
6 ENVIRONMENTAL IMPACTS

6.4 Noise

Background

6.4.1 Scoping concluded a need to give detailed consideration to potential noise impacts by way of baseline monitoring and predictive modelling.

6.4.2 The purpose of the assessment has been to identify any increase in noise during daytime/night-time periods over ambient noise levels, and the tonal characteristics and output levels of noise emitted by equipment used during operational phase of the proposed scheme.

Scope of the Assessment

6.4.3 In order to establish an up to date representative noise baseline, the applicant commissioned Kirby Charles Associates to undertake an independent noise survey and feasibility assessment at the site in June 2011. This was submitted to SCC for information purposes in September 2011, and also included an assessment of the proposals based on a preliminary design.

6.4.4 Following development and refinement of the proposed scheme in 2012, a number of significant changes were made to the preliminary design and layout configuration, resulting in a need to revisit this assessment. Accordingly, RSK Environment Ltd has undertaken a new assessment based on the final design of the proposals and operational regimes, referencing the baseline data gathered in June 2011 by Kirby Charles Associates.

6.4.5 Focus has been directed in the assessment towards the identification of potential noise increases associated with the operation of the containerised generator plant, externally sited ancillary equipment and exhaust stacks.

6.4.6 Noise predictions have been calculated using CadnaA noise-modeling software.

6.4.7 In order to validate the conclusions of this assessment, noise levels of similar equipment currently operating at a similar site operated by Greenpark Energy Limited at Houghton Main (South Yorkshire) have been used. Operational monitoring data was gathered on the 26th June 2012 by Bruce Smith (Acoustic Associates) on behalf of Alkane Energy UK Limited, and is presented in **Appendix 6**.

Noise Standards and Guidelines

6.4.8 The National Planning Policy Framework gives guidance to local authorities on the use of planning powers to minimise adverse noise impacts from development.

6.4.9 In relation to noise from industrial and commercial developments the likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS4142.

6.4.10 Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the “rating level” defined in BS4142. This rating level should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the development (expressed in terms of the rating level) and the existing background noise level.

- 6.4.11 The Standard indicates that a difference of around 10 dB or higher indicates that complaints are likely, and a difference of around 5 dB is of marginal significance.
- 6.4.12 BS 4142 references two indices:
- **L90** - the level of noise exceeded for 90% of the measurement period, this is known as the background noise level, and
 - **Leq**, i.e. the equivalent continuous noise level, which is the steady noise level that contains the same amount of energy over a specific time period as that in a fluctuating sound. This level can be A-weighted (LAeq) in order to account for the sensitivity of the human ear.
- 6.4.13 The assessment procedure contained in BS4142 compares the noise from a fixed installation, using the Leq index corrected for tonal components etc., with the background noise level for the area (i.e. the L90 index). If the corrected noise from the proposals is +10 dB or more above the background noise level this is a positive indication that complaints would be likely, whilst a difference of -10 dB would be a positive indication that complaints would be unlikely. Differences of +5 dB are of marginal significance.
- 6.4.14 BS4142 states that the method is not suitable for assessing the noise inside buildings or when the background and rating noise levels are both very low. For the purposes of the standard, background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low.
- 6.4.15 BS8233 indicates that for gardens and balconies etc, it is desirable that the steady noise level does not exceed 50 dB LAeq_T and 55 dB LAeq_T should be regarded as the upper limit. An indication of the design target for indoor ambient noise levels is reproduced from the Standard in Table 6.1 below.

Table 6.1: Indoor ambient noise levels in spaces when they are unoccupied

Criterion	Typical Situation	Design Range LA _{eqT} dB	
		Good	Reasonable
Reasonable resting/sleeping conditions	Living rooms	30	40
	Bedrooms*	30	35
* For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L _{Amax} .			

- 6.4.16 BS8233 states that the level of sound reduction that can be actuated via an open window is between 10-15 dB. Therefore, the external targets at the façade of a residential building in order to meet the 'Good' and 'Reasonable' design range for sleeping conditions are between 40-45 dB and 45-50 dB respectively.

Assessment Assumptions

- 6.4.17 The assessment has been based on the following design assumptions.
- Extraction of ground gas from a previously drilled borehole via underground pipe.
 - Installation of two containerised CAT 2.0 MWe generators, with only one generator operating 24 hours a day 7 days a week at any given time, and contained within one half of a new barn at Three Nooks Farm.
 - Generator radiators and associated plant and equipment sited external to the farm building.

- Noise from the generator exhaust stack will be limited to an appropriate level forming part of the generator package (discussed in the mitigation section below).
- A construction specification of the new barn, based on details presented in **Section 5**.

6.4.18 Specifications for the proposed plant and equipment referenced in the assessment are presented in **Appendix 7**.

6.4.19 As an involved party in the project, the owner of Three Nooks Farm would not be considered within a BS4142 Assessment; however in order to protect the amenity of residents of the property, an assessment to BS8233 internal noise targets has been undertaken.

Noise Monitoring and the Existing Noise Climate

6.4.20 Monitoring was carried out at Three Nooks Farm by Kirby Charles Associates from 20.20 hrs on Monday 20th June 2011 to 03.10 hrs on Tuesday 21st June 2011. The noise monitor was positioned adjacent to Lask Edge Farmhouse at the Leek Lane / Lask Edge Road junction; this location was selected because it would give a representative indication of the general noise climate of the local area (excluding any working farm noise).

6.4.21 Monitoring was undertaken using a Cirrus Type CR811B Precision (Type 1) Integrating/Logging Sound Level Meter, and was calibrated before and after the monitoring periods using a Cirrus Type CR511E Calibrator, which complies with IEC 942. No drift in calibration was observed.

6.4.22 The microphone was positioned 1.5m above ground level and equipped with a windshield. Noise monitoring was undertaken when the weather conditions satisfied the requirements of BS4142: 1997, i.e. mean wind speed less than 5m/s and no significant rainfall. Wind speeds were recorded using an anemometer. Personnel were present throughout the monitoring periods to ensure an accurate representation of the prevailing noise climate was recorded.

6.4.23 Monitoring results indicate that the lowest night-time noise climate is typically 37 dB LAeq_{5min} and 27 dB LA90_{5min}. Full noise survey results for Three Nooks Farm are presented in **Appendix 8**.

Receptor Locations

6.4.24 The assessment has considered the worst-case night-time noise impact of the proposed scheme on a selection of residential receptors in the area, comprising the following locations presented in Table 6.2 (height of receptor based on whether residence is a bungalow or a property with upper storey floors).

Table 6.2: Residential Receptors

ID	Name	Height of receptor point	Coordinates	
			x	y
R1	Dales Close	4.5	390831.0	357973.6
R2	Leek Lane	4.5	391020.3	357673.6
R3	Poolside Farm	4.5	391347.9	358155.6
R4	Wellfield Farm	4.5	391388.2	358164.9
R5	Lask Edge Farm	4.5	391428.0	357543.0
R6	Three Nooks Farm	4.5	391511.5	357853.6
R7	Catt Hayes Farm	1.5	391868.9	357575.2

ID	Name	Height of receptor point	Coordinates	
			x	y
R8	Sprinks Farm	4.5	392101.6	357935.1
R9	Croft Meadows Farm	4.5	392043.3	357691.6

6.4.25 Receptor locations in relation to the site are presented in **Figure 15A**. Details of the modeling, including assumptions based on equipment data, are provided in **Appendix 9**.

Predicted Impacts and Mitigation

6.4.26 Noise predictions have been calculated based on the layout presented in **Figure 16**.

6.4.27 Table 6.3 below presents the results of a BS4142 assessment utilising a +5 dB correction on plant noise levels at receptor points to account for tonality of equipment. The rating noise level contours are presented graphically on **Figure 17**.

Table 6.3: BS4142 Assessment

ID	Name	Background Noise Level (L _{A90, dB})	Predicted Noise Level (dB)	Rating Noise Level	Difference with background
R1	Dales Close	27	22	27	0
R2	Leek Lane	27	23	28	+1
R3	Poolside Farm	27	30	35	+8
R4	Wellfield Farm	27	30	35	+8
R5	Lask Edge Farm	27	30	35	+8
R7	Catt Hayes Farm	27	21	26	-1
R8	Sprinks Farm	27	17	22	-5
R9	Croft Meadows Farm	27	20	25	-2

6.4.28 The modeling results indicate that predicted rating noise levels at residences surrounding Three Nooks Farm would be, at most, 35 dBA.

6.4.29 As both the background and rating level are considered very low in accordance with BS4142, the results have been assessed (including the residence of Three Nooks Farm) and compared with criteria within BS8233. The results of this assessment are presented in Table 6.4 below; the predictions of internal noise consider attenuation of noise through an open window of 10 dB.

Table 6.4: Assessment of internal noise levels in relation to BS8233 internal noise criteria

ID	Name	Predicted Noise Levels at Receptor		BS8233 Criteria Limits		Difference between noise level and limits	
		External	Internal	Garden Limit	Internal Limit	Garden Limit	Internal Limit
R1	Dales Close	22	12	55	35	-33	-23
R2	Leek Lane	23	13	55	35	-32	-22
R3	Poolside Farm	30	20	55	35	-25	-15
R4	Wellfield Farm	30	20	55	35	-25	-15
R5	Lask Edge Farm	30	20	55	35	-25	-15
R6	Three Nooks Farm	45	35	55	35	-10	0
R7	Catt Hayes Farm	21	11	55	35	-34	-24
R8	Sprinks Farm	17	7	55	35	-38	-28
R9	Croft Meadows Farm	20	10	55	35	-35	-25

- 6.4.30 The results show that predicted noise levels at receptors surrounding the site will be substantially below BS8233 criteria limits for internal noise levels. Noise levels predicted at the residential building of Three Nooks Farm would be within the BS8233 internal target level for 'Reasonable' conditions.
- 6.4.31 In order that noise from the generator exhaust stack does not contribute to noise at residents surrounding the site (therefore preventing rating noise levels increasing over 35 dBA) the package will be designed such that the noise level 1m from the opening of the stack does not exceed 68 dB(A). The detail of how this maximum limit was ascertained is presented in **Appendix 9**.

Conclusions

- 6.4.32 Noise levels associated with the operation of the proposed scheme are not predicted to exceed industrial noise or residential amenity criteria at residences surrounding the site. It is not considered that noise levels predicted at Three Nooks Farm would result in disturbance to the residential amenity of occupiers therein.
- 6.4.33 A maximum noise limit of 68 dB(A) will be applied to noise 1m from the opening of the generator exhaust stack. If this cannot be achieved as designed, a silencer providing the necessary sound reduction will be required in order that noise levels do not exceed industrial or residential amenity criteria at residential receptors.