HAMPTON POOL – ACOUSTIC NOTE - REV. A

28th November 2016

1 Introduction

This document provides information and clarification requested by Chris Hunt, Principal Environmental Health Officer at London Borough of Richmond upon Thames & Merton (LBRuT&M) on an email from the 1st November 2016 relative to 'Hampton Pool Acoustic Report', 18th August 2016.

2 Information / Clarification on Raised Items

1)

LBRuT&M -Background noise assessment- this was undertaken at the current Boiler Room location, we would expect this to be undertaken closer to the receptor location as per the BS4142 methodology requirements

Max Fordham – Background noise assessment was undertaken on the top of the existing (Hampton Pool) Boiler Room for the following reasons:

- Secure location for long term measurements
- Location representative of nearby sensitive receiver's background noise levels as it is sufficient close (< 20m) to these locations and no noise from the boiler room operation was audible at the measurement location.

The background noise levels taken as reference for this assessment were the minimum noise levels measured during the day and night time periods. The resulting values are more onerous (i.e lower) than they would be if calculated following BS4142:2014 guidelines, where some form of statistical approach is recommended.

2)

LBRuT&M - There are no calculations within the report and it is unclear how they have applied the BS4142 methodology/assessment

Max Fordham – The mechanical plant equipment planned to be installed is listed below.

1. 1 no. CHP Bosch CE 19 NA
2. 2 no. VRF Daikin REYQ10T / REYQ12T
3. 1 no. café kitchen extract fan (internal)
4. 4 no. MVHR VES EDC
5. 2 no. Remeha Quinta Pro 115
6. Grundfos water pumps Alpha / Magnus – low noise level generated within the plant room.

Calculation of the noise levels generated by items 1, 2 and 3 at the nearest sensitive receivers are presented below.

Item 4) The manufacturer has not provided data for MVHR induct noise level (only casing break-out noise level is provided). In-situ noise tests will be undertaken to assess the noise levels generated by these units at the nearest sensitive receivers. If required duct attenuators will be installed at inlet and outlet ducts.

Item 5) The manufacturer has not provided data for Boilers flue noise level (only casing break-out noise level is provided). In-situ noise tests will be undertaken to assess the noise levels generated by these units at the nearest sensitive receivers. If required, attenuators will be installed on the flue gas pipe.

Item 6) Noise level generated by water pumps within plant room is relatively low and not considered in this assessment.

Plant room air inlet and outlet openings will be fitted with attenuators such that noise egressing from the plant room will not increase the noise levels at the nearest sensitive receivers calculated below. The performance of these attenuators will be specified in the next design phase.

The target noise levels are shown below (from 'Hampton Pool Acoustic Report' acoustic report 18th August 2016):

	LA90,15min, dBA	Maximum plant noise $L_{AR,5min}$ at 1 m from nearest sensitive façade, dBA
Daytime (07:00-23:00)	51	46
Night time (23:00-07:00)	44	39

Table 1 Measured background noise levels and maximum allowed plant noise levels at nearest sensitive receivers.

The location of plant equipment is shown below.

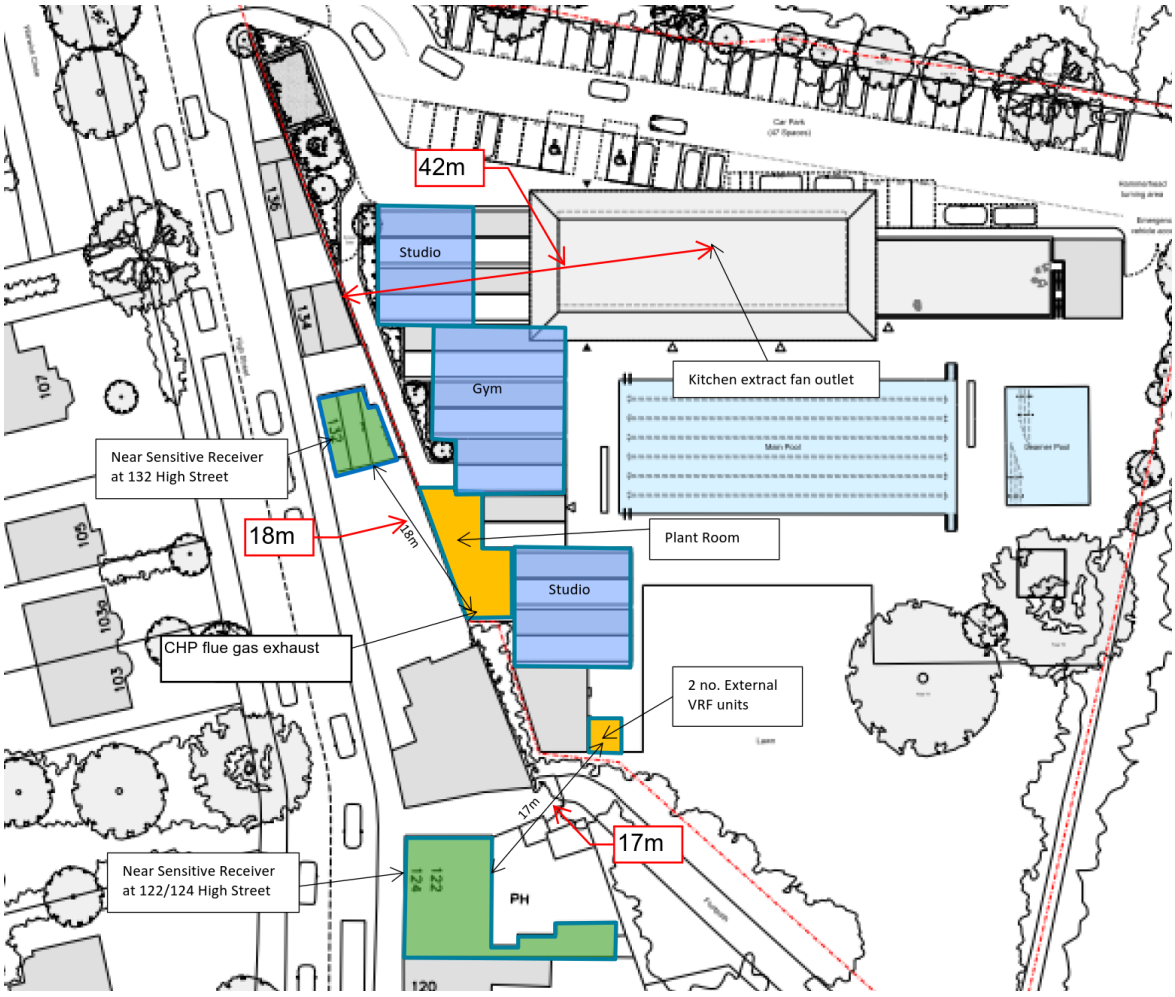


Figure 1 Location of plant equipment: CHP flues, VRF units, kitchen extract.

Calculations of noise levels at nearer sensitive receivers are shown in tables 2, 3 and 4. See Section 4 for equipment noise data.

CHP Unit Bosch CE 19	Noise level
LAeq at 1m from exhaust with secondary exhaust attenuator day time / night time	52 dBA LAeq / 52 dBA LAeq
Tonal Correction (BS4142:2014)	+ 6 dBA / + 6 dBA
Noise level at 132 High Street façade at 18m (LAR) day time /night time	34 dBA / 34 dBA

Table 2 Calculation of CHP Unit Bosch CE 19 noise levels at nearest sensitive receiver.

VRF Daikin REYQ12T	Noise level
LAeq at 1.4m from unit, 2 no.units day time /night time (low noise mode)	64 dBA LAeq / 61 dBA LAeq
Barrier (2.5m high, unit 1.75m high, receiver 4m high)	-11 dBA / -11 dBA
Tonal Correction (BS4142:2014)	+6 dBA /+6 dBA
Noise level at 122/124 High Street façade at 17m (LAR) day time /night time (low noise mode)	38 dBA / 35 dBA

Table 3 Calculation of VRF Daikin REYQ12T noise levels at nearest sensitive receiver.

Kitchen Extract Fan M.K.Plastics AXB	Noise level
Sound Power Level (SWLA) day time only	92 dBA SWLA
Attenuator	31 dBA
Tonal Correction (BS4142:2014)	+6 dBA /+6 dBA
Noise level at 134 High Street façade at 42m (LAR) day time only	27 dBA

Table 4 Calculation of Kitchen Extract fan M.K.Plastics AXB noise levels at nearest sensitive receiver.

It is concluded that the noise levels generated by the plant equipment items described in Tables 2, 3 and 4 are significantly below noise targets at nearest sensitive receivers (46 dB LAR day, 39 dB LAR night).

3)

LBRuT&M - The report states that there will be closed windows and mechanical ventilation/ac to the gym and studios- can we get confirmation of this. We would also expect calculations for music noise breakout.

Max Fordham – Gyms and studios are designed to allow windows to be closed at any time of the year, including peak summer times. This is possible due to cooling and mechanical ventilation being incorporated in the design. Glazing and walls sound insulation performance will be specified during the next design phase with the aim of assuring that maximum noise levels targets at the nearest residences are not exceeded (i.e. noise levels not to exceed existing external noise levels: 62dB LAeq during day time and 58 dB LAeq during night time).

4)

LBRuT&M - Substation- no assessment undertaken. Low frequency noise can be a problem with substations and is difficult to mitigate. We therefore require this to be assessed with special attention paid to the LF content.

Max Fordham – The substation was moved from the location indicated in the planning submission (behind 136 High Street) to the location indicated in the figure below as to provide an extra margin of security regarding airborne and structure borne noise targets at 136 High Street.

The substation, a 315kVA unit from Schneider electric (see Section 4 for substation data), is proposed to be housed within a brick enclosure. The enclosure doors would be located at 7m and the ventilation openings would be located at 8.6m from 136 High Street nearest facade. Calculations of noise levels at 136 High Street are presented in Table 5 and Table 6.

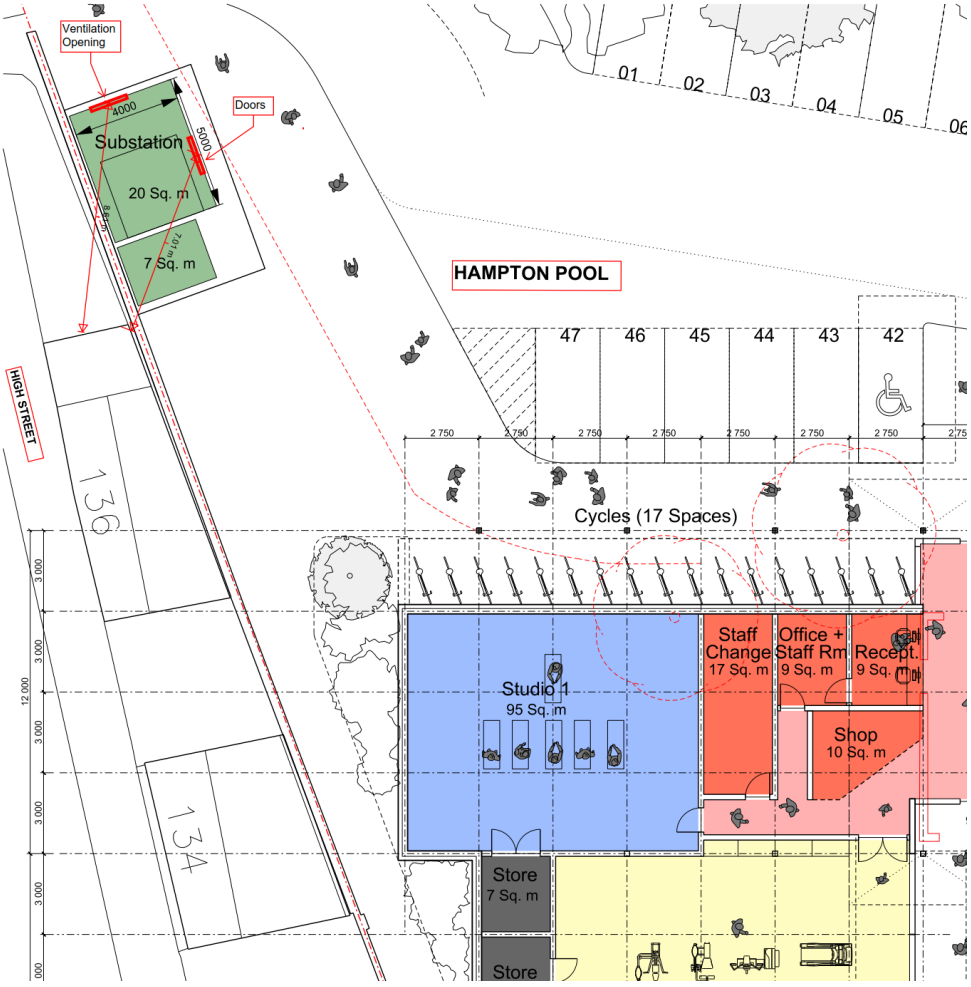


Figure 2 Location of electric substation

Electrical Substation	Noise level
Sound power level (SWLA)	51 dBA (SWLA)
Occlusion (no direct line of sight from enclosure door/ventilation opening to residential façade)	-10 dBA
Tonal Correction (BS4142:2014)	+ 6 dBA
Noise level at 136 High Street façade 7m away (LAR)	22 dBA

Table 5 Calculation of Electrical Substation noise levels at nearest sensitive receiver.

Electrical Substation	31Hz	63Hz	125Hz
Existing external night time background noise level L90 (dB)	43	53	48
DEFRA/Uni. Salford limits for low frequency internal noise (dB)	65	47	41
Predicted noise levels at façade or 136 High St. (dB)	30	26	21

Table 6 Electrical Substation low frequency octave band noise levels at nearest sensitive receiver.

It is concluded that the noise levels generated by the electrical substation at the nearest sensitive receiver, 22 dB LAeq, is significant below noise level targets (46 dB LAr day, 39 dB Lar night).

It is also concluded that the octave band external noise levels generated by the electrical substation at the nearest sensitive receiver are significantly below DEFRA internal noise targets and also significantly below existing external background noise levels.

3 Conclusions

An assessment of the impact of plant noise associated with the proposed redevelopment of Hampton Pool has been undertaken.

The assessed plant equipment units (electric substation, CHP, VRF, kitchen extract) meet target noise levels at the nearest sensitive receivers.

Noise levels for the 4 no. MVHR and 2 no. boiler units are currently not available from the manufacturer (only case breakout noise levels are available). In-situ tests of these relatively quiet units will be undertaken. In the unlikely case that attenuators are required to meet noise targets these will be fitted on the exhaust and/or inlet pipes/ducts of the MVHR and boiler units.

Overall it is concluded that London Borough of Richmond upon Thames & Merton noise criteria for plant equipment will be met.

4 Equipment Noise Data

Electric Substation Schneider Electric USS 315kVA

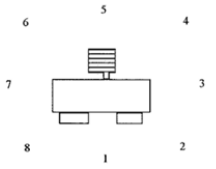
Schneider Electric

Sound Level Measurement

Transformer Rating 315kVA	Serial No 100205175
Transformer Type USS	Location IN THE TEST AREA
Drawing Number LK50292A0	
EDF Spec ES 4-6000	Date of Test 25/05/07
HV Voltage 11000-6600	Tested in Accordance with BS EN 60076-10:2001 / IEC 60076-10:2001
LV Voltage 433	
Tap position 3	
Witness	Customer EDF Energy
Measurement in dB(A)	
	With Breather Cap

Microphone Position	Ambient Before	Measured Level	Ambient After	Octave filter Frequency Hz	Measured value at point 1 **(trf energised)**
1	41.6	43.9	41.1	31.5	54.3
2	42.1	45.6	41.7	62.5	54.0
3	41.3	44.8	40.0	125	50.8
4	41.6	43.7	40.6	250	46.9
5	41.1	44.6	40.1	500	38.3
6	41.1	44.5	40.2	1000	35.0
7	42.0	43.9	41.5	2000	35.2
8	40.9	44.7	40.6	4000	29.7
				8000	30.6
				16000	30.7
Average	41	44	41	A	49.0
Difference		3			
Correction		3			
Corrected	Lpa	41			
height	1.66 m	Contour Lm	5.4m	S=1.25hLm = 11.2 m²	
				Lwa = Lpa+10logS	
				= 41 + 10 = 51	
Sound pressure	41 dB(A)	Sound power Level	51 dB(A)	Guaranteed value 51dB(A)	
Tested by	P. GARNET	Signature			

See Drawing LK50292A0 For Plan View



CHP Bosch CE 19

9.1.1 Module

Frequency [Hz]	Free field sound pressure level L_p / dB(A) at 1m
31.5	42.3
63	45.6
125	43.3
250	48.4
500	46.7
1000	48.6
2000	46.8
4000	42.9

Table 8: Module Single Octave Bands

9.1.2 Primary Exhaust Silencer

Frequency [Hz]	Free field sound pressure level L_p / dB(A) at 1m
31.5	48.5
63	40.9
125	42.3
250	42.9
500	47.6
1000	47.3
2000	43.0
4000	35.1

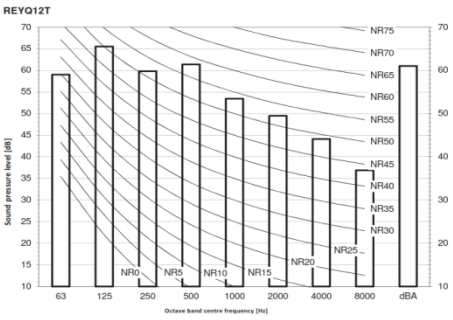
Table 9: Primary Exhaust Silencer Single Octave Bands

9.1.3 Secondary Exhaust

Due to the very low noise emissions at the outlet of the exhaust gas system, a sound pressure level at a distance of 1m could not be established.

Therefore octave band reading are unavailable.

VRF Daikin REYQ12T



(sound pressure level at 1m from the unit)

Low noise mode data

			8HP	10HP	12HP	14HP	16HP	18HP	20HP
Standard	sound pressure	dBA	58	58	61	61	64	65	66
	Cooling Capacity/Heating Capacity (Norminal)	kW	22.4	28.0	33.5	40.0	45.0	50.0	56.0
	Heating Capacity (Max)	KW	25.0	31.5	37.5	45.0	50.0	56.0	63.0
Low noise level 1	Sound pressure	dBA	56	58	58	58	58	60	60
	Cooling Capacity	kW	20.6	28.0	29.5	35.2	36.9	45.0	47.6
	ratio	-	92%	100%	88%	88%	82%	90%	85%
	Heating Capacity	kW	21.3	28.4	28.9	34.2	35.0	45.9	47.3
	ratio (VS Max)	-	85%	90%	77%	76%	70%	82%	75%
Low noise level 2	Sound pressure issue value	dBA	55	54	54	52	52	52	52
	Cooling Capacity	kW	20.2	23.5	25.1	30.0	31.5	35.0	36.4
	ratio	-	90%	84%	75%	75%	70%	70%	65%
	Heating Capacity	kW	21.3	22.7	23.6	27.9	28.5	33.6	34.7
	ratio (VS Max)	-	85%	72%	63%	62%	57%	60%	55%
Low noise level 3	Sound pressure	dBA	53	52	52	47	47	48	48
	Cooling Capacity	kW	15.7	21.6	23.5	24.0	24.8	27.5	28.0
	ratio	-	70%	77%	70%	60%	55%	55%	50%
	Heating Capacity	kW	16.3	20.5	21.4	21.6	22.0	24.6	25.2
	ratio (VS Max)	-	65%	65%	57%	48%	44%	44%	40%

Ambient condition: Cooling 35 DB./heating 6 WB
Indoor: 100% connection

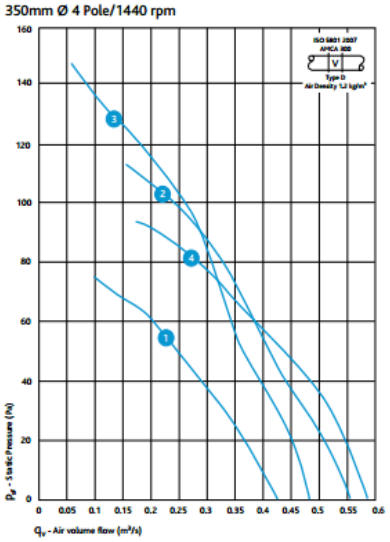
Used to reduce operation noise level through reduction of the upper limit of the fan using internal input. (Use Step 8 for normal operation.)	Use the "External control adapter." Set "Setting mode No. 12" to "ON" and select a mode with No. 25.
(1) Level 1: Not higher than Step 7	Set "Setting mode No. 29: Capacity priority setting" to "ON," as appropriate.
(2) Level 2: Not higher than Step 5	
(3) Level 3: Not higher than Step 5	

Kitchen Extract fan M.K.Plastics AXB

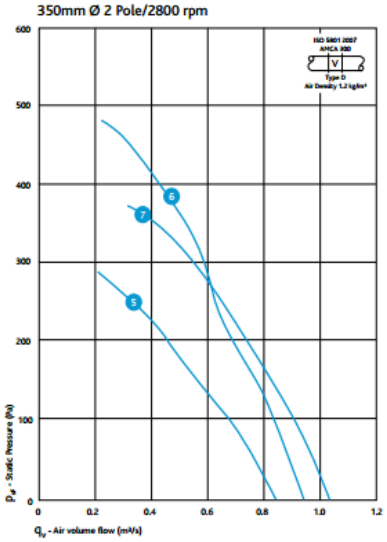
0.6 m3/s at 250 Pa, Curve 6

PERFORMANCE - BIFURCATED AXIAL FLOW UNITS - 350MM Ø

350mm Ø 4 Pole/1440 rpm



350mm Ø 2 Pole/2800 rpm



ELECTRICAL & SOUND

Curve No	Unit Code	Blade Angle°	Speed RPM	Unit kg	A.V. Set	Motor frame size	1 Phase (230V-50Hz) Motor kW	FLC amps	SC amps	3 Phase (400V-50Hz) Motor kW	FLC amps	SC amps	In-duct inlet sound power levels dB re 1pW Octave band mid frequency Hz 125	250	500	1K	2K	4K	8K	Breakout dBA@3m
350mm Ø - 4 Pole/1440rpm																				
1	AXB3SA-41*A	25°	1430	25	NAV2	71	0.37	2.9	11.6	0.37	1.06	3.5	78	67	66	65	61	54	48	43
2	AXB3SD-41*A	25°	1430	25	NAV2	71	0.37	2.9	11.6	0.37	1.06	3.5	74	75	70	71	67	58	50	48
3	AXB3SD-42*A	30°	1430	25	NAV2	71	0.37	2.9	11.6	0.37	1.06	3.5	84	79	74	72	68	60	51	48
4	AXB3SM-45*A	35°	1430	25	NAV2	71	0.37	2.9	11.6	0.37	1.06	3.5	92	75	75	74	69	63	56	48
350mm Ø - 2 Pole/2800rpm																				
5	AXB3SA-21*A	25°	2810	25	NAV2	80	0.55	3.8	17.1	0.55	1.36	5.8	80	80	83	85	80	73	68	60
6	AXB3SD-21*A	25°	2810	25	NAV2	80	0.55	3.8	17.1	0.55	1.36	5.8	82	84	91	87	84	77	70	65
7	AXB3SB-22*A	30°	2810	25	NAV2	80	0.55	3.8	17.1	0.55	1.36	5.8	83	92	88	89	84	77	72	65

Notes relating to the table: The electrical and sound information in the table is nominal. Breakout dBA@3m is spherical, free field.
Start currents (sc) are DOL other than for motors of 4kW and above which are Star Delta (T).
*Insert number for correct phase. 1 = 1 phase, 3 = 3 phase.
For ancillaries please refer to page 310.