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**PROPOSED REPLACEMENT GAS COMPRESSOR AT ROYAL FREE HOSPITAL,
HAMPSTEAD**

PLANT NOISE SURVEY

Technical Report: R2914-3 Rev 0

Date: 14th September 2009

For:
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Project Title: Proposed Replacement Gas Compressor at Royal Free Hospital, Hampstead
Plant Noise Survey

Report Ref: R2914-3 Rev 0

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1.0 INTRODUCTION

- 1.1 Mitie Technology and Infrastructure Ltd has retained 24 Acoustics Ltd to undertake a noise impact assessment of the proposed replacement gas compressor plant at the Royal Free Hospital, Hampstead.
- 1.2 This report presents the results of a background noise survey undertaken between 10th August and 4th September 2009 and noise measurements of the existing plant undertaken on site on 28th August 2009.
- 1.3 All noise levels in this report are presented in dB relative to 20 μ Pa. A description of the acoustic terminology used in this report is provided in Appendix A.

2.0 SITE DESCRIPTION, BACKGROUND AND PROPOSED OPERATION

- 2.1 The existing gas compressor plant at the Royal Free Hospital is housed within an acoustic enclosure within the hospital service yard (accessed off Fleet Road). The unit operates on a continuous 24 hour basis. It is proposed to replace and upgrade the gas compressor package with a similar (updated) screw-compressor type package which will be installed within an acoustic enclosure at the same location.
- 2.2 The nearest residential properties to the compressor package are flats which are located in block on the corner of Pond Street and Fleet Road. The nearest residential facade (located on the south-eastern facade of the building) is approximately 5 m from the nearest part of the gas compressor package.
- 2.3 In addition to noise from the existing gas compressor package, the occupants of these properties are also exposed to noise from the hospital boiler house and from service yard activities (mostly comprising deliveries and collection of wheeled hospital waste bins).
- 2.4 Figure 1 provides an aerial view of the site.

3 EXISTING PLANT NOISE SURVEY

- 3.1 A noise survey of the existing gas compressor unit on the site was undertaken on 28th August 2009. Noise measurements were undertaken using a hand-held Rion NA-27 sound level meter which was calibrated before and after the measurements using a Brüel and Kjær 4231 acoustic calibrator. No drift in calibration was recorded.
- 3.2 The sound level meter was installed on a tripod and an environmental windshield was fitted.
- 3.2 An indicative plan of the noise measurement locations is provided in Appendix B, together with the results of the noise survey, which are summarised below.
- Sound pressure level, 0.5 m from each gas compressor surface: 65- 70 dB L_{Aeq} .

4.0 BACKGROUND NOISE SURVEY

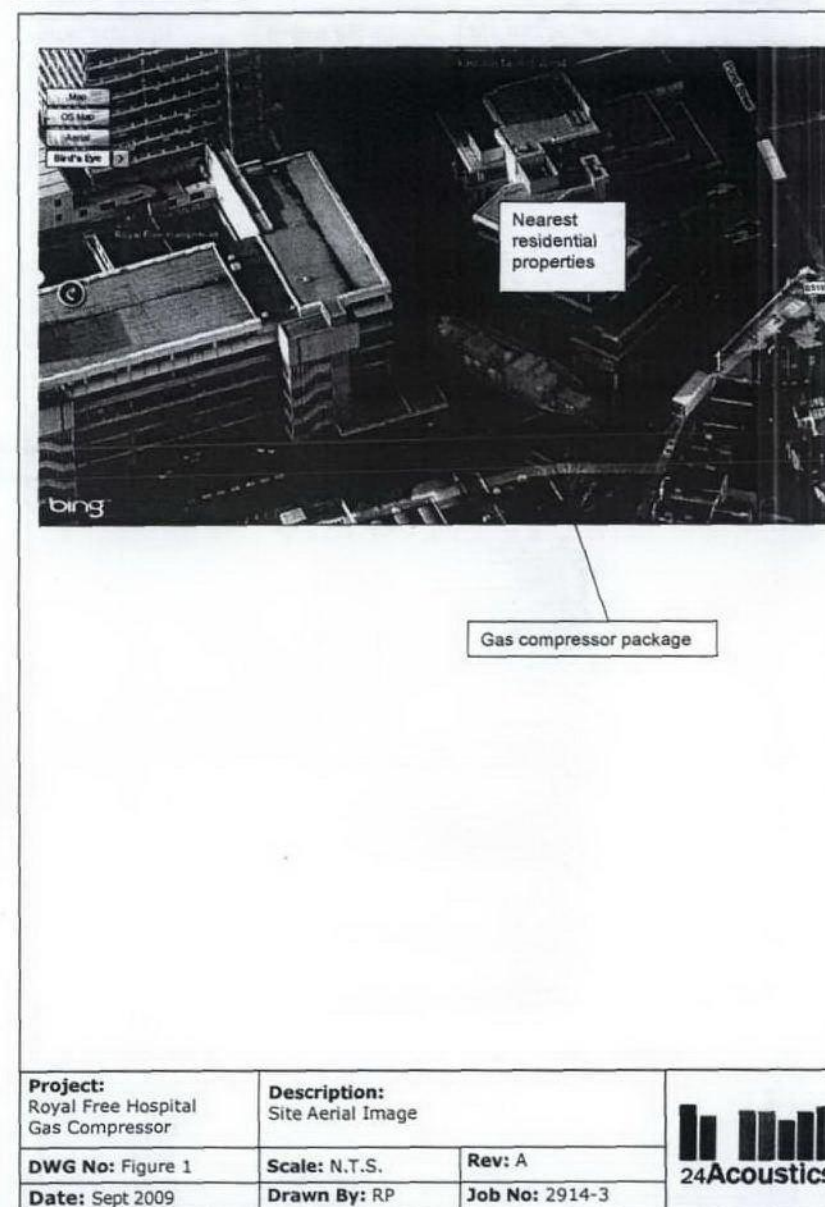
- 4.1 A background noise survey was undertaken between the 28th August and 4th September 2009. Measurements were undertaken externally on a roof top opposite the residential flats which had a line of site into some areas of the service yard but was unaffected by noise from the existing gas compressor package.
- 4.2 The instrumentation was set up to monitor and store noise levels continuously in 5 minute samples (using fast time weighting) in terms of the overall A-weighted L_{Aeq} and L_{90} sound pressure levels. A definition of the acoustic terminology used in this report is provided in Appendix A.
- 4.3 The following instrumentation was used during the survey:
- Rion NL-31 precision grade sound level meter;
 - Bruel and Kjaer Type 4231 acoustic calibrator.
- 4.3 Calibration was checked before and on completion of the measurements and no drift was recorded. The weather during the survey was dry with wind speeds below 5 m/s. Noise measurements were made in accordance with BS 7445: 1991 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use'.

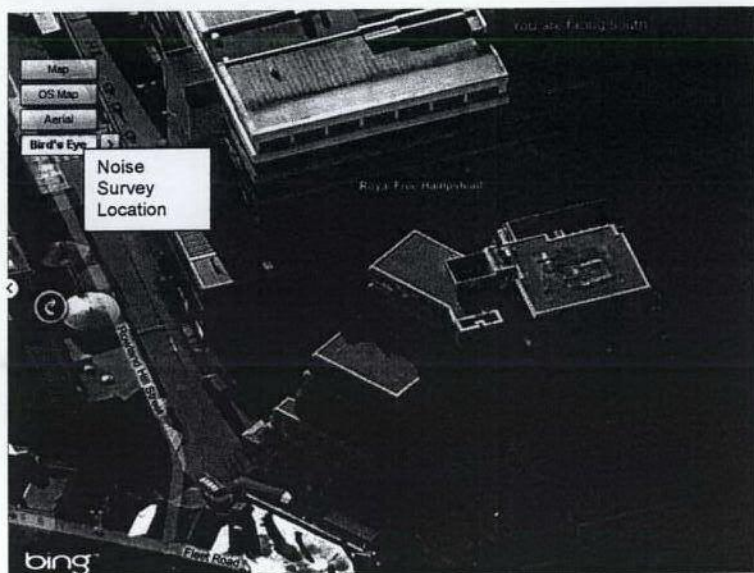
Results

- 4.4 The results of the environmental survey are presented in graphical format in Figure 3, showing the recorded average $L_{Aeq, 5 \text{ min}}$ and background $L_{A90, 5 \text{ min}}$ values. The measurements indicate little variation with time and this is as a result of the domination of noise from the hospital boiler house.
- 4.5 The noise survey results indicate that the minimum recorded L_{A90} sound pressure level during the survey was 60 dB $L_{A90, 5 \text{ min}}$.

5.0 CONCLUSIONS

- 5.1 Mitie Technology and Infrastructure Ltd has retained 24 Acoustics Ltd to undertake a noise impact assessment of the proposed replacement gas compressor plant at the Royal Free Hospital, Hampstead.
- 5.2 This report presents the results of a background noise survey and noise survey of the existing gas compressor level and will therefore be useful for determining a suitable acceptable limiting noise criteria for the proposed new plant.





Project:
Royal Free Hospital
Gas Compressor

Description:
Noise Survey Location

DWG No: Figure 2

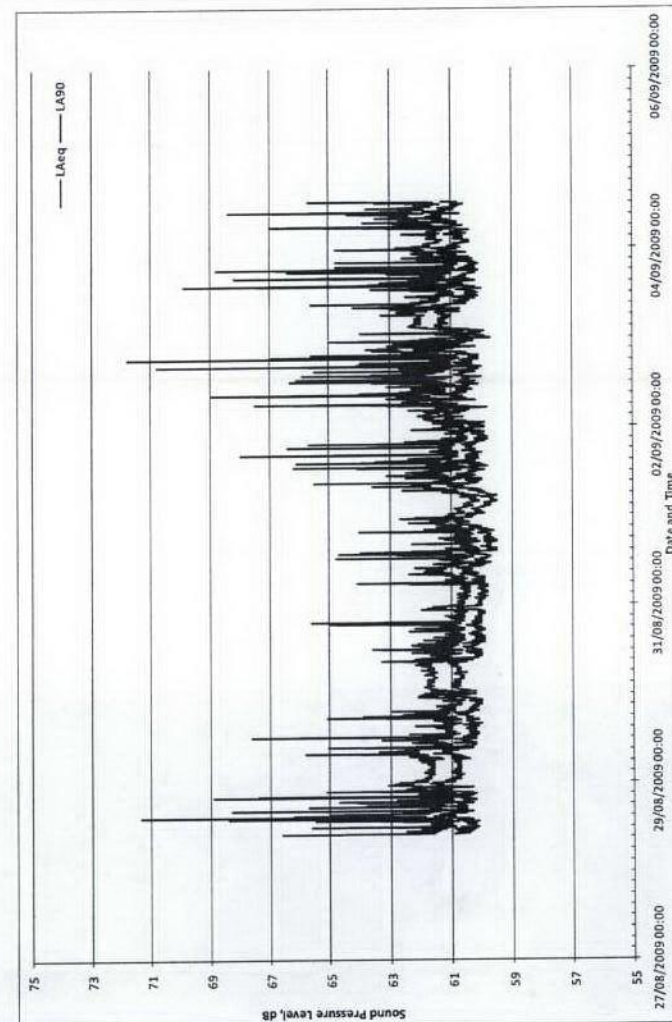
Scale: N.T.S.

Rev: A

Date: Sept 2009

Drawn By: RP

Job No: 2914-3



Project:
Royal Free Hospital
Gas Compressor

Description:
Background Noise Survey Results

DWG No: Figure 3

Scale: N.T.S.

Rev: A

Date: Sept 2009

Drawn By: RP

Job No: 2914-3

APPENDIX A: Acoustic Terminology

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB(A) is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB(A). The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB(A) corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

The L_{max} noise level

This is the maximum noise level recorded over the measurement period.

The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 [1] as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

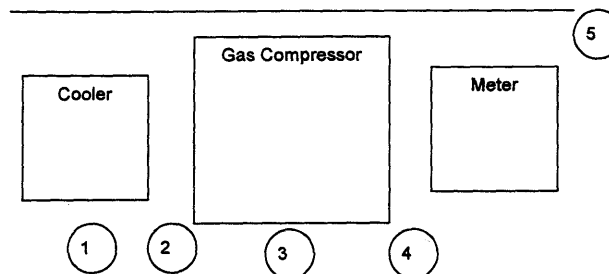
The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B: Existing Gas Plant Noise Survey Results



Description	Overall	Octave Band Sound Pressure Level, dB per Hz								
	A	31.5	63	125	250	500	1k	2k	4k	8k
1. Cooler	65	77	76	75	68	63	57	52	49	40
2. Between cooler & compressor	70	75	80	78	70	68	64	60	58	49
3. Gas Compressor	69	77	76	78	72	65	63	60	53	46
4. Between Gas Compressor & Meter	69	74	75	73	75	63	63	59	53	43
5. Between flats and Metering	68	77	79	72	75	60	62	56	52	43

Table B1: Existing Gas Compressor Noise Survey Results, 0.5 m from each surface