61, a Section 60 notice cannot be served provided the agreed conditions are maintained on-site.

8.2.6 CoPA requires that BPM (as defined in Section 72 of CoPA) be adopted for construction noise on any given site. CoPA makes reference to British Standard (BS) 5228 as BPM.

Environmental Permitting Regulations 2016

8.2.7 The Environmental Permitting (England and Wales Regulations) 2016 (Ref 8-3) require the application of Best Available Techniques (BAT) to activities performed within installations regulated under an Environmental Permit in order to manage the impact of these operations on the surrounding environment. The Environmental Permit applies only to the operational and decommissioning periods; not to the construction period.

8.2.8 In terms of noise specifically, the selection of BAT will have to be considered and balanced with releases to different environmental media (air, land and water) and to give due consideration to issues such as usage of energy and raw materials. Noise, therefore, cannot be considered in isolation from other impacts on the environment.

8.2.9 The definition of pollution includes *"emissions which may be harmful to human health or the quality of the environment, cause offence to human senses or impair or interfere with amenities and other legitimate uses of the environment"* (clause 2). BAT is therefore likely to be similar, in practice, to the requirements of the statutory nuisance legislation which requires the use of BPM to prevent or minimise noise nuisance. In the case of noise, *"offence of any human senses"* may be judged by the likelihood of complaints. However, the lack of complaint should not necessarily imply the absence of a noise problem. In some cases, it may be possible, and desirable, to reduce noise emissions still further at reasonable costs and this may therefore represent BAT for the control of noise

emissions from an installation. Consequently, the aim of BAT should be to ensure that there is no reasonable cause for annoyance to persons beyond the installation boundary.

8.2.10 Guidance regarding Environmental Permitting and noise is available in the Environment Agency's Integrated Pollution Prevention and Control (IPPC) H3 document 'Horizontal Guidance for Noise Part 2 - Noise assessment and Control' (Ref 8-4). However, 'Horizontal Guidance for Noise Part 1 – Regulation and Permitting' (Ref 8-5), which provided guidance relating to noise limits from industrial installations in terms of absolute rating levels and rating levels relative to background noise levels (as defined in BS 4142:1997 (now superseded)) was withdrawn in February 2016. Therefore industry wide noise limits no longer apply.

Planning Policy Context

National Planning Policy

National Policy Statements for Energy

8.2.11 Section 5.11 of the Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref 8-6) refers to the Government's policy on noise within the Noise Policy Statement for England (NPSE) (discussed further below) and sets out requirements for noise and vibration assessment for Nationally Significant Infrastructure Projects (NSIP) such as the Proposed Development.

8.2.12 With regards to decision making, NPS EN-1 states:

"The project should demonstrate good design through selection of the quietest cost-effective plant available; containment of noise within buildings wherever possible; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission." (paragraph 5.11.8).

8.2.13 **Section 8.5** describes the impact avoidance measures identified relevant to the Proposed Development.

8.2.14 The NPS for Fossil Fuel Electricity Generating Infrastructure (EN-2) (Ref 8-7) sets out policy specific to fossil fuel power stations. In paragraph 2.7.1, specific sources of noise are identified. Those that are relevant to the Proposed Development include "*the gas and steam turbines that operate continuously during normal operation*". It then reiterates the point made in NPS EN-1, stating that:

"The primary mitigation for noise from fossil fuel generating stations is through good design, including enclosure of plant and machinery in noise-reducing buildings wherever possible and to minimise the potential for operations to create noise" and goes on to state that "*Noise from gas turbines should be mitigated by attenuation of exhausts to reduce any risk of low-frequency noise transmission.*" (paragraph 2.7.5).

8.2.15 **Table 8-1** below provides a summary of the NPS advice regarding noise and vibration and how this has been considered in this chapter.

Table 8-1: Summary of relevant NPS advice regarding Noise and Vibration

Summary of NPS	Consideration within the Chapter
NPS EN-1	
Paragraph 5.11.4 states: *"Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:* • *A description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive, tonal, impulsive or low frequency characteristics of the noise;* • *Identification of noise sensitive premises and noise sensitive areas that may be affected;* • *The characteristics of the existing noise environment;* • *A prediction of how the noise environment will change with the proposed development;* • *In the shorter term such as during the construction period;* • *In the longer term during the operating life of the infrastructure;* • *At particular times of the day, evening and night as appropriate;* • *An assessment of the effect of predicted changes in the noise;* • *Measures to be employed in mitigating noise.* *The nature and extent of the noise assessment should be proportionate to the likely noise impact."*	For descriptions of noise generating aspects of the Proposed Development see **Section 8.6.** Noise Sensitive Premises have been identified in **Table 8-5** – Monitoring Locations. Information relating to the existing noise environment has been presented in **Section 8.4**. Both construction and operational impacts have been presented in **Section 8.6**. The mitigation of construction and operational noise has been discussed in **Section 8.7**.
Paragraph 5.11.5 states: "*The noise*	Construction related traffic noise has

Summary of NPS	Consideration within the Chapter
impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered."	been assessed in **paragraphs 8.6.11– 8.6.16**
Paragraph 5.11.6 states: "*Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. Further information on assessment of particular noise sources may be contained in the technology-specific NPSs. In particular, for…electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies."*	The effects of operational noise and its impact on human receptors can be found in **paragraphs 8.6.20– 8.6.30**
Paragraph 5.11.7 states: "*The applicant should consult EA and Natural England (NE), as necessary and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account."*	Potential effects of noise on ecology and nature conservation are considered in **Chapter 9:** Ecology.
NPS EN-2	
Paragraph 2.7.2 states: "*The ES should include a noise assessment as described in Section 5.11 in EN-1."*	A noise assessment is included within this chapter.

National Planning Policy Framework

8.2.16 The revised National Planning Policy Framework (NPPF) (Ref 8-8) was published in February 2019, replacing earlier versions published in July 2018 and March 2012.

8.2.17 The NPPF states that;

"planning policies and decisions should contribute to and enhance the natural and local environment by…

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions. (paragraph 170)

- *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
  - *mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; [and]*
  - *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason".* (paragraph 180)

8.2.18 With regards to 'adverse effects' and 'significant adverse effects' the NPPF refers to the NPSE (Ref 8-10), which is described below.

Noise Policy Statement for England

8.2.19 The NPSE seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The NPSE applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

8.2.20 The Statement sets out the long-term vision of the government's noise policy, which is to:

"promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development" (paragraph 2.15).

8.2.21 This long-term vision is supported by three aims:

- *"avoid significant adverse impacts on health and quality of life;*

- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvements of health and quality of life."* (paragraph 1.7)

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

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

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

8.2.24 The three aims can therefore be interpreted as follows:

- the first aim is to avoid noise levels above the SOAEL;
- the second aim considers situations where noise levels are between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur; and
- the third aim seeks, where possible, to positively improve the health and quality of life through the pro-active management of noise, whilst also taking account of the guiding principles of sustainable development. It is considered that the protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

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

Planning Practice Guidance

8.2.26 In March 2014, DCLG released its Planning Practice Guidance (PPG) (Ref 8-11) web-based resource to support the NPPF. The guidance advises that local planning authorities' should consider:

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

8.2.27 This guidance introduced the additional concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). Full details of the PPG on effects are provided in **Table 8-2**.

8.2.28 Factors to be considered in determining if noise is a concern are identified, including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts.

8.2.29 With particular regard to mitigating noise impacts on residential development, the guidance highlights that impacts may be partially offset if residents have access to a relatively quiet façade as part of their dwelling, or a relatively quiet amenity space (private, shared or public).

Table 8-2: Planning Practice Guidance

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, *e.g.* turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, *e.g.* avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the	Significant Observed Adverse Effect	Avoid

Perception	Examples of outcomes	Increasing effect level	Action
	time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.		
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, *e.g.* regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, *e.g.* auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Local Development Plan Policy

8.2.30 The Bassetlaw District – Local Development Framework (December 2011) (Ref 8-12), has been reviewed. Policy DM10: Renewable and Low Carbon Energy has been identified as relevant to the consideration of noise emissions from the Proposed Development in that the policy sets out a list of criteria against which proposals for renewable and low carbon energy infrastructure will need to demonstrate compliance with including those that:

- *"are compatible with tourism and recreational facilities;*
- *will not result in unacceptable impacts in terms of ….noise…; and*
- *will not result in an unacceptable cumulative impact in relation to the factors above."*

8.2.31 The policy also states that large-scale renewable and low carbon energy proposals must provide full details of arrangements for decommissioning and reinstatement of the site if/when it ceases to operate.

8.2.32 BDC is currently in the early stages of preparing a new Local Plan for the District and began consulting on a Draft Bassetlaw Local Plan (Ref 8-13) in January 2019. Although the draft Local Plan makes specific reference to the existing West Burton Power Station, there are no specific policies or objectives relating to noise or vibration.

8.2.33 The Adopted Central Lincolnshire Local Plan, published in April 2017 (Ref 8-14) includes policy LP26: Design and Amenity which makes clear that:

"All development…must achieve high quality sustainable design that contributes positively to local character, landscape and townscape, and supports diversity, equality and access for all".

8.2.34 The Plan includes key environmental objective (Objective J.) '*to minimise pollution (air, noise and light) and improve air quality*'.

8.2.35 It goes on to state that:

"Development proposals will be assessed against the following relevant design and amenity criteria:

The amenities which occupiers of neighbouring properties may reasonably expect to enjoy must not be unduly harmed by or as a result of development. Proposals should demonstrate, where applicable, how the following matters have been considered, in relation to both the construction and life of the development:

- *m. Compatibility with neighbouring land uses; and*
- *r. Adverse noise and vibration."*

Other Guidance

British Standard 7445-1:2003 and 7445-2:1991

8.2.36 BS 7445 'Description and measurement of environmental noise' (Ref 8-15 and Ref 8-16) defines parameters, procedures and instrumentation required for noise measurement and analysis.

British Standard 5228:2009+A1:2014

8.2.37 BS 5228-1 'Code of practice for noise and vibration control on construction and open sites. Noise' (Ref 8-17) provides a 'best practice' guide for noise control, and includes Sound Power Level (SWL) data for individual plant as well as a calculation method for noise from construction activities. BS 5228-2 'Code of practice for noise and vibration control on construction and open sites. Vibration' (Ref 8-18) provides comparable 'best practice' for vibration control, including guidance on the human response to vibration.

British Standard 6472:2008

8.2.38 BS 6472-1 'Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting' (Ref 8-19) presents recommended frequency weighted vibration spectra (for continuous vibration) and vibration dose values (VDV) (for intermittent vibration) above which adverse comment is likely to occur in residential properties.

British Standard 7385:1993

8.2.39 BS 7385-2 'Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration' (Ref 8-20) presents guide values for transient and continuous vibration, above which there is a likelihood of cosmetic damage. The standard establishes the basic principles for carrying out vibration measurements and processing the data, with regard to evaluating vibration effects on buildings.

British Standard 4142:2014

8.2.40 BS 4142 'Methods for rating and assessing industrial and commercial sound' (Ref 8-21) can be used for assessing the effect of sound of an industrial nature, including mechanical services plant sound. The method compares the difference between 'rating level' of the industrial sound, with the 'background sound level' at the receptor position. Within the operational noise assessment, the term 'sound' is used when applying the BS 4142 assessment method.

World Health Organisation

8.2.41 The World Health Organisation's (WHO) 'Guidelines for Community Noise' (Ref 8-22) recommend external daytime and evening environmental noise limits, and internal night-time limits to avoid sleep disturbance.

8.2.42 The WHO 'Night Noise Guidelines for Europe' (Ref 8-23) recommend updated guidelines on night-time noise limits to avoid sleep disturbance.

Calculation of Road Traffic Noise

8.2.43 Department of Transport (DfT)/Welsh Office Memorandum 'Calculation of Road Traffic Noise' (CRTN) (Ref 8-24) describes procedures for traffic noise calculation, and is suitable for environmental assessments of schemes where road traffic noise may have an effect.

Design Manual for Road and Bridges

8.2.44 The Highways England '*Design Manual for Road and Bridges Volume 11 Section 3 Part 7 HD213/11 (Revision 1) Traffic Noise and Vibration*' (DMRB) (Ref 8-25) provides guidance on the appropriate level of assessment to be used when assessing the noise and vibration effects arising from all road projects, including new construction, improvements and maintenance. The guidance can also be used for assessing changes in traffic noise levels as a result of non-road projects such as the Proposed Development.

International Standards Organisation (ISO) 9613-2:1996

8.2.45 ISO 9613-2:1996 *'Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation'* (Ref 8-26) specifies an engineering method for

calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources.

ISO 4866-2:1996

8.2.46 ISO 4866:2010 *'Mechanical Vibration and Shock – Vibration of Fixed Structures – Guidelines for the Measurement of Vibrations and Evaluation of Their Effects on Structures'* (Ref 8-27) establishes the principals for carrying out vibration measurement and processing data with regard to evaluating vibration effects on structures.

8.3 Assessment Methodology and Significance Criteria

Consultation

8.3.1 The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal Scoping Opinion (**Appendix 1B**: ES Volume II) and in response to the formal consultation is summarised in **Table 8-3**.

Table 8-3: Consultation summary table

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
Secretary of State	June 2017 (Scoping Opinion)	The Secretary of State agrees that the methodology and choice of noise receptors should be confirmed with the Bassetlaw District Council (BDC) Environmental Health Officer (EHO) and in so far as it relates to the Environmental Permit, with the Environment Agency (EA). The Secretary of State recommends that the Applicant take into account the noise monitoring locations set out by West Lindsey District Council (WLDC) in their scoping response.	The choice of monitoring locations was informed by the annual West Burton noise monitoring programme, and supplemented through liaison with BDC and WLDC *via* the Scoping Opinion and subsequent engagement. The seven selected positions were chosen to be representative of the potentially worst-affected and closest NSR to the Site in each direction.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		Detailed information should be provided on the construction and operational noise data and assumptions used to underpin the proposed noise modelling (for example atmospheric and ground parameters used in ISO 9613-2 calculations).	Full details of the assumptions made within the construction and operational noise predictions are provided in this chapter.
		The Secretary of State acknowledges the Applicant's intention to use BS4142:2014 criteria to assess a likely significant operational noise effect which is appropriate having had regard to the nature of the Proposed Development. The Secretary of State reminds the Applicant of the requirements in the Noise Policy Statement for England (NPSE), which suggests that noise assessment thresholds should be described in terms of the Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL). The Applicant should identify mitigation	BS4142:2014 has been used to assess the significance of operational noise, see **paragraphs 8.6.20–8.6.30**. AECOM's interpretation of the guidance provided within NPSE and BS 4142:2014 with respect to assessment levels used to predict whether effects should be classified as significant is defined in **paragraph 8.3.44-8.3.51** and through the combined use of **Table 8-13, Table 8-14** and **Table 8-15**.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		measures to address adverse effects.	
		Scoping Report paragraph 5.4.2 states that annual noise surveys associated with WBA have been undertaken. The surveys include day, evening and night 15 minute noise measurements undertaken at noise sensitive receptors. Whilst the Secretary of State notes that the Applicant proposes to agree noise monitoring requirements with the BDC EHO, the Applicant would also need to provide a clear justification for any departure from the reference time intervals stated within BS 4142:2014.	Referenced in **paragraph 8.6.25** and no departure from BS 4142:2014 methodology has been made.
		The noise assessment should state any assumptions made in relation to the rating level for operational noise sources and the range of likely operational conditions, allowing for diurnal variation.	The assumptions related to the prediction of rating levels for different assessment periods and operational configurations are presented in **Section 8.6**.
		Scoping Report paragraph 5.4.10 states that the focus of the assessment	Recommendations relating to the construction phase mitigation have been

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		will be on recommendations for appropriate mitigation. The Secretary of State recommends that mitigation proposals are presented in the form of Construction Noise and Vibration Management Plans or as part of a Construction Environmental Management Plan (CEMP) and/or that the Applicant demonstrates that such mitigation is secured through appropriate requirements in the draft DCO.	outlined in **paragraphs 8.5.1 to 8.5.7**, including reference to the Framework CEMP (**Application Document Ref. 7.3**). Implementation of the noise control measures is proposed to be secured by a Requirement of the draft DCO.
		Operational noise mitigation measures should be addressed in the ES, including any measures to address the risk of low frequency noise emissions from gas turbine exhausts. Measures such as engineering design to reduce noise; layout of plant and equipment to minimise transmission; and any operational controls should be discussed. The Secretary of State recommends that operational noise requirements in the	The level of required attenuation predicted to be required based on the 'worst-case' plant configuration and potential mitigation methods have been discussed in **paragraphs 8.7.7 – 8.7.18** and **Table 8-31**-**Table 8-34**.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		draft DCO are clearly distinguished from construction noise requirements.	
		Consideration should be given to monitoring noise complaints during construction and when the development is operational.	It is proposed that monitoring of potential construction noise complaints would be included within the CEMP (**paragraph 8.5.3**). The Framework CEMP (**Application Document Ref. 7.3**) includes provision for this measure.
		The results from the noise and vibration assessments should inform the terrestrial, aquatic/marine ecological assessments.	The assessment relating to impact on terrestrial ecology has been considered in **Chapter 9**: Ecology. Impacts on aquatic/ marine ecology have been scoped out of the assessment, given that outfalls to the River Trent are no longer proposed.
Bassetlaw District Council (BDC)	Email (4th May 2017)	Confirmation of proposed baseline monitoring Locations	Confirmation of BDC agreement to the proposed scope of baseline survey.
West Lindsey District Council (WLDC)	Email (4th May 2017)	Confirmation of proposed baseline monitoring locations	Confirmation of agreement to the proposed scope of baseline survey. WLDC request for an additional location at the southern edge of Gainsborough was acknowledged and this location was included in survey – see **Section 8.4**.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
Planning Inspectorate	Meeting 4 July 2017	Construction noise assessment should be quantitative rather than qualitative and follow BS5228.	The construction noise assessment provided both at formal consultation (Preliminary Environmental Information Report (PEI)) stage and in this ES used quantitative prediction methods in accordance with BS5228.
Bassetlaw District Council (BDC)	Telephone and Email (4- 6 December 2017)	Confirmation was sought on the method used to derive representative *background sound levels*. BDC were asked to respond with any comments in or objections to the proposed method set out in this chapter. No such comments were received.	
Bassetlaw District Council Environment Agency Lincolnshire County Council Nottinghamshire County Council West Lindsey District Council	March/April 2019	Provision of copies of final draft chapter and offer of pre-application meeting to each consultee to: • discuss final proposals and assessments; • obtain feedback prior to submission of Application; and • agree an approach to drafting of Statements of Common Ground (SoCG) prior to submission of the Application. Further details on consultation undertaken can be found in the Consultation Report (**Application Document Ref. 7.1**).	

Summary of Key Changes to Chapter 8 since Publication of the Preliminary Environmental Information (PEI) Report

8.3.2 The PEI Report (Ref 8-28) was published for statutory consultation in September 2017, allowing consultees the opportunity to provide informed comment on the Proposed Development, the assessment process and preliminary findings through a consultation process, prior to the finalisation of this ES.

8.3.3 The key changes relevant to this chapter since the PEI Report was published are summarised in **Table 8-4** below.

Table 8-4: Summary of key changes to chapter since publication of the PEI Report

Summary of change since PEI Report	Reason for change	Summary of change to chapter text in the ES
Presentation of worst-case scenario to align with Rochdale Envelope principles used.	Alignment of assessment methodology.	The worst-case plant configuration based upon the ten scenarios presented at formal consultation was derived and used as the basis for assessment and mitigation (operational noise text and tables from **paragraphs 8.6.20–8.6.31**) and operational noise mitigation requirements set out in **paragraphs 8.7.7**– **8.7.18**Error! Reference source not found..
Detailed consideration of the most representative way to determine the background sound levels for use in the noise assessment and further engagement with BDC.	As there are no significant topographical features in the area surrounding the Proposed Development, the largest influence on sound propagation is wind direction. It is considered appropriate to base the assessment for each NSR on comparison of the downwind predicted levels from the Proposed Development with the background sound level measured with a similar wind direction, since this accounts for background sound levels arising from the existing WBA and WBB Power Stations.	Table 8-23 in the PEI Report contained a range of values for the background sound level at each receptor - one level based on analysis of the full data set collected during the noise monitoring survey and the other based only on the measurements for periods when the receptor was downwind of the Site. The equivalent table in this ES chapter (**Table 8-24**) and resultant mitigation tables (**Table 8-31**-**Table 8-34**) have been updated so that the assessment for each receptor is based upon comparison of the downwind predicted levels

Summary of change since PEI Report	Reason for change	Summary of change to chapter text in the ES
		with the background sound level measured with a similar wind direction, to take account of background sound levels arising from the existing WBA and WBB Power Stations. As described in **Table 8-3**, BDC was asked to respond with any comments or objections to the proposed method set out in this chapter. No such comments were received.
The possibility of installing an outfall to the River Trent was presented in the PEI Report. Following formal consultation and further engineering design works, the potential surface water outfall options are now excluded from the Proposed Development and therefore the proposed Order Limits, draft DCO and associated documentation exclude the need for a direct discharge to the river.	Updated design information regarding the feasibility of discharge of surface water on-Site to the existing drainage system of WBA Power Station. Discharge to the River Trent from the wider power station site will continue via the existing outfall structure and the rate of discharge into that system from the Proposed Development will be controlled via the surface water drainage system.	The PEI report did not assess the potential for impacts on aquatic species in the River Trent given the uncertainty at the time regarding whether outfalls were required. Outfalls are no longer proposed; thereby the need to assess construction noise impacts on aquatic species is scoped out of this assessment.
Construction phase assessment year updated for road traffic related emissions.	To reflect updated indicative construction programme.	Update of relevant paragraphs in **Section 8.6**

Assessment Methods

Baseline Sound Surveys

8.3.4 The location of potential NSR in proximity to the Site has been considered when assessing the effects associated with noise and vibration levels from the construction, operational and decommissioning phases of the Proposed Development.

8.3.5 Key NSR locations have been selected which are considered to be representative of the nearest and potentially most sensitive existing receptors to the Site. It is considered that if noise and vibration levels are suitably controlled at the key receptors identified, then noise and vibration levels will be suitably controlled at other sensitive receptors in the surrounding area.

8.3.6 In order to define existing sound conditions at NSR, long-term ambient sound measurements have been undertaken at seven representative residential NSR locations around the existing West Burton Power Station site. The noise monitoring locations and protocol were discussed in advance and during the surveys with BDC and WLDC. The seven locations are shown in **Table 8-5** and on **Figure 8.1** (ES Volume III).

Table 8-5: Monitoring locations

Monitoring location	National Grid Reference	Address	Distance/Direction from Site	Details
ML1	478832, 384556	Kent House, North Street, Sturton-le-Steeple	1.4km SW	Located in the rear garden to the north of the residential property.
ML2	478585, 385365	Crossing Keepers Cottage, West Burton	1.9km SW	Located in the rear garden to the north of the residential property.
ML3	478934, 386410	Mill House Farm	1.1km W	Located in the rear garden to the south of the residential property.
ML4	479505, 387023	Manor Cottage, Bole	0.9km NW	Located in the rear garden to the south of the property.
ML5	482104, 387925	194 Lea Road, Gainsborough	2.3km E	Located in the rear garden to the west of the residential property.

Monitoring location	National Grid Reference	Address	Distance/Direction from Site	Details
ML6	482483, 387052	Green Lane, Lea	2.1km E	Located in the rear garden to the north of the residential property.
ML7	482779, 384625	Knaith Hall, Knaith	2.5km E	Located in the garden to the west of the residential property.

8.3.7 All measurements were undertaken between Friday 14 July and Monday 24 July 2017.

8.3.8 Daytime relates to the period between 07:00 and 23:00 (with evening between 19:00 and 23:00), and night-time between 23:00 and 07:00.

8.3.9 All measurements were taken at approximately 1.2-1.5m above ground level (AGL), with the exception of ML6, which was approximately 1.8m AGL (due to having to attach the microphone to a garden trellis), and in accordance with the requirements of British Standard BS 7445 (Ref 8-15). All monitoring locations were positioned at least 3.5m from any reflecting surface, other than the ground (*i.e.* free-field). Details of on-going activities and typical noise sources in the area were recorded during visits to the monitoring locations to set up and collect the measurement equipment.

Noise Survey Instrumentation

8.3.10 Details of the instrumentation (sound level meters (SLMs)) used during the surveys are presented in **Table 8-6** below:

Table 8-6: Measurement equipment

Monitoring location	Manufacturer	SLM model	SLM serial number	Microphone model	Microphone serial number
ML1	Rion	NL-52	01021278	Rion UC59	04334
ML2	Svantek	959	15606	GRAS 40AE	98114
ML3	B&K	2250	2827270	B&K 4189	2820205
ML4	Svantek	958	14693	GRAS 40AE	17973
ML5	Norsonic	Nor140	1403077	NOR1225	91924
ML6	B&K	2238	2381585	B&K 4188	2200371

Monitoring location	Manufacturer	SLM model	SLM serial number	Microphone model	Microphone serial number
ML7	B&K	2250	2827271	B&K 4189	2820200

8.3.11 All SLMs used were Class 1 precision instruments. Each was programmed to log a number of parameters including L_{Aeq}, L_{A90} and L_{Amax} values, in 15-minute contiguous intervals.

8.3.12 The calibration levels were checked prior to and following all measurements with a Brüel & Kjær 4231 field calibrator (serial number 2217877). No significant drift, more than 0.2 dB, occurred. Full calibration details are available upon request.

Meteorological Conditions

8.3.13 Observations regarding weather conditions were made during the noise survey. In addition, a weather monitoring station was in operation at ML3. The weather station collected data relating to the wind speed (average and maximum), direction, precipitation and temperature.

8.3.14 At the start of the survey period (Friday 14 July 2017), weather conditions were observed to be dry with patchy cloud; wind blowing from a north-westerly direction with an average speed of approximately 2m/s and a maximum wind speed of approximately 4m/s. Road surfaces were noted to be dry and the ambient temperature was approximately 20°C.

8.3.15 During the second site visit (Monday 17 July 2017) weather conditions were noted to be dry with minimal cloud coverage and no wind. Road surfaces were noted to be dry and the ambient temperature was approximately 28°C.

8.3.16 Upon collection of the survey (Monday 24 July 2017), weather conditions were observed to be wet with thick cloud; wind blowing from a easterly direction with an average speed of approximately 1.8m/s and a max wind speed of approximately 2.2m/s. Road surfaces were noted to be wet and the ambient temperature was approximately 14°C.

8.3.17 A daily overview of the data collected from the weather station has been presented in **Table 8-7** below.

Table 8-7: Daily overview of meteorological conditions

Date	Time Period	Wind Direction Average Degrees Clockwise from North	Range of 15-minute Average Wind Speeds (m/s)	Ambient Rain Gauge (mm)
Friday 14th July 2017	16:30 – 23:00	283	0.7 – 3.0	0.3

Date	Time Period	Wind Direction Average Degrees Clockwise from North	Range of 15-minute Average Wind Speeds (m/s)	Ambient Rain Gauge (mm)
	23:00 – 07:00	200	0.6 – 2.0	0.1
Saturday 15th July 2017	07:00 – 23:00	201	1.2 – 3.2	1.0
	23:00 – 07:00	212	1.0 – 2.9	0.0
Sunday 16th July 2017	07:00 – 23:00	290	0.6 – 2.6	0.0
	23:00 – 07:00	233	0.2 – 1.3	0.0
Monday 17th July 2017	07:00 – 23:00	262	0.4 – 1.8	0.0
	23:00 – 07:00	197	0.3 – 0.6	0.0
Tuesday 18th July 2017	07:00 – 23:00	79	0.3 – 2.0	0.0
	23:00 – 07:00	44	0.5 – 1.9	0.0
Wednesday 19th July 2017	07:00 – 23:00	139	1.0 – 3.8	0.0
	23:00 – 07:00	207	0.4 – 3.2	2.4
Thursday 20th July 2017	07:00 – 23:00	269	1.1 – 3.3	10.3
	23:00 – 07:00	153	1.0 - 3.8	0.0
Friday 21st July 2017	07:00 – 23:00	151	2.2 – 5.1	0.0
	23:00 – 07:00	133	0.6 – 3.4	11.2
Saturday 22nd July 2017	07:00 – 23:00	194	0.2 – 4.3	8.1
	23:00 – 07:00	209	0.2 – 1.8	0.0
Sunday 23rd July 2017	07:00 – 23:00	287	0.4 - 2.0	2.3
	23:00 – 07:00	215	1.2 – 2.3	0.1
Monday 24th July 2017	07:00 – 13:00	310	2.0 – 5.1	0.0

8.3.18 Overall, the meteorological conditions were within the limits considered suitable by relevant standards for collecting sound level measurements, with the exception of some elevated wind speeds during Friday 21 July 2017 and elevated levels of

precipitation during Thursday 20 July 2017 daytime and Friday 21 July 2017 night-time. However, the measured levels are considered representative of a range of conditions prevailing at NSR within the study area. No periods of baseline sound level data collection were therefore excluded from the assessment.

Assessment of Construction Noise Impacts

8.3.19 At this stage in the project design development, before the appointment of a construction contractor, site-specific details on the construction activities, programme and number or type of construction plant are not yet available. Therefore, detailed construction noise predictions at specific NSR have not been undertaken. Nevertheless, indicative construction noise predictions have been undertaken using the calculation methods set out in BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites' (Ref 8-17), based upon construction information from other power stations projects and data provided by the Applicant relating to the construction phase of the Proposed Development.

8.3.20 The calculation method provided in BS 5228 takes account of factors including the number and types of equipment operating, their associated SWL, their modes of operation (% on-times within the working period), the distance to NSR, and the effects of any intervening ground cover or barrier/topographical screening. This allows prediction of the magnitude of impact.

8.3.21 BS 5228 contains a number of example methodologies for identifying significant construction noise effects based on fixed thresholds or noise level changes. Taking into account this guidance, the threshold values detailed in **Table 8-8** have been adopted in this chapter to define the SOAEL (the 'significant observed adverse effect level', as defined in **Section 8.2**) and the LOAEL (the 'lowest observable adverse effect level') for residential receptors.

Table 8-8: Construction Noise SOAEL and LOAEL for residential receptors

Time of Day	SOAEL $L_{Aeq,T}$ dB (façade)	LOAEL $L_{Aeq,T}$ dB (façade)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	75	65
Evenings (19:00 – 23:00 weekdays) and Weekends (13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays)	65	55
Night-time (23:00 – 07:00)	55	45

8.3.22 The criterion for the SOAEL at residential receptors corresponds to the threshold values for Category C in the BS 5228 example ABC method. Similarly, the criterion for the LOAEL corresponds to the threshold values for Category A in the BS 5228 example ABC method. In accordance with the NPPF and NPSE, it is

important to consider receptors that exceed the LOAEL and ensure adverse effects are mitigated and minimised.

8.3.23 When considering exceedances of the SOAEL and LOAEL, other project-specific factors have been taken into account, such as the existing ambient noise levels, number of receptors affected and the frequency and duration of the impact.

8.3.24 Based upon the above, the magnitude of the impact of construction noise on residential receptors has been classified in accordance with the descriptors in **Table 8-9**.

Table 8-9: Construction Noise magnitude of impact criteria for residential receptors

Magnitude of Impact	Daytime $L_{Aeq,T}$ dB (façade)	Evening/Weekend $L_{Aeq,T}$ dB (façade)	Night-time $L_{Aeq,T}$ dB (façade)
High	> 80	> 70	> 60
Medium	>75-80	>65-70	>55-60
Low	>65-75	>55-65	>45-55
Very Low	≤ 65	≤ 55	≤ 45

Assessment of Daytime Construction Works Traffic on the Public Highway

8.3.25 The Proposed Development will affect traffic flows on existing roads in the area surrounding the Site during construction. The assessment focuses on the impact at existing residential properties located alongside the local road network.

8.3.26 Construction traffic noise has been assessed by considering the increase in traffic flows during the construction works, following the guidance of CRTN (Ref 8-24) and DMRB (Ref 8-25).

8.3.27 18-hour (06:00 – 24:00) Annual Average Weekday Traffic (AAWT) data have been obtained for the assessed construction year 2029 'with' and 'without' construction traffic during the peak construction period, in order to determine if any existing roads are predicted to be subject to a potentially significant change in 18-hour traffic flows. Basic Noise Level (BNL) calculations have been undertaken to predict the change in noise level between the 'with' and 'without' scenarios.

8.3.28 The traffic data used within this assessment has been sourced from **Chapter 7**: Traffic and Transport and its accompanying **Appendix 7A**: Transport Assessment (ES Volume II). The data represents the peak traffic flow periods for assessment of the worst-case impacts; outside of these periods traffic flow and hence noise effects would be lower.

8.3.29 The criteria for the assessment of traffic noise changes arising from construction works have been taken from Table 3.1 of DMRB and are provided in **Table 8-10** below.

Table 8-10: Traffic noise criteria

Magnitude of impact	Change in traffic noise level $L_{A10,18h}$ dB
High	≥ 5
Medium	3 to <5
Low	1 to <3
Very low	<1

8.3.30 DMRB advises that an increase in road traffic flows of 25% (where the traffic speed and composition remain consistent) equates to an increase in road traffic noise of 1 dB L_A. A doubling of traffic flow would be required for an increase in 3 dB L_A.

8.3.31 It is generally accepted that changes in noise levels of 1 dB L_A or less are imperceptible, and changes of 1 to 3 dB L_A are not widely perceptible. Consequently, at the selected road traffic noise receptors the magnitude of the predicted change in noise levels uses the scale shown in **Table 8-10** above with respect to construction traffic. The criteria are based on the current guidance on short-term changes in traffic noise levels in DMRB. The SOAEL is set at a change in traffic noise of +3 dB and the LOAEL at +1 dB.

Assessment of Construction Vibration Impacts

Impacts on Humans – Annoyance

8.3.32 Vibration due to construction activities has the potential to result in adverse impacts at nearby NSR. The transmission of ground-borne vibration is highly dependent on the nature of the intervening ground between the source and receiver and the activities being undertaken. BS 5228-2: 2009+A1: 2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites - Vibration' (Ref 8-18) provides data on measured levels of vibration for various construction works, with particular emphasis on piling. Impacts are considered for both damage to buildings and annoyance to occupiers.

8.3.33 **Table 8-11** details Peak Particle Velocity (PPV) vibration levels and provides a semantic scale for the description of construction vibration effects on human receptors, based on guidance contained in BS 5228-2.

Table 8-11: Construction vibration threshold at residential dwellings

Peak Particle Velocity (PPV) level	Description	Magnitude of impact
>= 10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	High

Peak Particle Velocity (PPV) level	Description	Magnitude of impact
1.0 to < 10 mm/s	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.	Medium
0.3 to < 1 mm/s	Vibration might be just perceptible in residential environments.	Low
0.14 to < 0.3 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Very low

8.3.34 For residential receptors and other high sensitivity receptors, the LOAEL is defined as a PPV of 0.3mm/s (millimetres per second), this being the point at which construction vibration is likely to become perceptible. The SOAEL is defined as a PPV of 1.0mm/s, this being the level at which construction vibration can be tolerated with prior warning.

8.3.35 At receptors above the SOAEL, further consideration of whether an effect is significant is undertaken using professional judgement, taking account of the duration and frequency of the effect, as well as the time of evening/night that the effect would be experienced.

8.3.36 In the absence of specific information on likely construction activities and plant, a qualitative assessment based upon professional judgement has been undertaken at this stage. Given the significant distance to residential receptors, this qualitative judgement made is that no significant vibration (medium or high magnitude impacts) is expected to result at residential NSR from the proposed construction and therefore further assessment is scoped out. However, further consideration is given to the occupants of adjacent buildings associated with WBA Power Station and WBB Power Station within the West Burton Power Station site.

Impacts on Buildings

8.3.37 In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels are controlled to those relating to annoyance (*i.e.* 1.0mm/s), then it is highly unlikely that buildings will be damaged by construction vibration levels.

8.3.38 The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage. The principal concern is generally transient vibration, for example due to piling.

8.3.39 BS 7385-2: 1993 'Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration' (Ref 8-20) provides guidance on vibration levels likely to result in cosmetic damage and is referenced in BS 5228-2: 2009+A1:2014. Guide values for transient vibration, above which cosmetic damage could occur, are given in **Table 8-12**.

Table 8-12: Transient vibration guide values for cosmetic damage

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4Hz to 15Hz	15Hz and above
Reinforced or framed structures (industrial and heavy commercial buildings).	50mm/s at 4Hz and above.	
Unreinforced or light framed structures (residential or light commercial buildings).	15mm/s at 4Hz increasing to 20mm/s at 15Hz.	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above.
NOTE 1: Values referred to are at the base of the building. NOTE 2: For un-reinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6mm (zero to peak) is not to be exceeded.		

8.3.40 BS 7385-2:1993 states that the probability of building damage tends to zero for transient vibration levels less than 12.5mm/s PPV. For continuous vibration, such as from vibratory rollers, the threshold is around half this value.

8.3.41 It is also noted that these values refer to the likelihood of cosmetic damage. ISO 4866:2010 defines three different categories of building damage:

- cosmetic – formation of hairline cracks in plaster or drywall surfaces and in mortar joints of brick/concrete block constructions;
- minor – formation of large cracks or loosening and falling of plaster or drywall surfaces or cracks through brick/block; and
- major – damage to structural elements, cracks in support columns, loosening of joints, splaying of masonry cracks.

8.3.42 BS 7385-2:1993 defines that minor damage occurs at a vibration level twice that of cosmetic damage and major damage occurs at a vibration twice that of minor damage. Therefore, this guidance can be used to define the magnitude of impact identified in **Table 8-13** below.

Table 8-13: Magnitude of impact – construction vibration building damage

Magnitude of impact	Damage risk	Continuous vibration level ppv mm/s
High	Major	30
Medium	Minor	15
Low	Cosmetic	6
Very low	Negligible	<6

8.3.43 In the absence of specific information on likely construction activities and plant, a qualitative assessment based upon professional judgement has been undertaken. The qualitative judgement made at this stage, again given the significant distance to residential receptors, is that no significant vibration is expected to result from the proposed construction activities at nearby residential buildings and therefore further assessment of the effects of vibration on such buildings is scoped out. However, further consideration is given to the adjacent buildings within the West Burton Power Station site.

Assessment of Operational Noise Impacts

8.3.44 The assessment of operational sound levels has been based upon calculations using plant emissions data available at this stage. The data currently available includes: proposed plant equipment (provided by a range of equipment manufacturers), SWLs relating to the proposed plant, distance between the proposed plant and NSR and the acoustic screening offered by the existing landscape and existing West Burton Power Station buildings.

8.3.45 Based upon the predicted sound levels, an assessment of potential impact at nearby NSR has been undertaken using the guidance in BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound' (Ref 8-21).

8.3.46 A key aspect of the BS 4142:2014 assessment procedure is a comparison between the *background sound level* in the vicinity of residential locations and the *rating level* of the sound source under consideration. The relevant parameters in this instance are as follows:

- *background sound level* – $L_{A90,T}$ – defined in the Standard as the *"A-weighted sound pressure level that is exceeded by the residual sound for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels"*;
- *specific sound level* – L_s ($L_{Aeq,Tr}$) – the *"equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr"*; and
- *rating level* – $L_{Ar,Tr}$ – the *"specific sound level plus any adjustment made for the characteristic features of the sound"*.

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

- tonality: up to +6 dB correction;
- impulsivity: up to +9 dB correction (this can be summed with tonality correction); and
- other sound characteristics (neither tonal or impulsive but still distinctive): + 3 dB correction.

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

- *"Typically, the greater the difference, the greater the magnitude of impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending upon the context.*
- *The lower the rating level is to the measured background sound level, the less likely it is that the specific sound will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon the context."* (Section 11)

8.3.49 Importantly, as suggested above, BS 4142:2014 requires that the *rating level* of the sound source under assessment be considered in the context of the environment, when defining the overall magnitude of the impact.

8.3.50 BS 4142:2014 suggests that a one hour assessment period is considered during the day and a 15-minute assessment period at night.

8.3.51 **Table 8-14** illustrates the adopted magnitude of impact scale used in this assessment based upon the numerical level difference. For BS 4142 assessment purposes the SOAEL is set at a rating level above the background sound level of +10 dB, and the LOAEL at +5 dB, although it should be remembered that the context assessment (including the absolute level of the sound under consideration) can vary the overall classification of effects.

Table 8-14: Magnitude of impact for industrial noise including building services

Magnitude of impact	BS 4142 descriptor	Excess of *rating level* over *background sound level* (dB)
High	No BS 4142 descriptor for this magnitude level.	>15
Medium	Indication of a significant adverse effect, depending upon context.	+10 approx.
Low	Indication of an adverse effect, depending upon context.	+5 approx.
Very low	Indication of low impact, depending upon context.	≤ 0

Assessment of Operational Vibration Impacts

8.3.52 No causes of potentially significant vibration associated with the Proposed Development are known and therefore further assessment of operational vibration is scoped out of this assessment.

Significance Criteria

8.3.53 Effects are classified based on the magnitude of the impact and the sensitivity or value of the affected receptor. The criteria for assigning the magnitude of impacts are outlined above for the various potential impacts during construction, operation and decommissioning, and these are followed by a scale of receptor sensitivity in **Table 8-15** and overall classification of effects matrix in **Table 8-16**.

Receptor Sensitivity

8.3.54 In accordance with the principles of EIA, the sensitivity of existing receptors to noise (or vibration) impacts during either construction or operational phases has been defined in **Table 8-15**.

Table 8-15: Sensitivity/value of receptors

Sensitivity/value of resource/receptor	Description	Examples of receptor usage
Very high	Receptors where noise or vibration will significantly affect the function of a receptor.	Auditoria/studios. Specialist medical/teaching centres, or laboratories with highly sensitive equipment.
High	Receptors where people or operations are	Residential. Quiet outdoor areas used for recreation.

Sensitivity/value of resource/receptor	Description	Examples of receptor usage
	particularly susceptible to noise or vibration. Sensitive ecological receptors known to be vulnerable to the effects of noise or vibration.	Conference facilities. Schools/educational facilities in the daytime. Hospitals/residential care homes. Libraries. Ecologically sensitive areas for example Special Protection Areas (SPAs).
Medium	Receptors moderately sensitive to noise or vibration where it may cause some distraction or disturbance.	Offices. Restaurants/retail. Sports grounds when spectator or noise is not a normal part of the event and where quiet conditions are necessary (*e.g.* tennis, golf).
Low	Receptors where distraction or disturbance of people from noise or vibration is minimal.	Residences and other buildings not occupied during working hours. Factories and working environments with existing high noise levels. Sports grounds when spectator or noise is a normal part of the event.

Classification of Effects

8.3.55 The following terminology has been used in the assessment to classify effects:

- adverse – detrimental or negative effects to an environmental resource or receptor;
- neutral – effects to an environmental resource or receptor that are neither adverse nor beneficial; or
- beneficial – advantageous or positive effect to an environmental resource or receptor.

8.3.56 The effect resulting from each individual potential impact type above is classified according to the magnitude of the impact and the sensitivity or value of the affected receptor using the matrix presented in **Table 8-16** below, but where necessary also considering the context of the acoustic environment.

Table 8-16: Classification of effects

Sensitivity/value of resource/receptor	Magnitude of impact			
	High	Medium	Low	Very low
Very high	Major	Major	Moderate	Minor

Sensitivity/value of resource/receptor	Magnitude of impact			
	High	Medium	Low	Very low
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible

8.3.57 For the purposes of this assessment, negligible and minor effects are not considered to be significant, whereas moderate and major effects are considered to be significant.

Extent of Study Area

8.3.58 The extent of the study area has been defined to include the nearest receptors/communities in each direction from the Site and alongside the transport corridors that may be affected by changes in road traffic flows during the construction and operational phases of the Proposed Development. Representative NSR within this study area in all directions from the Site have been identified for the purposes of assessment, to ensure all effects are appropriately considered.

Rochdale Envelope

8.3.59 The noise and vibration assessment has been undertaken with reference to the Rochdale Envelope (i.e. the maximum parameters for the Proposed Development and in particular its main buildings and structures). It is considered that the potential variation in building locations and dimensions presented in **Chapter 4**: The Proposed Development is unlikely to adversely affect the overall conclusions regarding the significance of residual noise effects, for reasons described below.

8.3.60 The construction assessment has been based on the worst-case assumption of activities occurring at the closest part of the Site to each receptor as shown in **Figure 4.1a** and **Figure 4.1b** (ES Volume III).

8.3.61 The operational assessment is based on the limits of deviation defined in **Chapter 4**: The Proposed Development and these relate to the Works Plans that accompany the Application (**Application Document Ref. 3.2**). These constrain the design parameters of each element of the Proposed Development (and as for construction, in any event, mitigation will be integrated into the detailed design in order to meet agreed noise limits at the nearest NSR, in accordance with a Requirement of the draft DCO (**Application Document Ref. 2.1**). Due to the relatively small size of the Proposed Power Plant Site compared with the distances to NSR, there would be no significant effect with regard to predicted sound levels at NSR, no matter where operational plant is located on the Proposed Power Plant Site.

Sources of Information/Data

8.3.62 The following sources of information that define the Proposed Development have been reviewed and form the basis of the assessment of likely significant effects of noise and vibration:

- construction plant and equipment from similar power station projects;
- initial estimates of numbers of construction plant and equipment from the Applicant;
- construction noise data referenced from BS 5228;
- indicative concept layout plans for the Proposed Power Plant Site (see **Figures 4.1a** and **4.1b** in ES Volume III) and the implications of the application of the Rochdale Envelope;
- schedule of buildings and plant for the Proposed Development, including SWLs and internal reverberant sound pressure levels, provided by Original Equipment Manufacturers (OEMs) and also sourced from similar representative projects;
- AAWT traffic data from **Appendix 7A:** Transport Assessment (ES Volume II);
- Ordnance Survey mapping of the Site and surrounding area; and
- aerial photography.

8.4 Baseline Conditions

Existing Baseline

Sound Survey Results

8.4.1 The processed results from each long-term sound survey position are provided in **Table 8-17** to **Table 8-23** below. The L_{A90} values presented represent the lowest 10th percentile of all 15-minute measurements within the time period. Observations regarding the general baseline sound environment at each monitoring location are detailed after the tables.

Table 8-17: Baseline Sound Levels at ML1 – 4 North Street, Sturton-le-Steeple

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Monday 17 July	15:30 – 23:00*	46	78	39
	23:00 – 07:00	47	72	29
Tuesday 18	07:00 –	50	78	32

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
July	23:00			
	23:00 – 07:00	47	79	29
Wednesday 19 July	07:00 – 23:00	48	80	27
	23:00 – 07:00	47	78	20
Thursday 20 July	07:00 – 23:00	49	76	26
	23:00 – 07:00	43	74	20
Friday 21 July	07:00 – 23:00	53	74	34
	23:00 – 07:00	48	70	25
Saturday 22 July	07:00 – 23:00	50	89	26
	23:00 – 07:00	43	74	21
Sunday 23 July	07:00 – 23:00	48	86	29
	23:00 – 07:00	46	71	34
Monday 24 July	07:00 – 13:00*	50	83	35

* Note – this period does not cover the full 16-hr day period and therefore may not be directly comparable with other complete time periods.

Table 8-18: Baseline Sound Levels at ML2 – Crossing Keepers Cottage, West Burton

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Friday 14 July	15:00 – 23:00*	54	84	45
	23:00 – 07:00	53	86	33

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Saturday 15 July	07:00 – 23:00	54	84	38
	23:00 – 07:00	55	91	35
Sunday 16 July	07:00 – 23:00	54	88	39
	23:00 – 07:00	48	77	26
Monday 17 July	07:00 – 23:00	57	90	30
	23:00 – 07:00	48	83	28
Tuesday 18 July	07:00 – 23:00	57	88	38
	23:00 – 07:00	51	78	33
Wednesday 19 July	07:00 – 23:00	53	80	30
	23:00 – 07:00	46	77	27
Thursday 20 July	07:00 – 23:00	52	89	31
	23:00 – 07:00	50	77	35
Friday 21 July	07:00 – 23:00	56	79	44
	23:00 – 07:00	54	84	45
Saturday 22 July	07:00 – 23:00	53	86	33
	23:00 – 07:00	54	84	38
Sunday 23 July	07:00 – 23:00	55	91	35
	23:00 – 07:00	54	88	39

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Monday 24 July	07:00 – 13:00*	48	77	26

* Note – this period does not cover the full 16-hr day period and therefore may not be directly comparable with other complete time periods.

Table 8-19: Baseline Sound Levels at ML3 – Mill House Farm, West Burton

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Friday 14 July	16:30 – 23:00*	49	75	34
	23:00 – 07:00	40	68	30
Saturday 15 July	07:00 – 23:00	48	73	35
	23:00 – 07:00	41	73	31
Sunday 16 July	07:00 – 23:00	47	76	33
	23:00 – 07:00	43	68	28
Monday 17 July	07:00 – 23:00	51	91	34
	23:00 – 07:00	43	61	34
Tuesday 18 July	07:00 – 23:00	55	84	38
	23:00 – 07:00	41	60	34
Wednesday 19 July	07:00 – 23:00	49	75	38
	23:00 – 07:00	44	75	33
Thursday 20 July	07:00 – 23:00	52	74	34
	23:00 – 07:00	41	60	34

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Friday 21 July	07:00 – 23:00	48	72	39
	23:00 – 07:00	47	70	38
Saturday 22 July	07:00 – 23:00	47	71	34
	23:00 – 07:00	40	69	31
Sunday 23 July	07:00 – 23:00	46	67	32
	23:00 – 07:00	45	65	30
Monday 24 July	07:00 – 12:45*	51	73	40

* Note – this period does not cover the full 16-hr day period and therefore may not be directly comparable with other complete time periods.

Table 8-20: Baseline Sound Levels at ML4 – Manor Cottage, Bole

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Friday 14 July	17:30 – 23:00*	44	88	34
	23:00 – 07:00	42	76	34
Saturday 15 July	07:00 – 23:00	49	88	38
	23:00 – 07:00	41	65	34
Sunday 16 July	07:00 – 23:00	45	79	34
	23:00 – 07:00	43	77	28
Monday 17 July	07:00 – 23:00	45	78	32
	23:00 – 07:00	46	84	36

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Tuesday 18 July	07:00 – 23:00	52	86	38
	23:00 – 07:00	46	78	33
Wednesday 19 July	07:00 – 23:00	48	86	39
	23:00 – 07:00	44	78	36
Thursday 20 July	07:00 – 23:00	48	80	37
	23:00 – 07:00	45	68	36
Friday 21 July	07:00 – 23:00	52	80	40
	23:00 – 07:00	50	79	38
Saturday 22 July	07:00 – 23:00	49	79	36
	23:00 – 07:00	47	78	33
Sunday 23 July	07:00 – 20:15*	48	81	34

* Note – this period does not cover the full 16-hr day period and therefore may not be directly comparable with other complete time periods.

Table 8-21: Baseline Sound Levels at ML5 – 194 Lea Road, Gainsborough

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Monday 17 July	13:00 – 23:00*	48	89	36
	23:00 – 07:00	40	66	29
Tuesday 18 July	07:00 – 23:00	46	82	37
	23:00 – 07:00	39	78	27

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Wednesday 19 July	07:00 – 23:00	51	88	35
	23:00 – 07:00	43	80	29
Thursday 20 July	07:00 – 11:00*	48	76	41

* Note – this period does not cover the full 16-hr day period and therefore may not be directly comparable with other complete time periods.

Table 8-22: Baseline Sound Levels at ML6 – Green Lane, Lea

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Friday 14 July	16:30 – 23:00*	47	89	36
	23:00 – 07:00	41	72	30
Saturday 15 July	07:00 – 23:00	47	82	35
	23:00 – 07:00	40	82	31
Sunday 16 July	07:00 – 23:00	45	75	35
	23:00 – 07:00	45	83	33
Monday 17 July	07:00 – 23:00	45	82	36
	23:00 – 07:00	42	79	26
Tuesday 18 July	07:00 – 23:00	46	80	35
	23:00 – 07:00	42	76	26
Wednesday 19 July	07:00 – 23:00	45	80	34
	23:00 – 07:00	43	74	30

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Thursday 20 July	07:00 – 23:00	51	86	35
	23:00 – 07:00	41	79	30
Friday 21 July	07:00 – 23:00	48	82	37
	23:00 – 07:00	45	80	27
Saturday 22 July	07:00 – 23:00	56	84	31
	23:00 – 07:00	41	75	27
Sunday 23 July	07:00 – 23:00	46	84	35
	23:00 – 07:00	45	80	31
Monday 24 July	07:00 – 11:45*	50	77	43

* Note – this period does not cover the full 16-hr day period and therefore may not be directly comparable with other complete time periods.

Table 8-23: Baseline Sound Levels at ML7 – Knaith Hall, Knaith

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Monday 17 July	15:30 – 23:00*	49	77	33
	23:00 – 07:00	44	65	21
Tuesday 18 July	07:00 – 23:00	48	73	39
	23:00 – 07:00	42	60	24
Wednesday 19 July	07:00 – 23:00	53	89	38
	23:00 – 07:00	41	61	29

Date (2017)	Time period	$L_{Aeq,T}$ dB	Highest $L_{Amax,T}$ dB	$L_{A90,T}$ dB
Thursday 20 July	07:00 – 23:00	51	87	38
	23:00 – 07:00	44	68	30
Friday 21 July	07:00 – 23:00	51	74	42
	23:00 – 07:00	45	67	27
Saturday 22 July	07:00 – 23:00	47	78	35
	23:00 – 07:00	39	60	20
Sunday 23 July	07:00 – 23:00	44	78	34
	23:00 – 07:00	43	65	32
Monday 24July	07:00 – 13:00*	48	63	44

* Note – this period does not cover the full 16-hr day period and therefore may not be directly comparable with other complete time periods.

Observations of General Baseline Sound Environment

North Street, Sturton-le-Steeple (ML1)

8.4.2 The dominant sound source at this location during the daytime was noted to be road traffic noise from Cross Street, Station Road and Gainsborough Road. Some additional (low level) noise was audible, potentially attributed to the maintenance of the WBB Power Station.

Crossing Keepers Cottage, West Burton (ML2)

8.4.3 The dominant sound source at this location during the daytime was noted to be road traffic noise from Gainsborough Road (west).

Mill House Farm, West Burton (ML3)

8.4.4 The dominant sound source at this location during the daytime was noted to be road traffic noise from Gainsborough Road. In addition, electrical sound from the nearby electricity pylons was audible.

Manor Cottage, Bole (ML4)

8.4.5 The dominant sound source at this location during the daytime was noted to be road traffic noise from Sturton Road.

194 Lea Road, Gainsborough (ML5)

8.4.6 The dominant sound source at this location during the daytime was noted to be road traffic noise from Lea Road. Occasional dog barking was also noted at the neighbouring property.

Green Lane, Lea (ML6)

8.4.7 The dominant sound source at this location during the daytime was noted to be road traffic noise from Gainsborough Road (east).

Knaith Hall, Knaith (ML7)

8.4.8 The dominant sound source at this location during the daytime was noted to be road traffic noise from Gainsborough Road (east). During the setup of equipment, a gardener was present (using power tools).

Representative Background Sound Levels

8.4.9 Representative background sound levels have been established for daytime and night-time periods, based upon review and comparison of the modal and lowest 10^{th} percentile of all 15-minute interval results throughout the daytime and night-time periods surveyed.

8.4.10 The area around the Site is very flat and the potential NSR are located all around the Site at distances of approximately 1km to over 2km. There are very few existing sources of background sound, particularly at night.

8.4.11 As there are no significant topographical features in the area, the largest influence on sound propagation is wind direction. When a receptor is downwind of a source, sound propagation will be 10-15 dB higher than when it is upwind. Therefore at each NSR, the background sound level varies depending on whether it is upwind or downwind of the major sound sources. This applies to sound both from the existing background sources and the Proposed Development.

8.4.12 Background sound measurements were undertaken over an extended period. During the survey, wind direction was also monitored to determine whether this had a significant effect on the results. It was found that the background sound level for each NSR derived from the periods when it was downwind of the Site were slightly higher than those derived from the dataset as a whole (between 1 and 5 dB). This is because the most significant background sound sources are the existing WBA and WBB Power Stations and when the wind was blowing in the opposite direction for each receptor, the contribution from the existing Power Stations will have been reduced.

8.4.13 As the Proposed Power Plant Site is to be located immediately north of the operational WBB Power Station, any sound emitted by the Proposed Development would be subject to the same wind propagation effects as the existing sounds emitted. The sound predictions in the assessment are based on the ISO 9613 method, which assumes gentle downwind conditions. Therefore, the predicted levels will only actually be experienced at each NSR when it is downwind of the Proposed Power Plant. Consequently, it is appropriate to compare these predicted levels with background sound levels measured in similar conditions.

8.4.14 There is no reliable method of predicting upwind propagation as there are too many variables. However as stated above, the upwind sound levels from an individual sound source will generally be 10-15 dB lower than the downwind sound levels. The difference between the upwind and downwind background sound levels at the receptors was smaller than this (at 1-5 dB) as they have contributions from sources located all around them. So the potential impact of the Proposed Development would be at its greatest in downwind conditions.

8.4.15 As a result, the wind direction has also been taken into consideration in the analysis of the data to produce a representative *background sound level* for each NSR. The wind direction data was gathered by a portable monitor alongside one of the sound level meters during the baseline sound survey. This information was used to analyse and refine the measured results from all seven NSR. The results produced by the analysis and refinement were consistent with the locations of the major sound sources listed for each location and, in view of the very flat nature of the land around the Site, it is assumed that the wind direction measured at the single location was representative for all.

8.4.16 **Table 8-24** summarises the defined representative *background sound levels* taken forward for the NSR adjacent to each monitoring location within the BS 4142 assessment.

Table 8-24: Representative background sound levels

Receptor	ML1	ML2	ML3	ML4	ML5	ML6	ML7
Daytime L_{A90} dB (07:00-23:00)	31	34	37	37	36	35	36
Night-time L_{A90} dB (23:00-07:00)	26	33	34	34	29	29	24

8.4.17 Up to 20 battery storage units were constructed within the footprint of WBB Power Station and commenced operation in January 2018. The development includes a central control unit and associated cabling to connect the battery units to the existing 6.6 kV station switchboard. The battery units are arranged in pairs that measure 17.6m by 5.3m and are 2.9m in height.

8.4.18 A noise impact assessment was undertaken for the battery project (Ref 8-29). Assessments made in accordance with BS 4142:2014 predicted that the noise generated from operation of the battery units would be unlikely to be noticeable (+0.1 dB - +0.2 dB) at the NSR used for the purposes of this chapter, which would be below the threshold of an adverse effect. The current baseline at local NSR is therefore unlikely to be affected by the battery project and no further consideration has been given in this chapter to the development.

8.4.19 No other developments, including those recently consented on the wider West Burton Power Station site, are considered to have likely materially changed the reported baseline for the purposes of this assessment.

Future Baseline

8.4.20 In the absence of the Proposed Development, future baseline sound levels at NSR will depend largely on traffic flows on surrounding road/rail networks and the future operations at other industrial and commercial premises in the area. It is anticipated that WBA Power Station would close by 2025 under current legislation; potentially resulting in a reduction in future baseline at properties within the Site vicinity, compared with current periods when the existing coal fired power station is in operation. WBB Power Station is assumed to remain operational in the future baseline scenario.

8.5 Development Design and Impact Avoidance

Construction Noise

8.5.1 Construction activities will be undertaken during 0700 and 1900 hours on Monday to Friday and 0800 and 1800 hours on a Saturday), although some works may take place outside of core working hours, provided they do not exceed a noise limit at locations to be agreed with BDC.

8.5.2 Measures to mitigate noise will be implemented during the construction phase of the Proposed Development in order to minimise impacts at local residential NSR, particularly with respect to activities required outside of core working hours. The appointed contractor(s) will produce a Construction Environmental Management Plan (CEMP) that would provide details of proposed environmental control measures, including measures related to noise. A Framework CEMP is included as **Application Document Ref. 7.3** and contains the impact avoidance measures as outlined in this section. It is proposed that the final CEMP will be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**) and submitted for approval by the local planning authority prior to construction. The appointed contractor will then implement the approved CEMP.

8.5.3 Mitigation measures for inclusion within the CEMP include, but are not limited to:

- abiding by construction noise limits at locations to be agreed with BDC;
- ensuring that all appropriate processes are in place to minimise noise before works begin and ensuring that BPM are being achieved throughout the construction programme, including the use of localised screening around significant noise producing plant and activities;
- ensuring that modern plant is used, complying with the applicable UK noise emission requirements;
- selection of inherently quiet plant where possible;
- hydraulic techniques for breaking to be used in preference to percussive techniques where reasonably practicable;
- if piling is required, use of lower noise piling (such as rotary bored or hydraulic jacking) rather than driven piling techniques where reasonably practicable;
- off-site pre-fabrication where reasonably practicable;
- all plant and equipment being used for the works to be properly maintained, silenced where appropriate, operated to prevent excessive noise, and switched off when not in use;
- all contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2) (Ref 8-17 and Ref 8-18), which should form a prerequisite of their appointment;

- loading and unloading of vehicles, dismantling of site equipment such as scaffolding or moving equipment or materials around the Site, to be conducted in such a manner as to minimise noise generation as far as reasonably practicable;
- all vehicles used on-Site shall incorporate broadband reversing warning devices as opposed to the typical tonal reversing alarms to minimise noise disturbance where reasonably practicable;
- appropriate routing of construction traffic on public roads and along access tracks (see **Chapter 7:** Traffic and Transport);
- provision of information to BDC and local residents to advise of potential noisy works that are due to take place; and
- monitoring of noise complaints, and reporting to the Applicant for immediate investigation and action.

8.5.4 Method Statements regarding construction management, traffic management and overall site management will be prepared in accordance with best practice and relevant British Standards, to help to minimise impacts of construction works. One of the key aims of such Method Statements would be to minimise noise disruption to local residents during the construction phase, as far as reasonably practicable.

8.5.5 Consultation and communication with the local community throughout the construction period would serve to publicise the works schedule, giving notification to residents regarding periods when higher levels of noise may occur during specific operations, and providing lines of communication where complaints can be addressed.

8.5.6 The selected contractor would be encouraged to be a member of the 'Considerate Constructors Scheme' which is an initiative open to all contractors undertaking building work.

8.5.7 A detailed noise assessment would be carried out once the contractor is appointed and further details of construction methods are known, in order to identify specific mitigation measures for the Proposed Development (including construction traffic). The control of noise, including monitoring during construction is proposed to be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).

Operational Noise

8.5.8 The selection of the Proposed Power Plant Site and development of the indicative concept layout have already included consideration of potential noise effects and proximity to NSR, with plant being located close to WBB Power Station, in order to increase the distance between plant and the NSR. During the detailed design stage, further options to mitigate potential significant noise effects by design will be explored.

8.5.9 Several options for configuration of generation plant and equipment have been considered within the Rochdale Envelope assessed. Preliminary modelling has shown that options are available that are capable of meeting applicable threshold noise levels.

8.5.10 The Proposed Development would be operated in accordance with an Environmental Permit issued and regulated by the Environment Agency. This will require operational noise from the generating station to be controlled through the use of BAT, which will be determined through the Environmental Permit application. It is proposed that operational noise will also be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).

8.6 Likely Impacts and Effects

Construction Noise and Vibration

8.6.1 This section discusses the potential noise and vibration effects on sensitive receptors during the construction phase of the Proposed Development.

8.6.2 Noise levels experienced by local receptors during such works depend upon a number of variables, the most significant of which are:

- the noise generated by plant or equipment used on-Site, generally expressed as SWL or the vibration generated by the plant;
- the periods of use of the plant on-Site, known as its on-time;
- the distance between the noise/vibration source and the receptor;
- the noise attenuation due to ground absorption, air absorption and barrier effects;
- in some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings; and
- the time of day or night the works are undertaken.

8.6.3 Residential NSR are located at distance in different directions around the Site. The closest residential NSR to the West Burton Power Station site include Manor Cottage, Bole, located approximately 1.2km to the west, and Mill House Farm located approximately 1.3km to the west of the Proposed Power Plant Site.

8.6.4 Predicted noise levels during construction of the Proposed Development have been based upon construction methods used for other power stations in the UK, and supplemented by information provided by the Applicant. As a conservative approach, it is assumed that all plant and activities are taking place at the closest point within the Proposed Power Plant Site to each NSR, whereas in reality, this will not occur for any significant duration, if at all. Also no screening provided by buildings within the West Burton Power Station site or soft ground attenuation have been taken into account.

8.6.5 The predicted levels apply to core weekday daytime working hours (07:00 – 19:00).

8.6.6 A summary of noise predictions at NSR locations around the Site (using the closest NSR to the Proposed Development construction works in the vicinity of the baseline sound survey locations) are presented in **Table 8-25**. Facade noise levels have been predicted to allow subsequent comparison with Construction Noise SOAEL and LOAEL for residential receptors as detailed in **Table 8-8**.

8.6.7 As advised by BS 5228 (Ref 8-17), noise levels predicted at distances over 300m (which all NSR exceed) should be treated with caution due to the increasing importance of meteorological effects.

Table 8-25: Construction noise predictions for the Proposed Development at nearby NSR during daytime

Receptor	Predicted free-field noise level for daytime construction activity dB $L_{Aeq,12h}$					
	Electrical & Gas connection enabling works	Site Preparation	Piling and foundation	Building & General Site Activities	Fit out	Landscaping
ML1 - North Street, Sturton-le-Steeple – to east of	54	52	53	52	51	33
ML2 – Crossing Keepers Cottage, West Burton	55	52	53	54	51	33
ML3 - Mill House Farm	55	55	56	57	54	36
ML4 - Manor Cottage, Bole	56	57	58	59	56	38
ML5 - Causeway Lane	51	51	52	53	50	32
ML6 - Green Lane, Lea	51	51	52	53	50	32
ML7 - Knaith Hall, Knaith	49	49	49	50	47	29

Construction Noise Effects

8.6.8 The effects of the predicted daytime construction noise levels (as presented in **Table 8-25** have been compared against the absolute construction noise limit values in **Table 8-8** and using the semantic scales in **Table 8-9**, the classification of effects is summarised in **Table 8-26** below.

Table 8-26: Predicted effect on NSR resulting from construction of the Proposed Development during daytime

Receptor	Predicted Effect - Construction of the Proposed Development					
	Electrical & Gas connection enabling works	Site Preparation	Piling and foundation	Building & General Site Activities	Fit out	Landscaping
ML1 - North Street, Sturton-le-Steeple	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)
ML2 – Crossing Keepers Cottage, West Burton	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)
ML3 - Mill House Farm	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)
ML4 - Manor Cottage, Bole	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible(not significant)
ML5 - Causeway Lane	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)
ML6 - Green Lane, Lea	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)
ML7 - Knaith Hall, Knaith	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)	Negligible (not significant)

8.6.9 Construction noise effects at all NSR during construction of the Proposed Development are predicted to be negligible (not significant) during the daytime period, due largely to the distances between the construction works and NSR.

8.6.10 It may be necessary for some construction activities to take place continuously over day, evening and night periods during peak construction times of the Proposed Development, although the exact nature of the works is unknown. SOAEL and LOAEL threshold values during non-weekday daytime periods have been defined in **Table 8-8**. Comparison of the predicted daytime noise levels against the lower limit values for evening, weekend and particularly night-time working indicate potential minor adverse (not significant) effects at NSR during evening and weekend working, but potential for moderate adverse (significant) effects at some NSR during night-time working, if the same intensity of working as for the daytime is assumed. Therefore, construction activities taking place during night-time hours will need to be planned, managed and mitigated appropriately, so as not to exceed the SOAEL threshold values and reduce levels towards the LOAEL (or less) where practical. Provided the SOAEL threshold values are not exceeded, construction activities outside of core working hours would be considered as having a minor adverse effect or less (not significant). Potential measures to ensure that appropriate mitigation is in place during the works are discussed in **Section 8.5**, whilst additional measures related night-time working are detailed in **Section 8.7**.

Construction Traffic Noise

8.6.11 HGVs delivering construction materials would access the West Burton Power Station site from the existing site entrance located off the C2 Gainsborough Road, with all HGVs arriving and departing to/from the north via the A620 and onwards to the A631. Data have been used from **Appendix 7A:** Transport Assessment (ES Volume II) for the assumed typical traffic flows associated with construction.

8.6.12 2029 is assumed to be the year with the peak traffic flows related to the construction of the Proposed Development. **Table 8-27** presents the predicted 2029 Baseline and Committed Development Traffic Flows, and **Table 8-28** presents 2029 Baseline, Committed Development and Construction Traffic Flows combined.

Table 8-27: Scenario 1 - 2029 Baseline and Committed Development traffic flows

Location	Flow	Total Vehicles (AAWT)	Total HGVs	Percentage HGV	Average Speed
Gainsborough Road (South of Power Station Entrance)	Total 2-Way	3,211	481	15.0%	64kph

Location	Flow	Total Vehicles (AAWT)	Total HGVs	Percentage HGV	Average Speed
Sturton Road (North of Power Station Entrance)	Total 2-Way	3,527	504	14.3%	82kph
A620 Gainsborough Road	Total 2-Way	5,636	771	13.7%	80kph
A620 Saundby Road	Total 2-Way	8,804	1,166	13.2%	71kph

Table 8-28: Scenario 2 - 2029 Baseline, Committed Development and construction traffic flows

Location	Flow	Total Vehicles (AAWT)	Total HGVs	Percentage HGV	Average Speed
Gainsborough Road (South of Power Station Entrance)	Total 2-Way	3,231	481	14.9%	64kph
Sturton Road (North of Power Station Entrance)	Total 2-Way	3,845	616	16.0%	82kph
A620 Gainsborough Road	Total 2-Way	5,656	771	13.6%	80kph
A620 Saundby Road	Total 2-Way	9,102	1,278	14.0%	71kph

8.6.13 The potential changes in road traffic noise along these roads as a result of construction traffic relating to the Proposed Development have been considered by calculating the BNL at 10m from the road and comparing the change **Table 8-29** presents the results of the BNL change assessment.

Table 8-29: Changes in BNL as a result of the Proposed Development construction traffic

Link	Predicted BNL, $L_{A10, 18hr}$ dB		Change in BNL, dB (Scenario 2 minus Scenario 1)	Effect
	Scenario 1 2029 Baseline and Committed Development	Scenario 2 2029 Baseline, Committed Development and Construction Traffic		
Gainsborough Road (South of Power Station Entrance)	65.3	65.3	0	Negligible (not significant)
Sturton Road (North of Power Station Entrance)	68.0	68.7	+0.7	Negligible (not significant)
A620 Gainsborough Road	69.8	69.8	0	Negligible (not significant)
A620 Saundby Road	70.0	70.2	+0.2	Negligible (not significant)

8.6.14 The above predictions assume that all roads are laid with impervious bitumen (such as hot rolled asphalt) with a 2mm texture depth and that the road surface remains unchanged with and without construction traffic.

8.6.15 **Table 8-29** shows either no change or very low magnitude of noise impact is expected due to changes in traffic flows along all the assessed routes during construction of the Proposed Development. This will result in no change or negligible adverse effects (not significant) at local residential NSR. Based upon the above, no further specific mitigation measures are proposed in addition to those listed in **Section 8.5**.

8.6.16 The construction noise management measures listed within **Section 8.5**, which will be further developed as the project progresses and more details of the construction phase are known, will assist in minimising the potential for adverse effects due to construction traffic noise at nearby NSR.

Construction Vibration Effects

8.6.17 The magnitude of impact at different receptors will be dependent upon a number of factors, including distance between the works and receptors, ground conditions, the nature and method of works required close to receptors and the specific activities being undertaken at any given time.

8.6.18 There are no residential receptors within close proximity to the Proposed Development which have the potential to be affected by construction vibration. However, there is the potential for some vibration impacts upon buildings/structures within the West Burton Power Station site. Whilst it is considered unlikely that most typical construction working routines would generate levels of vibration above which building damage would be expected to be sustained (subject to final plant and working requirements), there is the potential that vibration impacts could cause annoyance to occupants and exceed the LOAEL and SOAEL set out in **Section 8.3**. The need for piling, and the type of any piling potentially required is not yet confirmed.

8.6.19 If piling, heavy earthworks, vibratory rollers or other significant vibration producing operations are proposed in close proximity to any existing sensitive buildings, further consideration will be given to potential impacts, once the contractor is appointed and the construction methods and requirements are developed. As the construction of the Proposed Development and the use of many of the existing buildings within the West Burton Power Station site are both within the control of the Applicant, any identified issues can be effectively managed by the Applicant and their contractor. Potential measures to ensure that appropriate mitigation is in place during the works are discussed in **Section 8.5** and **Section 8.7**.

Operational Noise

8.6.20 The preferred configuration of the Proposed Development is yet to be decided. Therefore, noise modelling has been undertaken for a number of different potential operational scenarios of plant configuration, in order to give a view of the range of sound levels that could be produced by various unmitigated and mitigated options for the purposes of determining a representative worst-case. In the PEI Report (Ref 8-28), results for ten scenarios assessed were presented. However, in order to simplify the assessment, the worst-case configuration, which comprises five smaller OCGTs, is presented in this section, whilst the need for and effects of proposed mitigation measures are discussed in **Section 8.7**.

8.6.21 The indicative locations of operational equipment were taken from **Figure 4.1b** (ES Volume III). Input SWL data was either provided by typical equipment manufacturers or taken from AECOM's archive of data for similar installations. The SWL data was provided for various source components. The typical source components included the following (noting some minor differences in the data provided by each manufacturer):

- gas turbine (GT) enclosure;
- diffuser enclosure;
- generator enclosure;
- auxiliaries enclosure;
- air duct;

- air intake inlet;
- air intake body;
- stack body upstream silencer;
- stack body downstream silencer; and
- stack outlet.

8.6.22 The assessment described below sets out the predicted noise impacts and effects associated with operation of the Proposed Development, which would be long-term.

8.6.23 The following assumptions have been made when undertaking the operational noise modelling and assessment:

- the Proposed Development would operate to meet market demand and therefore operate intermittently at times of peak demand or system need as discussed in **paragraph 8.6.24**. However, the BS 4142 assessment method (Ref 8-21) is based upon reference periods of 1 hour during the day and 15 minutes at night. Therefore the assessment only considers the sound averaged over the worst hour of the daytime or worst 15 minutes of the night. When the Proposed Development is operational, the sound produced by the plant would be relatively constant in nature and each period of operation is assumed to be longer than one hour. As a result, the intermittent nature of the operation does not have an impact on the assessment.
- a +3 dB correction has been applied to the specific sound levels predicted from the Proposed Development, on the basis that the sound emissions may be distinctive above the residual acoustic environment, through its expected cyclical operation, potentially each day. This is considered conservative in the context of the prevailing noise environment, which includes road traffic noise and some noise from WBA Power Station and WBB Power Station;
- corrections for tonality, impulsivity, and intermittency have not been applied, on the assumption that these potential features will be designed out of the Proposed Development during the detailed design phase by the selection of appropriate plant, building cladding louvres and silencers/attenuators;
- the SWLs provided by manufacturers for all principal sound emitting enclosure/elements (air inlet filters, electrical buildings, transformers, workshops etc.) are understood to be external radiated SWL; and
- prediction methodologies have been based on ISO 9613:2.

8.6.24 Operation of the plant is to be driven by the dynamics of the energy market; as a result the plant could run for shorter or longer periods, at any time of day, up to the maximum allowed under its Environmental Permit, which is currently anticipated to be up to 1,500 hours/year on a rolling 5 year average.

8.6.25 The plant would be expected to generally operate during periods of peak demand for relatively short periods, typically a few hours at a time. However, it is not possible to predict what the maximum operating period would be or how many periods could occur during a single day. Therefore, to inform a worst-case assessment, continual operation has been assumed. In accordance with BS 4142:2014 (Ref 8-21) the daytime assessment considers a 1-hour period and the night-time assessment considers a 15-minute period.

8.6.26 In the absence of any additional mitigation, the predicted free-field operational specific sound levels at the NSR around the Proposed Development, for the worst-case plant configuration (up to five OCGTs), are presented in **Table 8-30**.

Table 8-30: Predicted worst-case operational *specific sound levels* $L_{Aeq,T}$ – Proposed Power Plant Site without mitigation

Location	Reference	Up to five OCGTs
Kent House, North Street, Sturton-le-Steeple	ML1	41
Crossing Keepers Cottage, West Burton	ML2	42
Mill House Farm	ML3	47
Manor Cottage, Bole	ML4	50
194 Lea Road, Gainsborough	ML5	39
Green Lane, Lea	ML6	41
Knaith Hall, Knaith	ML7	37

8.6.27 The daytime BS 4142 assessments results for receptors ML1-ML7 are presented in **Table 8.31** below. The values presented are the differences between the range of representative *background sound level* at each NSR and the predicted *rating level* (the specific Sound Level $L_{Aeq,T}$ plus a +3 dB correction for a potentially distinctive character). Positive values in the table indicate an excess of the *rating level* over the *background sound level*.

Table 8-31: BS 4142 worst-case daytime excess of *rating level* over *background sound level*, without mitigation

Location	Reference	Up to five OCGTs - Excess of rating level over background sound level (dB)	Classification of Effect (unmitigated)
Kent House, North Street, Sturton-le-	ML1	13 (Medium/High)	Moderate/major (significant)

Location	Reference	Up to five OCGTs - Excess of rating level over background sound level (dB)	Classification of Effect (unmitigated)
Steeple			
Crossing Keepers Cottage, West Burton	ML2	11 (Medium)	Moderate (significant)
Mill House Farm	ML3	13 (Medium/High)	Moderate/major (significant)
Manor Cottage, Bole	ML4	16 (High)	Major (significant)
194 Lea Road, Gainsborough	ML5	6 (Low)	Minor (not significant)
Green Lane, Lea	ML6	9 (Medium)	Moderate (significant)
Knaith Hall, Knaith	ML7	4 (Low)	Minor (not significant)

8.6.28 The night-time BS 4142 assessment results for ML1 – ML7 are presented in **Table 8-32**.

Table 8-32: BS 4142 worst-case night-time excess of *rating level* over *background sound level*, without mitigation

Location	Reference	Up to five OCGTs - Excess of rating level over background sound level (dB)	Effect (unmitigated)
Kent House, North Street, Sturton-le-Steeple	ML1	18 (High)	Major (significant)
Crossing Keepers Cottage, West Burton	ML2	12 (Medium/High)	Moderate/major (significant)
Mill House Farm	ML3	16 (High)	Major (significant)
Manor Cottage, Bole	ML4	19 (High)	Major (significant)
194 Lea Road, Gainsborough	ML5	13 (Medium/High)	Moderate/major (significant)
Green Lane,	ML6	15 (High)	Major (significant)

Lea			
Knaith Hall, Knaith	ML7	16 (High)	Major (significant)

8.6.29 In accordance with **Table 8-14** , the values in **Table 8-31** and **Table 8-32** for the worst-case scenario produce a range of impact magnitudes from low to high adverse at the seven NSR. This would result in effects between minor (not significant) to major adverse (significant) in accordance with **Table 8-16**.

8.6.30 On the basis of the above results and a desire to reduce sound levels to the LOAEL (no greater than +5 dB excess of rating level over background sound level), potential mitigation options to reduce sound levels have been considered and are discussed in **Section 8.7**.

Decommissioning

8.6.31 The potential impacts and effects would require further consideration at the decommissioning stage of the Proposed Development, but potential measures to ensure that appropriate mitigation is in place during such works are detailed in **Section 8.5**. The predicted noise and vibration effects of eventual decommissioning of the Proposed Development are considered to be comparable to, or less than those assessed for construction activities, and thus effects are not anticipated to be significant.

8.7 Mitigation and Enhancement Measures

Construction

8.7.1 It is predicted that there is the potential for no more than negligible adverse (not significant) noise effects at residential NSR during construction works during daytime working hours and minor adverse (not significant) noise effects if work were to take place at the same intensity during evenings and/or weekends. Therefore, no further specific mitigation measures have been identified for these time periods beyond those reported in **Section 8.5** and included in the Framework CEMP (**Application Document Ref. 7.3**). In the event that construction activities are required at night-time, levels in excess of the SOAEL for night-time (55 dB) could occur at ML4 and ML3 (depending on the nature of activities undertaken and intensity of working). This could result in a moderate adverse (significant) noise effect at these NSR in the absence of additional mitigation. Measures would therefore be put in place to control activities at night-time so as not to exceed the SOAEL or relevant noise limit at locations to be agreed with BDC. It is proposed that this would be secured by a Requirement in the draft DCO (**Application Document Ref. 2.1**).

8.7.2 There is the potential for some vibration effects at buildings, primarily at the existing buildings within the West Burton Power Station site, during construction of the Proposed Development depending upon the requirement for, and nature of,

piling and other vibration emitting activities. As the construction of the Proposed Development and the use of many of the existing buildings within the West Burton Power Station site are both within the control of the Applicant, any identified issues can be effectively managed by the Applicant and their contractor.

8.7.3 Control of construction noise and vibration is proposed to be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**). Furthermore, if piling is required, this will be subject to a piling and penetrative foundation design method statement, informed by a risk assessment, which will be submitted to and, after consultation with the Environment Agency, approval sought from BDC. It is proposed that this would be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).

8.7.4 The preferred approach for controlling construction noise and vibration is to reduce levels at source where possible, but with due regard to practicality. Sometimes a greater noise or vibration level may be acceptable if the overall construction time, and therefore length of disruption, is reduced.

8.7.5 The list of noise control measures presented within **Section 8.5** provides a detailed, but not exhaustive list of construction noise and vibration management measures that are outlined in the Framework CEMP (**Application Document Ref. 7.3**).

8.7.6 Residual noise and vibration effects after mitigation are described in **Section 8.9**.

Operational Noise

8.7.7 The operational assessment has assumed that potential sound of a tonal, impulsive or intermittent nature (according to BS4142: 2014) will be designed out of the Proposed Development during the detailed design phase through the selection of appropriate plant, building cladding, louvres and silencers/attenuators as necessary. However, a +3 dB correction has been applied to the Specific Sound Levels predicted from the Proposed Development, on the basis that the sound emissions have the potential to be distinctive above the residual acoustic environment.

8.7.8 For the purposes of assessment, the 'mode' (as advocated in BS 4142:2014 (Ref 8-21)) has been considered alongside the 10th percentile of the measured $L_{A90,15mins}$ values to determine representative background sound levels. Based on the profile of the obtained noise monitoring results, background sound levels equal to or lower than the mode have been assigned as 'representative' in this assessment, which are more conservative than the use of the 10th percentile of the measured values. Therefore, conservative ('worst-case') assessment results are provided.

8.7.9 Based on the worst-case results presented in **Table 8-31** and **Table 8-32**, mitigation would be required to achieve operational sound levels below the SOAEL and LOAEL at all assessed NSR. **Table 8-33** and **Table 8-34** outline the overall

attenuation required to achieve the daytime and night-time LOAEL criterion of *rating level* no greater than +5 dB above the defined representative *background sound level* at each NSR.

Table 8-33: Maximum attenuation (dB) required to achieve daytime operational LOAEL criteria

Location	Reference	Up to five OCGT required attenuation to achieve daytime LOAEL (operation)
Kent House, North Street, Sturton-le-Steeple	ML1	8
Crossing Keepers Cottage, West Burton	ML2	6
Mill House Farm	ML3	8
Manor Cottage, Bole	ML4	11
194 Lea Road, Gainsborough	ML5	1
Green Lane, Lea	ML6	4
Knaith Hall, Knaith	ML7	0

Table 8-34: Maximum attenuation (dB) required to achieve night-time operational LOAEL criteria

Location	Reference	Up to five OCGTs - required attenuation to achieve night-time LOAEL (operation)
Kent House, North Street, Sturton-le-Steeple	ML1	13
Crossing Keepers Cottage, West Burton	ML2	7
Mill House Farm	ML3	11
Manor Cottage, Bole	ML4	14
194 Lea Road, Gainsborough	ML5	8
Green Lane, Lea	ML6	10
Knaith Hall, Knaith	ML7	11

8.7.10 In light of the required attenuation to achieve the defined noise criteria, further appraisal by plant engineers has been undertaken. This has evaluated the main potential noise sources associated with the operational plant and identified potential design and embedded mitigation options that, in combination, could reduce predicted sound levels at nearby NSR to below the LOAEL criteria. The potential mitigation measures include:

- reducing the breakout noise from the GTs, generator and accessories through use of enhanced enclosures, or potentially containing them within a building;
- reducing the air inlet noise emissions by addition of further in-line attenuation;
- reducing the stack outlet noise emissions by addition of silencers or sound proofing panels;
- reducing fin fan cooler noise emissions by screening, re-sizing, fitting low noise fans or attenuation;
- screening or enclosing the transformers or other equipment;
- use of screening or bunding to shield receptors from noise sources; or
- orientation of plant within the Site to provide screening of low level noise sources by other buildings and structures, or orientating fans and the air inlets away from sensitive receptors.

8.7.11 An engineering appraisal was undertaken to assess the reduction in sound levels that could be achieved by application of the mitigation measures listed above. Through discussion with one of the manufacturers, it was concluded that the sound power emissions from the major source components in the unmitigated scenario could be practically reduced by the amounts given in **Table 8-35.**

Table 8-35: Practical sound power reductions for worst-case source components provided by a manufactures

Source component	Practical sound power level (SWL) reduction from worst-case scenario
Air intake	15
GT Enclosure	15
Stack	16
Fin Fan Cooler	10
Main transformer	10

8.7.12 By application of those mitigation measures to the manufacturer's worst-case data, the mitigated *specific sound levels* given in **Table 8-36** are predicted.

Table 8-36: Predicted operational *specific sound levels* $L_{Aeq,T}$ – Proposed Power Plant Site with mitigation

Location	Reference	Up to five OCGTs – predicted operational specific sound levels $L_{Aeq,T}$
Kent House, North Street, Sturton-le-Steeple	ML1	21
Crossing Keepers Cottage, West	ML2	23

Location	Reference	Up to five OCGTs – predicted operational specific sound levels $L_{Aeq,T}$
Burton		
Mill House Farm	ML3	28
Manor Cottage, Bole	ML4	31
194 Lea Road, Gainsborough	ML5	20
Green Lane, Lea	ML6	21
Knaith Hall, Knaith	ML7	17

8.7.13 The daytime BS 4142 assessment results for these mitigated predictions at receptors ML1-ML7 are presented in **Table 8-37** below. The values presented are the differences between the range of representative *background sound level* at each NSR and the predicted *rating level* (the specific Sound Level $L_{Aeq,T}$ plus a +3 dB correction for a potentially distinctive character). Positive values in the table indicate an excess of the *rating level* over the *background sound level, whilst* negative values indicate that the *rating level* is below the *background sound level*.

Table 8-37: BS 4142 daytime excess of *rating level* over *background sound level*, with mitigation

Location	Ref.	Up to five OCGTs - Excess of rating level over background sound level (dB)	Classification of Effect (mitigated)
Kent House, North Street, Sturton-le-Steeple	ML1	-7 (Very low)	Negligible adverse (not significant)
Crossing Keepers Cottage, West Burton	ML2	-7 (Very low)	Negligible adverse (not significant)
Mill House Farm	ML3	-6 (Very low)	Negligible adverse (not significant)
Manor Cottage, Bole	ML4	-3 (Very low)	Negligible adverse (not significant)
194 Lea Road, Gainsborough	ML5	-13 (Very low)	Negligible adverse (not significant)
Green Lane, Lea	ML6	-11 (Very low)	Negligible adverse (not significant)
Knaith Hall, Knaith	ML7	-15 (Very low)	Negligible adverse (not significant)

8.7.14 The night-time BS 4142 assessment results for ML1 – ML7 are presented in **Table 8-38**.

Table 8-38: BS 4142 night-time excess of *rating level* over *background sound level*, with mitigation

Location	Ref.	Up to five OCGTs - Excess of rating level over background sound level (dB)	Classification of Effect (mitigated)
Kent House, North Street, Sturton-le-Steeple	ML1	-2 (Very low)	Negligible adverse (not significant)
Crossing Keepers Cottage, West Burton	ML2	-6 (Very low)	Negligible adverse (not significant)
Mill House Farm	ML3	-3 (Very low)	Negligible adverse (not significant)
Manor Cottage, Bole	ML4	0 (Very low)	Negligible adverse (not significant)
194 Lea Road, Gainsborough	ML5	-6 (Very low)	Negligible adverse (not significant)
Green Lane, Lea	ML6	-5 (Very low)	Negligible adverse (not significant)
Knaith Hall, Knaith	ML7	-3 (Very low)	Negligible adverse (not significant)

8.7.15 In accordance with **Table 8-14**, on this basis, the use of a combination of such mitigation measures would result in a very low magnitude of impact at each of the NSR. This would result in negligible (not significant) noise effects at NSR in accordance with **Table 8-15** and **Table 8-16**.

8.7.16 As the Proposed Development design progresses to the detailed design stage, the existing noise model will be refined and additional acoustic assessment will be undertaken in consultation with the design engineers, to determine the most appropriate mitigation options in accordance with BAT. The findings of the further assessment will inform the design to ensure that rating levels meet with a target of no greater than +5 dB above the representative background sound level at each NSR, resulting in no more than a low magnitude of impact and no greater than a minor adverse effect which would not be significant. Operational noise is proposed to be secured by a Requirement in the draft DCO (**Application Document Ref. 2.1**), with the levels and the approach to monitoring of noise effects to be agreed with BDC in consultation with WLDC.

Decommissioning

8.7.17 Consistent with construction mitigation, it has been assumed that relevant best practice mitigation measures would be in place during any decommissioning

works. No additional mitigation has been identified as necessary for the decommissioning phase of the Proposed Development.

8.7.18 Residual effects after mitigation are described in **Section 8.9**.

8.8 Limitation or Difficulties

Construction

8.8.1 Detailed construction information is not yet available (given that the construction contractor has not yet been appointed). Therefore, this assessment draws upon the experience and assessments undertaken for other similar projects. The assessment is quantitative, but indicative, although it is considered to be robust. Construction noise thresholds (limit values) have been provided in **Table 8-8**, which are to be applied at local NSR. Further assessment has been identified as being required pre-construction, to ensure that appropriate mitigation measures are developed to achieve the threshold values, once the contractor is appointed. It is proposed to secure this (and other mitigation measures detailed in **Section 8.7**) by a Requirement of the draft DCO (**Application Document Ref. 2.1**), which will ensure that construction noise and vibration is minimised. Construction noise impacts will be further minimised through the use of the CEMP.

Operation

8.8.2 Assumptions made during the noise modelling, and assessment of the Proposed Development operation, are presented in **paragraph 8.6.23**. It is considered that the assumptions made result in the assessment being conservative.

8.8.3 Given the large extent of sound level data obtained during the noise surveys, significantly different 'representative' background sound level values can be obtained using different statistical analysis methods. The example analysis used in BS 4142:2014 is the 'mode'. In this assessment the mode has been considered alongside the 10th percentile of the measured $L_{A90,15mins}$ values. As a result, background sound levels equal to or lower than the mode have been assigned as 'representative' in this assessment. Therefore, conservative ('worst-case') assessment results are provided.

8.8.4 The preferred configuration of the Proposed Development is yet to be decided. Therefore, the operational noise modelling undertaken has considered a representative worst-case which comprises up to five smaller OCGTs, assessing both unmitigated and mitigated scenarios. Given the requirement for additional mitigation measures, further assessment will be undertaken at the detailed design stage to control noise emissions in order to meet the appropriate noise limits at nearby NSR.

8.8.5 Construction and operational noise management measures provided in this chapter, including noise monitoring of the Proposed Development, are proposed to be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).

These proposals would be agreed with BDC, in consultation with WLDC in relation to operational noise, including the definition of agreed noise limits at the nearest NSR or other locations as agreed with the authorities.

8.9 Summary of Likely Significant Residual Effects

8.9.1 A summary of the residual effects, assuming the implementation of appropriate mitigation to reduce noise and vibration during construction, operation and decommissioning phases, is presented in **Table 8-39** below.

Table 8-39: Likely significant residual effects summary table

Predicted Impact	Duration	Classification of effect (unmitigated)	Mitigation	Residual Effect
Noise impact during construction of the Proposed Development (daytime).	Short-term (3-4 years)	Negligible (daytime) not significant.	Further detailed assessment and preparation of a construction noise control scheme (including agreed noise limits) once contractor appointed in accordance with a Requirement of the draft DCO (**Application Document Ref. 2.1**).	Negligible adverse at the nearest residential NSR (not significant).
Noise impact during construction of the Proposed Development (evenings/weekends), where works are required, are proposed to be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).	Short-term (3-4 years)	Minor adverse (evenings/weekends) and not significant.	Further detailed assessment and preparation of a construction noise control scheme (including agreed noise limits) once contractor appointed in accordance with a Requirement of the draft DCO (**Application Document Ref. 2.1**).	Minor adverse (evenings/weekends) and not significant.
Noise impact during construction of the Proposed Development (night-	Short-term (3-4 years)	Moderate adverse (night-time) and significant	Proposals would be put in place to control construction activities at night-time so as not to exceed the SOAEL or relevant noise	Minor adverse (night-time) and not significant.

Predicted Impact	Duration	Classification of effect (unmitigated)	Mitigation	Residual Effect
time), where works are required, is proposed to be secured by a Requirement of the draft DCO (**Application Document Ref 2.1**).			limit to be agreed with BDC. A Requirement of the draft DCO is proposed to secure this (**Application Document Ref 2.1**).	
Noise impacts due to construction traffic on public highways.	Short-term (3-4 years)	No change or negligible adverse (not significant) during 'worst-case' period of construction traffic.	No further mitigation considered necessary, unless number of proposed construction vehicle movements changes.	Negligible adverse (not significant)
Operation of the Proposed Development.	Long-term	Based on the worst-case assessment of up to five OCGT units without additional mitigation, the impact magnitude ranges from low to high at the seven receptor locations. This would result in effects between minor (not significant) to major adverse (significant) if noise is not controlled further.	Application of practical sound mitigation to the turbine (enclosure, inlets and exhaust), the cooling equipment and the transformers during the detailed design will control sound emissions to result in a low or very low magnitude of impact. As design progresses, preparation of operational noise control proposals (including agreed noise limits) will be undertaken in accordance with a Requirement of the draft DCO (**Application Document Ref.**	Negligible/ minor adverse (not significant)

Predicted Impact	Duration	Classification of effect (unmitigated)	Mitigation	Residual Effect
			2.1).	
Noise impacts during decommissioning of the Proposed Development.	Short-term	As detailed above for construction effects.	Further detailed assessment and Decommissioning Environmental Management Plan (DEMP), particularly regarding working outside of daytime working hours, in accordance with a Requirement of the draft DCO (**Application Document Ref. 2.1**).	Further assessment would need to confirm the potential level of effect at NSR, although they may be expected to be similar to those during construction.

8.9.2 The residual noise and vibration effects from the Proposed Development are therefore considered to be not significant.

8.10 References

Ref 8-1 Her Majesty's Stationary Office (1990) *Environmental Protection Act 1990.*

Ref 8-2 Her Majesty's Stationary Office (1974) *Control of Pollution Act 1974*.

Ref 8-3 Her Majesty's Stationary Office (2016) *Environmental Permitting (England and Wales) Regulations 2016.*

Ref 8-4 Environment Agency (2002a) *Integrated Pollution Prevention and Control (IPPC) H3 document Horizontal Guidance for Noise Part 2 - Noise assessment and Control.*

Ref 8-5 Environment Agency (2002b) *Integrated Pollution Prevention and Control (IPPC) H3 document Horizontal Guidance for Noise Part 1 – Regulation and Permitting.*

Ref 8-6 Department of Energy & Climate Change (2011) *Overarching National Policy Statement for Energy EN -1.*

Ref 8-7 Department of Energy & Climate Change (2011) *National Policy Statement for Fossil Fuel Electricity Generating infrastructure EN -2.*

Ref 8-8 Ministry of Housing, Communities and Local Government (2019) *National Planning Policy Framework.*

Ref 8-9 Office of the Deputy Prime Minister (1994) *Planning Policy Guidance (PPG) 24 - Planning and Noise.*

Ref 8-10 Department for Environment, Food & Rural Affairs (2010) *Noise Policy Statement for England (NPSE).*

Ref 8-11 Department for Communities and Local Government (DCLG) (2014) *Planning Practice Guidance.*

Ref 8-12 Bassetlaw District Council (2011) *The Bassetlaw District Council – Local Development Framework.*

Ref 8-13 Bassetlaw District Council (2019) *The Bassetlaw District Council – Draft Local Plan.*

Ref 8-14 West Lindsey District Council (2017) *Central Lincolnshire Local Plan.*

Ref 8-15 British Standards Institute (2003) *BS 7445-1 – Description and measurement of environmental noise. Guide to quantities and procedures.*

Ref 8-16 British Standards Institute (1991) *BS 7445-2 – Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use.*

Ref 8-17 British Standards Institute (2014) *BS 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 1: Noise.*

Ref 8-18 British Standards Institute (2014) *BS 5228-2:2009+A1:2014 – 'Code of practice for Noise and Vibration control on construction and open sites. Part 2:Vibration.'*

Ref 8-19 British Standards Institute (2008) *BS 6472-1 – Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting.*

Ref 8-20 British Standards Institute (1993) *BS 7385-2 – Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.*

Ref 8-21 British Standards Institute (2014) *BS 4142 – Methods for rating and assessing industrial and commercial sound.*

Ref 8-22 World Health Organisation (1999) *Guidelines for Community Noise.*

Ref 8-23 World Health Organisation (2009) *Night Noise Guidelines for Europe.*

Ref 8-24 Department of Transport/Welsh Office (1998) *Calculation of Road Traffic Noise (CRTN).*

Ref 8-25 Highways Agency (2011) *Design Manual for Road and Bridges Volume 11 Section 3 Part 7 HD213/11 (Revision 1) Traffic Noise and Vibration.*

Ref 8-26 International Standards Organisation (1996) *ISO 9613-2 – Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation.*

Ref 8-27 International Standards Organisation (2010) *ISO 4866:2010 – Vibration of Fixed Structures – Guidelines for the Measurement of Vibrations and Evaluation of Their Effects on Structures.*

Ref 8-28 AECOM (2017) *Preliminary Environmental Information (PEI) Report*, September 2017.

Ref 8-29 Spectrum Acoustic Consultants (2016) *West Burton CCGT Power Station Noise Impact Assessment of Proposed 49MW Enhanced Frequency Response Unit.*