ENVIROSOUND

NOISE SURVEY REPORT

On behalf of:	**RJR Services Ltd** **Vickers House** **Priestley Road** **Basingstoke** **RG24 9NP**
Undertaken by:	**Envirosound Ltd** **Unit 8** **Murrell Green Business Park** **London Road** **Hook** **Hampshire** **RG27 9GR** **Tel: 01256 760775** **Fax: 01256 760754**
Site address:	**KFC Drive Through** **Coventry Road** **Hinckley** **Leicestershire**
Survey Date:	**09.08.11 – 10.08.11**
File ref:	**P4765**
Report Issue:	**15.08.2011**
Compiled by:	**P Hartnell**
Checked by:	**D Brown MIOA.AMIMechE.Grad Dip Mech**

1.00 Reasons for Survey

1.01 To establish by measurement the background noise level in the vicinity of the proposed KFC.

1.02 To provide plant noise impact assessments in regard to the external noise levels from the ventilation systems air conditioning condensers and refrigeration plant

2.00 Equipment Used

2.01 A Rion NA-27 Class 1 Sound Analyser, serial number 10342191-UC-53A 305688 NH-20: 46066. This is an integrating instrument for parallel real-time analysis of 1/3 octave bands and octave bands between 16 Hz to 12.5 kHz, plus weighted measurements and statistical time averaged and percentile measurements.

2.02 The meter calibration was checked prior to and after the survey by use of a Rion NC-74-002 Sound Calibrator, serial number 35062532. Copies of the Calibration Certificates for this equipment are available on request.

3.00 Observations

3.01 In relation to the KFC, the nearest residential property is number 390 Coventry Road to the South of the site at a distance of approximately 45m. Beyond this distance there are residential properties to the West, numbers 391 and 416 on the North and South side of Coventry Road the B4666. To the East the nearest residential properties are at a distance of approximately 130m, however there are canal moorings on the Ashby Canal to the East at a distance of approximately 38m, this is therefore considered to be the nearest noise sensitive location.

3.02 During the day time period to 18:45hrs the background noise level was mainly due to traffic movements on the B4666 and ground work taking place on site.

3.03 During the late evening period traffic movements on the B4666 were light.

3.04 During the night time period traffic movements were very light, with approximately one vehicle passing the site per minute.

4.00 Method

4.01 During the late evening and night time periods the equipment was positioned approximately 10m to the East of number 391 Coventry Road approximately 15m from the carriageway. The equipment was configured to record the statistical L_{eq} and L_{A90} background noise levels.

Early evening measurements were obtained close to the site boundary and the junction with Maple Drive and Coventry Road.

5.00 Weather Conditions

5.01 The early evening weather conditions were dry but somewhat breezy, with a mainly clear sky. By 21:00hrs the wind conditions had settled to calm and during the early morning survey period, very calm and clear with an overnight temperature of 10^0c

6.00 Measurements

6.01 Measurements results are shown within a spread sheet provided in section 15.00.

7.00 Summary of Measurements

7.01 The L_{A90} background noise level occurring during the day time period 21:45hrs – 22:00hrs was 42.4dB(A).

7.02 The lowest recorded $L_{A90\ 5min}$ background noise level occurred during the period 04:18hrs to 04:23hrs the recorded level was 37.1dB (A).

8.00 Assessment of Plant Noise

8.01 To minimise the risk of justifiable noise complaints and provide guidance as to the allowable noise level we have assessed the situation using British Standard BS 4142. This method of assessment provides a procedure to determine whether noise from industrial or similar fixed installations, measured externally, is likely to give rise to complaints from occupants of residential properties in the area. It is often used to provide guidance on whether such noise might be considered a nuisance in law, under the Environmental Protection Act.

The rating method is based on the difference between the 'rating level' (the noise level produced by the source under investigation weighted, if necessary, for character) and the background level (the commonly occurring minimum noise level with no contribution from the noise source). The rating level is expressed as the continuous noise level (dB L_{AeqT}) and the background noise level expressed as the noise level exceeded for 90% of the measurement period (dB L_{A90T}).

The background noise level is subtracted from the rating level and if the difference is 10 dB or more, it is considered that complaints would be likely. A difference of approximately 5 dB is considered 'marginal', whilst below 5 dB the lower the value, the less likelihood there is that a complaint will occur.

A 5 dB penalty is applied to the rating level if the noise under investigation contains distinguishable discrete continuous notes, i.e. (whines, hisses, screeches, hums, bangs, clicks, clatters or thumps).

8.02 Intrusive Noise

The World Health Organisation recommends NR 25 as being a suitable background noise criterion for bedrooms. NR 25 can be assumed to be generally equivalent to not less than 30dB(A).

BS 8233 states that a partially open window provides a noise reduction between 10 to 15dB(A). Therefore, taking a conservative approach, the limiting external noise level for plant noise emission is 40dB(A) outside the windows.

9.00 Plant Details

9.01 The external AC and refrigeration units will be located in the open topped service yard located at the North East corner of the premises. This area is shown on Technical Design Consultants drawing KFC 2220/PSL3 revision C dated 19.11.10. This area provides a degree of natural acoustic screening in relation to the surrounding residential properties.

9.02 Kitchen Extract Fan

Published Noise data for Systemair MUB 062-630DV Kitchen Extract Fan									
Octave Band Centres Hz	63	125	250	500	1k	2k	4k	8k	Total
LwA Outlet Sound Power levels	76	78	82	84	83	80	75	68	89
A weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	
									dBA
Outlet sound Power levels dB	102.2	94.1	90.6	87.2	83	78.8	74	69.1	89.3

9.03 Toilet Extract Fan

Published Noise data for Systemair KVK200 Fan									
Octave Band Centres Hz	63	125	250	500	1k	2k	4k	8k	Total
LwA Outlet Sound Power levels	60	62	67	67	64	66	61	56	73
A weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	
									dBA
Outlet sound Power levels dB	86.2	78.1	75.6	70.2	64	64.8	60	57.1	73.2

9.04 Fresh Air Fan

Catalogue Noise data for Woods 56JM/16/4/5/28-32 Axial Flow Fan								
Octave Band Centres Hz	63	125	250	500	1k	2k	4k	8k
In duct SWL's dB	78	81	76	76	73	70	66	61

9.05 Air Conditioning Condensers

Air Conditioning Condensers							
Model	Make	Qty	Dimensions mm			SPL @ 1m dB(A)	SWL dB(A)
			Height	Width	Depth		
RAV-SP1404AT-E	Toshiba	3	1340	900	320	52	69

9.06 Refrigeration Plant

Refrigeration Plant, Published Data								
Model	Make	Qty	Dimensions mm			dB(A) @10	dB(A) @3m	Lw(A)
			Height	Width	Depth			
H38Z-CAJ4517Z	Silensys	2	615	1000	392	37	48	65
B29Z-TFH2511Z	Silensys	1	615	1000	392	47	58	75
Alterrnative Refrigeration Plant, Published Data								
Model	Make	Qty	Dimensions mm			dB(A) @10	dB(A) @3m	Lw(A)
			Height	Width	Depth			
DCU4.3L	Foster Refrigeration	1	458	880	400		62	
DCU4.3H	Foster Refrigeration	2	458	880	400		61	

Please note the plant noise assessment has been based on the use of the Silensys refrigeration units as the data provided indicates that these are quieter than the Foster Refrigeration units

10.00 Recommendations

10.01 In compiling this plant noise assessment attenuators have been selected to mitigate the level of duct borne noise to atmosphere. The performance requirements for these attenuators are listed below.

Attenuator Details															
System	Model	Dimensions mm			M^3/sec	Pa	Insertion Losses dB at Octave band centres Hz								
		Width	Height	Length			63	125	250	500	1k	2k	4k	8k
Kitchen Exhaust	EVS-2-1200-ME	1200	1200	1200	3.2	30	8	14	24	36	40	35	29	23
Kitchen FAI	EVS-3-1200	900	900	1200	2.3	30	7	12	19	23	22	26	28	25

11.00 Plant Noise Rating Levels

11.01 For plant located within the open topped service yard calculations have been undertaken to predict the accumulative plant noise level 1m from the nearest residential property. These calculations treat the open topped service yard as a semi reverberant area radiating noise hemispherical from the open top, at 90 degree to the vertical axis.

The noise radiating from the extract ventilation terminations located in the East facing façade have been calculated separately and combined within the accumulative total.

Details of these calculations can be found in appendix 1.

11.02 Table of predicted BS4142 noise rating levels.

BS4142 Noise Rating Levels									
	Predicted Specific Plant Noise Levels		Character Correction	BS4142 Rating Levels		L_{A90} Background Noise level		Assessment Level	
	Day Time	Night Time		Day Time	Night Time	Day Time	Night Time	Day Time	Night Time
Location									
Canal Moorings	35dB(A)		No	35dB(A)		42dB(A)		-7	
Canal Moorings		31dB(A)	No		31dB(A)		37dB(A)		-6
390 Coventry Road	22dB(A)		No	22dB(A)		42dB(A)		-20	
390 Coventry Road		18dB(A)	No		18dB(A)		37dB(A)		-19

12.00 Conclusion

12.01 Calculations undertaken to predict the accumulative plant noise rating levels 1m from the nearest residential property predict day time noise rating levels 7dB below the late evening L_{A90} background level and 6dB below the night time levels. Whilst the air conditioning and refrigeration plant is intermittent in operation this feature is not considered to attract a 5dB character correction, this is due to the predicted levels and the plant screening afforded by the building.

The conclusion drawn from BS4142 is that complaints are unlikely.

The predicted plant noise levels are therefore considered acceptable subject to confirmation of the local authorities requirements.

13.00 Photographs



The site looking East from Maple Drive

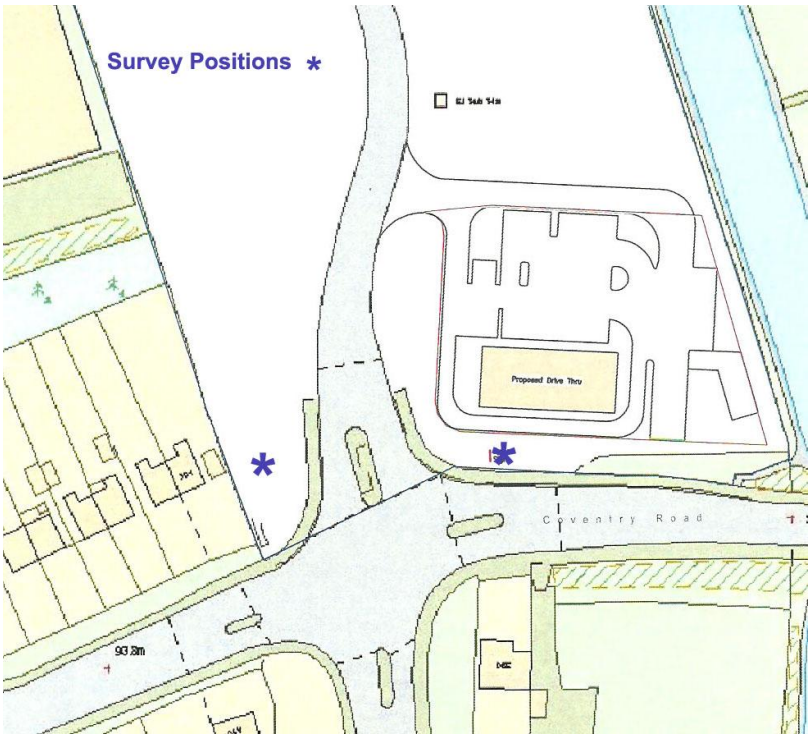


The nearest residential property to the South opposite the site



View from the Junction of Maple drive looking towards Long Meadow Drive with Coventry Road passing left to right.

14.00 Site Plan



15.00 Survey Results

Project :	**KFC Hinckley**														
File :	**P4765**														
Survey Date:	**09.08.2011 and 10.08.2011**														
				dB at Octave Band Centre Frequencies, Hz											
Location	**Type**	**dB Lin**	**dB(A)**	**32**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**TC**	**File**	**NR**
Residual noise level 18:30hrs to 18:45hrs	Leq	82.4	65.1	72.0	76.8	67.2	62.5	60.6	61.0	57.2	52.5	43.5	Fast	1	61
Background noise level 18:30hrs to 18:45hrs	L90	75.5	55.5	65.5	67.2	57.2	52.1	50.4	50.8	46.5	40.1	40.1	Fast	1	51
Residual noise level 21:45hrs to 22:00hrs	Leq	62.0	49.9	54.4	59.9	48.2	44.1	43.6	47.4	42.1	31.1	23.4	Fast	2	47
Background noise level 21:45hrs to 22:00hrs	L90	56.6	42.4	49.2	52.8	41.7	39.3	39.0	39.0	30.2	20.1	20.1	Fast	2	39
Residual noise level 04:07hrs to 04:13hrs	Leq	61.5	50.8	54.9	56.9	48.0	45.9	44.7	47.2	44.4	37.1	29.7	Fast	3	47
Background noise level 04:07hrs to 04:13hrs	L90	54.2	40.1	46.6	48.0	37.9	38.3	36.6	36.6	28.7	20.1	20.1	Fast	3	37
Residual noise level 04:12hrs to 04:16hrs	Leq	63.2	51.3	56.6	59.6	54.1	49.6	47.1	46.8	44.3	35.6	29.8	Fast	4	47
Background noise level 04:12hrs to 04:16hrs	L90	52.7	39.0	45.3	45.9	37.5	38.4	35.0	35.5	28.7	20.1	20.1	Fast	4	36
Residual noise level 04:18hrs to 04:23hrs	Leq	64.0	52.5	52.5	59.9	59.2	52.4	48.2	45.2	45.7	41.5	36.7	Fast	5	48
Background noise level 04:18hrs to 04:23hrs	L90	52.2	37.1	43.8	43.9	40.3	38.2	33.5	32.6	24.0	20.1	20.1	Fast	5	33

Appendix 1, Calculations

Sheet 1	Ventilation plant noise to canal moorings
Sheet 2	Ventilation plant noise to 390 Coventry Rd
Sheet 3	AC & refrigeration plant noise levels
Sheet 4	AC & refrigeration plant noise predictions
Sheet 5	Summary of predicted specific day and night time plant noise levels

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CALCULATION SHEET

Client: RJR Services

Project: KFC Hinckley

Subject	63	125	250	500	1 K	2 K	4 K	8 K	dBA
Kitchen Exhaust									
In duct SWL	102	94	91	87	82	79	74	69	
System Losses	0	0	0	0	0	0	0	0	
System End Reflection	-5	-2							
Distance loss to point of interest canal morings 38m	-42.6	-42.6	-42.6	-43	-43	-42.6	-42.6	-43	
Directivity C, 0 degrees	6	6	8	8	9	9	9	9	
Un-silenced noise level at point of interest	60.4	55.4	56.4	52.4	48.4	45.4	40.4	35.4	54.6
EVS-2-1200-ME Attenuator Insertion Losses	8	14	24	36	40	35	29	23	
Mitigated Noise level at point of interest	52.4	41.4	32.4	16.4	8.4	10.4	11.4	12.4	30.3
Fresh Air Inlet									
In duct SWL	78	81	76	76	73	70	66	61	
System Losses Panel Filters	-3	-3	-3	-4	-6	-6	-6	-6	
System End Reflection	-5	-2							
Distance loss to point of interest canal morings 41m	-43.3	-43.3	-43.3	-43	-43	-43.3	-43.3	-43	
Directivty J2, 0 degrees	7	8	8	8	9	9	9	9	
Un-silenced noise level at point of interest	33.7	40.7	37.7	36.7	32.7	29.7	25.7	20.7	38.5
EVS-3-1200 Attenuator Insertion Losses	7	12	19	23	22	26	29	25	
Mitigated Noise level at point of interest	26.7	28.7	18.7	13.7	10.7	3.74	0	0	17.7
Toilet Exhaust									
In duct SWL	86	78	76	70	64	65	60	57	
System Losses Duct Bend					-1	-2	-3	-3	
System End Reflection	-9	-5	-2						
Distance loss to point of interest canal morings 47m	-44.4	-44.4	-44.4	-44.4	-44.4	-44.4	-44.4	-44	
Directivty C, 90 degrees	2	2	-1	-1	-4	-10	-10	-10	
Un-silenced noise level at point of interest	34.6	30.6	28.6	24.6	14.6	8.6	2.6	0	24.9
Accumulative noise level from the ventilation plant.	52.5	42	34	25.5	16.8	13.1	11.9	12.4	31.6
Sheet 1									

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Project: KFC Hinckley

Subject	63	125	250	500	1 K	2 K	4 K	8 K	dBA
Kitchen Exhaust									
In duct SWL	102	94	91	87	82	79	74	69	
System Losses	0	0	0	0	0	0	0	0	
System End Reflection	-5	-2							
Distance loss to point of interest (390 coventry Rd) 51mm Q =2	-42.7	-42.7	-42.7	-43	-43	-42.7	-42.7	-43	
Screening Loss Path Difference 0.213	-7	-8	-10	-12	-14	-15	-15	-15	
Un-silenced noise level at point of interest	47.3	41.3	38.3	32.3	25.3	21.3	16.3	11.3	34.5
EVS-2-1200-ME Attenuator Insertion Losses	8	14	24	36	40	35	29	23	
Mitigated Noise level at point of interest	39.3	27.3	14.3	0	0	0	0	0	16.2
Fresh Air Inlet									
In duct SWL	78	81	76	76	73	70	66	61	
System Losses Panel Filters	-3	-3	-3	-4	-6	-6	-6	-6	
System End Reflection	-5	-2							
Distance loss to point of interest (390 coventry Rd) 55m Q=4	-40	-40	-40	-40	-40	-40	-40	-40	
Screening Loss Path Difference 1.	-10	-12	-14	-15	-15	-15	-15	-15	
Un-silenced noise level at point of interest	20	24	19	17	12	9	5	0	18.6
EVS-3-1200 Attenuator Insertion Losses	7	12	19	23	22	26	29	25	
Mitigated Noise level at point of interest	13	12	0	0	0	0	0	0	7.3
Toilet Exhaust									
In duct SWL	86	78	76	70	64	65	60	57	
System Losses Duct Bend					-1	-2	-3	-3	
System End Reflection	-9	-5	-2						
Distance loss to point of interest (390 coventry Rd) 55m Q=2	-42.7	-42.7	-42.7	-43	-43	-42.7	-42.7	-43	
Screening Loss Path Difference 3	-13	-15	-15	-15	-15	-15	-15	-15	
Un-silenced noise level at point of interest	21.3	15.3	16.3	12.3	5.3	5.3	0	0	14.0
Accumulative noise level from the ventilation plant.	39.4	27.7	18.4	12.3	5.3	5.3	0	0	18.0
Sheet 2									

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Subject	63	125	250	500	1 K	2 K	4 K	8 K	dBA
AC plant									
Toshiba Rav SP1404 AT-E Sound Power Level									69.0
Correction For 3 units									4.8
Total SWL for the AC Plant									73.8
Refrigeration Plant									
Silensys H38Z-CAJ4517Z Sound Power Level									65.0
Correction for 2 units									3.0
Total SWL for two Silensys H38Z-CAJ4517Z									68.0
Silensys B29Z-TFH2511Z Sound Power Level									75.0
Total SWL from Refrigeration Plant									75.8
Day time SWL to Plant Area									77.9
Night time SWL to Plant Area									75.8
Predicted Mean SPL in the Plant Area									
Lp=SWL+10log RT-10log V+14									
V=30.24m^3 RT taken as 0.5sec									
Day time SPL									74.1
Night Time SPL									72.0
Day Time SWL to open top									79.1
Night time SWL to open top									77.0
Sheet 3									

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Subject	63	125	250	500	1 K	2 K	4 K	8 K	dBA
Day time AC & refrigeration plant									
Predicted SWL to open top plant area									79.1
Mean Distance Loss to Canal Morings 40m									-40.0
Directivity loss 90 degrees									-6.0
Predicted SPL from AC and Refrigeration plant									33.1
Night time refrigeration plant									
Predicted SWL to open top plant area									77.0
Mean Distance Loss to Canal Morings 40m									-40.0
Directivity loss 90 degrees									-6.0
Predicted SPL from AC and Refrigeration plant									31.0
Day time AC & refrigeration plant									
Predicted SWL to open top plant area									79.1
Mean Distance Loss to 390 Coventry Road 55m									-42.8
Directivity loss 90 degrees									-6.0
Screening Loss path difference 1									-10.0
Predicted SPL from AC and Refrigeration plant									20.3
Night time refrigeration plant									
Predicted SWL to open top plant area									77.0
Mean Distance Loss to 390 Coventry Road 55m									-42.8
Directivity loss 90 degrees									-6.0
Screening Loss path difference 1									-10.0
Predicted SPL from AC and Refrigeration plant									18.2
Sheet 4									

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CALCULATION SHEET

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Project: KFC Hinckley

Subject	63	125	250	500	1 K	2 K	4 K	8 K	dBA
Summary									
Predicted day time noise levels to canal morings									
Ventilation plant with noise mitigation	52.5	42.0	34.0	25.5	16.8	13.1	11.9	12.4	31.6
AC and Refrigeration Plant									33.1
Day time total with noise mitigation measures									35.4
Night time total									31.0
Summary									
Predicted day time noise levels to 390 Coventry Rd									
Ventilation plant with noise mitigation	39.4	27.7	18.4	12.3	5.3	5.3	0	0	18.0
AC and Refrigeration Plant									20.3
Day time total with noise mitigation measures									22.3
Night time total									18.2
Sheet 5									