

Indaver Rivenhall IWMF DCO

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ES CHAPTER 8: NOISE AND VIBRATION

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Indaver Rivenhall Ltd

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8 Noise and Vibration

8.1 Introduction

- 8.1.1 This chapter of the ES was prepared by SLR Consulting Limited and presents an assessment of the likely significant effects of the Proposed Development on noise and vibration.
- 8.1.2 Preliminary assessment results were included within the PEI Report and were based on a previous acoustic assessment for the Proposed Development undertaken by Belair Research Limited in July 2015 which formed part of the 2015 ES Addendum for the Consented Scheme.
- 8.1.3 This chapter presents a full assessment of the Proposed Development utilising updated drawings and a detailed noise modelling process to verify the results presented within the PEI Report.
- 8.1.4 This chapter contains the following appendices (**ES Volume 2, Appendices (Doc Ref. 6.2)**):
- **Appendix 8.1: Glossary of Acoustic Terminology;** and
 - **Appendix 8.2: Noise model input data provided by EPC Contractor.**

Competence

- 8.1.5 The author is Emma Aspinall, who has over 6 years' experience in Acoustic Consultancy, a post graduate Diploma in Acoustics. Emma is an Associate Member of the Institute of Acoustics (AMIOA).
- 8.1.6 This chapter has been reviewed by Benedict Sarton, who has over 18 years' experience in Acoustic Consultancy, a post graduate Diploma in Acoustics and is a full corporate Member of the Institute of Acoustics (MIOA).

8.2 Legislation, Planning Policy and Guidance

Legislation Context

- 8.2.1 The following legislation is relevant to the Proposed Development:
- Environmental Protection Act 1990¹; and
 - Control of Pollution Act 1974².

Planning Policy Context

- 8.2.2 The following national and local planning policy is relevant to the Proposed Development:

National

- National Planning Policy Framework (2023)³;

- Planning Practice Guidance (2019)⁴;
- Noise Policy Statement for England ('NPSE') (2010)⁵;
- National Policy Statement ('NPS') EN-1⁶;
- NPS for Renewable Energy Infrastructure (EN-3)⁷;
- Revised draft NPS EN-1⁸; and
- Revised draft NPS EN-3⁹.

8.2.3 On 6 March 2014, the Department for Communities and Local Government (DCLG) launched the Planning Practice Guidance (PPG) web-based resource, which was updated on 22 July 2019.

8.2.4 The section on noise includes a table that summarises "*the noise exposure hierarchy*" which offers "*examples of outcomes*" relevant to the 'No Observed Effect Level' (NOEL), 'Lowest Observed Adverse Effect Level' (LOAEL) and 'Significant Observed Adverse Effect Level' (SOAEL) effect levels described in the NPSE and discussed below. These outcomes are in descriptive form. There is still no numerical definition of the NOEL, LOAEL and SOAEL and no reference to the further research that was identified as necessary in the NPSE in 2010.

8.2.5 With reference to the above, Table 8.6 defines the noise exposure hierarchy in numerical terms in accordance with the relevant guidance and/or planning conditions.

8.2.6 The NPSE was published on 15th March 2010 and sets out the vision of government noise policy to '*promote good health and a good quality of life through the management of noise*' within the context of Government policy on sustainable development.

8.2.7 The aims of the NPSE are:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *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 improvement of health and quality of life."*

Local

- Essex and Southend-on-Sea Waste Local Plan 2017¹⁰; and
- Braintree District Local Plan 2013-2033 (2022)¹¹.

Guidance

8.2.8 The following guidance is relevant to the Proposed Development:

- IEMA, The Guidelines for Environmental Noise Impact Assessment (2014)¹² ('IEMA Guidelines'), which detail generic noise impacts and provide magnitude of impact descriptors which have been used for this assessment; and

- Air Quality Technical Advisory Group 09 Guidance on the effects of industrial noise on wildlife (2005)¹³ (AQTAG09), which provides noise limits for ecological receptors.

8.3 Consultation

EIA Scoping Study

- 8.3.1 A request for a Scoping Opinion was submitted by the Applicant to the Planning Inspectorate on April 25th 2023. An EIA Scoping Report ('Scoping Report') accompanied the request (**ES Volume 2, Appendix 5.1: EIA Scoping Report (Doc Ref. 6.2)**). A Scoping Opinion ('Scoping Opinion') was issued by the Planning Inspectorate on 6th June 2023 (**ES Volume 2, Appendix 5.2: Planning Inspectorate Scoping Opinion (Doc Ref. 6.2)**) which included comments from statutory consultees. Table 8.1 summarises key comments raised by consultees of relevance to this assessment during the EIA Scoping study and how the assessment responded to them.

Table 8.1: EIA Scoping Response Summary

Consultee and Comment	Response
<i>The Planning Inspectorate (06 June 2023)</i>	
The Inspectorate agrees that the effects of road traffic noise can be scoped out of further assessment.	N/A
The scoping report states that during the operational phase, the Proposed Development is unlikely to give rise to any vibration that would be measurable beyond the Site boundary. However as noted in ID 3.2.4, the Inspectorate considers that the scoping report has provided insufficient justification for scoping this matter out. In the absence of information such as evidence demonstrating clear agreement with relevant statutory bodies, the Inspectorate is not in a position to agree to scope this matter from the assessment. Accordingly the ES should include an assessment of this matter or the information referred to demonstrating the absence of likely significant effects.	Further information is provided within paragraphs 8.4.3 to 8.4.8 of this ES chapter to justify that operational vibration effects would not be significant on sensitive receptors.
Identification of noise effects on the closest ecological receptors, which includes Storey's Wood Local Wildlife Site (LWS) and Upney Wood LWS. The ES should ensure that all noise receptors are identified, and if receptors are to be	Further information is provided within paragraphs 8.6.9 to 8.6.11 of this ES chapter to justify that operational noise effects upon ecological receptors would not be significant.

Consultee and Comment	Response
excluded from the assessment, a justification should be provided.	
Increased volume of steam sent to the turbine. It is unclear if the increased volume of steam will increase the number of turbine rotations and whether this will lead to a change in noise or vibration effects. The ES should identify the impacts arising from the increased volume of steam sent to the turbine as a result of the Proposed Development on relevant noise and vibration.	It has been considered that the increased volume of steam sent to the turbine will have no effect on the noise output from the Proposed Development (see Chapter 3: Proposed Development and Construction for further details). The only change to the Energy from Waste (EfW) plant which was assessed for the Consented Scheme is in relation to the inlet control valves. This will allow it to run at greater efficiency to generate a greater output, with no additional inputs required. As such, the potential for noise and vibration effects at sensitive receptors due to the increase in steam to the turbine is not considered further within this ES chapter.
<i>Braintree District Council (BDC) (23 May 2023)</i>	
Receptors at Silver End and Park Gate Road should be included within the assessment to ensure adequate assessment of nearby sensitive receptors in varying directions of propagation.	Receptors along Park Gate Road including Park Gate Farm Cottages have been included in the assessment. Receptors at Silver End, including Sheepcotes Farm have been included in the assessment.
The Scoping Report states that the calculations provided by the EPC contractor would be relied upon in the event that data provided by the EPC contractor is unsuitable. In such a case it would be necessary to undertake revised calculations. It is assumed that this is a typo. However, clarification is required to confirm that 'Method 2' would be utilised in the event that 'Method 1' is deemed unsuitable.	Octave band sound power levels and locations for proposed plant have been provided by the EPC contractor. The data has been analysed and is considered to suitably represent noise levels associated with the proposed plant for the Proposed Development. Therefore, given the suitable nature of the data provided, Method 2 has been utilised for the purposes of this assessment.
It is therefore recommended that an updated survey is undertaken to support the identification of thresholds for residential impacts. The thresholds should be based on existing or updated survey data, whichever is lower. Survey data for all survey periods should be presented and for all working periods. Presentation of survey data should include statistical	In terms of the proposed assessment methodology and thresholds used, the assessment presented within this Chapter remains in-line with the methodology used for the Consented Scheme and has been agreed with the Inspectorate. Therefore, the noise limits used as part of this assessment will remain consistent with the Consented

Consultee and Comment	Response
<p>analysis of background sound levels for all survey years. Assessment of rating sound levels over background should be presented within the ES to provide further context to the assessment.</p>	<p>Scheme and updated survey data has not been used to inform this assessment.</p>
<p><i>Essex County Council (ECC) (23 May 2023)</i></p>	
<p>It is therefore considered that rather than assessing whether the proposed changes would still enable the development to operate in compliance with the planning conditions of the IWMF planning permission, the EIA should undertake a new noise impact assessment to show the IWMF as proposed to be changed, when combined with the cumulative impacts from other development namely operations at Bradwell Quarry, would be compliant with current noise guidance, particularly BS4142:2014+A1:2019. And if necessary propose noise mitigation to ensure compliance with the new guidance. Should a DCO be granted, it may require revised noise conditions to meet the requirements of the current guidance. For information there are no specific noise limits set within the Environmental Permit issued by the Environment Agency.</p>	<p>The assessment for the DCO relates to the increased output from the Proposed Development and it has been confirmed that the proposed plant for the EfW remains the same as the Consented Scheme.</p> <p>A cumulative assessment alongside operations from Bradwell Quarry has been undertaken.</p>
<p>It is not considered that revised background noise monitoring is required as those contained within previous assessments are still considered relevant. However, since the grant of planning permission for the IWMF, new housing is under construction and in occupation on the south east edge of Silver End Village (north of Western Road), the closest properties being approximately 1km from the IWMF site. It is therefore considered that an additional sensitive receptor should be considered on Jewitt Way, Silver End and for this new receptor background noise levels would need to be established.</p>	<p>The assessment includes the closest sensitive receptors and as these lie closer to the Proposed Development than properties along Jewitt Way, it is considered that if no impact is identified at these locations, no impact will be experienced at those which lie further away.</p>

PEI Report Consultation

8.3.2 Chapter 8: Noise of the PEI Report was subject to review by statutory consultees. A summary of the key comments from this review are provided in Table 8.2.

Table 8.2: PEI Report Response Summary

Consultee and Comment	Response
<i>Jacobs on behalf of ECC (August 2023)</i>	
Reference is needed to Planning Practice Guidance on the consideration of noise impacts	This has been included in this ES chapter (see para. 8.2.3 and Table 8.6).
It is considered that that is it unclear how the facility will generate a greater output of electricity and what the impactions of that would be.	The only change to the Energy from Waste (EfW) plant which was assessed for the Consented Scheme is in relation to the inlet control valves. This will allow it to run at greater efficiency to generate a greater output, with no additional inputs required. There are no other changes to the facility. Therefore, it is considered that there would be no changes in the level of noise and vibration generated by the plant.
In terms of the noise survey, it is unclear whether a new survey has been undertaken or if it was just for new noise receptors in Silver End or a more extensive survey was undertaken. In addition, information is needed to substantiate the claim that the 2005 measurements are still relevant as reference in the 2015 survey, as such the baseline data needs to be robustly demonstrated that it is justified.	Within the ECC consultation response to the Request for a Scoping Opinion, the need for additional background noise monitoring was not considered necessary, except for new receptors identified on Jewitt Way, Silver End. Given that the assessment will consider the closest sensitive receptors, if no impact is identified at these receptors, it is considered that no impact would be experienced at receptors further away along Jewitt Way. Given that there are noise limits associated with the Consented Scheme, the assessment would not be based on measured baseline sound levels at the receptors. Therefore, the relevance of the 2005 measurements is minimal and as such it was not considered necessary to use updated baseline survey data for the purposes of this updated assessment.
It would be expected that the ES robustly demonstrate that the use of the current noise limits remains valid. In particular, reference should be made to BS4142:2014+A1:2019, given this is	An assessment in-line with BS 4142 is not proposed to be undertaken for this assessment. For the purposes of the DCO application, the assessment relates to the increased electrical output from the EfW

Consultee and Comment	Response
<p>recognised as the appropriate guidance when considering the noise effects of industrial facilities on residential premises. It shall be noted that an assessment in line with the requirements of BS4142:2014+A1:2019 would allow the consideration of impact in accordance with the most current and relevant guidance. It would enable consideration of existing and updated baseline noise monitoring to confirm or revise proposed noise limits. In deriving such limits, the Standard allows for due consideration to be given, as appropriate, to matters such as absolute noise levels (i.e. consideration to guidance in BS 8233 and WHO), context of the sound, and characteristics of the sound.</p>	<p>component of the IWMF which is achieved through changing one item of plant compared to the Consented Scheme. All other plant remains the same as the Consented Scheme. Conditions 38, 39 and 40 set out noise limits for the day, evening and night-time for the Consented Scheme at the closest receptors. The draft DCO makes clear that the IWMF (as amended by the Proposed Development) would continue to be constructed and operated according to the terms of the planning permission granted by ECC.</p> <p>Therefore, the potential effects of the DCO have been assessed in-line with the consented noise limits, as these are the limits to which the IWMF would be operated in the absence of the Proposed Development.</p> <p>This methodology will ensure that the effects of the Proposed Development can be assessed and, if necessary, measures proposed which specifically mitigate the effects of the DCO.</p>
<p>No justification is provided on why night-time is deemed as more sensitive when compared to daytime.</p>	<p>Night-time is widely accepted as more sensitive than daytime for noise levels due to lower background levels and the likelihood for sleep disturbance.</p>
<p>The facility needs to be treated as one noise source, and not the additional components of that facility, as such combined noise levels needs to be considered.</p>	<p>The assessment considers all items of plant and building noise breakout as part of the Consented Scheme on the assumption that all items would be operating simultaneously to represent a worst-case scenario.</p>
<p><i>Essex County Council</i></p>	
<p>The Scoping Report proposes no new baseline data needs to be gathered as the existing conditions of the existing permission for the IWMF form the baseline. The WPA wholly supports the acoustic specialist view that a new noise assessment is required and the new noise assessment is undertaken in accordance with BS4142:2014 +1:2019, appropriate for the noise effects of industrial facility on residential properties. The EfW should</p>	<p>As already stated, an assessment in-line with BS 4142 is not proposed to be undertaken for this assessment. For the purposes of the DCO application, the assessment relates to the increased electrical output from the IWMF which is achieved through changing one item of plant compared to the Consented Scheme. All other plant remains the same as the Consented Scheme. Conditions 38, 39 and 40 set out noise limits for the day, evening</p>

Consultee and Comment	Response
<p>also be considered as a specific sound source, not the additional component, as BS4142:2014 +A1:2019 is clear that residual and background sound sources/levels should not include any contribution from the specific sound source.</p> <p>It should also be noted that mineral operations are now located more distant to the IWMF than at the time of the assessment in 2005 and 2015. Extraction operations are now complete on land adjacent to the IWMF, with restoration works largely anticipated to be completed within the next 2 years by 2025, prior to operation of the EfW plant. The mineral processing plant area lies approximately 1.3 km to the north and extraction operations in site A7 lie approximately 1.2 km to the east north east of the Application Site. The quarry haul road will in 2025 be the closet element of the quarry to the IWMF at 600m. It is considered that this supports that the noise assessment should be on the basis of an industrial facility as quarrying does now form part of the noise environment.</p>	<p>and night-time at the closest receptors. The draft DCO also makes clear that the IWMF (as amended by the Proposed Development) would continue to be constructed and operated according to the terms of the Consented Scheme.</p> <p>Therefore, it is proposed to assess the potential effects of the DCO in-line with the consented noise limits as these are the limits to which the IWMF will be operated. This methodology will ensure that the effects of the DCO proposals can be assessed and, if necessary, measures proposed to mitigate the effects of the DCO specifically.</p>
<p>When considering evening and night-time operations the noise assessment should take into account the Dry Silo Mortar plant and the bagging plant at Bradwell Quarry processing area which are both permitted to operate in the evenings (18:30 to 22:00) Mondays to Fridays.</p>	<p>A cumulative assessment has been presented to include the noise being generated by the Bradwell Quarry and the results compared to the consented noise limits.</p>

Non-Statutory Consultation

- 8.3.3 Table 8.3 provides a summary or additional non-statutory consultation carried out in addition to the consultation processes out above.

Table 8.3: Non-Statutory Consultation Response Summary

Consultee and Comment	Response
<i>ECC and BDC Technical Meeting</i>	
The noise assessment should be sent to ECC and BDC at the point of submission to allow them to review ahead of PINs. The noise models should also be sent.	It is agreed that the noise ES Chapter will be issued to ECC and BDC at the point of submission to the Planning Inspectorate. The noise models can also be sent for review.

8.4 Assessment Methodology

Summary of Assessment Scope

- 8.4.1 As outlined within the EIA Scoping Report, and as agreed with the Planning Inspectorate via the EIA Scoping Opinion, the scope of the assessment within this chapter will be limited to an assessment of operational noise effects associated with the Proposed Development, which includes noise breakout from the building itself.

Non-Significant Effects

- 8.4.2 It has been agreed via the EIA Scoping Opinion that an operational off-site road traffic noise assessment would be scoped out of the ES.

Operational Vibration

- 8.4.3 As stated in Table 8.1, the EIA Scoping Opinion requested that further justification is provided to demonstrate that there would be no adverse impacts from any operational vibration being generated by the Proposed Development.
- 8.4.4 BS5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration*¹⁴ gives recommendations for basic methods of vibration control relating to construction and open sites where work activities / operations generate significant vibration levels.
- 8.4.5 The majority of people are known to be very sensitive to vibration, the threshold of perception being typically in the peak particle velocity (PPV) range of between 0.14 mm^s⁻¹ and 0.30 mm^s⁻¹. Vibration levels above these values can cause disturbance. BS5228-2:2009+A1:2014 provides guidance on the effects of vibration shown in Table 8.4.

Table 8.4: Risk of Complaints from Vibration Levels

Vibration Level, $\text{mm}^{\text{s}^{-1}}$	Effect
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.
0.30	Vibration might be just perceptible in residential environments.
1.00	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10.00	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

8.4.6 The minimum distance to the nearest vibration sensitive receptor (VSR) from the Site boundary (The Lodge) is approximately 420m.

8.4.7 For vibration to be perceived over this distance a substantial force would need to be applied which can only be achieved through a very high-energy impact. For example, in accordance with Table E.1 of BS5228- 2:2009+A1:2014 Part 2 Vibration, the predicted vibration level for percussive piling using a 500 KJ hammer impact would be $0.04 \text{ mm}^{\text{s}^{-1}}$ which with reference to Table 8.4 is below the level of perceptibility.

8.4.8 The Proposed Development does not contain any mechanically moving parts that are capable of generating a fraction of the energy required to transmit such levels of vibration. Therefore, operational vibration has not been considered any further in this assessment.

Study Area

8.4.9 The Site is bordered to the north by Bradwell Quarry, with open fields and scattered residential receptors surrounding the Site.

8.4.10 The study area encompasses the Site and extends to include the closest off-site Noise Sensitive Receptors (NSRs) which have been identified within the Scoping Report. The NSRs surrounding the Site have been chosen based upon professional judgement as these lie closest to proposed operations of the Proposed Development and receptors beyond these lie at a distance where noise levels would not be significant.

Establishing Baseline Scenarios

Baseline Acoustic Surveys

8.4.11 A baseline monitoring survey was undertaken in October 2005 by Golder Associates (UK) Ltd at locations representative of the closest NSRs as part of the original 2008 planning application for the IWMF Site. An updated noise survey was undertaken in August and October 2015 to inform the 2015 ES Addendum, which confirmed the acoustic environment had remained consistent.

8.4.12 As stated below, the Proposed Development would be carried out in the context of the Consented Scheme which is subject to existing daytime, evening and night-time noise limits. The EIA Scoping Opinion from the Planning Inspectorate was in agreement that the existing noise limits should be used for this assessment. The proposed methodology to be followed within this ES chapter is to ensure that the Proposed Development meets the existing noise limits.

Future Baseline

8.4.13 The baseline for the noise and vibration assessment is taken as the Consented Scheme Future Baseline; this is defined as the operation of the Consented Scheme once fully constructed and operational.

8.4.14 Site operations are subject to existing planning conditions relating to noise associated with the Consented Scheme. Condition 38 states:

“Except for temporary operations, as defined in Condition 42, between the hours of 07:00 and 19:00 the free field Equivalent Continuous Noise Level ($L_{Aeq, 1\text{ hour}}$) at noise sensitive properties adjoining the Site, due to operations in the Site, shall not exceed the $L_{Aeq, 1\text{ hour}}$ levels set out [in Table 8.5]:

Table 8.5: Daytime Noise Limit Criteria – Condition 38

Noise Sensitive Receptor Location	Criterion dB $L_{Aeq, 1\text{ hour}}$
Heron’s Farm	45
Deeks Cottage	45
Haywards	45
Allshot’s Farm	47
The Lodge	49
Sheepcotes Farm	45
Greenpastures Bungalow	45
Goslings Cottage	47
Goslings Farm	47
Goslings Barn	47
Bumby Hall	45
Parkgate Farm Cottage	45

8.4.15 Condition 39 states:

“The free-field continuous sound level ($L_{Aeq, 1\text{-hour}}$) shall not exceed 42 dB $L_{Aeq, 1\text{-hour}}$ between the hours of 19:00 and 23:00 as measured or predicted at noise sensitive properties listed in condition 38.”

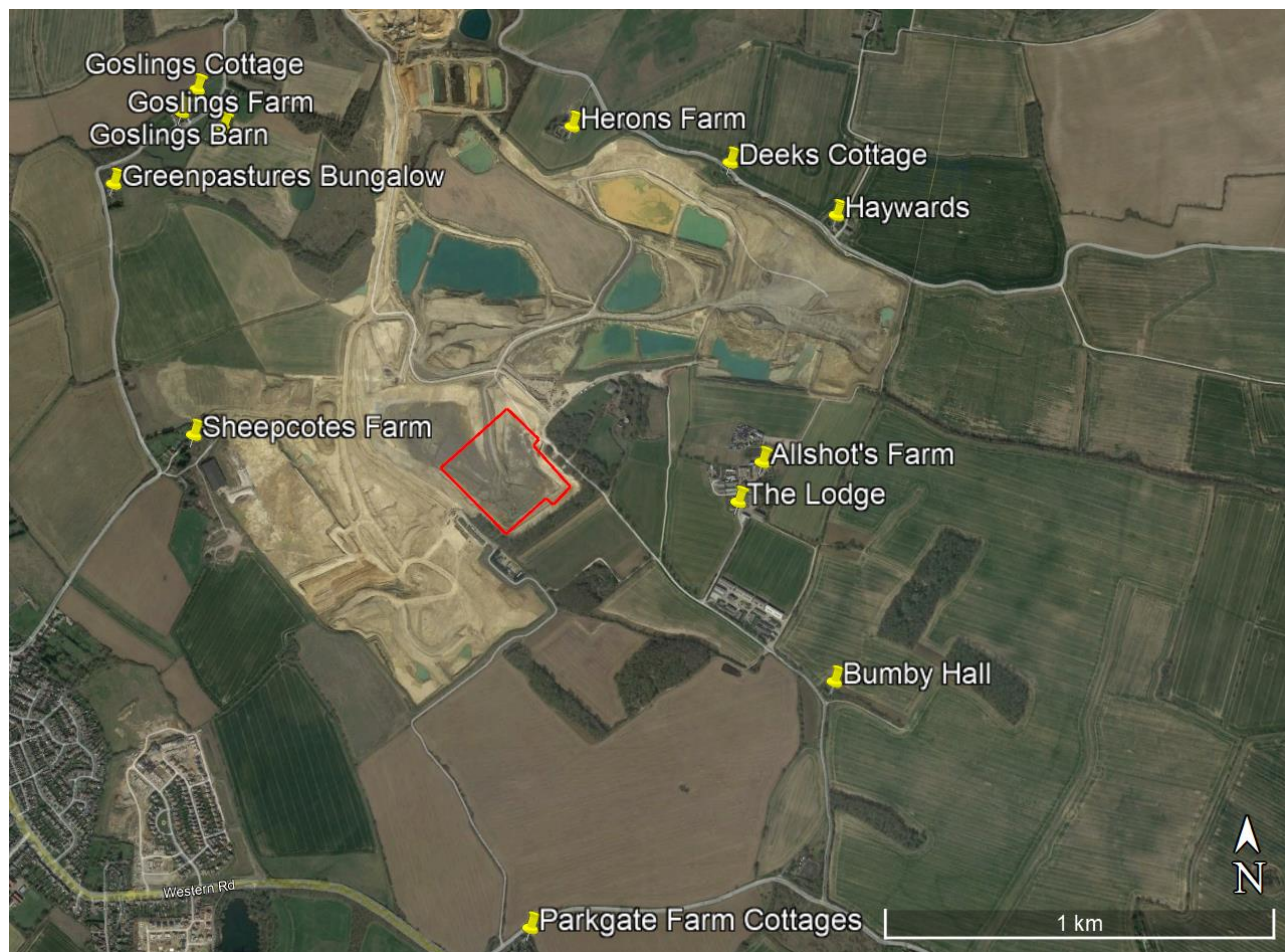
8.4.16 Condition 40 states:

“The free-field continuous sound level ($L_{Aeq, 1-hour}$) shall not exceed 40 dB $L_{Aeq, 5-min}$ between the hours of 23:00 and 07:00 as measured or predicted at noise sensitive properties listed in condition 38.”

8.4.17 The daytime, evening and night-time limits contained in Conditions 38, 39 and 40 have been utilised to determine the effects of noise associated with operational noise from the Proposed Development.

8.4.18 The locations of the receptors (identified in Table 8.5) are shown in Figure 8.1.

Figure 8.1: Sensitive Receptor Locations identified in Condition 38



Identifying Likely Significant Effects

8.4.19 CADNA noise mapping software was used for all potential sources of operational noise. Noise levels generated by the Proposed Development at the nearest NSRs were predicted using the methodology in ISO 9613-2:1996, Acoustics – Attenuation of Sound during Propagation Outdoors¹⁵.

8.4.20 The predicted noise levels provided by HZI, who are the Engineering, Procurement and Construction (EPC) contractor for the Proposed Development, were used and are based on the exact specification of the plant.

8.4.21 Hourly vehicle movements were also included in the daytime and evening scenario, based on the numbers provided for the Consented Scheme of 40 trips per hour.

8.4.22 The impact of the operational noise of the Proposed Development upon existing receptors was calculated and assessed against the noise limits presented in Conditions 38, 39 and 40 (i.e. the Consented Scheme Future Baseline). Based on these limits, the magnitude of impact of operational noise upon NSRs was determined, as outlined in Table 8.6.

Table 8.6: Operational Noise Upon Residential Receptors – Consented Limits

Magnitude	Description	PPG Noise Exposure Hierarchy
High	A specific noise level which is between more than 5dB(A) above the noise limits set in Conditions 38, 39 and 40.	SOAEL
Medium	A specific noise level which is between 3 and 5dB(A) above the noise limits set in Conditions 38, 39 and 40.	
Low	A specific noise level which is between 1 and 3dB(A) above the noise limits set in Conditions 38, 39 and 40.	LOAEL
Negligible	A specific noise level equal or below the noise limits set in Conditions 38, 39 and 40.	NOEL

Cumulative Effects

8.4.23 A cumulative noise assessment was undertaken which includes consented operations associated with Bradwell Quarry.

8.4.24 For the purposes of the cumulative assessment, the noise assessment associated with consented operations for Bradwell Quarry (ESS/12/20/BTE) was used in the cumulative assessment to determine compliance against the noise limits outlined in Table 8.5.

Determining Effect Significance

Sensitivity of Receptor

8.4.25 The sensitivity of the receiving environment is shown in Table 8.7.

Table 8.7: Receptor Sensitivity Descriptors

Value (Sensitivity)	Descriptor
High	Residential properties (night-time)
Medium	Residential properties (daytime)
Low	Offices and other non-noise producing employment areas

Value (Sensitivity)	Descriptor
Negligible	Industrial areas

Magnitude of Impact

8.4.26 The IEMA Guidelines list the following generic definitions for noise impacts, these are provided in Table 8.8.

Table 8.8: Magnitude of Impact Descriptors

Impact Magnitude	Descriptor
High	<i>“Significant changes in behaviour and/or 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”</i>
Moderate	<i>“Causes a material change in behaviour and/or attitude, e.g. voiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area”</i>
Minor	<i>“Noise impact can be heard and causes small changes in behaviour and/ or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life”</i>
Negligible	<i>“Noise impacts can be heard, but do not cause any change in behaviour or attitude, e.g. turning up volume on television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is perceived change in the quality of life”</i>

Assessing Significance

8.4.27 The sensitivity of the receiving environment together with the magnitude of impact defines the level of effect as shown in Table 8.9.

Table 8.9: Significance of Effects Matrix

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

8.4.28 For the purposes of this assessment, where an effect is classified as Major, this is considered to represent a 'significant effect' in terms of the EIA Regulations. Where

an effect is classified as Moderate, this may be considered to represent a 'significant effect' but should always be subject to professional judgement and interpretation, particularly where the sensitivity or impact magnitude levels are not clear or are borderline between categories or the impact is temporary or intermittent.

- 8.4.29 The Significance of Effects Matrix provided within Table 8.9 provides a guide to decision making but is not a substitute for professional judgement.

Assumptions and Limitations

- 8.4.30 The noise predictions were based upon operational noise data for all the proposed plant provided by the Applicant and/or from a report completed by HZI, the EPC contractor. Therefore, it is considered that uncertainty regarding the predicted noise levels was reduced as far as reasonably practicable.
- 8.4.31 The assessment was undertaken using Cadna/A three-dimensional noise modelling of source noise levels at a number of locations both horizontally and vertically. The model was based on ISO 9613 noise propagation methodology and allowed for the prediction of noise levels to be undertaken at the closest NSRs. The noise software calculates noise levels based on the emission parameters and spatial settings that are entered. Assumptions made within the noise model will affect the overall noise levels presented. The assumptions made were based upon the detailed information available when the assessment was undertaken, including building layout, plant layout and elevations. Any subsequent changes would need to be remodelled.

8.5 Baseline Conditions

Existing Baseline Scenario

- 8.5.1 The Site is currently a formerly excavated quarry, with enabling and construction works underway associated with the Consented Scheme.

Future Baseline Scenario

- 8.5.2 The Proposed Development cannot be carried out in the absence of the construction of the EfW plant which forms part of the Consented Scheme.
- 8.5.3 Therefore, this assessment has been carried out against a future baseline which assumes that the Consented Scheme has been constructed and is operational accordance with the IWMF planning permission. This sets noise limits for the closest noise sensitive receptors (detailed in Paragraph 8.4.14-8.4.16). Given these controls in place, these noise limits have been used to assess operational noise from the Proposed Development.
- 8.5.4 Based upon previous monitoring data, the soundscape includes road traffic noise from the A120 and aircraft operating from Stansted Airport. It is considered that the future baseline is unlikely to differ significantly from the current baseline and would not alter the soundscape around the Proposed Development such that impacts would be later rendered higher in magnitude or significance.
- 8.5.5 The operation of the Bradwell Quarry to the north of the Proposed Development may have the potential to impact on daytime baseline sound levels. Therefore, once

operations at the quarry cease daytime baseline sound levels at the nearest receptors may decrease. However, it is considered that the more sensitive evening, weekend and night-time baseline levels would not be influenced by changes in the operational status of the quarry (as the quarry will not be operational during these periods).

Summary of Receptors and Sensitivity

8.5.6 Table 8.10 summarises the closest existing sensitive receptor locations to the Site for the assessment of operational noise from the completed Proposed Development.

8.5.7 The location of these receptors is shown on Figure 8.1.

Table 8.10: Summary of Receptor Sensitivity

Receptor		Sensitivity (Value)
<i>Existing</i>		
R01	Heron's Farm	Medium – Daytime/Evening High – Night-time
R02	Deeks Cottage	
R03	Haywards	
R04	Allshot's Farm	
R05	The Lodge	
R06	Sheepcotes Farm	
R07	Greenpastures Bungalow	
R08	Goslings Cottage	
R09	Goslings Farm	
R10	Goslings Barn	
R11	Bumby Hall	
R12	Parkgate Farm Cottage	

8.6 Assessment of Operational Effects

Noise Model

8.6.1 A detailed modelling exercise using the Cadna/A noise modelling software and the calculation algorithms contained in ISO9613-2 has been undertaken. The operational plant noise levels of the Consented Scheme as amended by the Proposed Development provided by the EPC contractor are outlined within Appendix 8.2 and have been used within the noise model.

8.6.2 The noise model has also been based on the following inputs and assumptions:

- A ground absorption factor of 0.75.
- A reflection factor of 3.
- Detailed topographical modelling for the Site and surrounding area.

- All items of modelled plant for the EfW operating simultaneously 100% of the time to represent a worst-case scenario.
- During the daytime (07:00 to 23:00) and evening (19:00 to 23:00) sound levels have been predicted at 1.5m above local ground level which is the approximate height of a ground floor window. During the night-time (23:00 to 07:00) sound levels have been predicted at 4m above local ground level, which is the approximate height of a first-floor window.
- The daytime predictions include the noise generated by on-site heavy goods vehicle movements which are based on the numbers provided for the Consented Scheme of 40 trips per hour. It is expected that movements to the Consented Scheme as amended by the Proposed Development itself would be less than this, but a worst-case daytime scenario has been assessed.
- During the night-time there would be no operations associated with the tipping hall, so this area of the Site has not been considered in the night-time model.
- During the night-time the Fabric Filter Pumps would also not be operational.

Assessment of Residential Receptors

8.6.3 The predicted noise levels at the closest noise sensitive receptors are shown in Tables 8.11 to 8.13 and have been compared to the relevant daytime, evening and night-time noise limits for the Consented Scheme.

8.6.4 It should be noted that all predicted noise levels have been rounded to the nearest decibel.

Table 8.11: Daytime Noise Assessment, dB

Receptor		Predicted Noise Level $L_{Aeq,T}$	Daytime Noise Limit, $L_{Aeq,T}$
R01	Heron's Farm	40	45
R02	Deeks Cottage	36	45
R03	Haywards	35	45
R04	Allshot's Farm	40	47
R05	The Lodge	41	49
R06	Sheepcotes Farm	40	45
R07	Greenpastures Bungalow	38	45
R08	Goslings Cottage	41	47
R09	Goslings Farm	41	47
R10	Goslings Barn	41	47
R11	Bumby Hall	37	45
R12	Parkgate Farm Cottage	34	45

Table 8.12: Evening Noise Assessment, dB

Receptor		Predicted Noise Level $L_{Aeq,T}$	Evening Noise Limit, $L_{Aeq,T}$
R01	Heron's Farm	27	42
R02	Deeks Cottage	26	
R03	Haywards	28	
R04	Allshot's Farm	33	
R05	The Lodge	38	
R06	Sheepcotes Farm	33	
R07	Greenpastures Bungalow	29	
R08	Goslings Cottage	29	
R09	Goslings Farm	30	
R10	Goslings Barn	30	
R11	Bumby Hall	32	
R12	Parkgate Farm Cottage	30	

Table 8.13: Night-time Noise Assessment, dB

Receptor		Predicted Noise Level $L_{Aeq,T}$	Night-time Noise Limit, $L_{Aeq,T}$
R01	Heron's Farm	27	40
R02	Deeks Cottage	28	
R03	Haywards	29	
R04	Allshot's Farm	35	
R05	The Lodge	39	
R06	Sheepcotes Farm	31	
R07	Greenpastures Bungalow	26	
R08	Goslings Cottage	25	
R09	Goslings Farm	26	
R10	Goslings Barn	25	
R11	Bumby Hall	32	
R12	Parkgate Farm Cottage	31	

8.6.5 It can be seen from Table 8.11, 8.12 and 8.13 that the modelled predicted noise levels are below the daytime, evening and night-time noise limits at all the identified receptors.

8.6.6 With reference to Tables 8.6 and 8.7, operational noise impacts are negligible magnitude at receptors of medium sensitivity during the daytime and evening. Therefore, with reference to Table 8.9 the significance of effect is negligible which

is not significant in EIA terms. It can also be seen from Table 8.6 that the predicted specific noise levels would equate to a NOEL in conjunction with the PPG Noise Exposure Hierarchy

- 8.6.7 With reference to Tables 8.6 and 8.7, operational noise impacts are negligible magnitude at receptors of high sensitivity during the night-time. Therefore, with reference to Table 8.9 the significance of effect is negligible which is not significant in EIA terms. It can also be seen from Table 8.6 that the predicted specific noise levels would equate to a NOEL in conjunction with the PPG Noise Exposure Hierarchy.
- 8.6.8 A noise contour plot of the predicted specific sound level during the daytime and night-time periods can be seen on Figures 8.2 and 8.3 respectively.

Figure 8.2: Predicted Daytime Specific Sound Level at Grid Height of 1.5m – dB(A)

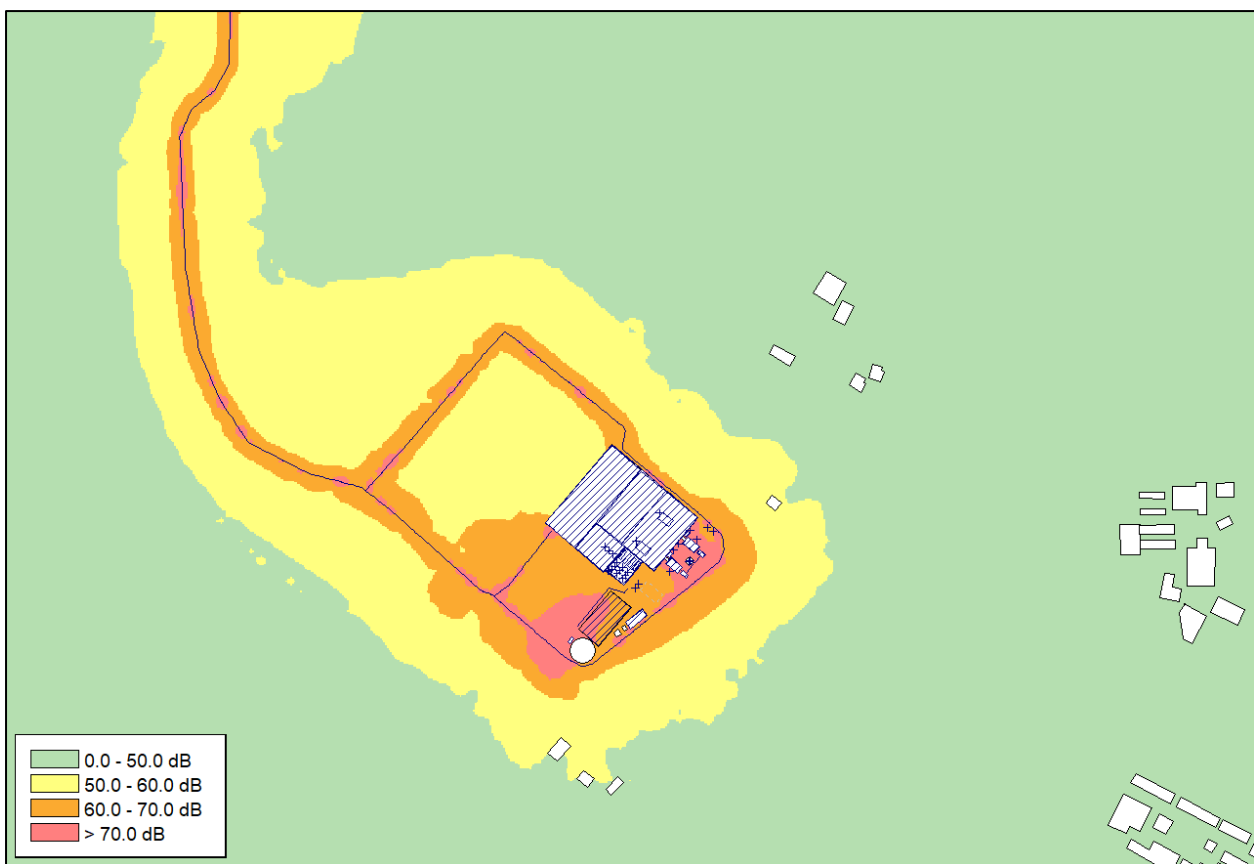
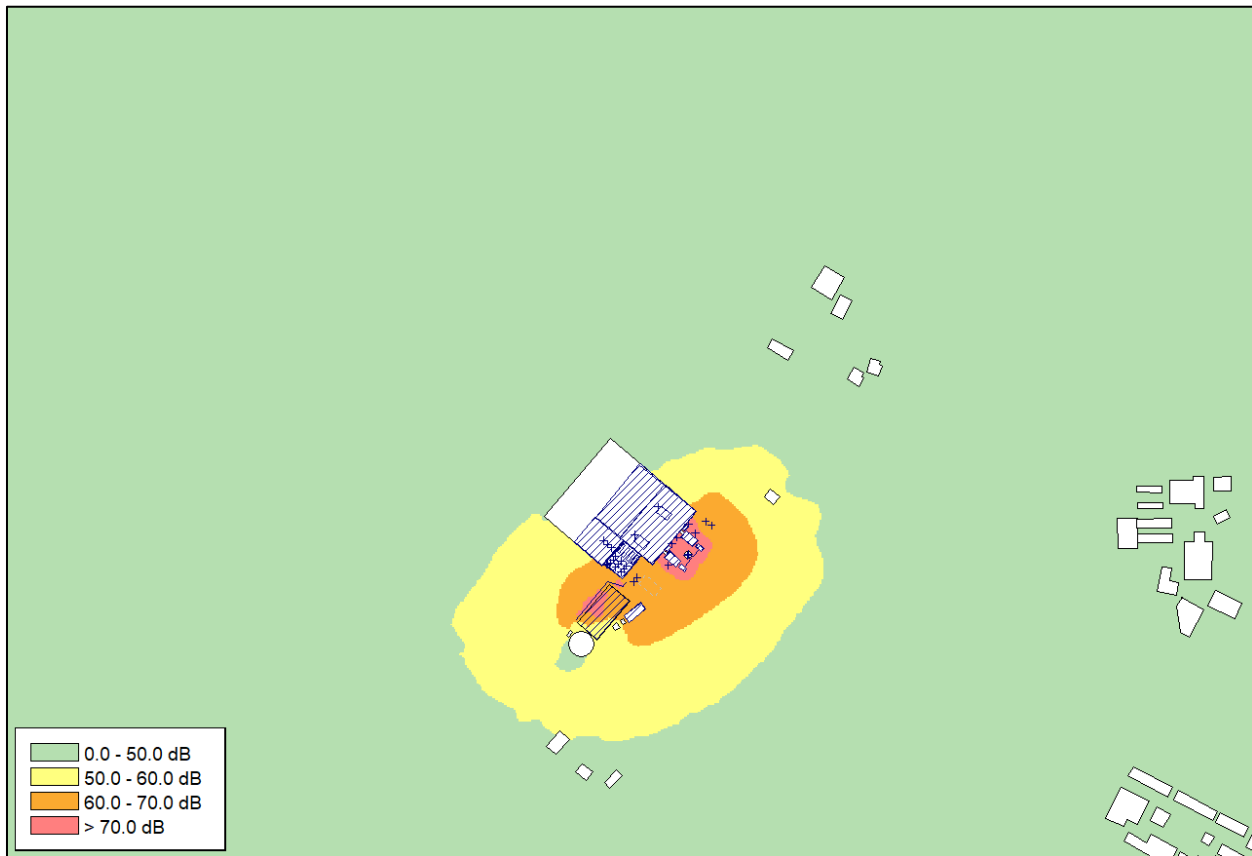


Figure 8.3: Predicted Night-time Specific Sound Level at Grid Height of 4.0m – dB(A)



Assessment of Ecological Receptors

- 8.6.9 In addition to the above assessment on the closest sensitive residential receptors, the Scoping Opinion received by the Planning Inspectorate requested that the assessment should identify the noise effects on the closest ecological receptors. This includes Storey's Wood Local Wildlife Site (LWS) and Upney Wood LWS, located approximately 290m south and 900m south east from the Site boundary respectively.
- 8.6.10 There is no specific guidance in relation to the effects of noise upon ecological receptors. However, the Air Quality Technical Advisory Group 09 Guidance on the effects of industrial noise on wildlife (ATAG09) provides guidance to assist planning and/or licensing officials handling pollution prevention and control applications for industrial installations on relevant noise emissions and relates these to the requirements of the Habitats Regulations.
- 8.6.11 The Habitats Directive (92/43/EEC)¹⁶ specifies that, where specific noise from industry measured at the habitat / nest site is below 55dB $L_{Aeq,1hr}$, it is considered unlikely that it will have an adverse impact on designated species.
- 8.6.12 As shown from the assessment tables above, noise levels at the closest assessed residential receptors fall well below the 55dB $L_{Aeq,1hr}$ threshold. Therefore, noise levels at the closest ecological receptors which lie further away than the closest residential receptors, will also fall below this threshold and the noise effects will not be significant at these receptors.

Mitigation, Monitoring and Residual Effects

- 8.6.13 The assessment has established that the potential noise effects of the Proposed Development will be negligible and not significant. Therefore, no noise mitigation measures are necessary.
- 8.6.14 As no mitigation measures are required, the residual effects are as described above.
- 8.6.15 Once the Proposed Development is operational, it is recommended that a programme of compliance monitoring is undertaken at the receptors considered to determine compliance with the consented noise limits.
- 8.6.16 Such compliance monitoring is required by condition 41 of the IWMF planning permission. The draft DCO makes clear that the IWMF (as amended by the Proposed Development) would continue to be constructed and operated according to the terms of the IWMF planning permission (including condition 41).
- 8.6.17 Condition 41 states:

“Noise levels shall be monitored at three monthly intervals at up to five of the locations, listed in Condition 38, as agreed with the Waste Planning Authority. The results of the monitoring shall include the L_{A90} and L_{Aeq} noise levels, the prevailing weather conditions, details of the measurement equipment used and its calibration and comments on the sources of noise which control the noise climate. The survey shall be for four separate 15 minute periods, two during the working day 0700 and 1830, and two during the evening/night time 18:30 to 07:00 hours, the results shall be kept by the operating company during the life of the permitted operations and a copy shall be supplied to the Waste Planning Authority. After the first year of operation of the IWMF, the frequency of the monitoring may be modified by agreement with the Waste Planning Authority.”

8.7 Cumulative Effects

Assessment

- 8.7.1 Cumulative predicted noise levels from the Proposed Development and consented operations at Bradwell Quarry have been assessed for the daytime period. The night-time period has not been assessed for cumulative operations as the quarry will not be operational during this period.
- 8.7.2 The predicted specific noise level from Bradwell Quarry have been taken from the Noise Impact Assessment associated with consented operations for Bradwell Quarryⁱ. Receptors R11 and R12 were not assessed as part of the assessment for Bradwell Quarry and have not been included within this cumulative assessment. Given the greater distance from the quarry operations for R11 and R12, cumulative noise levels are unlikely to give rise to significant effects.

ⁱ Ref: ESS/12/20/BTE

Table 8.14: Cumulative Assessment with Bradwell Quarry Operation - Daytime, dB

Receptor		Daytime Predicted Specific Noise Level, $L_{Aeq,1hr}$ Proposed Development	Daytime Predicted Specific Noise Level, $L_{Aeq,1hr}$ Bradwell Quarry	Total Cumulative Level, dB $L_{Aeq,1hr}$	Daytime Noise Limit, $L_{Aeq,T}$
R01	Heron's Farm	39.7	42	44.0	45
R02	Deeks Cottage	36.2	42	43.0	45
R03	Haywards	35.4	46	46.4	45
R04	Allshot's Farm	40.0	44	45.5	47
R05	The Lodge	41.4	43	45.3	49
R06	Sheepcotes Farm	40.1	35	41.3	45
R07	Greenpastures Bungalow	38.0	41	42.8	45
R08	Goslings Cottage	41.2	41	44.1	47
R09	Goslings Farm	41.0	41	44.0	47
R10	Goslings Barn	40.9	41	44.0	47

8.7.3 Table 8.14 shows that cumulative noise levels fall below the daytime noise limit at the closest sensitive receptors, with the exception of R03. It can be seen that at this receptor the noise levels associated with consented operations at Bradwell Quarry exceed the daytime noise limit for the Consented Scheme in the absence of the Proposed Development by 1dB. As such, the Proposed Development is not the cause for this exceedance.

8.7.4 With reference to Tables 8.6 and 8.7, cumulative noise impacts are of negligible magnitude at all NSRs given they have medium sensitivity during the daytime. Therefore, with reference to Table 8.9, the significance of effects at all receptors is negligible, which is not significant in EIA terms. It can also be seen from Table 8.6 that the predicted cumulative noise levels would equate to a NOEL in conjunction with the PPG Noise Exposure Hierarchy.

Mitigation, Monitoring and Residual Effects

8.7.5 As identified above, no mitigation measures are proposed as the potential noise effects are negligible and not significant.

8.7.1 As set out in paragraph 8.6.8, once the Proposed Development is operational it is recommended that a programme of compliance monitoring is undertaken. This is secured by condition 41 of the IWMF planning permission, which the draft DCO makes clear would continue to bind the operation of the Consented Scheme as amended by the Proposed Development.

8.7.2 Table 8.15 provides a summary of the residual effects following the assessment presented in this chapter.

Table 8.15: Summary of Residual Effects

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact	Mitigation and Monitoring	Residual Effect
<i>Operational Development</i>						
Operational Noise	High – Night-time	Local	Permanent	Negligible	Compliance monitoring is required by condition 41 of the IWMF planning permission. The draft DCO makes clear that the IWMF (as amended by the Proposed Development) would continue to be constructed and operated according to the terms of the IWMF planning permission (including condition 41).	Negligible
	Medium – Daytime/ Evening			Negligible		Negligible
<i>Cumulative Effects</i>						
Operational Noise	High – Night-time	Local	Permanent	Negligible	Compliance monitoring is required by condition 41 of	Negligible
	Medium – Daytime/ Evening			Negligible		Negligible

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact	Mitigation and Monitoring	Residual Effect
					the IWMF planning permission. The draft DCO makes clear that the IWMF (as amended by the Proposed Development) would continue to be constructed and operated according to the terms of the IWMF planning permission (including condition 41).	

References

- ¹ Her Majesty's Stationary Office, (1990). Environmental Protection Act 1990
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- ⁶ Department of Energy and Climate Change ('DECC'), (2011). Overarching National Policy Statement for Energy (EN-1). July 2011.
- ⁷ DECC, (2011). National Policy Statement for Renewable Energy Infrastructure (EN-3). July 2011.
- ⁸ DESNZ, (2023). Revised (draft) Overarching National Policy Statement for Energy (EN-1). March 2023.
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- ¹⁰ Essex County Council (2017). Essex and Southend-on-Sea Waste Local Plan 2017.
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- ¹³ Ormerod, L., Goodlad, N. and Horton, K. (2005). AQTAG09 – Guidance on the Effects of Industrial Noise on Wildlife. Air Quality Technical Advisory Group.
- ¹⁴ BSI Group (2014). BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'
- ¹⁵ International Organization for Standardization (ISO) 9613-2:1996, Acoustics – Attenuation of Sound during Propagation Outdoors.
- ¹⁶ European Commission (1992): EC Directive on the Conservation of Natural Habitats and Wild Flora and Fauna, 92/43/EEC

