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Acoustic Assessment of Proposed Electrical Transformer at UPS, 353 Regis Road, London

Report Reference: 141201-002A

Date: December 2014

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Client:	Bennett Williams 106 Dixons Green Road Dudley West Midlands DY2 7DJ
Report Reference:	141201-002
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0. SUMMARY

- ACA Acoustics Limited have been commissioned by Bennett Williams on behalf of the client to assess noise emissions from a proposed new electrical transformer to be installed to an existing commercial property at UPS, 353 Regis Road, London.

- The assessment is required in order to provide evidence that noise emissions from the new transformer complies with London Borough of Camden Council's acoustic requirements. London Borough of Camden Council's requirement, applicable at this site, is that noise from the new equipment shall be designed to 10dBA below the prevailing background level at 1m outside windows of the nearest affected noise-sensitive property.

- A noise survey has been carried out in the vicinity to establish existing background noise levels. Whilst on site the author identified closest noise-sensitive properties to be flats above shops facing onto Kentish Town Road. Closest windows of the residential flats has been scaled to be approximately 39m from the location of the new transformer.

- Lowest background noise levels are measured at LAF90 43dB overnight. Based on results of the noise survey and London Borough of Camden Council's planning consent requirement, the overall noise limit for the transformer to outside nearest noise-sensitive windows is set at ≤33dBA.

- Based on calculations using manufacturer's noise data, the overall noise level for the transformer is 30dBA outside any nearby noise-sensitive windows. This achieves London Borough of Camden Council's planning consent requirement. Noise from the transformer should not be detrimental to the amenity of any residential occupiers in the vicinity.

1. INTRODUCTION

A new electrical transformer and associated ancillaries is proposed to be installed to an existing commercial property at UPS, 353 Regis Road, London.

The Planning Department of London Borough of Camden Council requires information in the form of an acoustic report regarding noise from the new transformer. The report is required to demonstrate that the new transformer will comply with London Borough of Camden Council's acoustic requirements applicable for plant or equipment affecting nearby noise-sensitive properties.

ACA Acoustics Limited has been commissioned to carry out an assessment of noise from the new equipment and, where necessary, make recommendation to reduce noise and vibration levels from the equipment to comply with London Borough of Camden Council's planning requirements.

This report presents results of the noise survey and assessment and includes:

- Review of London Borough of Camden Council's noise requirements;
- Measurement of existing background noise levels;
- Calculation of equipment noise levels;
- Review of any noise/vibration control treatments necessary to the equipment to ensure compliance with the requirements of London Borough of Camden Council.

2. LONDON BOROUGH OF CAMDEN COUNCIL PLANNING CONSENT ACOUSTIC REQUIREMENTS

London Borough of Camden Council's policies relating to noise from new mechanical services equipment are contained within the Council's Local Development Framework; Policy DP28.

In Summary, London Borough of Camden's noise conditions are:

Noise level from plant and machinery at which planning permission will not be granted:	
Noise at 1m external to a sensitive façade;	*5dBA < LA90*
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1m external to a sensitive façade;	*10dBA < LA90*
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1m external to a sensitive façade;	*10dBA < LA90*
Noise at 1m external to sensitive façade where LA90 > 60dB	*55dB LAeq*

Table 1: London Borough of Camden Council noise-related planning conditions

Each of the above is applicable over a period of 60 minutes and measured at 1m external to noise-sensitive facades.

The characteristic of noise from an electrical transformer would typically be described as containing a dominant low-frequency tone or 'hum'. Therefore to ensure that the assessment is robust and that the amenity of nearby occupiers is not detrimentally affected, the more onerous noise condition of 10dBA below the existing background noise is used for the assessment in this report.

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site at 353 Regis Road, London. 353 Regis Road is a large detached commercial building providing offices and distribution facilities for UPS.

The area along Regis Road is predominately of commercial and industrial premises, being a mix of light industrial uses, vehicle pound and rear entrance to a police station. During the author's visits to site closest noise-sensitive properties to the proposed location of the new equipment were identified to be rear upper floor windows to flats above shops facing onto Kentish Town Road; the closest windows has been scaled to be at least 39m from the proposed transformer location.

Planning permission is sought for a new electrical transformer along with associated ancillaries to provide charging facilities to electrical vehicles. The equipment comprises one ESE 1500KVA 11000/433v 3ph 50z oil cooled outdoor type distribution transformer along with ancillaries, to be installed in a GRP enclosure.

Drawing showing proposed layout of the system, provided by the client, is shown in Figure 1 below.

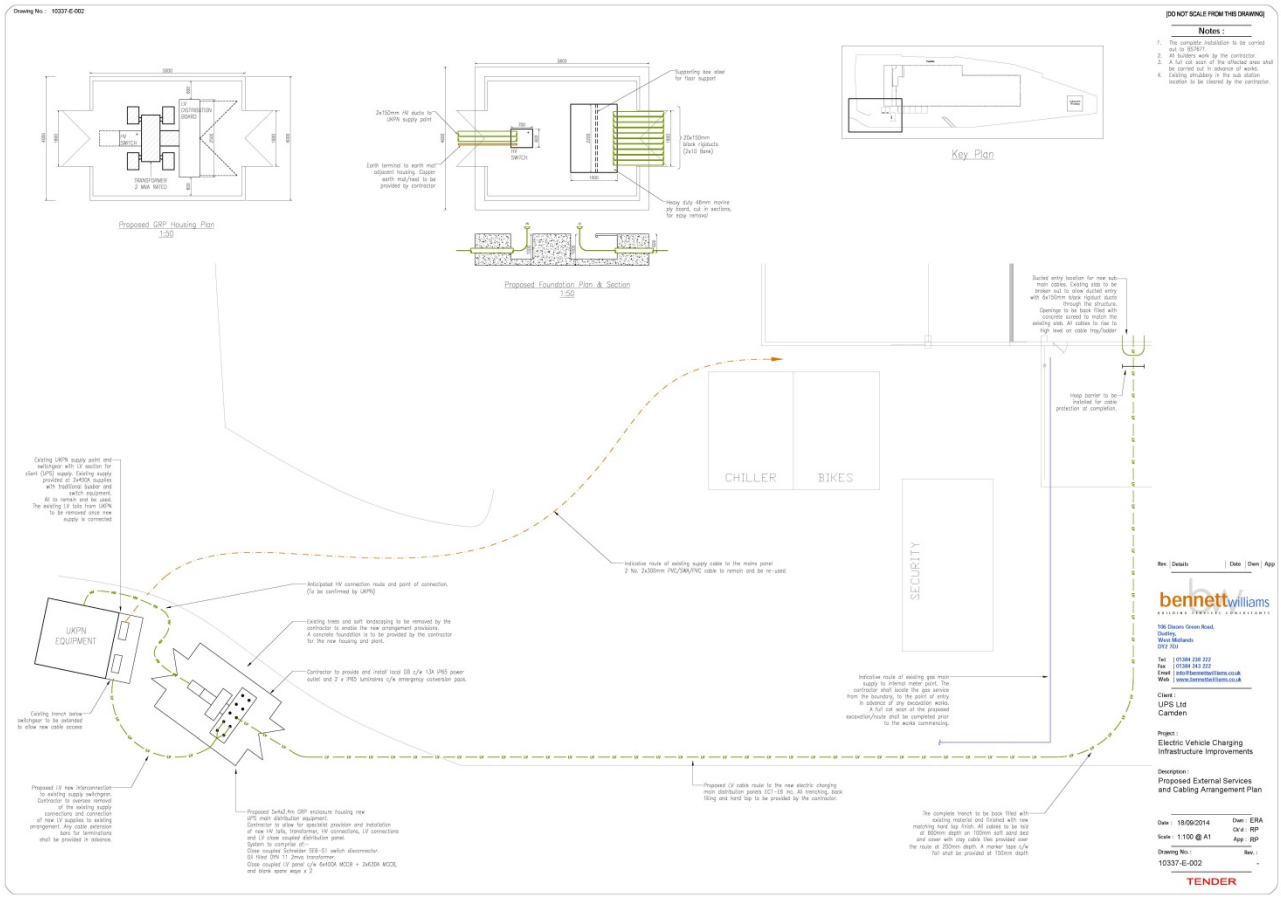

Figure 1: Site layout drawing

4. NOISE SURVEY

In order to assess noise from the mechanical services equipment in accordance with London Borough of Camden Council's requirements it is necessary to establish representative background noise levels at the nearest noise-sensitive properties. Details of the background noise survey carried out by ACA Acoustics Limited are provided in Sections 4.1 to 4.3 below.

4.1 Noise Measurement and Assessment Procedure

The site was not considered secure enough to leave noise-monitoring equipment and therefore a manned noise survey was carried out over representative daytime and night time periods on 3rd, 5th and 6th December 2014.

The background noise measurement position was selected at the rear façade of properties facing onto Kentish Town Road at a position equivalent to the closest noise-sensitive windows.

4.2 Instrumentation

The following equipment was used during the noise survey; the sound level meter was calibrated before and after the survey measurements with no change noted:

Equipment	Serial Number
NTi Audio Class 1 sound level meter type XL2	A2A-06294-E0
NTi Audio calibrator type CAL200 94/114dB. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	11441
Microphone extension cable and telescopic boom arrangements	-

Table 2: Equipment used

4.3 Noise Measurement Results

Complete results of the noise survey are provided in graphical form in Figures 2 and 3 on the following page.

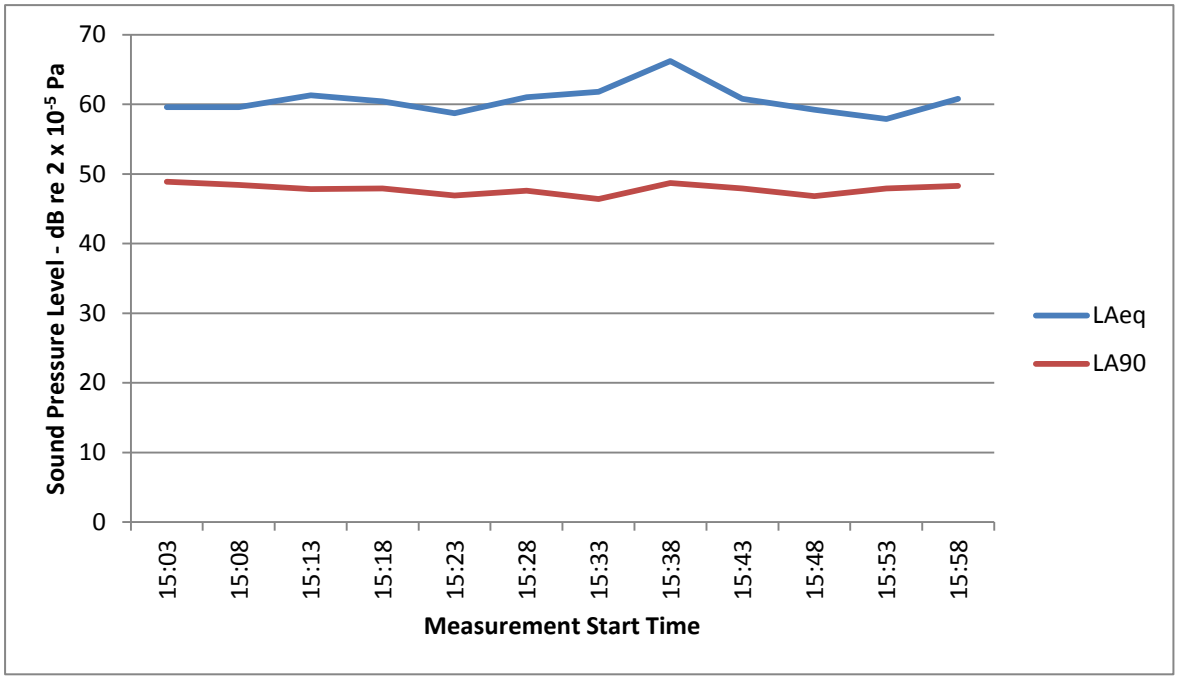

Figure 2: Daytime noise survey results - 3rd December 2014

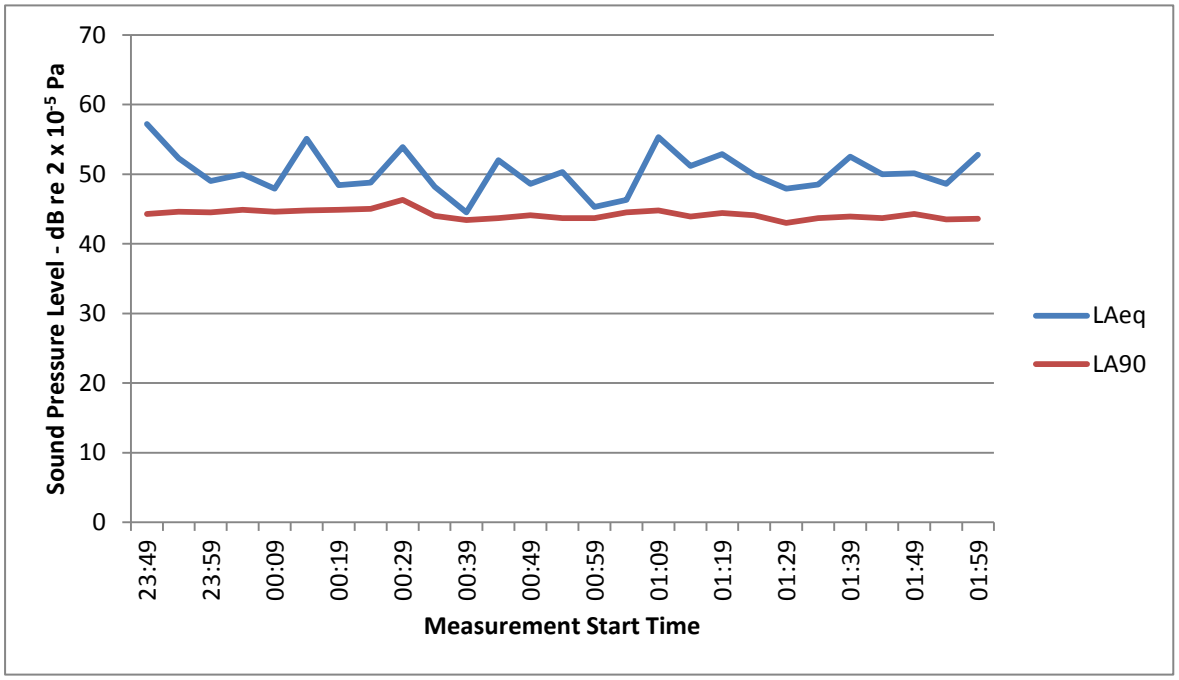

Figure 3: Night time noise survey results - 5th-6th December 2014

The lowest measured background noise level during the daytime noise survey was LA90 46dB and overnight was LA90 43dB.

The values recorded by ACA Acoustics Limited are used as basis for acoustic design such that noise from the proposed equipment is ≤33dBA outside nearest noise-sensitive windows. Summary of measured noise levels are provided in Table 3 on the following page.

Time Period	Lowest Recorded LA90	Camden Council Noise Limit
Daytime	46dB	≤ 33dBA
Evening	43dB	

Table 3: Summary noise survey results and London Borough of Camden Council noise limit

The limit to achieve London Borough of Camden Council's requirement outside nearby noise-sensitive windows is 33dBA; this is 10dBA below the lowest measured background noise level. At this level the equipment noise will not be disturbing or detrimental to the amenity of nearby occupants.

5. NOISE FROM MECHANICAL SERVICES EQUIPMENT

The planning application includes installation of an electrical transformer along with associated ancillaries. The equipment is to be installed internally within a GRP enclosure.

Noise levels from the proposed equipment can be determined from manufacturer's noise data. Manufacturer's data for the transformer is 85dBA at 1m. Corrections published by Stevens & Hung (Canadian Acoustical Association, 17-Vol 38 No 1, 2010) have been used to determine octave band spectra for the transformer from the published single-figure level, for use within the computer calculation.

A computer noise model has been used to calculate the noise contribution from the equipment to outside nearest noise-sensitive windows. The model is based on the environmental correction method of ISO 9613-2:1996 and takes account of distance between the transformer and noise-sensitive windows and environmental conditions.

The calculated noise level from the proposed transformer outside the nearest noise-sensitive windows compared with the planning requirement is shown in Table 4. Summary print-outs from the calculation model are included in Appendix A.

Description	Calculated Equipment Noise Levels	Camden Council Noise Limit
Nearest noise-sensitive windows	30dBA	≤ 33dBA

Table 4: Calculated transformer noise at nearest noise-sensitive windows

Table 4 shows that the overall noise level from the equipment is at least 13dBA below the lowest measured background noise outside nearby noise-sensitive properties and achieves London Borough of Camden Council's planning consent requirements.

Resultant noise from the equipment will not be disturbing or detrimental to the amenity of nearby existing occupants. The calculations include benefit of the GRP housing; whilst this will provide minimal acoustic reduction it is nonetheless recommended any ventilation apertures or service penetrations are acoustically treated such that the performance of the housing is not degraded.

6. RECOMMENDATIONS FOR NOISE & VIBRATION CONTROL TREATMENTS

As discussed in Section 5 above, noise from the proposed transformer will be low and should not be disturbing or detrimental to the amenity of any nearby residential occupants.

The transformer is to be installed within a GRP enclosure and no further noise control treatments are necessary.

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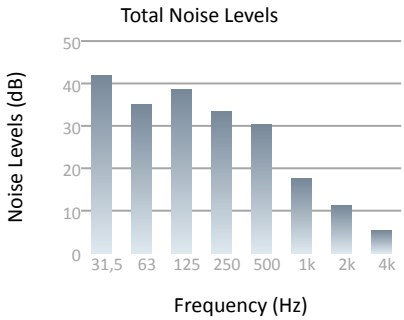
APPENDIX A

Acoustic Calculations

UPS, Regis Road, London

Project Name	UPS, Regis Road, London
Project Reference	141201
Reference	Rear of Kentish Town Road
Description	Rear windows to flats on Kentish Town Road
Noise Limit	33
dBA	30.4



Noise Sources

Reference	Quantity	Noise Levels (dB)							
		31,5	63	125	250	500	1k	2k	4k
Transformer	1	41.8	35	38.6	33.3	30.4	17.5	11.3	5.4

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Calculation Sheet

Transformer to Rear of Kentish Town Road

		Octave Band Centre Frequency (Hz)							
		31,5	63	125	250	500	1k	2k	4k
Noise Source									
Noise Source - Transformer									
Sound Pressure Levels @ 1m	**85.0**								
Octave Band Correction									
Octave Band Correction - Transformer									
Shaper Values		**94.0**	**89.0**	**91.0**	**87.0**	**86.0**	**75.0**	**68.0**	**63.0**
GRP Enclosure									
		-8.0	*-11.0*	*-12.0*	*-11.0*	*-14.0*	*-17.0*	*-16.0*	*-16.0*
ISO 9613 Calculation									
Horiz. Distance (m)	39.0								
Source Height (m)	1.5								
Receiver Height (m)	4.0								
Conditions - 10°C 70% Humidity									
Gm	0.0								
Gs	1.0								
Gr	0.0								
Barrier - Single Barrier									
Distance to Barrier (m)	34.0								
Barrier Height (m)	2.0								
Screening at (m)	3.7								
Reflection (dB)	2.5								
		-44.2	*-43.0*	*-40.4*	*-42.7*	*-41.6*	*-40.5*	*-40.7*	*-41.6*
External Receiver									
External Receiver - Rear of Kentish Tow									
Sound Pressure, Lp		**41.8**	**35.0**	**38.6**	**33.3**	**30.4**	**17.5**	**11.3**	**5.4**

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