Noise Assessment for Peaking Plant Facility

Saltholme North, Middlesbrough

For Statera Energy Limited

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Quality Management

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Figure 5.1 below indicates the anticipated average hours of operation per day in each month.

Appendices

1 Introduction

1.1 The Acoustics Team at RPS Planning and Environment has been commissioned by Statera Energy Limited to undertake a noise assessment for a proposed gas-fired peaking plant facility at land east of Cowpen Bewley Road, Middlesbrough. The site will be known as Saltholme North and comprise of four gas-fired engines with a total output of 49 MW. The Application Site is located within the administrative area of Stockton-On-Tees Borough Council (SoTDC).

1.2 The proposed development is for a gas-fired Peaking Plant Facility (PPF), which would operate at times of peak demand and, in accordance with the requirements of the Environmental Permit which will be required to operate the site, will be operational for no more than 2,750 hours in any one year. Typically, the PPF would be switched off but on standby awaiting an instruction from National Grid (NG) to power-up. These instructions could come as a result of system instability, which may occur every three to five days and would require the PPF to operate for a period ranging from one to seven hours, between 08.00 and 20.00 hrs. During the winter 'peak' periods (November to February), the facility may generate energy to reduce stress on the electricity transmission system; historically, these peaks, and hence additional generating times, last for up to three hours, between 16.30 and 19.30 hrs.

1.3 Outside of these hours, such as during a major power shortage or system stress event, NG may require the facility to step-in and provide generating support in an emergency situation. For example, there have been three NISM (Notice of Insufficient Margin) warnings in the last six years, all occurring in the early evening at peak demand. The likelihood of the facility being required to start up at night is extremely low but has been considered in this assessment in conjunction with use during the more likely times of the day and evening.

1.4 The assessment has been undertaken based upon appropriate information on the proposed development provided by Statera Energy Limited and manufacturer's data. RPS is a member of the Association of Noise Consultants (ANC), the representative body for acoustics consultancies, having demonstrated the necessary professional and technical competence. The assessment has been undertaken with integrity, objectivity and honesty in accordance with the Code of Conduct of the Institute of Acoustics (IOA) and ethically, professionally and lawfully in accordance with the Code of Ethics of the ANC.

1.5 The technical content of this assessment has been provided by RPS personnel, all of whom are corporate (MIOA) or non-corporate, associate members (AMIOA) of the IOA (the UK's professional body for those working in acoustics, noise and vibration). Personnel and individual qualifications are provided within the Quality Management table at the start of this report and in Appendix A in accordance with the requirement of Section 12 of British Standard (BS) 4142:2014 'Methods for rating and assessing industrial and commercial sound' [1].This report has been peer reviewed within the RPS team to ensure that it is technically robust and meets the requirements of our Quality Management System.

2 Acoustic Terminology and Concepts

2.1 This section provides an overview of the fundamentals of how sound propagates away from a source.

2.2 Increasing the distance from a sound source normally results in the level of sound getting quieter, due primarily to the spreading of the sound with distance, analogous to the way in which the ripples in a pond spread after a stone has been thrown in. Another important factor relates to the type of ground over which the sound is travelling. Acoustically “soft” ground, (such as grassland, ploughed fields etc.) will result in lower levels of sound with increasing distance from the sound source as compared to acoustically “hard” surfaces (e.g. concrete, water, paved areas). The reduction in sound level depends, however, on the frequency of the sound.

2.3 Wind also affects the way in which sound propagates, with sound levels downwind of a source being louder than upwind. This is partly due to the sound ‘rays’ being bent either upwards or downwards by the wind in a similar way that light is bent by a lens, as shown in Figure 2.1. Varying temperatures in the atmosphere can also cause sound ‘rays’ to be bent, adding to the complexity of sound propagation.

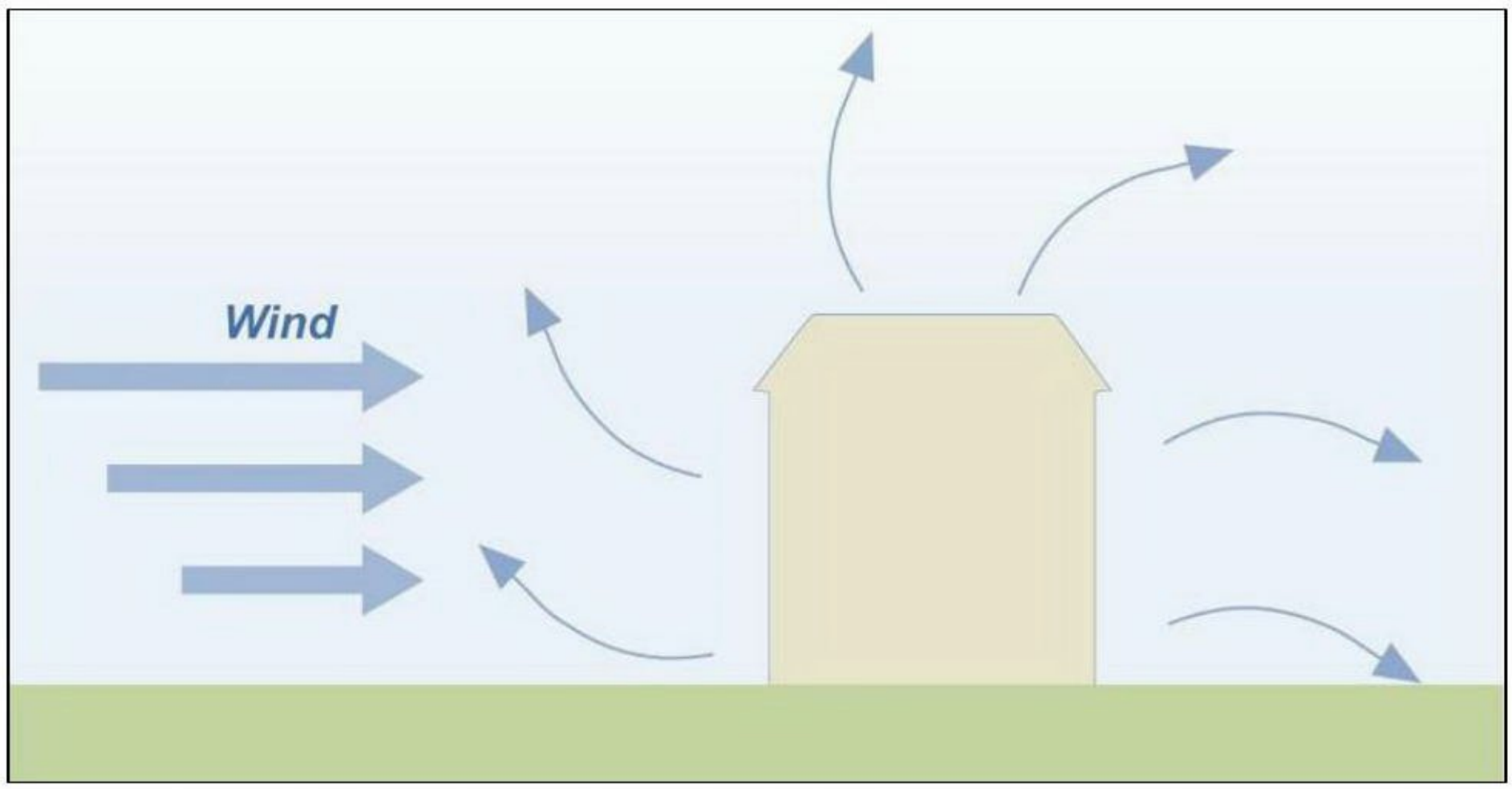

Figure 2.1 Refraction of Sound Waves Due to Wind Gradients (increasing wind speed with height)

2.4 Another attenuation mechanism is absorption of sound by the molecules of the atmosphere. Higher pitched (higher frequency) sounds are more readily absorbed than lower pitched (lower frequency) sounds. The factors affecting the extent to which the sound is absorbed are the temperature and the water content of the atmosphere (relative humidity).

2.5 The effect of varying temperature and humidity is usually minimal when compared to other factors, such as wind and ground effects. However, where high frequency sounds are encountered, there may well be a significant variation between measured sound levels on different days due to variations in temperature and humidity.

2.6 When hearing sound which occurs out in the open (e.g. from road traffic, aircraft, birds, wind in the trees etc.), it is common experience that the sound level is not constant in loudness but is changing in amplitude all of the time. Therefore, in order to numerically describe the sound levels, it is beneficial to use statistical parameters. It has become practice to use indices which describe the sound level which has been exceeded for a certain percentage of the measurement period, and also an index which gives a form of average of the sound energy over a particular time interval. The former are termed percentile noise levels and are notated L_{A90}, L_{A50}, L_{A10} etc. and the latter is termed the equivalent continuous noise level and is notated by L_{Aeq}. It is worth noting that if the noise level does not vary with time, then all the parameters, in theory, normalise to a single value.

2.7 With regard to the percentile levels, the L_{A90} is the sound pressure level which is exceeded for 90% of the measurement time. It is generally used as the measure of background sound (i.e. the underlying sound, sometimes referred to as background noise) in environmental noise standards.

2.8 The $L_{Aeq,T}$ is the A-weighted equivalent continuous noise level and is an energy averaged value of the actual time varying sound pressure level over the time interval, T. It is used in the UK as a measure of the noise level of a specific industrial noise source when assessing the level of the specific source against the background sound. It is also used as a measure of ambient sound (i.e. the “all-encompassing” sound field).

2.9 Other useful parameters for describing sound levels include the maximum and minimum sound pressure level encountered over the time period, denote L_{Amax} and L_{Amin} respectively.

2.10 The term 'A' weighting implies a measurement made using a filter with a standardised frequency response which approximates the frequency response of the human ear at relatively low levels of sound. The resulting level, expressed in 'A' weighted decibels, or dBA, is widely used in noise standards, regulations and criteria throughout the world.

2.11 For a more detailed analysis of the frequency characteristics of a sound source, then sound measurements can be made in bands of frequencies, usually one octave wide. The resulting levels are termed octave band sound pressure levels. The standard octave band centre frequencies range from 31.5 Hz (about three octaves below middle ‘C’ on the piano) to 8 kHz (about five octaves above middle ‘C’). This covers most of the audible range of frequencies (usually taken to be around 20 Hz to 20 kHz). Octave band sound levels are usually quoted as linear data – i.e. without an ‘A’ weighting filter being applied. For more detailed analysis narrowband filters are useful for analysing tones.

2.12 The term decibel is a relative quantity and should always be referenced to an absolute level. In this report, all sound pressure levels (denoted L_P) are expressed in dB re 20 µPa. Hence, a sound pressure level of 0 dBA refers to a pressure level of 20 µPa, which is generally taken as the lowest level of sound that the human ear can detect. A negative dBA value usually implies that the sound is below the threshold of human hearing.

2.13 Subjectively, and for steady noise levels, a change in noise level of 3 dB is normally just discernible to the human ear. However, a noise change of less than 3 dB could be discernible if it has particular frequency characteristics or if it varies in loudness over time. A difference of 10 dB represents a doubling or halving of subjective loudness.

2.14 Sound power (denoted L_W) is the acoustical power radiated from a sound source. The advantage of using the sound power level, rather than the sound pressure level, in reporting noise from a source is that the sound power is independent of the location of the source, distance from the measurement point and environmental conditions. If the sound power of a source is known, then it is possible to calculate the sound pressure level at a distance away from the source, accounting for the attenuation due to propagation, as discussed above. Sound power levels are referenced to power rather than pressure; hence sound power levels are expressed in dB re 1 pW.

3 Summary of Relevant Policy, Consultation, Guidance, Standards and Consultation

Noise Policy Statement for England

3.1 The Noise Policy Statement for England (NPSE) [2] sets out the long term overarching vision of Government noise policy, which is to promote good health and a good quality of life through the management of noise within the context of Government policy on sustainable development.

3.2 The NPSE is intended to aid decision makers by making explicit the implicit underlying principles and aims regarding noise management and control that are to be found in existing policy documents, legislation and guidance.

3.3 Where existing policy and guidance does not provide adequate guidance then decision makers can go back to the aims of the policy statement to provide overriding guidance. The "Noise Policy Vision" is to *"promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development"*. This long term vision is supported by the following aims, through effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

i) avoid significant adverse impacts of health and quality of life;

ii) mitigate and minimise adverse impacts on health and quality of life; and

iii) where possible, contribute to the improvement of health and quality of life.

3.4 The aims of the policy differentiate between noise impacts on health (e.g. sleep disturbance, hypertension, stress etc.) and noise impacts on quality of life (e.g. amenity, enjoyment of property etc.). The aims also differentiate between "significant adverse impacts" and "adverse impacts". The explanatory note to the NPSE clarifies that a significant adverse impact is deemed to have occurred if the "Significant Observed Adverse Effect Level" (SOAEL) is exceeded. An adverse effect, on the other hand, lies between the "Lowest Observed Adverse Effect Level" (LOAEL) and the SOAEL.

3.5 In assessing whether a development should be permitted, there are therefore four questions that should be answered, with reference to the principles of sustainable development, viz. will the development result in:

a) a significant adverse impact to health;

b) a significant adverse impact to quality of life;

c) an adverse impact to health; or

d) an adverse impact to quality of life?

3.6 If the answer to question a) or b) is yes, then the NPSE provides a clear guidance that the development should be viewed as being unacceptable (item i. above). If the answer to question c) or d) is yes, then the NPSE provides a clear steer that the impact should be mitigated and minimised (item ii. above).

National Planning Policy Framework

3.7 The National Planning Policy Framework (NPPF) [3] sets out the Government's planning policies for England and how these are expected to be applied. The emphasis of the Framework is to allow development to proceed where it can be demonstrated to be sustainable. In relation to noise, Paragraph 180 of the Framework states:

"180. Planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should::

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from the development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'

recognise that development will often create some noise and existing businesses wanting to develop in continuance of their 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."

Planning Practice Guidance - Noise

3.8 Planning Practice Guidance on Noise (PPG-N) [4] provides guidance to local planning authorities to ensure effective implementation of the planning policy set out in the National Planning Policy Framework. The PPG-N suggests that planning authorities should ensure that unavoidable noise emissions are controlled, mitigated or removed at source and establish appropriate noise limits for extraction in proximity to noise sensitive properties.