WATERLOO ACOUSTICS

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PERMIT

ENVIRONMENTAL NOISE MEASUREMENT REPORT

Site Name:	**Emsworth T.E. (MUA)**
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:**	**1374/01** **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 new air handling units at Emsworth Telephone Exchange comprising:

a) 2 off eBTA130 units (1 + 1 Future use) located internally on the first floor MUA 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 which also contributed to the ambient noise levels at the site boundary.

2.4 The proposed Air Handling Plant consists of :

2 off Edenaire type eBTA130 (1 + 1 Future use)fresh air units located internally on the first floor MUA area of the exchange building and ducted via the manufacturers acoustic Plinth to inlet air acoustic louvres on the western facade of the exchange building overlooking the rear of number 4 Warblington Road. The PRV louvres (discharge air) will be located within the same room space on the eastern facade of the exchange building and ducted via discharge air acoustic louvres overlooking the rear of 8-10 Bath Road generally as indicated on site plan and Edenaire drawing ref: NNC067-Q01.

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 residential property of 4 Warblington Road at approximately 20m to the north west of the proposed eBTA130 units inlet air acoustic louvre on the western facade of the exchange (see site plan).

ii. The rear of the residential properties of 8 -10 Bath Road at approximately 30m to the east of the proposed PRV discharge air acoustic louvres 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: 2 off Edenaire type: eBTA130 units (1 + 1 future use)
System: Inlet Air
Location: Nearest affected residential property
4 Warblington Road

Comments			**BS4142 clause**
Background		30 dBA	*7.3*
Single Unit Noise @ 2m eBTA130 unit (fitted with manufacturers Acoustic Plinth)	46 dBA		*Manufacturers' Data*
S.R.I. of Acoustic Louvres	- 10 dBA		
Correction for 1 off future unit	+ 3 dBA		
Site correction Factor	+ 3 dBA		
Distance correction to 2m to 20m	- 20 dBA		
Specific Noise @ residents		22 dBA	*3.4*
Tonal Qualities		+ 5 dBA	*8.2*
Rating Level		27 dBA	*3.6*
Excess of Rating over Background		- 3 dBA	*9*
BS 4142 Assessment:	**Complaints Unlikely**		*9*
Subjective Comments:	**Complaints Not Anticipated**		

We would not anticipate complaints with this installation. The rating level by calculation to the nearest residence is 27dBA with a specific noise level of 22dBA which is 8BA below the lowest recorded background noise.

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7 Assessment - continued

7.2 Assessment

Units: 2 off Edenaire type: eBTA130 units (1 + 1 future use)
System: Discharge Air; PRV's
Location: Nearest affected residential properties
8-10 Bath Road

Comments			**BS4142 clause**
Background		30 dBA	*7.3*
Internal Noise Level (NR65)	72 dBA		*Assumed BT internal noise level.*
20Log(r) where (r =31m)	- 30 dBA		**** empirical formulae*
S.R.I. of Acoustic Louvres	- 10 dBA		
Site correction factor	+ 3 dBA		
10Log(S) where (S=1.5m x 0.5m)	+ 0 dBA		**** empirical formulae*
Formula factor	- 14 dBA		
Specific Noise @ residents (calculated only)		21 dBA	*3.4*
Tonal Qualities		+ 5 dBA	*8.2*
Rating Level		26 dBA	*3.6*
Excess of Rating over Background		- 4 dBA	*9*
BS 4142 Assessment:	**Complaints Unlikely**		*9*
Subjective Comments:	**Complaints Not Anticipated**		

We would not anticipate complaints with this installation. The rating level by calculation to the nearest residence is 26dBA and a specific noise level of 21dBA which is 9dBA below the lowest recorded background noise.

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

*** 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 1mx2m louvre area)*

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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.

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9 Recommendations

9.1 In line with BS4142: 1997 and expected local authority requirements it is recommended that the noise emissions 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 this criterion we would recommend that the proposed acoustic louvres are maintained in this scheme.

9.3 The inlet/discharge louvres should be fully sealed in the opening and correctly sized to ensure that regenerated air noise across the louvres 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.

9.4 Due to the relatively small height dimensions on the PRV acoustic louvres the recommended face velocity of 1.5m/s across the active section of the louvre will be increased which may compromise the results of the assessment due to regenerated air noise across the louvres. We would recommend where possible that the PRV louvre sizes are increased to achieve a face velocity of no more than 1.5m/s across the active section of the louvre.

9.5 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 does not compromise criteria).

9.6 The noise levels at the boundary of the exchange in relation to the rear gardens of the nearest affected properties should be considered. These are in the region of 36dBA at 5m from the facade to the west on the inlet air side and 37dBA at 5m from the PRV's discharge air side on the eastern facade. We would recommend that boundary conditions be agreed as necessary with the local authority.

9.7 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

9.8 Summary of assessment to the nearest affected residential properties with manufacturer's acoustic plinth and acoustic louvres fitted.

Unit	Rating Level	Excess over Background	BS4142 Assessment Result	Comments
Inlet air: 2 off eBTA130 units Affecting the residential property of 4 Warblington Road	27dBA	- 3dBA	Marginal Significance complaints not precluded	No further attenuation other than acoustic louvres
Discharge air: PRV's Affecting the rear of the residential properties of 8-10 Bath Road	26dBA	- 4dBA	Complaints Unlikely	No further attenuation other than acoustic louvres

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

Recommended Attenuation 2 off eBTA130 units (1 + 1 future use) assuming acoustic plinth fitted.

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

Recommended Attenuation 2 off PRV units

Discharge Acoustic Louvres (size at max 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 less than 25dBA i.e. 5dBA below the lowest measured background noise level at 1 metre from the facade of the nearest affected residential properties.

Care should be taken to ensure that the acoustic louvres are sized so as not to exceed 1.5ms^{-1} 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 2 : Definitions

Equivalent Continuous Sound Pressure Level - (L_{Aeq})

The equivalent continuous A-weighted sound pressure level in decibels at the measurement position over a given reference time interval. This is used to provide an equivalent steady state noise level when a fluctuating noise is measured. L_{Aeq} is quoted to the nearest whole number of decibels.

Background Sound Pressure Level - (L_{A90})

The A-weighted sound pressure level of the residual noise in decibels exceeded for 90% of a given time interval. L_{A90} is quoted to the nearest whole number of decibels.

Specific Noise Level - ($L_{Aeq, Tr}$)

The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

Rating Level

The specific noise level plus any adjustment for the character of the noise

Specific Noise Level - $L_{Aeq,Tr}$ **

The equivalent continuous A-weighted sound pressure level in decibels at the measurement position produced by the specific noise source over a given reference time interval. The specific noise level is quoted to the nearest whole number of decibels.

Ambient Noise

Total encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Residual Noise

The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise. Usually expressed as the equivalent continuous A-weighted sound pressure level of the residual noise.

** Definitions as noted in BS4142

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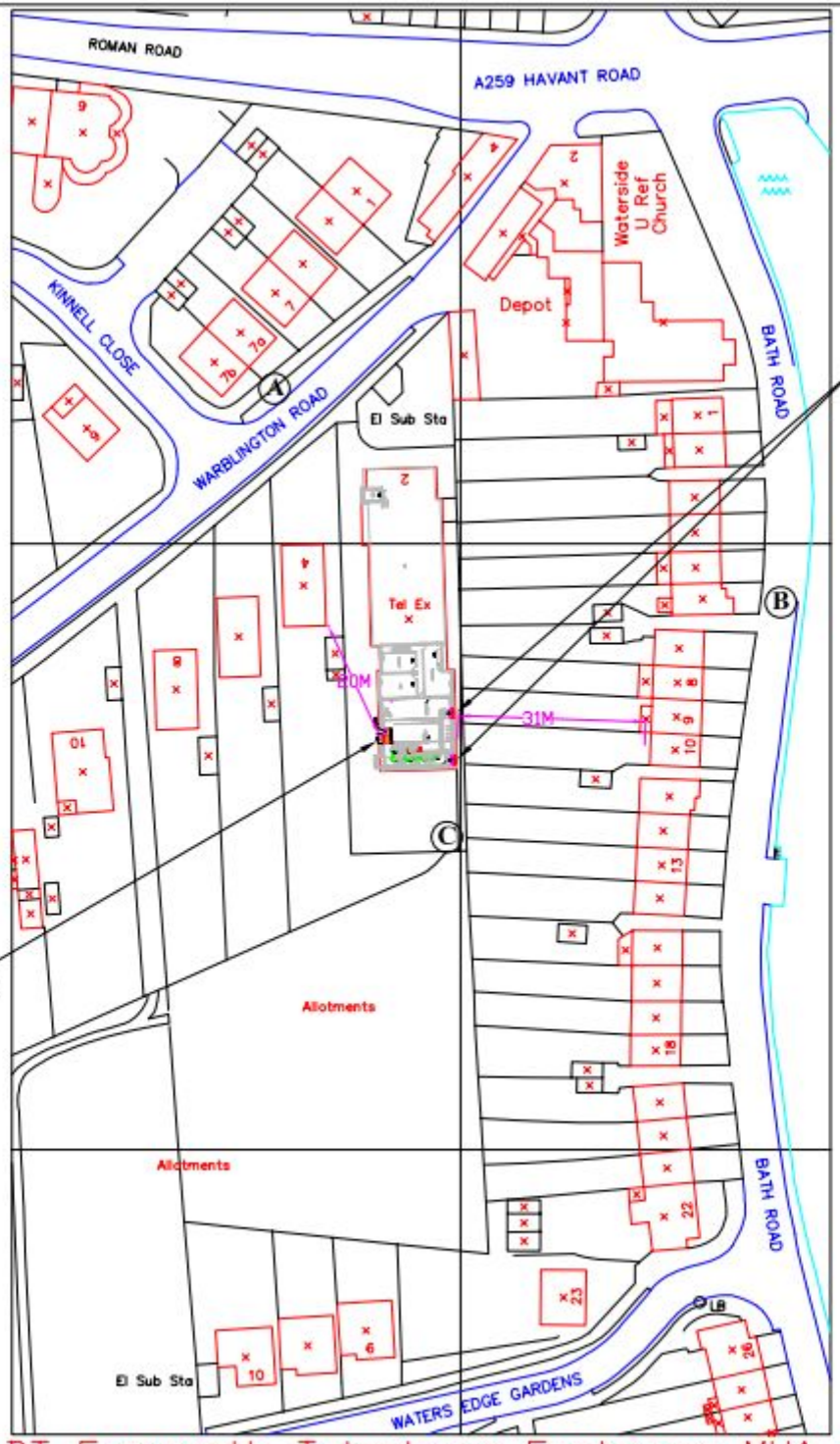
Appendix 3 : Manufacturer's Noise Data

Description		Units	eBTA66											eBTA130										
Net Cooling Capacity @ 5°C Δt, design airflow and clean filters		Kw	3.92											7.84										
Airflow		m³/s	0.66											1.3										
Dimensions	Width	mm	600											1200										
	Height	mm	900											900										
	Depth	mm	425 (440 over hinge)											425 (440 over hinge)										
Weight		kg	65											130										
External pressure		Pa	80											80										
Louvre area required per unit	Inlet	m²	0.33											0.66										
PRV area provided		m²	0.1581 (510 x 310mm)											0.2201 (710 x 310mm)										
No. of fans			1											2										
Filter type			EU4											EU4										
Controller			Temp controller (Cool)											Temp controller (Cool)										
Electrical supply		V / Ph / Hz	230/1/50											230/1/50										
Full Load Current		amps	2.2											4.4										
Starting Current		amps	Soft start											Soft start										
Recommended Fuse Rating (HRC)		amps	10											10										
Noise Specification *		Hz	63	125	250	500	1K	2K	4K	8K	63	125	250	500	1K	2K	4K	8K						
Sound Pressure Level - Internal (Free blow header)		dB(A) @ 2 m	63	67.5	65.5	53.5	49.5	43.5	42	35	63.5	73	68	60	57	52.5	49	41						
Sound Pressure Level - External, standard louvre, no plinth		dB(A) @ 2 m	66	65.5	61.5	50.5	45	41	34	29	70	68	64	54	50	47	41.5	39						
Sound Pressure Level - External, standard louvre, acoustic plinth		dB(A) @ 2 m	59	58	53.5	40	34.5	31.5	21.5	11.5	64	63	57	47	43	40	33	27.5						

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Appendix 4 : Site Plan & Edenaire Drawing



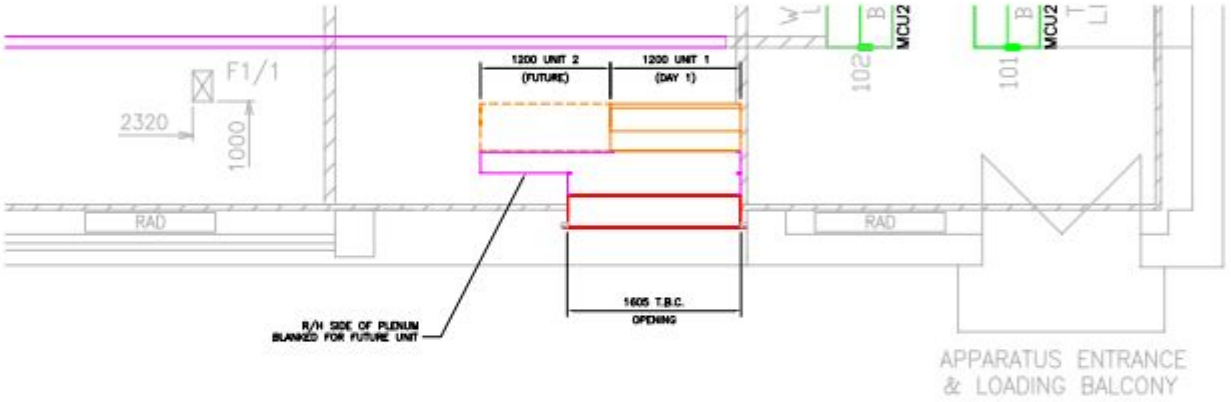
BT Emsworth Telephone Exchange MUA 1st floor
Measuring locations A, B & C

IF IN DOUBT ASK

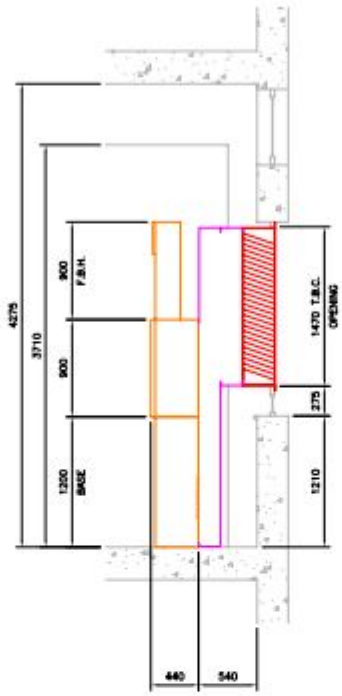
3RD ANGLE PROJECTION



SIDE ELEVATION OF PRV'S @ SCALE 1:25



PLAN VIEW OF UNIT @ SCALE 1:25



SIDE ELEVATION OF UNIT @ SCALE 1:25



SIDE ELEVATION OF PRV @ SCALE 1:25



PLAN VIEW @ SCALE 1:100

NOTES
1) BUILDING CONTRACTOR TO REMOVE GLAZING FROM 3 No. WINDOW POSITIONS. BUILDING CONTRACTOR TO OFFLOAD AND INSTALL LOUVRES.
2) RETURN AIR GRILLES ON OUR UNITS ARE NOT TO BE OBSTRUCTED.
3) ACCESS PANELS ON OUR UNITS ARE NOT TO BE COVERED OR ACCESS RESTRICTED.
4) ALL RADIATORS TO BE REMOVED BY OTHERS.
5) WEIGHT OF UNITS :- eBTA130 130kG
6) LOUVRE TYPE:- ACOUSTIC LOUVRE COLOUR:- SILVER RAL9006

ISSUE	CHANGE DESCRIPTION	MOD BY	DATE
-	ORIGINAL ISSUE	NJS	12.07.10

Eaton-Williams Ltd.
FIRCROFT WAY EDENBRIDGE, TN8 6EZ. Tel 01732 866066

DRAWN	NJS
CHECKED	NJS
DATE	12.07.10
TITLE	EMSWORTH T.E. MUA 1ST FLOOR PROPOSED AIR CONDITIONING SOLUTION 1 x eBTA130 UNIT
SCALE	SEE DWG
DWG No.	NNC067-Q01
SIZE	A1
ISSUE	-

All dimensions are in mm unless otherwise stated. This drawing is for proposal purposes only therefore all dimensions should be checked prior to manufacture

DO NOT SCALE THIS PRINT