H&H Acoustic Consultancy Division

Santander, 2 Triton Square
London NW1 3AN

External Plant Noise Assessment Report

Santander Global Facilities

2nd June 2015

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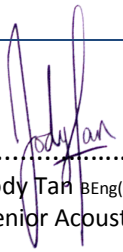
Prepared By:	 …… Jody Tan BEng(Hons)MIOA Senior Acoustic Consultant
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APPENDICES

1. INTRODUCTION

1.1 Hodgson & Hodgson Group Ltd has been commissioned to perform a noise assessment for proposed new external plant at Santander, 2 Triton Square in London.

1.2 This report details the methodology and results of a noise survey and assesses the potential impact of proposed noise sources on existing noise sensitive receptors within the vicinity.

1.3 A glossary of terminology used within this report is contained in Appendix A.

2. ASSESSMENT CRITERIA

British Standard 4142:1997

2.1 BS 4142:1997[1] presents a methodology for assessing the potential impact of industrial noise affecting residential properties within mixed industrial and residential settings. The Standard details a method of rating the acceptability of noise from existing or proposed new industrial sources relative to the prevailing background noise level (L_{A90}) at noise-sensitive premises over appropriate time intervals which are as follows:

- 1 hour during the daytime (07:00 – 23:00); and
- 5 minutes during the night-time (23:00 – 07:00)

2.2 The resulting noise solely from an industrial source is termed as the specific noise level which can be determined when it is possible to clearly distinguish residual noise (during the absence of the industrial noise sources being assessed) from the all encompassing ambient noise. This may be subject to an acoustic feature correction if the noise is assessed to result in increased annoyance. The types of noise that may be subject to an acoustic feature correction are given within Section 8 'Rating Level' of the Standard and detailed overleaf:

- The noise contains distinguishable discrete continuous note (whine, hiss, screech, hum, etc.);
- The noise contains distinct impulses (bangs, clicks, clatters or thumps); and
- The noise is irregular enough to attract attention.

2.3 Where an acoustic feature correction is required a 5 dB penalty is added to the specific noise level. The resulting noise level is termed the rating level. The background noise level is subtracted from the rating level, resulting in an excess of the rating over the background noise level. This excess is compared with the assessment methodology given within Section 9 of the Standard.

[1] British Standard 4142:1997 Method for rating industrial noise affecting mixed residential and industrial areas, BSI (1997)

3. NOISE SURVEY AND RESULTS

3.1 A noise survey was conducted at the site between approximately 17:00 hrs on 17th November 2014 and 11:00 hrs on 18th November 2014. The data collected during this period has been used to characterise the noise levels currently experienced at the proposed development site during the proposed operation times of the plant.

3.2 Continuous unattended long term noise measurements (illustrated in Appendix B as 'LT') were obtained at one location.

3.3 Measurements were in 'free field' (no vertical reflective surfaces within 3.5 metres of the microphone) at rooftop level. During all measurements the microphone was protected with a windshield.

3.4 Weather conditions during the commissioning of the survey equipment were partly cloudy, no precipitation, with dry roads and temperatures around 10°C. During the night time period, temperatures averaged around 9°C.

3.5 Weather conditions during the decommissioning of the survey equipment were noted as being slightly cloudy, temperatures around 13°C and with dry road surfaces.

3.6 During the survey it was noted that noise levels at the measurement location was mainly affected by road traffic noise from the A501 Euston Road.

3.7 It is understood that the plant will operate at any point in the day between 07:00 to 18:00 hours.

3.8 Noise monitoring was undertaken using the following equipment detailed in Table 3.1. Calibration certificates are available upon request.

Table 3.1: Noise Monitoring Equipment

Instrument	Serial No.	Calibration Due Date
Cirrus CR811BAClass 1 Sound Level Meter	C17468FD	01/12/2015
Cirrus CR513A Portable Calibrator	030803	01/12/2014

3.9 The instrument was calibrated immediately before and after each survey period using a portable calibrator, no significant drift in calibration levels were observed.

3.10 The sound level meter was set to measure various noise parameters including the L_{Aeq}, L_{A10}, L_{A90}, and L_{Amax} values using a 'fast' time weighting over the survey period (see Appendix A for an explanation of the parameters used). A graph to show the measured noise time history is presented in Appendix D and the relevant noise parameters are summarised in Tables 3.2 below for the entire survey period.

3.11 As discussed with Mario Houska of Camden Council on the 23rd February 2015, it was agreed (verbally) that a good representation of the background noise levels at the noise sensitive receptor should be approximately 5dB lower than the ones measured on the rooftop of 2 Triton Square.

Table 3.2: Summary of Unattended Noise Survey Results

Location	Time Period (T)	Lowest $L_{A90,1\ Hour/5\ Mins}$ (dB)	Average $L_{Aeq,1\ Hour}$ (dB)
LT	Daytime	61.5	62.3
	Night-time	60.0	62.4

4. NOISE ASSESSMENT

4.1 This section presents an assessment of proposed external plant noise in accordance with BS 4142.

4.2 The nearest noise sensitive receptor has been identified as a residential unit in Euston Tower which is located approximately 65 meters away from the location of the new plant.

4.3 It is understood that the proposed plant (VRF unit model no REYQ20P9 rated at 58 and 60 dB(A) @1m) will operate anytime during the proposed operating hours which is between 07:00 to 18:00 hours.

4.4 The specific noise level of this source has been determined at the assessment locations via calculation in accordance with section 6.3.6 of BS 4142. In order to establish the rating level, the + 5 dB penalty has been added to the specific noise level as the source could be described as irregular and may contain distinguishable discrete continuous notes. The results of the assessment are presented in Table 4.1.

Table 4.1: BS 4142 Assessment

Parameter	Room Window (Daytime)
Specific Noise Level (at assessment location)	26 dB
Rating Level (with acoustic feature correction)	31 dB
Background Noise Level (5 dB below the lowest measured $L_{A90,1\ hour}$)	50 dB L_{A90}
Difference between measured background noise level and the rating level	**-19 dB(A)**

4.5 The worst case assessment presented in Table 4.1 indicates that the rating level is calculated to be at least 19 dB (A) below the measured background noise level during the proposed operating hours of the plant.

5. SUMMARY

5.1 A noise assessment has been undertaken in relation to the proposed installation of a new plant at Santander, 2 Triton Square in London.

5.2 An assessment of potential industrial noise affecting the nearby noise sensitive receptors has been undertaken in accordance with BS 4142. The assessment demonstrates that the rating level is calculated to be at least 19 dB(A) below the measured background noise level during the proposed operating hours of the plant.

APPENDIX A – Terminology

The range of audible sound is from 0 dB to 140 dB from the threshold of audibility to the threshold of pain, respectively. The frequency response of the human ear is usually taken to cover the range from 20 Hz (number of oscillations per second) to 20,000 Hz. The ear does not respond equally to different frequencies at the same sound pressure 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 noise measurements. The weighting which is most widely used and which correlates best with human subjective response to noise is the A-weighting. This is an internationally accepted standard for noise measurements to represent human subjective response to sound.

For steady state noise levels an increase or decrease of 1 dB (A) is not perceptible to most human beings under normal conditions, although this may be perceptible under laboratory conditions. An increase or decrease of 3 dB (A) is normally only just perceptible under normal conditions. 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 or halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to surrounding activities. In an attempt to produce a figure that relates this variable noise level to the subjective response, a number of noise metrics are used. Relevant noise parameters to this assessment include:

1) *The L_{Aeq} Noise Level*
   This is the 'equivalent continuous A-weighted sound pressure level, in decibels', and is defined in British Standard BS 7445 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, noise from industrial premises and is the most suitable unit for the description of many other forms of environmental noise.

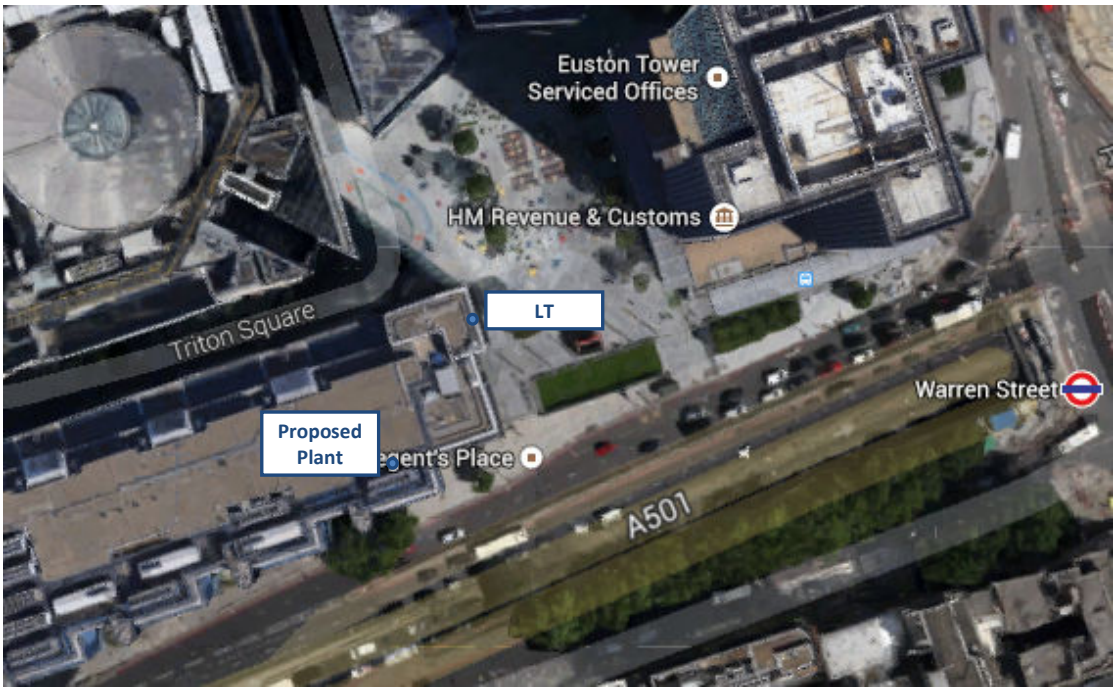
2) *The $L_{Amax,f}$ Noise Level*
   The $L_{Amax,f}$ is the maximum sound pressure level, measured over the measurement period, using a 'fast' time weighting.

3) *The L_{A90} Noise Level*
   The L_{A90} is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

4) *The $L_{Ar,Tr}$ Noise Level*
   The $L_{Ar,Tr}$ is the specific noise level of a source, plus any adjustment for characteristic features of the noise, determined for the reference time interval. It is also occasionally known as the rating level.

APPENDIX B – Location Plan

Noise Monitoring Location



Not to scale

APPENDIX C – Noise Monitoring Data

Location LT

Start Time	dB L_{Aeq}	dB L_{A90}
17:00	65.6	61.5
18:00	64.7	61.5
19:00	64.7	62.0
20:00	68.4	64.0
21:00	68.3	63.0
22:00	68.5	63.5
23:00	68.7	65.0
00:00	69.1	64.5
01:00	68.7	63.5
02:00	69.9	63.0
03:00	68.0	62.0
04:00	68.0	61.0
05:00	67.0	60.0
06:00	67.1	60.0
07:00	68.2	62.5
08:00	68.6	63.0
09:00	68.5	64.0
10:00	67.1	62.5

APPENDIX D – Graph to Show Noise Levels at Unattended Monitoring Location