



Primark Head Office Development Reading

Planning Noise Assessment

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Client: Macegreen Consulting

Date: 6 December 2016

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Introduction

This report details the noise impact assessment carried out for roof plant associated with the development of the new Primark HQ within their existing premises at West Street, Reading.

The report recaps the noise survey previously carried out at the site in support of planning, and details the extensive noise modelling and prediction exercise which has been carried out in order to assess the noise impact of plant on the surrounding area.

It is demonstrated that levels from roof plant impacting upon the nearest noise sensitive receptors, identified as residences on Cheapside, West Street and Friar Street, will be below the maximum levels stipulated by the Local Authority in Planning Condition 10 associated with the scheme.

Assessment Criteria

The following assessment criteria are referred to within this report:

BS 4142: 2014 *Methods for Rating and Assessing Industrial and Commercial Sound*

This standard provides a methodology for rating and assessing sound of an industrial or commercial nature, including sound from industrial and manufacturing processes, fixed plant installations, loading and unloading of goods, and sound from mobile plant.

The standard can be used both to assess sound from proposed new industrial and commercial sources, and sound from these sources affecting proposed new dwellings, as well as to investigate complaints. It does not, however, determine whether noise amounts to a nuisance. It is not appropriate for the assessment of noise from music or from dogs barking etc.

The standard leads to derivation of a 'rating level' for the industrial sound which is weighted for acoustically significant characteristics including tonality, impulsivity and intermittency. This is compared against the background noise level in the absence of the specific noise (the noise source arising from the industrial/commercial use), the difference between the two being used to give an indication of impact.

Typically, the greater the difference, the greater the magnitude of the impact;

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific noise source will have an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

It should be noted that not all adverse impacts will lead to complaints, and not every complaint is proof of an adverse impact.

Local Authority Requirements

Planning condition 10 requires that noise emissions from mechanical services plant are limited to a BS 4142:2014 rating level of at least 10 dB below the background noise level L_{A90} at 1m from the façade of noise sensitive receptors when all plant or any part of it is in operation.

Noise Survey

To assess the noise environment at the site, a noise survey was carried out on Wednesday, 15 April 2015. The survey comprised 3 measurement positions around the West Street site. Measurements were made during the day and evening periods in order to take into account potential noise impact during evening opening and operation.

The measurement locations at the West Street site are referenced in figure 1 below.

All measurements were of 15 minutes duration. In all cases the microphone was located approximately 1.5m above ground level and all measurements were made at 2 meters from the building façade due to space constraints (i.e. not in free field conditions).

The dominant noise source at all locations was local road traffic and pedestrian activity.



Figure 1: Site Plan Showing Measurement Locations at West Street

The weather during the measurements was warm and dry, with no wind or precipitation.

The noise monitoring equipment used during the survey was a CEL-633 Type 1 sound level meter, serial number 3921025. On site calibration checks were performed on the meter before and after the measurements using a CEL 120/1 calibrator serial number 2045151 and were found to be within the permitted tolerance of BS EN 61672-1:2013. All equipment had a valid calibration certificate at the time of the survey.

Measurement Results

Table 1 below summarises noise the measurements made around the site;

Location	Time	L_{Amax} (dB)	L_{Aeq} (dB)	L_{A10} (dB)	L_{A90} (dB) (Background Noise Level)
West St	10:32	80	68	72	59
	12:08	81	68	71	61
	18:32	84	70	74	64
	19:53	83	64	68	56
Friar St	11:00	82	66	69	60
	12:30	78	65	69	58
	18:49	98	71	68	59
	20:12	78	66	70	60
Cheapside	11:17	84	65	69	58
	12:45	93	68	70	57
	19:06	81	67	71	59
	20:30	76	62	65	53

Table 1: Measurement Results

No unusual events (sirens, road closures et cetera) were noted during the survey period and as such the measured noise levels are considered representative of those occurring in the area.

Assessment Criteria

Based on the data presented in Table 1 above and the requirement that the BS 4142 rating level for plant should be at least 10 dB below the background noise level at the nearest noise sensitive receptors, the following daytime and evening noise limits are set. Where the measured noise level during the evening was found to be higher than that during the daytime, the lower level has been used for both periods.

Receptor	Measured background noise level, L_{A90}	Required BS 4142 rating level, L_{Aeq}
West Street residential facades	56 dB	46 dB
Friar Street residential façade	58 dB	48 dB
Cheapside residential façade	53 dB	43 dB

Table 2: BS 4142 rating level for compliance with planning

Building Services Plant

Building services plant associated with the development of the West Street premises is located across the roof of the building. This is shown in Hoare Lea drawings reference;

0709881-HL-XX-RF-GA-M-590-1004-1

0709881-HL-XX-RF-GA-M-590-1004-2

0709881-HL-XX-RF-GA-M-590-1004-3

These drawings, and the noise data received from Hoare Lea, are appended to this report for reference.

Modelling and Prediction Exercise

The Soundplan 7.4 software package has been used to model the site and surrounding buildings, as well as each individual item of roof plant. Plant has been modelled as point sources due to its distance from the receptors.

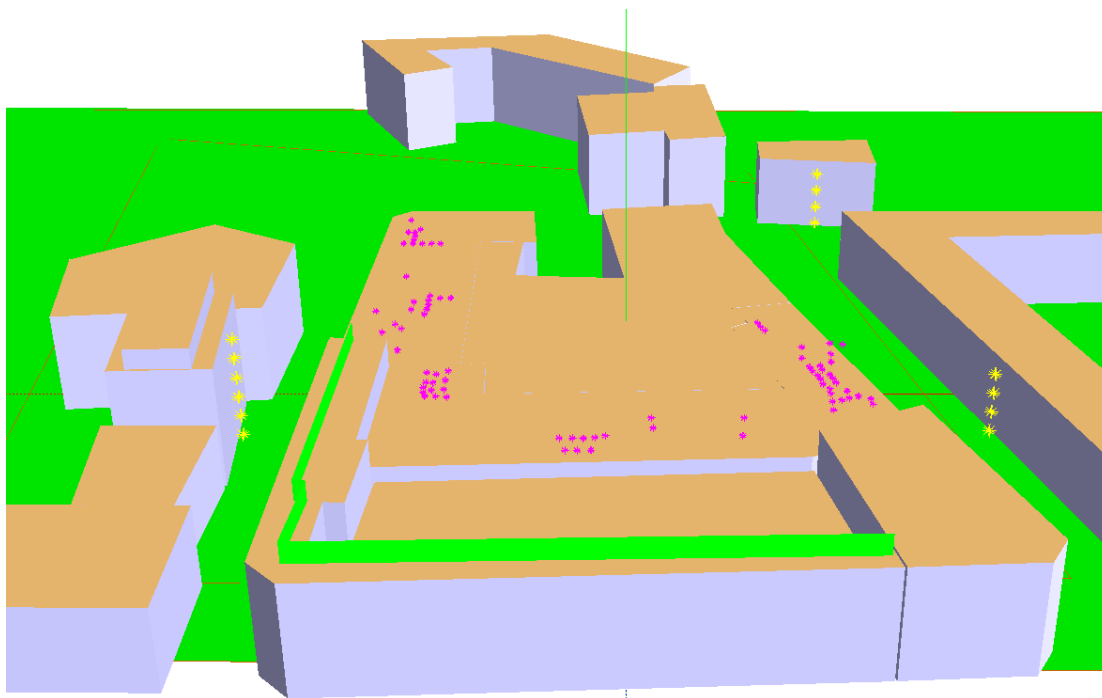
The model includes the relative height of buildings and plant, as well as screening due to the apex roof to the south west and south of the building.

Figure 2: Screenshot from Acoustic Model



The following screenshot shows a 3D view of the model. Plant noise sources are represented as pink dots. The yellow asterisks show noise sensitive receptor locations modelled at each of the three main residential receptor locations, at their closest point to the site.

Figure 3: 3D View of Model



Predicted Noise Levels

The worst case noise impact upon each of the residential receptors as predicted by the noise model, with all plant operating simultaneously, is as shown in the table below;

Location	Predicted Building Services Noise, L_{Aeq}
West St	39 dB
Friar St	33 dB
Cheapside	37 dB

Table 3: Predicted Noise Levels

BS 4142 Assessment

The following tables present BS4142 assessment for each receptor;

Table 4: BS4142 Assessment, West St

Results		Relevant Clause	Commentary
Predicted specific sound level	$L_{Aeq}(60 \text{ min})$ 39 dB	7.2, 7.3.6	Assessment made during the daytime so reference period 1hr
Background sound level (day/evening)	$L_{A90}(15 \text{ min})$ 56 dB	8.3	Measured during noise survey
Acoustic feature correction	4 dB	9.2	No acoustic features are anticipated with the plant as selected, however a correction has been included as a precaution
Rating level	$(39 + 4) =$ 43 dBA	9.2	
Excess of rating level over background sound level	$(56 - 43) =$ -13 dB	11	
Assessment indicates compliance with planning condition 10 and no adverse impact.		11	
Uncertainty of the assessment	Not significant	10	The rating level is substantially below the background noise level and as such measurement uncertainty does not significantly influence the outcome of the assessment. The assessment is conservative, based on the lowest measured background noise levels.

Table 5: BS4142 Assessment, Friar St

Results		Relevant Clause	Commentary
Predicted specific sound level	$L_{Aeq}(60 \text{ min})$ 33 dB	7.2, 7.3.6	Assessment made during the daytime so reference period 1hr
Background sound level (day/evening)	$L_{A90}(15 \text{ min})$ 58 dB	8.3	Measured during noise survey
Acoustic feature correction	4 dB	9.2	No acoustic features are anticipated with the plant as selected, however a correction has been included as a precaution
Rating level	$(33 + 4) =$ 37 dBA	9.2	
Excess of rating level over background sound level	$(58-37) =$ -21 dB	11	
Assessment indicates compliance with planning condition 10 and no adverse impact.		11	
Uncertainty of the assessment	Not significant	10	The rating level is substantially below the background noise level and as such measurement uncertainty does not significantly influence the outcome of the assessment. The assessment is conservative, based on the lowest measured background noise levels.

Table 6: BS4142 Assessment, Cheapside

Results		Relevant Clause	Commentary
Predicted specific sound level	$L_{Aeq}(60 \text{ min})$ 37 dB	7.2, 7.3.6	Assessment made during the daytime so reference period 1hr
Background sound level (day/evening)	$L_{A90}(15 \text{ min})$ 53 dB	8.3	Measured during noise survey
Acoustic feature correction	4 dB	9.2	No acoustic features are anticipated with the plant as selected, however a correction has been included as a precaution
Rating level	$(37 + 4) =$ 41 dBA	9.2	
Excess of rating level over background sound level	$(53-37) =$ -16 dB	11	
Assessment indicates compliance with planning condition 10 and no adverse impact.		11	
Uncertainty of the assessment	Not significant	10	The rating level is substantially below the background noise level and as such measurement uncertainty does not significantly influence the outcome of the assessment. The assessment is conservative, based on the lowest measured background noise levels.

Potential Night Time Operation

At the time of the noise survey it was assumed that plant would operating during day and evening periods only (07:00-23:00) and as such, no overnight noise survey was undertaken.

It is not known at present whether there is any requirement from Primark to operate this plant overnight. However, given that the rating level from plant is significantly below the measured evening background noise levels at each location and that the noise climate around the site was dominated by existing building services plant and road traffic noise, we anticipate that night time operation of plant with no adverse noise impact upon residents is feasible.

Conclusion

This report details the noise impact assessment carried out for roof plant associated with the development of the new Primark HQ within their existing premises at West Street, Reading.

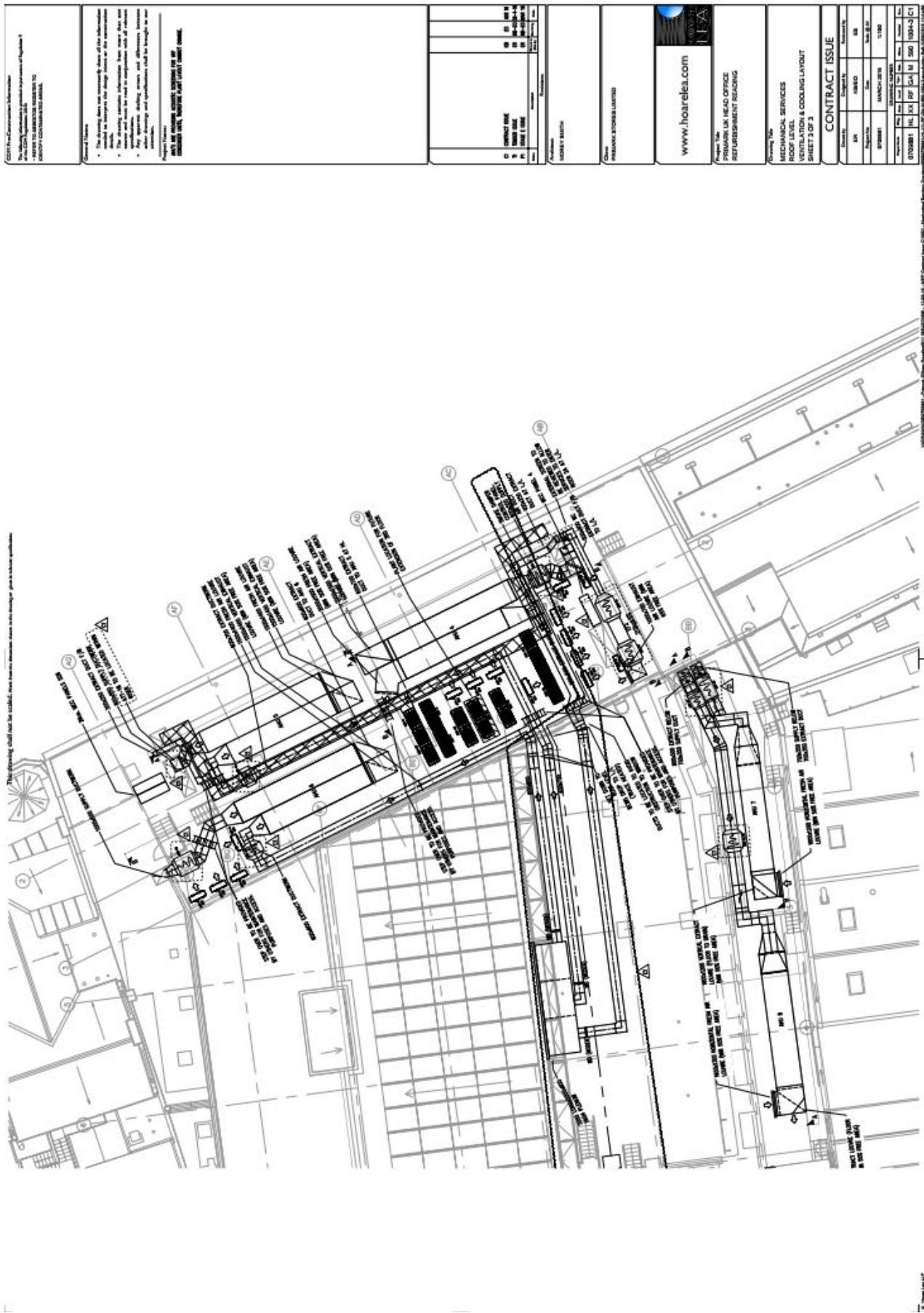
It is demonstrated that levels from roof plant impacting upon the nearest noise sensitive receptors, identified as residences on Cheapside, West Street and Friar Street, will be more than 10 dB below the background noise level as stipulated by the Local Authority in Planning Condition 10 associated with the scheme.

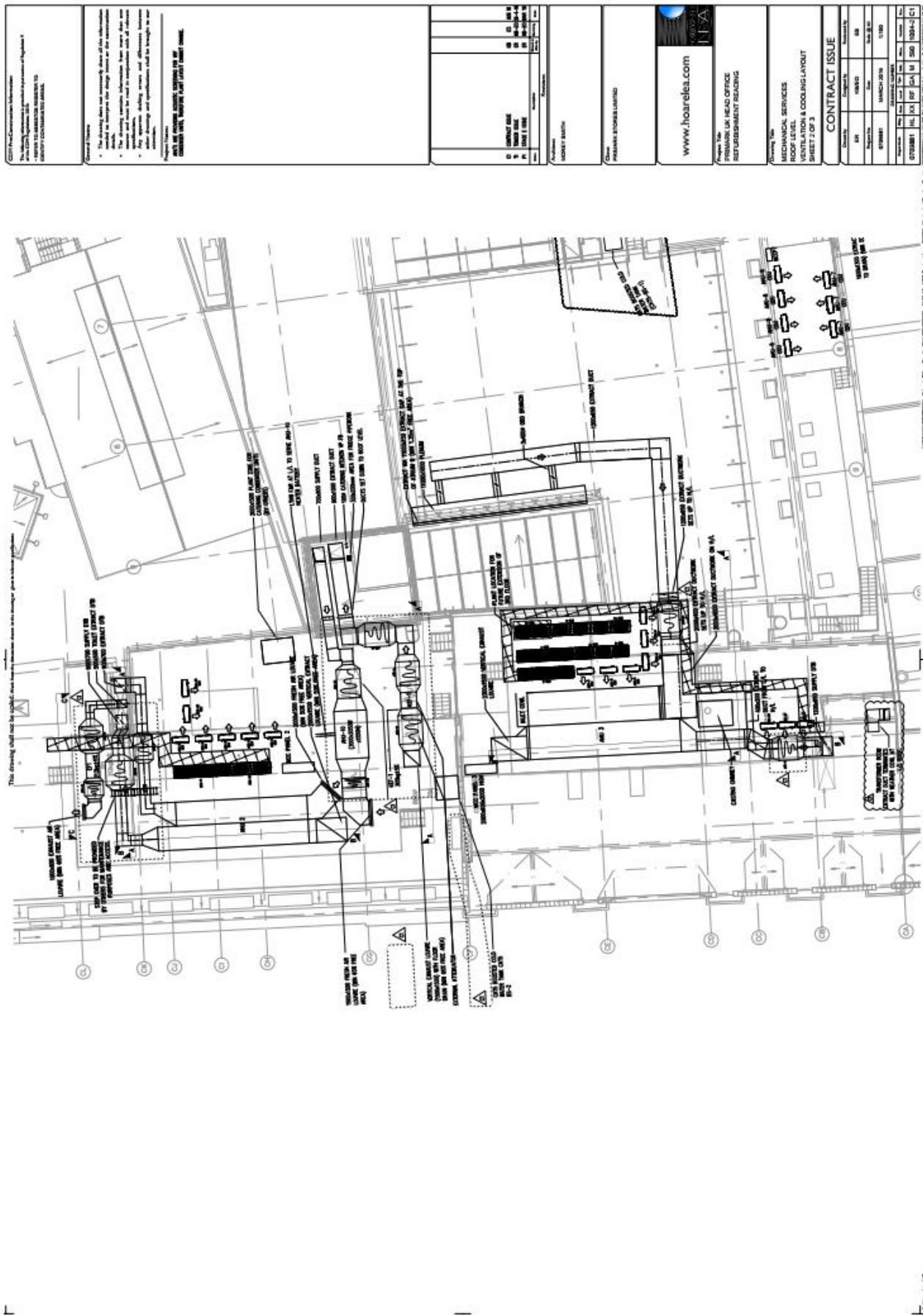
Glossary of Acoustic Terminology

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is $2 \times 10^{-5} \text{ N/m}^2$. The sound pressure level existing when microphone measured pressure is $2 \times 10^{-5} \text{ N/m}^2$ is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.

A2

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Schedule of Comfort Cooling Equipment

Project reference:

Mitsubishi Quotation Refere:

Date: 16/04/2014

MITSUBISHI ELECTRIC to Populate

Unit Reference	Plant Location	Riser Number	Quantity	Model Reference	Condenser Air Volume (m ³ /min) Lo-Ais-Hi	Noise (dBA) Lo-Ais-Hi	Type offSystem
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Schedule of Condensing Units

ODU1	Lower Ground Floor	1	1	PURY-P350YLM-A1	230	62.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU2	Lower Ground Floor	1	1	PURY-P250YLM-A1	185	60	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU3	Lower Ground Floor	3	1	PURY-P900YSLM-A1	320 / 320	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU4	Ground Floor	6	1	PURY-P800YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU5	Ground Floor	3	1	PURY-P800YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU6	Ground Floor	3	1	PURY-P200YLM-A1	185	59	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU7	Ground Floor	3	1	PURY-P750YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU8	Ground Floor	1	1	PURY-P450YLM-A1	320	62.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU9	Ground Floor	1	1	PURY-P550YSLM-A1	230 / 185	64.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU10	First Floor	6	1	PURY-P900YSLM-A1	320 / 320	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU11	First Floor	5d	1	PURY-P900YSLM-A1	320 / 320	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU12	First Floor	3	1	PURY-P800YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU13	First Floor	1	1	PURY-P800YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU14	First Floor	2	1	PURY-P750YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU15	Second Floor	6	1	PURY-P550YSLM-A1	230 / 185	64.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU16	Second Floor	5d	1	PURY-P700YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU17	Second Floor	3	1	PURY-P600YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU18	Second Floor	2	1	PURY-P850YSLM-A1	380	63.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU19	Second Floor	1 or 2	1	PURY-P500YLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU20	Third Floor	6	1	PURY-P750YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU21	Third Floor	3	1	PURY-P550YSLM-A1	230 / 185	64.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU22	Third Floor	1 or 2	1	PURY-P600YSLM-A1	230 / 230	65.5	Air Cooled City Multi R2-Series Heat Recovery VRF
ODU23	Ground Floor		1	PUHZ-ZRP60VHA	0	48 - 47	Air Cooled Mr Slim Heat Pump Power Inverter Split
ODU24	Ground Floor		1	PUHZ-ZRP71VHA	0	48 - 47	Air Cooled Mr Slim Heat Pump Power Inverter Split
ODU25	First Floor		1	PUHZ-ZRP60VHA	0	48 - 47	Air Cooled Mr Slim Heat Pump Power Inverter Split
ODU26	First Floor		1	PUHZ-ZRP71VHA	0	48 - 47	Air Cooled Mr Slim Heat Pump Power Inverter Split
ODU27	Second Floor		1	PUHZ-ZRP50VKA	0	46 - 44	Air Cooled Mr Slim Heat Pump Power Inverter Split
ODU28	Second Floor		1	PUHZ-ZRP50VKA	0	46 - 44	Air Cooled Mr Slim Heat Pump Power Inverter Split
ODU29	Third Floor IT		1	PUHY-P400YJM-A	210	61	Air Cooled City Multi Y-Series Heat Pump VRF
ODU30	Third Floor IT		1	PUHY-P400YJM-A	210	61	Air Cooled City Multi Y-Series Heat Pump VRF
AHU 1							
AHU 2			5	PUHZ-ZRP250YKA	0	62 - 59	Air Cooled Mr Slim Heat Pump Power Inverter Split
AHU 3			5	PUHZ-ZRP250YKA	0	62 - 59	Air Cooled Mr Slim Heat Pump Power Inverter Split
AHU 4			6	PUHZ-ZRP250YKA	0	62 - 59	Air Cooled Mr Slim Heat Pump Power Inverter Split
AHU 5			4	PUHZ-ZRP200YKA	0	62 - 59	Air Cooled Mr Slim Heat Pump Power Inverter Split
AHU 6			4	PUHZ-ZRP200YKA	0	62 - 59	Air Cooled Mr Slim Heat Pump Power Inverter Split
AHU 7			4	PUHZ-ZRP200YKA	0	62 - 59	Air Cooled Mr Slim Heat Pump Power Inverter Split
AHU 8			3	PUHZ-ZRP200YKA	0	62 - 59	Air Cooled Mr Slim Heat Pump Power Inverter Split
AHU 8			4	PUHZ-ZRP200YKA	0	62 - 59	Air Cooled Mr Slim Heat Pump Power Inverter Split

Notes:

ATTENUATOR SCHEDULE																
PROJECT										No. 07 - 07/09881						
Primark Reading Headquarters																
SCHEDULE REF										SCH 07						
Ref	System name/description	Press drop (Pa) MAX.	ATT dims (mm)		Y45-2 Air flow (L/s)	% free area	ATT Insertion loss (dB) for octave band centre frequency (Hz)								Comments	
			L (mm)	W (mm)			D (mm)	63	125	250	500	1k	2k	4k		
ATT 1	Boiler Room - FN 1	50	1500	900	400	1050	33	0	10	29	33	38	35	30	26	Contractor to Confirm
ATT 2	Boiler Room - FN 1	50	1800	1100	400	1050	28	12	20	32	36	37	35	32	29	Contractor to Confirm
ATT 3	Boiler Room															Contractor to Confirm
ATT 4	Boiler Room															Contractor to Confirm
ATT 5	Transformer room - FN4	50	1500	900	500	1430	33	0	14	28	30	25	30	33	35	Contractor to Confirm
ATT 6	Transformer room - FN4	50	1200	900	500	1430	33	0	0	11	19	21	27	27	28	Contractor to Confirm
ATT 7	Tank Room & UPS - FN3	50	600	300	200	160	33	0	8	8	11	7	12	11	8	Contractor to Confirm
ATT 8	Tank Room & UPS - FN3	50	600	300	200	160	33	0	0	0	0	3	8	5	3	Contractor to Confirm
ATT 9a	Kitchen - KEF-1	40	1500	1500	1500	6740	33	4	15	19	18	18	19	20	17	Contractor to Confirm
9b	Kitchen - KEF-1	40	1500	1500	1500	6740	33	4	15	19	18	18	19	20	17	Contractor to Confirm
ATT 10	Kitchen - KEF-1	40	1800	1500	1500	6740	33	8	17	30	40	40	32	26	20	Contractor to Confirm
ATT 11	Toilet WC1 - EF 1	50	1500	1500	900	2100	20	2	25	31	39	27	32	34	28	Contractor to Confirm
ATT 12	Toilet WC1 - EF 1	50	900	1200	600	2100	33	0	2	14	23	22	25	28	17	Contractor to Confirm
ATT 13	Toilet WC2 - EF 2	50	1200	1200	900	1700	33	7	16	21	22	30	29	29	28	Contractor to Confirm
ATT 14	Toilet WC2 - EF 2	50	900	1200	900	1700	33	0	0	11	24	28	27	28	20	Contractor to Confirm
ATT 45	LWR-Grd Smoke															Contractor to Confirm
ATT 46	Ventilation-Inlet Exhaust Fan															Contractor to Confirm
ATT 46	Ventilation-Outlet Exhaust Fan															Contractor to Confirm
NOTES																
1. PHYSICAL SIZES ARE GIVEN FOR TENDERING PURPOSES ONLY.																
2. KITCHEN EXTRACT ATTENUATORS TO BE FITTED WITH MELINEX LINING																
3. ALL ATTENUATOR SIZES ARE APPROXIMATE AND ARE FOR PRICING PURPOSES ONLY																
INSTALLER TO CHECK SELECTION DUTIES STATED TO ENSURE THEY ARE STILL VALID FOR THE ACTUAL INSTALLED COMPONENTS & LAYOUT																
ISSUE / REVISION			T1		C1											
DATE			20/05/2016		23/07/2016											
PREPARED BY			BLT		BRD											
REVIEWED BY			BLT/ES		BRD											

The following embedded PDF files contain noise data for ODU units, exhaust fans and AHUS.



PUHZ Noise
Data.pdf



ODU Schedule.pdf



KEF - 1.pdf



EF 2.pdf



EF 1.pdf



AHU-10.pdf



AHU selection.pdf



PURY-P-YLM Noise
Data.pdf