

Riverside Energy Park

Preliminary Environmental Information Report

CHAPTER:

08

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NOISE AND VIBRATION

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8 Noise and Vibration

8.1 Introduction

- 8.1.1 This Chapter presents the preliminary findings of the assessment of likely significant effects of the construction, operation and decommissioning of the Riverside Energy Park (REP) on the noise and vibration climate of the area surrounding the Proposed Development.
- 8.1.2 In particular, it identifies the likely impact of the Proposed Development on the local noise and vibration climate during the construction, decommissioning and operational phases taking into account relevant local and national guidance and regulations.
- 8.1.3 This Chapter describes the methods used to establish the baseline conditions which currently exist at noise sensitive receptors (NSRs) closest to the Application Site, the potential direct and indirect effects of the Proposed Development arising from noise and vibration, the mitigation measures required to prevent, reduce or offset the effects and the residual impacts. A description of the technical terminology used in this Chapter is provided in **Appendix D.2**.
- 8.1.4 This Chapter has been prepared by Peter Brett Associates LLP (PBA). A statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this Preliminary Environmental Information Report (PEIR) is provided in **Appendix A.3**.

8.2 Policy Context, Legislation, Guidance and Standards

- 8.2.1 As outlined in **Chapter 2**, the relevant National Policy Statements provide the primary basis for decisions made by the Secretary of State on nationally significant infrastructure projects.

National Planning Policy

NPS EN-1

- 8.2.2 The Overarching National Policy Statement for Energy (NPS EN-1) sets out the Government's policy for delivery of major energy infrastructure.
- 8.2.3 Section 5.11 of NPS EN-1 sets out the requirements for assessing and mitigating noise and vibration from NSIPs in the energy sector.
- 8.2.4 It advises that operational noise from a proposed development and the proximity to noise sensitive receptors, quiet areas or sites designated for ecological reasons will determine the likely impact of noise.
- 8.2.5 Where noise impacts are likely, a noise assessment should be undertaken in line with details listed in the NPS EN-1.
- 8.2.6 Operational noise and vibration should be assessed using relevant British Standards (e.g. BS 4142, BS 6472, BS 8233 and BS 5228) and other guidance, including the other NPSs.
- 8.2.7 NPS EN-1 advises, in paragraph 5.11.8, that 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.”

8.2.8 Paragraph 5.11.9, advises that the proposal should meet the following aims before granting consent:

- *“Avoid significant impacts on health and quality of life from noise,*
- *Mitigate and minimise other adverse impacts on health and quality of life from noise, and*
- *Where possible, contribute to improvements to health and quality of life through the effective management and control of noise.”*

8.2.9 Paragraph 5.11.11 to 5.11.13 of NPS EN-1 also set out advice on mitigation and states:

“The [decision maker]¹ should consider whether mitigation measures are needed both for operational and construction noise over and above any which may form part of the project application. In doing so the [decision maker]¹ may wish to impose requirements. Any such requirements should take account of the guidance set out in Circular 11/95 (see Section 4.1) or any successor to it.

Mitigation measures may include one or more of the following:

- *engineering: reduction of noise at point of generation and containment of noise generated;*
- *lay-out: adequate distance between source and noise-sensitive receptors; incorporating good design to minimise noise transmission through screening by natural barriers, or other buildings; and*
- *administrative: restricting activities allowed on the site; specifying acceptable noise limits; and taking into account seasonality of wildlife in nearby designated sites.*

In certain situations, and only when all other forms of noise mitigation have been exhausted, it may be appropriate for the [decision maker]¹ to consider requiring noise mitigation through improved sound insulation to dwellings.”

NPS EN-3

8.2.10 Taken together with the NPS EN-1, the NPS EN-3 provides the primary basis for decisions by the Secretary of State on applications received for nationally significant renewable energy infrastructure.

8.2.11 Regarding potential noise and vibration impacts, the policy states at paragraph 2.5.53 that:

“Generic noise and vibration impacts are covered in detail in Section 5.11 of EN-1. In addition there are specific considerations which apply to biomass and EfW generating stations as set out below. Sources of noise and vibration may include:

- *delivery and movement of fuel and materials;*
- *processing waste for fuel at EfW generating stations;*
- *the gas and steam turbines that operate continuously during normal operation; and*
- *external noise sources such as externally-sited air-cooled condensers that operate continuously during normal operation.”*

8.2.12 It also states at paragraph 2.5.54 that *“the ES should include a noise assessment of the impacts on amenity in case of excessive noise from the project as described in Section 5.11 in EN-1.”*

¹ Author’s inclusion

NPS EN-5

8.2.13 Taken together with the NPS EN-1, the NPS EN-5 provides the primary basis for decisions taken by the Infrastructure Planning Commission on applications it receives for electricity networks infrastructure.

8.2.14 Regarding potential noise and vibration impacts, the policy covers noise and vibration at paragraphs 2.9.1 to 2.9.9.

Paragraphs 2.9.1 and 2.9.2 state: *“Generic noise effects are covered in Section 5.11 of EN-1. In addition there are specific considerations which apply to electricity networks infrastructure as set out below.*

All high voltage transmission lines have the potential to generate noise under certain conditions.”

Paragraphs 2.9.8 and 2.9.9 go on to state:

“While standard methods of assessment and interpretation using the principles of the relevant British Standards are satisfactory for dry weather conditions, they are not appropriate for assessing noise during rain, which is when overhead line noise mostly occurs, and when the background noise itself will vary according to the intensity of the rain.

Therefore an alternative noise assessment method to deal with rain-induced noise is needed, such as the one developed by National Grid as described in report TR(T)94, 1993. This follows recommendations broadly outlined in ISO 1996 (BS 7445: 1991) and in that respect is consistent with BS 4142:1997.”

8.2.15 While this policy is noted, the operational noise and vibration impacts from the Electrical Connection have been scoped out of the assessment as agreed with the Secretary of State through the Scoping Opinion. The application of this policy is therefore not relevant to this scheme.

The National Planning Policy Framework (2012)

8.2.16 The National Planning Policy Framework (NPPF) was published in March 2012. In respect of noise, the document states, in paragraph 109, that:

“The planning system should contribute to and enhance the natural and local environment by ... preventing both new and existing development from contributing to or being put at unacceptable risk from or being adversely affected by unacceptable levels of ... noise pollution.”

8.2.17 The NPPF goes on to advise, in paragraph 123, that:

“Planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *Recognise that development will often create some noise and existing business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

8.2.18 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define the “*significant adverse impacts*”.

Planning Practice Guidance (online resource)

8.2.19 Government's Planning Practice Guidance on Noise (PPG) (Department of Communities and Local Government, 2014) provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the No Observed Effect Level (NOEL) and, as exposure increases, the Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL). These are defined fully in 8.2.28 and 8.2.29 below.

8.2.20 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

8.2.21 The LOAEL is described in PPG (at Paragraph: 005 Reference ID: 30-005-20140306) as the level above which “*noise starts to cause 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.*”

8.2.22 PPG identifies (at Paragraph: 005 Reference ID: 30-005-20140306) the SOAEL as the level above which “*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 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.*”

8.2.23 The PPG (at Paragraph: 006 Reference ID: 30-006-20141224) also provides guidance regarding what factors influence whether noise could be a concern, including:

- Time of day;
- Number and pattern of noise events (for non-continuous sound);
- Frequency content of the noise;
- General character (i.e. whether or not the noise contains particular tonal characteristics or other particular features); and
- Local topology and topography.

8.2.24 The PPG provides advice on how the adverse effects of noise can be mitigated. It advises that this will depend on “*the type of development being considered and the character of the proposed location*” (Paragraph: 008 Reference ID: 30-008-20140306). Four broad classifications of mitigation are defined. These include:

- “*Engineering methods: Reducing the noise generated at source and/or containing the noise generated;*
- *Layout: Optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening (by natural or purpose built barriers, or other buildings);*
- *Use of planning conditions/obligations: Restricting activities allowed onsite at certain times and/or specifying permissible noise levels for different time periods (e.g. daytime, evening and night-time); and*
- *Mitigating: the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building.*”

8.2.25 Furthermore, it advises at Paragraph: 009 Reference ID: 30-009-20140306 that the impact of the noise may be “*partially off-set if the residents of those dwellings have access to:*

- *A relatively quiet façade (containing windows to habitable rooms) as part of their dwelling and/or;*
- *A relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur, and/or;*
- *A relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;*
- *A relative quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance)”.*

National Planning Policy for Waste (2014)

8.2.26 Appendix B of the policy states that:

“In testing the suitability of sites and areas in the preparation of Local Plans and in determining planning applications, waste planning authorities should consider the factors below.

[...]

j. noise, light and vibration

Considerations will include the proximity of sensitive receptors. The operation of large waste management facilities in particular can produce noise affecting both the inside and outside of buildings, including noise and vibration from goods vehicle traffic movements to and from a site. Intermittent and sustained operating noise may be a problem if not properly managed particularly if night-time working is involved.”

Noise Policy Statement for England (NPSE)

8.2.27 The Noise Policy Statement for England (DEFRA, 2010) was published in March 2010. The document seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long term vision of Government noise policy:

“To promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”

8.2.28 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as reasonably practicable having regard to the underlying principles of sustainable development.

8.2.29 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and

LOAEL – Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.

8.2.30 The NPSE extends these to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.

8.2.31 The NPSE notes, in paragraph 2.22, *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times"*.

Emerging National Planning Policy

Draft National Planning Policy Framework (2018)

8.2.32 The Draft NPPF was published on 5 March 2018 and was out for public consultation until 10 May 2018. In respect of noise, the Draft NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by... preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of ... noise pollution."

8.2.33 In relation to ground conditions and pollution, the Draft NPPF goes on to advise that:

"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 and living conditions, as well as the potential sensitivity of the wider area to impacts that could arise from the development. In doing so, they should:

- a) *Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life;*
- b) *Identify and protect tranquil areas which may have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

Regional Planning Policy

The London Plan (2016)

8.2.34 The London Plan 2016 (Mayor of London, 2016) is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years. There have been a number of alterations to the London Plan since it was adopted in 2011 to ensure that it reflects the most recent Government guidance and legislation. Alterations were formally published in March 2016 to bring the London Plan in line with new housing standards and the Government's approach to car parking policy.

8.2.35 Policy 7.7 'Location and Design of Tall and Large Buildings' requires that tall and large buildings do not affect their surroundings adversely in terms of noise, amongst other considerations.

8.2.36 Policy 7.15 'Reducing and Managing Noise, Improving and Enhancing the Acoustic Environment and Promoting Appropriate Soundscapes' states that:

"Development proposals should seek to manage noise by:

- *Avoiding significant adverse noise impacts on health and quality of life as a result of new*

development;

- *Mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business;*
- *Improving and enhancing the acoustic environment and promoting appropriate soundscapes (including identifying and protecting Quiet Areas and spaces of relative tranquillity);*
- *Separating new noise sensitive development from major noise sources (such as road, rail, air transport and some types of industrial development) through the use of distance, screening or internal layout – in preference to sole reliance on sound insulation;*
- *Where it is not possible to achieve separation of noise sensitive development and noise sources, without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through the application of good acoustic design principles;*
- *Having particular regard to the impact of aviation noise on noise sensitive development; and*
- *Promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.”*

Sustainable Design and Construction – Supplementary Planning Guidance

8.2.37 The Mayor published supplementary planning guidance (SPG) on sustainable design and construction in April 2014.

8.2.38 The SPG provides guidance on the implementation of London Plan policies. Regarding noise, it states that “*Noise should be reduced at source and then designed out of a scheme to reduce the need for mitigation measures.*”.

Emerging Regional Planning Policy

Draft London Plan (2017)

8.2.39 The Draft London Plan (Mayor of London, 2017) is currently under consultation with hopes to finalise and adopt by Winter 2019. As the development of the Draft London Plan continues, more weight will be given to it by Local Authorities.

8.2.40 Policy D13: Noise states:

“A. In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:

- 1. Avoiding the Agent of Change principle to ensure measures do not add unduly costs and administrative barriers on existing noise-generating uses;*
- 2. Reflecting and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on development;*
- 3. Improving and enhancing the acoustic environmental and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity);*
- 4. Separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening or internal layout – in preference to sole reliance on sound insulation;*

5. *Where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles; and*
6. *Promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.*

B. Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra's Noise Action Plan for Agglomerations."

Draft London Environment Strategy (2017)

- 8.2.41 Regarding noise, the aim of the Draft London Environmental Strategy is to improve Londoners' quality of life by "*reducing the number of people adversely affected by noise and promoting more quiet and tranquil spaces.*"

Local Planning Policy

Bexley Core Strategy (2012)

- 8.2.42 The Bexley Core Strategy sets out a spatial planning framework for the borough until 2026. Policy CS09 (Using Bexley's resources sustainably) states that the Council will seek to maximise the effective and efficient use of natural and physical resources, while contributing to the health and well-being of the community and the environment.
- 8.2.43 The Council will do this by applying the requirements outlined in national and regional planning policy and guidance to new development, in particular the requirements of the Mayor's London Plan with regard to open space and the Blue Ribbon Network, energy and water supplies and resources, air and water quality, water and sewerage infrastructure, noise reduction, contaminated land, hazardous substances and sites and minerals.

Bexley Unitary Development Plan (2004) Saved Policies (2012)

- 8.2.44 The Bexley UDP was adopted in 2004. In 2012 some of the remaining policies were superseded by the adoption of the Bexley Core Strategy. The remaining saved policies form part of Bexley's Development Plan Framework until they are replaced in the new Bexley Local Plan.
- 8.2.45 Within Policy ENV39 it states that the Council will consider the extent to which the proposal has any unreasonable effect on the surrounding area by reason of noise and any emissions to land, air, or water, and is not, by reason of its location, itself adversely affected by such conditions as may already be in existence within the neighbourhood.

Dartford Borough Council Development Policies Plan and Policies Map (2017)

- 8.2.46 The Dartford Development Policies Plan was adopted in 2017, and forms the second part of the Dartford Local Plan. The plan sets out the main planning policies that will be used to assess planning applications. Policy DP5 states that development will only be permitted where it does not result in unacceptable material impacts, individually or cumulatively, on neighbouring uses, the borough's environment or public health. This includes noise disturbance or vibration; odour; light pollution; ground contamination; air and water quality; and intensity of use.

Kent Minerals and Waste Local Plan 2013-2030 (2016)

8.2.47 The Kent Minerals and Waste Local Plan 2013-30 (KMWLP) was adopted in July 2016 and sets out the vision and strategy for waste management and mineral provision up until the year 2030.

8.2.48 Policy DM11 Health and Amenity states that:

“Minerals and waste development will be permitted if it can be demonstrated that they are unlikely to generate unacceptable adverse impacts from noise, dust, vibration, odour, emissions, bioaerosols, illumination, visual intrusion, traffic or exposure to health risks and associated damage to the qualities of life and wellbeing to communities and the environment.”

Emerging Local Planning Policy

Draft Bexley Local Plan

8.2.49 The London Borough of Bexley (LBB) is preparing a new local plan which will set out the policies to guide development across the borough up till 2040. The draft timetable for the adoption of the new local plan is outlined in the Bexley Local Development Scheme (2017-2020) as below.

- August - September 2018: consultation on preferred policies (the ‘Regulation 18 consultation’);
- May - June 2019: consultation on the proposed submission draft local plan (the ‘Regulation 19 consultation’);
- December 2019: Submission to the Secretary of State for examination; and
- July 2020: adoption following receipt of Inspector’s Report.

Draft Dartford Borough Council Local Plan

8.2.50 Dartford Borough Council (DBC) is in the process of preparing a new local plan. The Council aims to undertake a strategic issues consultation in June 2018 which will include questions on the future strategy for long-term infrastructure and planning needs.

National Legislation

Control of Pollution Act 1974

8.2.51 The Control of Pollution Act 1974 (COPA) Section 61, sets out procedures for contractors to obtain ‘Prior Consent’ for construction works within agreed noise limits.

8.2.52 Applications for prior consent are made to the local authority. These would contain a method statement of the proposed works and the steps that would be taken to minimise and mitigate noise to acceptable levels and time periods during the construction period.

8.2.53 Section 60 of COPA describes the process that local authorities may follow to impose controls over potentially noisy demolition and construction works.

8.2.54 Using COPA local authorities may impose limitations on working hours, plant and machinery used, and noise levels emitted from sites.

Environmental Protection Act 1990

8.2.55 Under Part III of the Environmental Protection Act 1990, local authorities have a duty to investigate noise complaints from premises (land and buildings) and vehicles, machinery or equipment in the street. This includes noise arising from demolition and construction sites.

- 8.2.56 If the Environmental Health Officer (EHO) from the local authority is satisfied that the problem complained about amounts to a statutory nuisance and is prejudicial to health or a nuisance, then the authority must serve an abatement notice on the person responsible or in certain cases the owner or occupier of the property. The notice could require that the noise or nuisance must be stopped altogether or limited to certain times of the day.

Guidance and Standards

British Standard 7445: 2003 Description and Measurement of Environment Noise – Part 1: Guide to Quantities and Procedures

- 8.2.57 BS 7445-1 (British Standards Institution, 2003) describes methods and procedures for measuring noise from all sources which contribute to the total noise climate of a community environment, individually and in combination. The results are expressed as equivalent continuous A-weighted sound pressure levels, $L_{Aeq,T}$.
- 8.2.58 BS 7445-1 states that sound level meters that are used should conform to Type 1 (or Type 2 as a minimum) as described in BS EN 61672:2013 Electroacoustics. Sound level meters should be calibrated according to the instructions of the manufacturer and field calibration should be undertaken at least before and after each series of measurements.

British Standard 4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound

- 8.2.59 BS 4142 (British Standards Institution, 2014) describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in the standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
- 8.2.60 The standard is used to determine the rating levels for sources of sound of an industrial and/or commercial nature and the ambient, background and residual sound levels at outdoor locations. These levels could be used for the purposes of investigating complaints; assessing sound from the proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and assessing sound at proposed new dwellings or premises used for residential purposes. However, the determination of noise amounting to a nuisance is beyond the scope of the standard.
- 8.2.61 The procedure contained in BS 4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur.
- 8.2.62 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:
- Typically, the greater this difference, the greater the magnitude of impact;
 - A difference of around +10 decibel (dB) or more is likely to be an indication of a significant adverse effect, depending on the context;
 - A difference of around +5 dB is likely to be an indication of an adverse effect, depending on the context; and
 - The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse effect or a significant adverse effect. 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 on the context.

8.2.63 Where the initial estimate of the impact needs to be modified due to the context, the following factors should be considered:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions such as:
 - Façade insulation treatment;
 - Ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 - Acoustic screening.

**Design Manual for Road and Bridges (2011) – Design Manual for Road and Bridges
Volume 11 Section 3 Part 7 Traffic Noise and Vibration**

8.2.64 The Design Manual for Roads and Bridges (DMRB) is considered as the regulatory standard for the design of a new road or improvements to an existing road. In particular, Volume 11 Section 3 Part 7 sets out the method for assessing noise associated with road traffic. DMRB provides guidance on quantifying the noise impacts generated by changes in road traffic. Whilst the Proposed Development does not incorporate the provision of a new road, the assessment has been informed by the criteria stated in DMRB. This is a standard approach for assessing off-site road traffic impacts and has been agreed with LBB and PINS.

**British Standard 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control
on Construction and Open Sites**

8.2.65 BS 5228: 2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' (British Standards Institution, 2014) gives recommendations for basic methods of noise and vibration control relating to construction and open sites where work activities/operations generate significant noise and/or vibration levels.

8.2.66 The standard also provides a method for determining the sound levels associated with demolition and construction activities; and considers the numbers and types of equipment operating, their associated Sound Power Level (L_w); and the distance to receptors, along with the effects of any screening.

8.2.67 In Annex E it also provides examples of significance and threshold levels which could be used as design criteria for construction noise.

Calculation of Road Traffic Noise (CRTN)

8.2.68 CRTN (Department of Transport, Welsh Office, 1988) describes the procedures for traffic noise calculation and is suitable for environmental assessments of schemes where road traffic noise may have an impact.

8.3 Consultation

8.3.1 Consultation has been undertaken with both PINS and LBB. **Table 8.1** below summarises the consultation and where in this PEIR Chapter the comments have been addressed.

Table 8.1 Summary of Key Consultation Responses in Relation to Noise and Vibration

Reference	Comment	Response
Secretary of State Scoping Opinion		
Section 4.3 – ID 1	The Planning Inspectorate does not consider that noise impacts during construction of the electrical connection route can be scoped out	Assessment has been undertaken in Section 8.8
Section 4.3 – ID 2	Operational vibration impacts scoped out	n/a
Section 4.3 – ID 3	The ES should also assess impacts from noise and vibration to ecological receptors (where relevant) and should appropriately refer to the assessment of impacts on biodiversity	The assessment will be undertaken in the ES and included in the Ecology Chapter and includes consultation with the Environment Agency and Natural England.
Section 4.3 – ID 4	Assessment of any likely significant effects based on traffic model and HGV movements should be undertaken	To be completed
Section 4.3 – ID 5	The assessment should clearly explain the approach to establishing the study area for operation phase	See Section 8.5.2
Section 4.3 – ID 6	The assessment should clearly explain the approach to establishing the study area for construction phase	See Section 8.5.1
Environmental Health Department at London Borough of Bexley		
Email correspondence with Environmental Health Officer at London Borough of Bexley on 16 th February 2018	Baseline sound survey locations and durations agreed	Baseline survey reported in Section 8.5.4
Email correspondence with Environmental Health Officer at London Borough of Bexley on 16 th February 2018	Construction impacts associated with the REP site and Electrical Connection route will be undertaken according to guidance thresholds as defined in BS 5228-1:2009+A1:2014	This has been undertaken. See Section 8.5.23
Email correspondence with Environmental Health Officer at London Borough of Bexley on 16 th February 2018	Operational noise from the Proposed Development will be assessed using methodology defined in BS 4142:2014 Methods for rating and assessing industrial and commercial sound	This has been undertaken. See Section 8.5.37
Email correspondence with Environmental Health Officer at London Borough of Bexley on 16 th February 2018	Permitted core hours for construction works in the Borough in accordance with Control of Pollution Act 1974 powers are 8am to 6pm Mondays to Fridays, 8am to 1pm on Saturdays with no works on Sundays/Public Holidays.	See section 8.7

Reference	Comment	Response
Email correspondence with Environmental Health Officer at London Borough of Bexley on 16 th February 2018	The EHO also stated that in keeping with other development in the Borough, target criteria for operational fixed plant/equipment is a rating level of 5 dB(L _{Aeq}) below the typical background (L _{A90}) level at the nearest noise sensitive location.	The assessment criteria account for this requirement. See Table 8.10

8.4 Parameters Used for Assessment

- 8.4.1 The assessment is undertaken based on full operation of the Proposed Development with a design year assessed with maximum traffic vehicles in operation. For traffic impacts this assumes a scenario with 100% of waste input transported by road.
- 8.4.2 For the scenario where 100% of waste is transported by river, a qualitative review of potential impacts based on additional vessel movements associated with the Proposed Development has been undertaken. This will compare the current baseline number of vessels using the river against those required for the Proposed Development.
- 8.4.3 The operational effects assessment assesses the REP operating at its maximum capacity with all plant operating continuously over a 24 hour period. Therefore, the assessment considers the reasonable worst case parameters for the Proposed Development resulting in a conservative assessment.
- 8.4.4 In the absence of a detailed construction plant methodology, which is not available at this stage, a reasonable worst case scenario of all construction activities occurring simultaneously has been assessed. This includes piling activities occurring at the REP site.

8.5 Assessment Methodology and Significance Criteria

Study Area

- 8.5.1 The assessment of construction impacts considers noise and vibration sensitive receptors within 500 m of the REP site. The 500 m study area is based on the assessment criteria which has been agreed through consultation with LBB as outlined **Table 8.1** above. Based on experience of construction noise assessments, receptors beyond this distance are unlikely to be affected. The assessment of construction impacts associated with the Electrical Connection considers noise and vibration sensitive receptors immediately adjacent to the road network at distances up to 50 m from the road network that the Electrical Connection route would be constructed within. Where the Electrical Connection route leaves the road network as per option 2B (as described in **Chapter 3**), no residential receptors are located in close proximity and therefore there is no change in the study areas.
- 8.5.2 The operational stage noise impact associated with the Electrical Connection route has been scoped out through the EIA scoping process (see **Table 8.1**). For the operational stage of the Proposed Development the study area includes the Noise Sensitive Receptors (NSRs) in the local area that are most likely to be affected by the change in noise levels caused by the operation of the Energy Park. To cover the closest dwellings, operational impacts from the Proposed Development include a study area of 1 km from the REP site and includes the receptors south and south-east of the REP site. The NSRs to the REP site are provided below. These receptor locations have been agreed with LBB.
- Hackney House apartments along the A2016 – Approximately 760 m from the REP site.

- Jutland House apartments along Clydesdale Way – Approximately 860 m from the REP site.
- Dwellings along St. Thomas Road – Approximately 1000 m from the REP site.

8.5.3 For off-site road traffic impacts the assessment considers NSRs along routes most affected by the changes in traffic flows due to development traffic.

Baseline Data Collection

8.5.4 An attended environmental sound survey was undertaken to determine the existing noise climate at NSRs closest to REP site. The measurements were undertaken with the RRRF operational and forming part of the baseline.

8.5.5 Baseline measurements along the electrical connection route were not required, as agreed with the Environmental Health Department at London Borough of Bexley, as construction impacts are assessed against noise levels identified in BS 5228 rather than a baseline noise level. Operational impacts associated with the electrical connection route have been scoped out as agreed with the Secretary of State through the Scoping Opinion.

8.5.6 The survey was undertaken between 25th February and 27th February 2018 at three locations as detailed below which are the closest NSRs to the REP site:

- Hackney House;
- Jutland House; and
- Dwellings along St. Thomas Road.

8.5.7 During the attended measurements, weather conditions were calm and dry. The conditions were considered suitable for obtaining representative environmental noise levels.

8.5.8 At each location three sets of 15-minute measurements were undertaken over each of the following periods:

- 25th February 10:00hrs – 13:00hrs
- 25th February 19:00hrs – 22:00hrs
- 26th February 01:00hrs – 04:00hrs
- 26th February 10:00hrs – 13:00hrs
- 26th February 19:00hrs – 22:00hrs
- 27th February 01:00hrs – 04:00hrs

8.5.9 **Table 8.2** describes the survey locations and measurement periods. The dominant noise source is also stated. **Figure 8.1, Appendix D.1** presents the approximate locations of the sound survey positions.

Table 8.2 Sound Survey Measurement Locations and Duration

Measurement Location	Description	Dominant Noise Source
1	The microphone was located in a free field position approximately 25 m from the A2016 and 1.5 m from ground level. The measurement location was positioned such that it was representative of noise levels likely to be experienced at Hackney House apartments.	Road Traffic, Occasional Aircraft
2	The microphone was located in a free field position adjacent to Clydesdale Way and 1.5 m from ground level. The measurement location was positioned such that it was representative of noise levels likely to be experienced at Jutland House apartments.	Road Traffic, Occasional Aircraft
3	The microphone was located in a free field position adjacent to St. Thomas Road. The measurement location was positioned such that it was representative of noise levels likely to be experienced at dwellings along St. Thomas Road.	Road Traffic, Occasional Aircraft

8.5.10 A large range of statistical noise parameters was acquired, however the A-weighted sound parameters $L_{Aeq, T}$ and $L_{A90, T}$, are considered to be the most relevant in the context of planning and noise as these parameters are defined in the BS 4142:2014 guidance methodology that was agreed with LBB to be followed for the purposes of the assessment.

8.5.11 The instrumentation used to measure the environmental sound climate is presented in **Table 8.3**.

Table 8.3 Sound Survey Instrumentation

Description	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Analyser	NTi	XL2-TA	A2A-11051-E0	14/04/2018
Calibrator	NTi	CAL200	12405	16/10/2018

8.5.12 On-site calibration checks were performed before and after all measurements with no deviation being observed. The sound level meters and calibrators have valid laboratory calibration certificates, which are available upon request.

8.5.13 Manufacturer's windshields were fitted over the microphone at all times during the survey periods.

8.5.14 The noise survey was completed in general accordance with the guidance in BS 7445: 'Description and Measurement of Environmental Noise. Guide to Quantities and Procedures' (British Standards Institution (2003)).

Assessment

8.5.15 The assessment considers the likely impacts from noise and vibration generated as a consequence of the construction and decommissioning of the Proposed Development. It also considers the noise generated as a consequence of the operational phase.

Significance Criteria

8.5.16 In accordance with the NPPF, NPSE, and PPG for noise, Lowest Observable Adverse Effect Level (LOAEL), Significant Observable Adverse Effect Levels (SOAEL), and the No Observable Effect Limit (NOEL) have been proposed for each noise and vibration source under assessment.

8.5.17 With respect to the Infrastructure EIA Regulations 2017, the positive ('beneficial') and negative ('adverse') levels of noise and vibration effects have been related to the significance levels. Based on the descriptions of the adverse effect levels in the PPG for noise (DCLG, 2014), recommended actions for each significance level have been provided. The noise and vibration significance criteria are presented in **Table 8.4**, drawing upon Paragraph 005 Reference ID: 30-005-20140306 of the PPG. The assessment has been undertaken at the closest dwellings to the REP site, defined in Section 8.5.6. Dwellings are considered to be of high sensitivity due to potential impacts on resting/sleeping conditions and these were agreed with LBB as the receptors to be assessed. The noise and vibration impacts to Terrestrial Biodiversity receptors will be assessed in **Chapter 11** of the ES. The table below provides significance levels based on a receptor of high sensitivity. The receptor locations have been agreed with LBB and are identified in Section 8.5.6 and presented in **Figure 8.1, Appendix D.1**.

Table 8.4 Noise and Vibration Significance Criteria

Significance Level	Noise and Vibration Effect Level	Impact and Action (to be applied to potential effects)
Substantial		Noise causes extensive and regular changes in behaviour and could lead to psychological stress or physiological effects. This level is unacceptable and should be prevented.
Major	SOAEL	Noise causes a material change in behaviour and/or attitude. This level should be avoided.
Moderate		Noise can be heard and causes small changes in behaviour or attitude. Noise should be mitigated and reduced to a minimum.
Minor	LOAEL	Noise can be heard but does not cause a change in behaviour or attitude. No specific mitigation measures are required.
Negligible	NOEL	Noise has no effect. No specific measures required.

8.5.18 Effects which are determined as moderate adverse or above are considered significant with regards to the EIA.

Assessing Significance

8.5.19 This Section describes the methodology that has been used to determine the LOAELs and SOAELs for each noise and vibration source under consideration.

Construction Noise and Vibration (from the Proposed Development)

8.5.20 The noise levels generated by construction activities and experienced by any nearby sensitive receptors depend upon a number of variables, the most significant of which are:

- the noise generated by plant or equipment used on-site, or on-site activities (i.e. the physical demolition/construction), generally expressed as sound power levels (L_w);
- the periods of operation of the construction plant on the site, known as its 'on-time';
- the distance between the noise source and the receptor; and
- the attenuation provided by ground absorption and any intervening barriers.

8.5.21 Construction noise predictions have been undertaken, using the methodology outlined in BS 5228-1: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites: Part 1: Noise (BSI, 2014). BS 5228-1: 2009+A1:2014 predicts noise as an equivalent continuous A- weighted sound pressure level over a period such as one hour ($L_{Aeq,1hr}$).

8.5.22 BS 5228-1: 2009+A1:2014 has also been used to determine proposed LOAELs and SOAELs for construction noise and vibration. This assessment of construction noise effects at residential properties is undertaken in accordance with the guidance thresholds as defined in BS 5228-1: 2009+A1:2014, Annex E and replicated below:

- 70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise; and
- 75 decibels (dBA) in urban areas near main roads in heavy industrial areas.

8.5.23 Nearby dwellings are in an urban area and therefore the upper limit of 75 dB(A) has been appointed as the SOAEL. The LOAEL is defined as 5 dB below this.

8.5.24 **Table 8.5** sets out the suggested LOAEL and SOAEL applicable to construction noise impact on residential properties. The construction time periods have been based on correspondence with the EHO at LBB.

Table 8.5 Construction Noise Effect Levels for Permanent Residential Buildings

Day	Time Period, T	LOAEL $L_{pAeq, T}$ (dB) [*]	SOAEL $L_{pAeq, T}$ (dB)
Monday to Friday	08:00hrs – 18:00hrs	70	75
Saturday	08:00hrs – 13:00hrs	70	75

8.5.25 With respect to the vibration during construction, the proposed LOAELs and SOAELs are provided in **Table 8.6**. For human response to construction related vibration, it is considered appropriate to measure Peak Particle Velocity (PPV mm/s), as suggested in BS 5228-2:2009+

A1:2014 Code of practice for noise and vibration control on construction and open sites (BSI, 2014). The onset of significant effects (the LOAEL) is classified as 0.3mm/s PPV, the level at which construction vibration might just be perceptible can be tolerated with prior warning.

8.5.26 With respect to the SOAEL, the vibration level proposed is based on levels defined by BS 5228-1.

Table 8.6: Construction Vibration Effect Levels for Permanent Residential Buildings

Vibration Level PPV mm/s	Description of Effects	Effect	Adverse Effect Level
0.14	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.	Negligible	
0.3	Vibration might be just perceptible in residential environments.	Minor	LOAEL
1.0	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.	Moderate	
3.0		Moderate	SOAEL
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level	Major	

Construction Road Traffic

8.5.27 Construction traffic noise has been assessed by considering the short-term increase in traffic flows during construction works following the principles of CRTN and DMRB, Volume 11, Section 3, Part 7. A short term is considered to be a period of up to 1 year.

8.5.28 The criteria for the assessment of the magnitude of impact due to road traffic noise changes arising from construction works have been taken from Table 3.1 of DMRB and are provided here in **Table 8.7**.

Table 8.7 Construction Traffic Noise Effect Levels

Adverse Effect Level	Change in Noise Levels in short-term due to Construction Traffic (dB)
SOAEL	Greater than 5
LOAEL	Greater than 1
NOEL	0

Operational Road Traffic

- 8.5.29 The impact from road traffic noise on the noise climate of the surrounding area is based on the change in noise levels at NSRs due to a change in the volume of road traffic generated by the Proposed Development.
- 8.5.30 DMRB suggests that an increase in traffic flow of 25% will result in an increase in noise level of 1 dB, assuming other factors (such as vehicle speed and mix) remain the same, a change of 3 dB is the minimum perceptible under normal conditions and is accepted as the threshold of human perception of a change in noise levels in the long term. Additionally, an increase or decrease of 10 dB is considered to be a doubling or halving of loudness, respectively.
- 8.5.31 DMRB provides a magnitude scale of impact for the change in noise levels in the long-term term. The proposed criteria for assessing effect levels for operational road traffic is summarised in **Table 8.8**. The long term is assessed by comparing the future assessment year 'with development' and the baseline year 'without development'.

Table 8.8 Adverse Effect Levels for Existing Dwellings from REP Traffic

Effect Level	Change in Noise Levels in the Long-term due to REP traffic (dB)
SOAEL	Greater than 10
LOAEL	Greater than 3
NOEL	0

Operational Vessel movements

- 8.5.32 A qualitative assessment will be undertaken, within the ES, by commenting on the proposed vessel movements and comparing this to current vessel movements.

Operational Noise from the Proposed Development

- 8.5.33 The assessment of operational noise from the Proposed Development has been based on source data provided by the Applicant.
- 8.5.34 The source data utilised within the acoustic model are presented in **Table 8.9** below.

Table 8.9 Summary of sound power level of noise sources

Source Area/Equipment	L _{WA} dB(A)
Stacks (body and opening)	103
Air Cooled Condenser (ACC)	104
Transformer Area	101
Tipping Hall	91
Bunker Hall	100

Flue Treatment Hall	97
Boiler Hall (Boiler Hall and Bottom ash building)	104
Steam Turbine Hall	102
Re-cooler	96
Anaerobic Digestion equipment	104

- 8.5.35 To undertake detailed noise calculations of the Proposed Development, the noise propagation modelling software SoundPLAN version 8.0 has been used. The noise model considers directional and screening effects to predict the noise levels at the nearest NSRs. The effects of ground and air absorption are also taken into consideration.
- 8.5.36 The significance of the predicted operational noise effects of REP has been assessed taking into consideration guidance within BS 4142:2014.
- 8.5.37 Based on BS 4142 guidance and the context of the Proposed Development, **Table 8.10** details the proposed NOEL, LOAEL and SOAEL for the noise emission criteria from industrial sources at the REP site, when determined at 1 m from the façade of any existing dwellings.

Table 8.10 Proposed NOEL, LOAEL and SOAEL Levels associated with Industrial Noise from REP

No Observed Effect Level (NOEL)	Lowest Observed Adverse Effect Level (LOAEL)	Significant Observed Adverse Effect Level (SOAEL)
Plant noise emissions due to industrial sources at REP are 5 dB below the typical background sound levels subject to context, at 1 m from the façade of existing dwellings.	Plant noise emissions due to industrial sources at REP are 5 dB above the typical background sound levels subject to context, at 1 m from the façade of existing dwellings.	Plant noise emissions due to industrial sources at REP are 10 dB or more above the typical background sound levels subject to context, at 1 m from the façade of existing dwellings.

Limitations

- 8.5.38 Precise details of the types of construction methods and plant (both fixed and mobile) likely to be used during the construction phases are yet to be confirmed. Therefore, at this stage, in the design of the Proposed Development, it is not possible to state precisely where plant will operate and for how long during the working day. Thus the assessment has been based on typical plant used for construction activities. As described in para. 8.4.4, a reasonable worst case assessment was undertaken assuming all construction activities would be carried out simultaneously.
- 8.5.39 The noise data for the operational phase of the Proposed Development are based on the current available information. Details on the noise data can be found in the relevant Noise Impact Reports referenced in Section 8.5.33.

8.6 Baseline Conditions and Receptors

- 8.6.1 Baseline surveys were undertaken at Hackney House, Jutland House and dwellings at St. Thomas Road to determine the current background noise levels. These receptors are the closest NSRs to the REP site and are considered to be of high sensitivity.
- 8.6.2 Full results of the environmental noise survey undertaken in February 2018 at Hackney House, Jutland House and St. Thomas Road are presented in **Appendix D.3**.
- 8.6.3 The dominant environmental noise sources at the NSRs are road traffic along the A2016 and overhead aircraft.
- 8.6.4 A summary of the results for the A-weighted (dBA) L_{90} and L_{eq} , levels is presented in **Table 8.11** below. The noise levels are presented for three NSRs closest to the REP site.

Table 8.11 Baseline Sound Survey Summary

Location	Period, T	$L_{Aeq,T}$ (dB)	Typical $L_{A90,T}$ (dB)
1 – Hackney House apartments (760 m from the REP site)	Daytime (07:00 – 23:00)	60	54
	Night-time (23:00 – 07:00)	54	45
2 – Jutland House apartments (860 m from the REP site)	Daytime (07:00 – 23:00)	56	51
	Night-time (23:00 – 07:00)	51	46
3 – 1 St. Thomas Road Dwellings (1000 m from the REP site)	Daytime (07:00 – 23:00)	53	48
	Night-time (23:00 – 07:00)	48	44

Baseline Evolution

- 8.6.5 Whilst the potential for future developments in the area could give rise to higher noise levels at the NSRs, it is considered unlikely that significant changes to the background noise levels will occur. A review of background noise levels measured in 2018 have been compared to background noise levels measured in 1999, which were undertaken as part of the EIA for RRRF. At locations that were measured during both surveys the change in noise levels is not considered significant and therefore future baseline noise climate is not considered likely to alter significantly from that currently measured.

8.7 Embedded Mitigation

- 8.7.1 It is anticipated that an outline Code of Construction Practice will be submitted as part of the DCO application. In order to minimise noise from the construction activities affecting NSRs the following measures, based upon best practice guidance provided in BS 5228, are anticipated to be applied as appropriate through the outline CoCP. These measures have been assumed to be present and have been incorporated into the assessments that follow:
- Appropriate operational hours, likely to exclude work during the night-time and during Sundays and public holidays;
 - Permitted core hours for construction works in the Borough in accordance with Control of Pollution Act 1974 powers are 8am to 6pm Mondays to Fridays, 8am to 1pm on Saturdays

with no works on Sundays/Public Holidays. This would not preclude occasional, pre-approved works which in limited circumstances are required outside of the core hours;

- Ensuring the use of quiet working methods, the most suitable plant and reasonable hours of working for noisy operations, where reasonably practicable;
- Screening fixed and mobile plant to reduce noise which cannot be reduced by increasing the distance between the source and the receiver (i.e. by installing acoustic screens/enclosures);
- Orienting fixed and mobile plant that is known to emit noise strongly in one direction so that the noise is directed away from dwellings or sensitive receptors, where possible;
- Closing acoustic covers to engines when they are in use or idling; and
- Engage with local residents to keep them informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern.

8.8 Assessment of Likely Effects

The REP Site and Main Temporary Construction Compounds

Construction Traffic Noise

- 8.8.1 There is currently no data available for the assessment of noise from construction traffic. However, this assessment will be included in the ES.

Construction and Decommissioning Noise

- 8.8.2 Construction noise has the potential to cause an adverse impact at existing NSRs.
- 8.8.3 Precise details of the types of construction methods and plant likely to be used during the construction phase have yet to be confirmed. Therefore, at this stage it is not possible to state precisely where plant will operate and for how long during the working day.
- 8.8.4 In accordance with guidance set out in BS 5228, noise levels have been calculated for a reasonable worst case situation assuming that construction activities will occur on the site boundary closest to each receptor. In practice, noise levels would tend to be lower due to greater separation distances and screening effects.
- 8.8.5 The main construction phase is likely to include site levelling/clearance, ground excavation, installation of foundations, concreting, building construction and road construction.
- 8.8.6 Details of typical demolition and construction plant noise levels at the standard reference distance of 10 m provided by BS 5228 Part 1 (BSI, 2014b), in the absence of noise controls such as screening and operational constraints, are given below in **Table 8.12**. It is considered that the plant identified represent the likely plant to be used during the construction phase.

Table 8.12 Baseline Sound Survey Summary

Plant	Typical $L_{Aeq,T}$ (dB) at 10 m (dB)
Dozer	75
Tracked Excavator	78

Plant	Typical $L_{Aeq,T}$ (dB) at 10 m (dB)
Dump Truck	78
Wheeled Loader	79
Piling	79
Concrete pumps	87
Wheeled mobile telescopic crane	78
Road Roller	80
Vibratory Roller	75
Asphalt Paver	75

8.8.7 In the absence of specific details on the siting of construction activities, this information has been used to derive indicative noise levels at selected distance band using the data and procedures of BS 5228, and the results are presented in **Table 8.13**.

Table 8.13: Predicted Indicative Construction Noise Levels

Activity	Predicted Indicative Construction Noise Levels, $L_{Aeq,1hour}$ in dB
	500 m from the REP site and Main Temporary Construction Compounds
Construction Site Activities	54

8.8.8 At distances of 500 m from the REP site, noise levels from construction are likely to be 54 dB $L_{Aeq,1hour}$. This is below the proposed LOAEL and therefore equates to a negligible effect. The nearest dwellings to REP are over 500 m from the REP site, based upon this preliminary assessment the effect on these receptors is therefore assessed as Negligible.

8.8.9 During decommissioning, similar impacts to those described for construction could result from, for example, plant removal or site reinstatement. However, it is likely that these impacts would be less, given that some items may be left in situ. Therefore, based on the conservative and reasonable worst case construction impacts outlined above, the preliminary findings of the assessment of the effect of noise impacts from the decommissioning phase are predicted to **Negligible**.

Main Temporary Construction Compounds

8.8.10 The Main Temporary Construction Compounds is not likely to be utilised for significant construction works such as building construction and site levelling and is more likely to be utilised as a laydown area/parking. Therefore, based upon this preliminary assessment construction noise impacts from this area are not likely to be significant at the nearest receptor which is 150 m away.

Construction and Decommissioning Vibration

8.8.11 Construction activities may give rise to vibration impacts on adjacent buildings. The criteria used in this assessment relate to the potential for cosmetic, not structural damage. The principal concern is generally transient vibration due to piling. Cosmetic damage is most likely to occur within 20 m of piling activities. At greater distances damage is less likely to occur. Therefore, with the nearest residential receptors over 750 m away from the predicted impact from construction vibration is **Negligible**.

Operation

8.8.12 An assessment of the operating plant at the REP site has been undertaken in accordance with BS 4142:2014 to determine the likely noise impact on the NSRs.

8.8.13 The nearest NSRs are Hackney House, Jutland House and dwellings at St. Thomas Road.

8.8.14 The assessment of the likely future noise impact associated with the REP site is based on the following assumptions and considerations:

- The REP site operates continuously over 24 hours;
- Noise emissions from the REP site would be designed such that they do not contain tonal features and the main noise sources i.e. air cooled condensers and noise emissions from the buildings are unlikely to create discrete or impulsive noise. Therefore, no acoustic corrections have been applied to the source.
- Assessments have been undertaken by determining the noise emission levels at 1 m from the nearest façade of each of the receptors.

8.8.15 **Table 8.14** presents the preliminary results of the BS 4142 assessment at each of the receptors.

Table 8.14: BS 4142 Assessment of Noise Emissions from Operation of REP at Nearest NSRs

Location	Period	Rating Level ($L_{A,r,Tr}$)	Background Level ($L_{A90,15mins}$)	Excess of Rating Level over Background (a negative number indicates a rating level below background)	Initial Assessment of Impact
Hackney House	Daytime	40	54	-14	Indication of the specific sound source having a low impact, depending on the context
	Night-time	40	45	-5	Indication of the specific sound source having a low impact, depending on the context

Location	Period	Rating Level ($L_{A,r,T,r}$)	Background Level ($L_{A90,15mins}$)	Excess of Rating Level over Background (a negative number indicates a rating level below background)	Initial Assessment of Impact
Jutland House	Daytime	41	51	-10	Indication of the specific sound source having a low impact, depending on the context
	Night-time	41	46	-5	Indication of the specific sound source having a low impact, depending on the context
Dwellings on St.Thomas Road	Daytime	37	48	-11	Indication of the specific sound source having a low impact, depending on the context
	Night-time	37	44	-7	Indication of the specific sound source having a low impact, depending on the context

Context

8.8.16 BS 4142:2014 states that context should be considered when determining the impact. The following factors should be taken into consideration:

- The absolute sound levels;
- The character and level of the residual and specific sound levels; and
- The sensitivity of the receptor and use of mitigation measures.

Absolute Sound Levels

8.8.17 The calculated specific sound level at the worst affected façade of the nearest dwellings is relatively low, with noise levels significantly below the existing L_{Aeq} ambient noise levels.

Character and Level of Residual and Specific Sound Levels

8.8.18 With reference to **Table 8.11** residual sound levels are generally higher than the calculated rating level at the receptors implying that the sound from the REP site is secondary to other existing noise sources predominantly road traffic.

Receptor Sensitivity

8.8.19 The nearest receptors at Hackney House and Jutland House are not considered to be more sensitive than a typical residential dwelling. As such it is not considered necessary to modify the initial numerical assessment on the basis of receptor sensitivity.

Summary of BS 4142 Assessment

8.8.20 In considering the results of the initial numerical assessment and the context detailed above, noise emission levels from the REP site are likely to be at least 5 dB below the background noise levels during the daytime and night-time and equate to a NOEL. Based upon this, the preliminary findings of the assessment of effects are considered to be **Negligible** and not significant.

The Electrical Connection and the Cable Route Temporary Construction Compounds

Construction and Decommissioning

8.8.21 Construction noise has the potential to cause an adverse impact at existing NSRs.

8.8.22 Precise details of the types of construction methods and plant likely to be used during the construction phases are yet to be confirmed. Therefore, at this stage in the design of the Electrical Connection and Temporary Construction Compounds, it is not possible to state precisely where plant will operate and for how long during the working day.

8.8.23 In accordance with guidance set out in BS 5228, noise levels have been calculated for a reasonable worst case situation assuming that plant will operate at its closest point to each receptor in the absence of mitigation. In practice, noise levels would tend to be lower due to greater separation distances and screening effects.

8.8.24 In the absence of specific details on the siting of construction activities, typical construction plant noise levels have been used to derive indicative noise levels at selected distance bands using the data and procedures of BS 5228, and the results are presented in **Table 8.15**.

Table 8.15: Predicted Indicative Construction Noise Levels from Electrical Connection Route

Activity	Predicted Indicative Construction Noise Levels, $L_{Aeq,1hour}$ in dB			
	10 m from site	20 m from site	30 m from site	50 m from site
Construction Activities	80	74	70	66

- 8.8.25 At distances of 20 m or more from the construction activities noise levels are likely to be below the SOAEL. At distances greater than 30 m from the construction activities noise levels are likely to be below the agreed LOAEL.
- 8.8.26 Based on the assessment, exceedances of the LOAEL are likely to arise at existing properties within 30 m of the construction plant. It should be noted that the impact would be temporary and in practice, noise levels would tend to be lower due to periods of inactivity during the working day and screening effects. The impacts are likely to be limited to a few days at each location during the digging up of the road to lay the cables.
- 8.8.27 It is anticipated that an outline CoCP will be submitted as part of the DCO application, which will minimise adverse effects where practicable. Temporary sound reducing screens/enclosures around plant and activities (where possible) could provide 10 dB of noise attenuation from construction activities.
- 8.8.28 With the incorporation of mitigation measures as specified in the embedded mitigation Section and which are anticipated to be included in the outline CoCP the preliminary findings of the assessment are that the effects are considered to be **Negligible** and not significant.

Operation

- 8.8.29 At the end of its operational life, it is currently anticipated that the Electrical Connection will be left in situ, such that there will be no decommissioning works and therefore no effects. Operational effects have been scoped out as agreed with the Secretary of State through the Scoping Opinion.

Summary of Assessment

Construction and Decommissioning

- 8.8.30 Based upon the preliminary findings of the assessment, noise and vibration effects associated with the construction and decommissioning phase of the Proposed Development are likely to give rise to a **Negligible** temporary effect at the defined NSRs,.
- 8.8.31 With mitigation measures as detailed in the outline CoCP the construction effects associated with the Electrical Connection route are not considered to be significant.

Operation

- 8.8.32 The operation of the Electrical Connection is not anticipated to give rise to significant adverse effects to the environment with regards to noise and has been scoped out as agreed with the Secretary of State through the Scoping Opinion.

- 8.8.33 The noise effects from REP have been calculated to be at least 5 dB below the background sound levels at the nearest sensitive receptors during both the daytime and night-time assessment periods. The effect is considered, on the basis of this assessment, to be **Negligible** and not significant.

8.9 Cumulative Assessment

Construction/Decommissioning

- 8.9.1 Construction and decommissioning of the Proposed Development could occur simultaneously with other projects located in the vicinity of the Application Site. The 'other developments' with the most potential to give rise to simultaneous construction effects are identified in **Chapter 4**. Construction phase mitigation measures are anticipated to be employed during the construction of the Proposed Development, as such significant adverse cumulative construction effects are not anticipated to be likely. However, this assessment is subject to further detailed assessment, the results of which will be reported in the ES.
- 8.9.2 It is assumed for the purposes of this assessment that the REP generating equipment would be removed once the plant had ceased operations permanently. Any decommissioning phase is assumed to be of a similar or shorter duration to construction, and therefore environmental effects are considered to be of a similar level to those during the construction phase. It is assumed that the ducting for the Electrical Connection would remain in situ, but that the cables may be removed.
- 8.9.3 The Electrical Connection would be left in situ below ground and thus no environmental effects are expected.

Operation

- 8.9.4 The operation of the Proposed Development could occur simultaneously with other projects located in the vicinity of the Application Site. The 'other developments' with the most potential to give rise to simultaneous operational effects are identified in **Chapter 4**. Significant adverse cumulative operational effects are not anticipated to be likely. However, further detailed assessment is being undertaken and the results will be reported in the ES.

8.10 Further Mitigation and Enhancement

- 8.10.1 No further mitigation is considered necessary.

8.11 Residual Effects and Monitoring

Construction/Decommissioning

- 8.11.1 Based upon the preliminary findings of the assessment, the effect on the closest NSRs to the Proposed Development is below the proposed LOAEL and is therefore deemed **Negligible**.

Construction/Decommissioning Electrical Connection Route

- 8.11.2 Based upon the preliminary findings of the assessment, with the embedded mitigation, the effect on existing NSRs in close proximity to the electrical connection route is below the proposed LOAEL and is therefore deemed **Negligible**.

Operation

- 8.11.3 Based upon the preliminary findings of the assessment, with REP in place and fully operational, the effect on the nearest dwellings remains below LOAEL and is therefore deemed **Negligible**.

8.12 Summary of Residual Effects

	Receptor name and description	Potential mitigation	Preliminary Assessment of Residual Effects
The REP DCO			
Construction / decommissioning	Dwellings within 30 m of the electrical connection route	None required as included in embedded mitigation	Effects are anticipated to be not significant
Operation	Hackney House; Jutland House; and Dwellings along St. Thomas Road.	None required	Effects are anticipated to be not significant

8.13 Preliminary Conclusion and Further Assessment

- 8.13.1 A baseline environmental sound survey has been undertaken during the daytime and night-time to determine the background noise levels at the nearest dwellings to the REP site. The dominant environmental noise source at the existing dwellings is due to traffic on the local road network.
- 8.13.2 LOAEL and SOAEL criteria have been proposed and confirmed through consultation for construction/decommissioning and operational noise.
- 8.13.3 Reasonable worst case assessments of construction/decommissioning noise have been undertaken based on the assumption that all noise generating construction plant associated with construction are operating at the same time. The assessment has concluded that the effect from construction noise and vibration associated with the Proposed Development at all dwellings would be **Negligible**.
- 8.13.4 With the use of appropriate mitigation, construction effects associated with the electrical connection route are considered to be **Negligible**.
- 8.13.5 An assessment of the operational noise from REP has been undertaken with the aid of noise modelling software SoundPLAN 8.0. The results of the noise modelling indicate that the rating level associated with REP would fall to the proposed NOEL and be below the background noise levels. With reference to BS 4142 this is an indication of the specific source having a low impact. Therefore, operational effects are considered to be **Negligible**.

8.14 References

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