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PERMIT

ENVIRONMENTAL NOISE MEASUREMENT REPORT

Site Name:	**Emsworth T.E. (WBC)**
Report Type:	**Pre-installation**
Site Address:	**British Telecom Emsworth T.E. 2 Warblington Road Emsworth Hants PO10 7HQ**
Date of Measurements:	**18th August 2010**
Client:	**Mr P. Williams Edenaire Limited Station Road Edenbridge Kent TN8 6EG**
Report Author: Approved for Issue:	**A. Jowitt B.Costello B.E.**
Report No. Report Date:	**1375/01 19th August 2010**

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1 Introduction

1.1 This report was carried out on the instructions of Mr P. Williams of Edenaire to determine the environmental impact of noise emissions from the proposed installation of a new air handling unit at Emsworth Telephone Exchange comprising:

a) 1 off eBTA600 unit located internally on the ground floor WBC area of the exchange building.

1.2 The objectives of the survey are to:

a) Determine any critical locations that may be affected by the noise emissions from the proposed plant equipment.

b) Determine the historical night-time noise level at any critical location in accordance with BS4142: 1997 "Method for rating industrial noise affecting mixed residential and industrial areas".

c) Suggest acceptable design criteria for noise emissions from the Exchange to minimise the likelihood of complaint when assessed to BS4142 and expected local authority requirements.

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2 Site Description

2.1 Emsworth Telephone Exchange is located on Warblington Road in Emsworth Hants. The main access is on Warblington Road to the north west of the Exchange.

2.2 The site of the exchange occupies an area of approximately 20m x 70m. The exchange itself is a three storey building approximately 50m x 13m with a car parking area to the south of the exchange building. The exchange is bounded by residential properties to the east, west and north with allotments to the south beyond the car park. Warblington Road lies to the west, Waters Edge Gardens to the south, Bath Road to the east and the A259 Havant Road to the north (see attached site plan).

2.3 The predominant background noise was from intermittent road traffic on the A259 Havant Road to the north. In addition, plant noise from within the exchange also contributed to the ambient noise levels at the site boundary.

2.4 The proposed Air Handling Plant consists of :

1 off Edenaire type eBTA600 fresh air unit located internally on the ground floor WBC area of the exchange building and ducted to inlet air acoustic louvres on the eastern facade overlooking the rear of 5-6 Bath Road. *(This is a change from the initial proposal following preliminary assessments with the unit on the western façade which proved not to be feasible in terms of the practical achievement of the likely noise control measures)*.
The PRV louvres (discharge air) will be located within the same room space also on the eastern facade of the exchange building and ducted via discharge air acoustic louvres overlooking the rear of 5-6 Bath Road generally as indicated on site plan.

2.5 It is understood that the units are fully operational 24hrs per day although actual duties will depend upon the heat load in the exchange and external ambient temperatures.

2.6 The area is predominantly residential.

2.7 The nearest affected noise sensitive locations to the exchange and the proposed installation appears to be the residential properties of:-

i. The rear of the residential properties of 5-6 Bath Road at approximately 35m to the east of the proposed eBTA600 unit inlet air acoustic louvre and PRV discharge air acoustic louvre on the eastern facade of the exchange (see site plan).

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3 Instrumentation

3.1 Cirrus Research plc Integrating Sound Level Meter:
Type: GR 821B Serial No: C19350FE
Compliance to IEC 61672-1: 2002 Class 1, IEC 60651: 1979 Type 1, IEC 60804: 2001 Type 1, IEC 61260: 1995 Class 1, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983 and ANSI S1.43-1997

3.2 Cirrus Research plc Calibrator:
Type: GR 511E Serial No: 43553

4 Weather Conditions

4.1 Clear warm night (approx 12 C) with a light north westerly wind approximately 5mph. Road conditions were dry throughout the survey period.

5 Measurement Procedure

5.1 Measurements were taken at various locations in the vicinity of the exchange building. These readings were taken in order to establish noise levels likely to be experienced at nearest affected residential properties (see attached site plan).

5.2 Measurements were taken in accordance with the guide lines of BS 4142: 1997 "Method for rating industrial noise affecting mixed residential and industrial areas".

5.3 All measurements were taken between 00:00hrs and 01:00hrs on 18/08/2010.

5.4 The results are utilised to assess the likelihood of complaint based upon the requirements of BS 4142. External L_{Aeq} and L_{A90} measurements were taken over minimum 5 minute measurement intervals.

5.5 The meter was calibrated before and after the survey period and no deviation noted. All measurements are quoted to the nearest whole decibel. The sound level meter used was tripod mounted at a height 1.5 metres a wind shield was used during all measurements.

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6 Results

6.1 The results of the noise measurements when assessed in accordance BS 4142: 1997 "Method for rating industrial noise affecting mixed residential and industrial areas", were as follows:

Background noise levels

Night-Time Noise Levels			
Location	$L_{Aeq,5mins}$	$L_{A90,5mins}$	$L_{Amin,5mins}$
A	41	34	31
A	42	33	30
B	60	31	27
B	53	30	26
C	39	32	30
C	34	31	29

Measurements for all sampling periods at each position were found to be consistent.

The lowest recorded background noise levels for the purpose of these assessments are $L_{A90,\ 5mins}$ of 30dBA.

Measurement positions below and as noted on site plan:

Location A: To the north west of the exchange on the pavement in Warblington Road adjacent the junction with Kinnell Close at approximately 20 metres from the western facade of the exchange (see site plan).

Location B: To the east of the exchange on the pavement in Bath Road at approximately 50 metres from the eastern facade of the exchange (see site plan).

Location C: To the south of the exchange in the car park area at approximately 15 metres from the southern facade of the exchange (see site plan).

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7 Assessment

7.1 Assessment:

Units: 1 off Edenaire type: eBTA600
System: AHU Inlet and PRV discharge air
Location: Nearest affected residential properties
Rear of 5-6 Bath Road

Comments			Comments & BS4142 clause
Background		30 dBA	*7.3*
Noise via AHU Inlet Louvre			
Single Unit Noise @ 2m eBTA600 unit	58 dBA		*Manufacturers' Data*
S.R.I. of Acoustic Louvres	- 10 dBA		
Site correction Factor	+ 3 dBA		
Distance correction to 35m	- 25 dBA		
Specific Noise @ residence (calculated only)		26 dBA	*3.4*
Noise via PRV (Discharge Louvre)			
Internal Noise Level (NR65)	72 dBA		*Assumed BT internal noise level.*
20Log(r) where (r =35m)	- 31 dBA		**** empirical formulae*
S.R.I. of Acoustic Louvres	- 10 dBA		
Site correction factor	+ 3 dBA		
10Log(S) where (S=1.8m x 1.7m) (estimate)	+ 5 dBA		**** empirical formulae*
Formula factor	- 14 dBA		
Specific Noise @ residents (calculated only)		25 dBA	*3.4*
Combined Specific Noise Level @ residence		**28 dBA**	
Tonal Qualities		+ 5 dBA	*8.2*
Rating Level		**33 dBA**	*3.6*
Excess of Rating over Background		+ 3 dBA	*9*
BS 4142 Assessment:	**Marginal situation**		*9*
Subjective Comments:	**Further attenuation recommended (see appendix 1)**		*9*

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7 Assessment (continued)

*** Noise to atmosphere has been calculated from the following empirical formulae:-

$$SPL_{ext} = SPL_s - SRI - 20\log(r) + 10\log(S) - 14$$

Where:

SPL_{ext}	=	*external sound pressure level at distance r from wall/roof*
SPL_s	=	*sound pressure level in source room (dB)*
SRI	=	*sound reduction index of acoustic louvre*
S	=	*area of louvre radiating to outside (based on 1.5mx1.8m louvre area)*

7.2 The results of the assessment (7.1) with acoustic louvres fitted to both the inlet and discharge air indicates a Rating level of 33dBA and a specific noise level of 28dBA at the nearest affected residential properties which is 2dBA below the lowest recorded background noise level.

7.3 Whilst complaints can not be precluded in relation to the combined noise levels (based on this assessment to BS 4142: 1997) should the local authority insist upon background minus 5dBA then this would require further attenuation measures as noted in appendix 1

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8 Observations

8.1 In order to assess the acceptability of the proposed installation it is necessary to compare the plant noise level with the background noise at any critical location. Detailed guidance on the assessment procedure is given in BS 4142: 1997.

8.2 BS4142 requires a comparison to be made between the specific noise (i.e. plant noise under consideration) when measured in L_{Aeq} mode and the background noise when measured in the L_{A90} mode. The reference time interval (T) being 1 hour during the day and 5 minutes during the night.

8.3 Should the specific noise contain any distinguishable characteristics, e.g. whine, hiss, clicks, bangs, etc, or be of cyclic nature, 5dB should be added to the specific noise prior to the assessment.

8.4 We would expect that the likelihood of complaint should be minimised provided that the noise emissions from the units at the nearest affected residential property are at least 5dB below background. Typically, we would expect that the local authority may specify this noise limit at 1 metre from the facade of the nearest affected residential property.

8.5 The inlet/discharge louvres should be correctly sized to ensure that regenerated air noise across the louvre does not compromise the criteria (generally we would expect that the face velocity across the "active section" of each louvre should not exceed 1.5m/s) The building fabric itself should also be considered (i.e. open windows, doors single glazing, pressure relief dampers, etc.) to ensure that the specified criteria is not compromised by breakout noise from within the exchange.

8.6 This report can only deal with the sources under investigation and cannot account for the variable impact from other noise sources within the exchange. We would suggest that an overall strategic approach to the entire noise climate in the vicinity of the exchange be considered and where necessary be co-ordinated with other licensed operators.

8.7 Finally, we would point out that we would also consider it important to ensure that plant noise emissions do not have any adverse affects upon the residential gardens adjacent to the boundary which could cause loss of amenity to the residents. The additional attenuation recommended should therefore also take account of boundary conditions to ensure that there is no loss of residential amenity.

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9 Recommendations

9.1 In line with BS4142: 1997 and expected local authority requirements it is recommended that the specific noise level from the proposed plant should not exceed a specific noise level of 25dBA when measured at 1 metre from the facade of the nearest affected residential properties.

9.2 In order to maintain the criteria in 9.1 above further attenuation by way of acoustic louvres on the PRV units and Acoustic louvres and 600mm long attenuators on the inlet air of the eBTA600 unit are recommended to achieve the criteria of background minus 5dBA at the nearest residential properties.

9.3 The inlet/discharge louvres should be correctly sized to ensure that regenerated air noise across the louvre does not compromise the criteria (generally we would expect that the face velocity across the "active section" of each louvre should not exceed 1.4-1.5m/s) The building fabric itself should also be considered (i.e. open windows, doors single glazing, pressure relief dampers, etc.) to ensure that the specified criteria is not compromised by breakout noise from within the exchange.

9.4 Assessment for the PRV's (discharge air via room space) is based upon an internal noise level of NR65. Internal room noise levels must be considered carefully to ensure that breakout noise via the PRV's do not compromise criteria).

9.5 The noise levels at the boundary of the exchange in relation to the rear gardens of the nearest affected properties should be considered. The calculated combined specific noise level at 5 metres from the eastern facade (assuming attenuation as recommended) is 37dBA. We would recommend that boundary conditions be agreed as necessary with the local authority.

9.6 We are not aware of any specific local authority requirements but all design parameters should be agreed as necessary with the relevant local authority prior to installation.

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9 Recommendations - Continued

9.7 Summary of assessment to the nearest affected residential properties with acoustic louvres fitted.

Unit	Rating Level	Excess over Background	BS4142 Assessment Result	Comments
Inlet air: 1 off eBTA600 unit and Discharge air: PRV Affecting the rear of the residential properties of 5-6 Bath Road	33dBA	+ 3dBA	Marginal situation complaints not precluded	Further attenuation in addition to the acoustic Louvres will be required on the inlet airside. see appendix 1

Warnings:

Please ensure acceptance criteria are agreed as necessary with the relevant local authority.

"Compliance with a British Standard does not of itself confer immunity from legal obligations"

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Appendix 1 : Proposed Attenuation

1. Inlet Air

Inlet Acoustic Louvres: (size at max 1.5ms^{-1} face velocity on active louvre)

Inlet Attenuators: Ref; WP24/6P; - 600mmL to pass 6.0m^{3}s^{-1} @ 24Pa

The attenuator case should be a minimum of 150mm longer than the attenuator to provide a plenum section between the acoustic louvre and attenuator.

2. Discharge Air

Discharge Acoustic Louvres: (size at max 1.4-1.5ms^{-1} face velocity on active louvre)

The attenuation options above are indicative selections for the atmosphere side ducted inlet and discharge air to each unit. These selections are based upon achieving a specific noise level of 25dBA i.e. 5dBA below the lowest measured background noise level at 1 metre from the facade of the nearest affected residential properties.

Should internal room noise levels be in excess of current estimates then it would be necessary to increase the noise control measures on the discharge air.

Care should be taken to ensure that the acoustic louvres are sized so as not to exceed 1.4-1.5m/s face velocity on active louvre to reduce the likelihood of regenerated air noise.

Nominal equipment selections are based upon "Waterloo Acoustics Ltd's" standard product range performance data.

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Appendix 4 : Site Plan

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BT Emsworth Telephone Exchange WBC Grd floor
Measuring locations A, B, & C