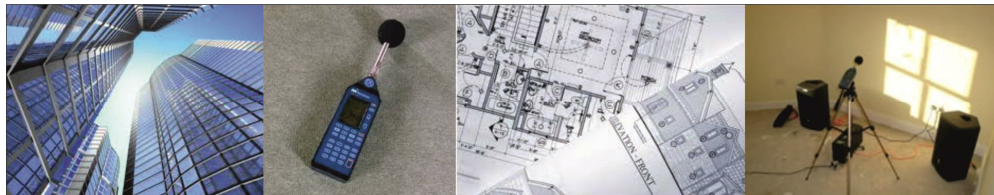


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INSTALLATION OF NEW GENERATOR SETS

***HARTS FARM WAY
HAVANT
HAMPSHIRE
PO9 1JJ***

ACOUSTIC DESIGN SPECIFICATION

v.2

Client:

Peak Gen Limited

Gables Lodge
62 Kenilworth Road
Leamington Spa
CV32 6JX

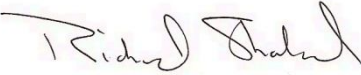
6 May 2014

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FIGURES

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Author	Richard Sharland
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1. SUMMARY

- 1.1 An assessment of noise has been undertaken at Harts Farm Way, Havant, where an array of electricity generator sets, and an associated HV transformer, are to be installed. The generators are intended to offer additional power to the national grid during peak periods of demand which is almost invariably during day or evening periods only.
- 1.2 Ambient noise levels have been measured, and this exercise indicates that the background noise level, L_{A90} , typically falls to a level of 50 dB(A) during the day time period of 0700 - 2300, and 39 dB(A) during the night time period, 2300 - 0700.
- 1.3 Calculations of noise radiating from the proposed plant have predicted a level of 40 dB(A) at 1m from the facade of nearest residential property.
- 1.4 A formal assessment of the predicted in accordance with the methodology of BS4142:1997 "Method of rating industrial noise affecting mixed residential and industrial areas" indicates that the impact of the predicted noise during the day time period would be below a 'marginal significance', and approaching one where there is a positive indication that complaints would not be expected.
- 1.5 In exceptional emergency demand, the generators may operate at night. A similar assessment to BS4142 would indicate a 'marginal' situation.
- 1.6 A further assessment of the predicted noise, in absolute terms, indicates that levels would fall comfortably within WHO and British Standard guidelines for residential occupation, whether operating during the day or night.
- 1.7 Consideration of noise affecting adjacent commercial buildings indicates that residual levels from the generators would be significantly lower than the typical of day time road traffic noise in the area and, although sometimes audible, would have a marginal impact only.
- 1.8 It is therefore concluded that the proposed installation of the generators would not have any significant adverse impact on the neighbouring properties.

2. INTRODUCTION

An assessment has been undertaken by Ian Sharland Limited on behalf of Peak Gen Limited, to assess the impact of noise from new electricity generating sets on neighbouring properties.

The proposed location of the new sets will be next to the A27 in Havant, on land accessed from Harts Farm Way (see Figure 1). The land immediately adjacent is largely commercial (including a transport depot and waste recycling centre), but it is noted that there is a residential property located off Mill Lane, some 250m to the north of the dual carriageway. There is also an office building, the Basepoint Business Centre, lying some 150m to the south of the proposed installation.

This project under consideration here is being carried out by Peak Gen Limited, a company which provides additional electricity to the mains grid during periods of peak demand. It is proposed that 10 diesel-engined containerised generators be sited on an area of land at the east end of the site (see Figure 1). The installation will also include the installation of a HV transformer set, and containers holding the switch gear and the fuel tank. It is key to understand that the generators themselves will only be expected to operate within the hours of 0700 - 2300, and expected demand (operation) is just 2 hours per week. Operation outside these hours will be exceptional and only in emergency demand conditions.

Given the presence of residential buildings in the area of the new scheme, it will be necessary to ensure that the operation of the new generators will have no significant adverse impact on the occupiers. Consideration should also be given to the adjacent commercial neighbours. An acoustic study has therefore been conducted to ensure that the installation will meet these requirements.

The objectives of the present exercise may therefore be summarised as follows:

- (a) To determine the existing ambient noise levels in the area;
- (b) To determine the likely noise emitted from the new generators;
- (c) Where appropriate, to recommend forms of noise control which will limit emissions to an acceptable level;
- (d) To assess the emitted noise in accordance with relevant standards.

This report describes the work carried out on each of those objectives and summarises the conclusions that can be drawn from the results.

3. SURVEY OF AMBIENT NOISE LEVELS

To assess the ambient background noise levels, a Rion NL31 sound level meter was set up on the site, close to the Basepoint Business Centre. This position was chosen as it was both accessible and a similar distance to the A27 as the nearest residential property to the north (see Figure 1).

The sound level meter was set up 1.8m above ground, in a free field position. The equipment was calibrated before and after the measurements were taken, and showed no significant variation. Calibration details for the equipment are as follows:

Type	Manufacturer	Serial number	Last Calibration Date	Calibration Certificate No.
NL31	Rion	531113	21/11/2012	TCRT12/1300

The survey ran from 12.00 am Thursday 13th February to 12.00 Tuesday 18th February 2014.

The primary noise source during day time hours would be traffic on the A27 dual carriageway.

The weather conditions were as follows:

Date	Ave Temp °C	Rainfall mm	Ave Wind Speed m/s	Prevailing Wind Direction
13/2/14	5	0	4.1	SW
14/2/14	8	0	6.4	S
15/2/14	8	0	7.7	W
16/2/14	5	0	1.7	S
17/2/14	8	0	3.1	S
18/2/14	6	0	2.2	S

The meter was configured to measure 5 minute samples of the following acoustic parameters:

- L_{Aeq} The A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.
- L_{Amax} The A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).
- L_{A90} A statistical parameter, representing the A-weighted noise level exceeded for 90% of each sample period. This gives a measure of the underlying noise, and is commonly used to describe the ambient background noise.

The variation of noise levels is shown graphically in Figure 3.

The key measurement for this exercise is the minimum value of the background noise recorded. Noting the relatively high wind speeds on the first three days and taking the data from the quieter days at the end of the survey, the levels were found to fall to the following minimum typical value¹:

Period	Minimum Typical Value L _{A90}
0700 - 2300	50 dB(A)
2300 - 0700	39 dB(A)

¹ Values quoted represent the lower 95% percentile of the background noise level measurements.

4. PREDICTION OF GENERATOR NOISE

The proposal for the site here involves the installation of 10 diesel engine generator sets. The engines and alternators are housed within an acoustically lined ISO container. Ventilation apertures and engine exhausts are all silenced.

Peak Gen have confirmed that the generators can be designed to a level of 75 dB(A) @1m from the container (an overall sound power level of 95 dB(A)).

In this project, the generators sets and transformer will be located in a compound on the east side of the site (Figure 2). The containers are 2.4m in height, although the engine exhausts may be some 400mm above the top of the containers.

It is proposed that a 3.5m high close boarded timber fence² be erected around the perimeter of the plant compound.

The distance from the generator compound to the nearest noise sensitive residential properties on Mill Lane is some 250m. The A27 dual carriageway is marginally elevated compared to the land on the north and south sides.

The Basepoint Business Centre is approximately 150m from the generator compound, with a clear line of sight (acoustically) between the two.

The Wölfel IMMI modelling software has then been used to provide predictions of noise emanating from the compound to the facade of both residential and office buildings (see Figure 4 for details).

The results of the predictions are as follows:

Receptor	Predicted Facade Noise Level $L_{Aeq, t}$
Residence on Mill Lane	40 dB(A)
Basepoint Business Centre	45 dB(A)

² The specification of the barrier would be 25mm thick timber boarded panels, butt-edged with a 25mm thick x 200mm wide sealing panel fixed behind each joint.

5. PLANNING POLICY & CRITERIA OF ACCEPTABILITY

5.1 National Planning Policy Framework (NPPF)

5.1.1 The recently introduced National Planning Policy Framework (March 2012) defines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people, and their answerable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

5.1.2 Section 123 states

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 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.*

5.1.3 The Framework states 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. It does not, however, provide any specific formal guidelines.

5.2 Noise Policy Statement for England (NPSE)

5.2.1 The document "Noise Policy Statement for England", referenced within the NPPF, sets out the following vision for on-going noise policy:

"Promote good health and quality of life through the effective management of noise within the context of Government policy on sustainable development."

This vision should be achieved through the following Noise Policy Aims:

"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".

5.2.2 To achieve these objectives the Noise Policy Statement sets out three noise levels to be defined by the assessor:

- **NOEL** - No Observed Effect Level
This is 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.
- **LOAEL** - Lowest Observed Adverse Effect Level
This is the level above which adverse effects on health and quality of life can be detected.
- **SOAEL** - Significant Observed Adverse Effect Level
This is the level above which significant adverse effects on health and quality of life occur.

5.2.3 The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the Policy Statement requires that:

"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development... .. This does not mean that such adverse effects cannot occur."

5.2.4 Where noise levels are below the LOAEL it is considered there will be no adverse effect. Once noise levels are below the NOEL there will be no observable change. No objective values are offered within the NPSE, as the document does indicate that each site should be considered on its own merits.

5.2.5 Guidance as to a numerical definition of LOAEL may therefore be given by the following Standards.

5.3 BS4142

5.3.1 The impact of commercial noise sources on existing residential properties is commonly judged using the methodology of British Standard 4142:1997 "Method for rating industrial noise affecting mixed residential and industrial areas".

5.3.2 In brief, this rating method determines "specific noise level" generated by the new plant, assessed immediately outside the residential properties most likely to be affected. The value may be measured, if the centre is operating, or calculated, if the centre is being designed. If the installation has equipment which is limited in its hours of operation, separate assessments may be made for the differing operating conditions. During the

period 0700 - 2300, the assessment is made over the loudest 1 hour period. At night, the assessment period is limited to 5 minutes.

- 5.3.3 A correction of + 5 dB(A) is made to the "specific noise level" if the new noise is noticeably tonal in content or intermittent. The result of any such adjustment is then termed the "Rating Noise Level".
- 5.3.4 A comparison is then made between the Rating Noise Level and the ambient background noise level³, at each location of interest and, if relevant, in each of the operating conditions.
- 5.3.5 If the Rating Noise Level exceeds the ambient background noise level by more than 10 dB(A), complaints are to be expected. An excess of 5 dB(A) is said to be "of marginal significance". If the Rating Noise Level is 10 dB below the ambient background noise level, this is a positive indication that complaints would not be expected.
- 5.3.6 It is likely that the Local Authority would seek to avoid marginal situations at the planning stage, and may try to ensure a positive likelihood that no complaints would be forthcoming. As such, they might recommend a noise target which limits the Rating Noise Level to a maximum which is as low as 5 - 10 dB(A) below the minimum background level currently experienced.
- 5.3.7 However, there are limitations to BS4142 if noise levels are very low, and in such circumstances, it may not be necessary to follow the normal guidance in order to achieve this aim. Indeed, within the Scope of the Standard, it is stated:

"The method is not suitable for assessing the noise measured inside buildings or when the background and rating noise levels are both very low."

Note: for the purpose of this Standard, background noise levels below about 30 dB and rating noise level below about 35 dB are considered to be very low."

³ That is the noise level which would prevail at that time and place, in the absence of any noise from the new plant under consideration. The background noise is normally measured and described as the L_{A90} parameter

5.4 BS8233

- 5.4.1 There is much guidance on the levels of intrusive noise which would be considered acceptable within residential accommodation such as this. Typical advice is found in British Standard 8233:2014 "Guidance on Sound Insulation and Noise Reduction for buildings". Following similar guidance in the 1999 World Health Organisation report "Guidelines for Community Noise", the Standard sets out the following limits for indoor ambient noise levels within living rooms and bedrooms. This suggests:

BS 8233 Guideline Values

Activity	Location	0700 - 2300	2300 - 0700
Resting	Living Room	35 dB(A) LAeq, 16 hr	-
Dining	Dining room/Area	40 dB(A) LAeq, 16 hr	-
Sleeping	Bedroom	35 dB(A) LAeq, 16 hr	30 dB(A) LAeq, 8 hr

- 5.4.2 It is usually considered that an open window will provide a reduction of some 10-15 dB(A)⁴. Therefore the 'good' internal standards quoted above would broadly equate to the following targets immediately outside the buildings:

Activity	Location	0700 - 2300	2300 - 0700
Resting	Living Room	48 dB(A) LAeq, 16 hr	-
Dining	Dining room/Area	53 dB(A) LAeq, 16 hr	-
Sleeping	Bedroom	48 dB(A) LAeq, 16 hr	43 dB(A) LAeq, 8 hr

- 5.4.3 BS8233 recognises that, where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB, and reasonable conditions will be achieved.
- 5.4.4 It should be noted that the levels quoted in BS8233 are intended to reflect the acceptability of steady, continuous noise. Sources of intermittent and tonal noise may generate greater annoyance for a similar overall magnitude. Whilst BS8233 does not explicitly state a correction for those circumstances, it may be appropriate to consider that the Good and Reasonable standards would be achieved with levels which are perhaps 5 dB lower than stated in the table above.
- 5.4.5 It is also noted that BS8233 was written from a view of designing new buildings to protect occupants from existing noise sources. This does necessarily infer, however, that the acceptability of an occupant to an absolute level noise within a building will be different if the introduction of the noise source post-dates the construction of the building. Other factors may be relevant in certain circumstances, and they are covered in large part by BS4142, discussed above.
- 5.4.6 In respect of office buildings, BS8233 indicates that noise levels within private offices should not exceed 35 - 40 dB(A) LAeq. Adopting a typical loss of 13 dB(A) through an open window, this target equates to an equivalent level of 48 - 53 dB(A) LAeq externally.

⁴ Reference PPG24 Planning & Noise, which adopted a mid-range value of 13 dB(A)

5.5 World Health Organisation Guidelines

- 5.5.1 Further advice is provided in the 1999 WHO report "Guidelines for Community Noise"
- 5.5.2 This indicates that the steady noise level in external amenity areas, such as gardens or outdoor living areas should not exceed 55 dB(A) $L_{Aeq, t}$, and should preferably be designed below 50 dB(A) $L_{Aeq, t}$.
- 5.5.3 The document also provides guidance on the impact of peak noise levels on sleeping conditions. This suggests that levels above 45 dB(A) L_{Amax} inside a bedroom would be disturbing to sleep. With windows open, this would equate to a level of approximately 58 dB(A) L_{Amax} externally.

6. ASSESSMENT OF PREDICTED NOISE LEVELS

6.1 Residential Properties

- 6.1.1 The prediction of generator noise at the nearest residential properties is 40 dB(A).
- 6.1.2 In absolute terms, it is confirmed that such levels are at least 8 dB lower than the recommended standard indicated by BS8233 for day time operation (ref. Para 5.4.3) and 3 dB lower than the equivalent night time level.
- 6.1.3 In respect of the guidelines of BS4142, a formal assessment of the noise predicted noise would be as follows:

	Day Time Operation	Night Time Operation
Predicted Facade Noise Level, $L_{Aeq, t}$	40 dB(A)	40 dB(A)
Correction for Tonality	+5 dB	+5 dB
Rating Noise Level	45 dB(A)	45 dB(A)
Minimum Background Level, L_{A90}	50 dB(A)	39 dB(A)
RATING	-5 dB	+6 dB

- 6.1.4 During day time operation, BS4142 would suggest that the noise emitted by the generators would be at a level which is one half as loud as one which would be described as being of marginal significance, and approaching a situation where there would be a positive indication that complaints would not be expected.
- 6.1.5 The generators are not expected to operate at night, other in conditions of exceptional demand. Were this to happen, however, it is confirmed that the assessment of noise under BS4142 would indicate an impact which is effectively a 'marginal situation'.

6.2 Commercial Properties

- 6.2.1 The predicted noise level at the facade of the nearest offices, the Basepoint Business Centre, is 45 dB(A).
- 6.2.2 This level is below the recommended guideline limits of BS8233 (para 5.4.6).
- 6.2.3 The existing ambient noise level during working hours was found to be in the order 55 - 60 dB(A), and the predicted levels are therefore significantly below those currently experienced.
- 6.2.4 It is therefore concluded that, whilst the noise from the generators may be audible during lulls in the traffic, the impact of the noise will be marginal.

Figure 1 - Aerial View of Site



Figure 2 - Proposed Plan of the Generator Compound



Figure 3 - Measured Ambient Noise Levels

