



Environmental Noise Survey and Plant Noise impact Assessment

Client: Uplands Retail

Project: 31 London Road
Waterlooville
PO7 5LG

Our Reference: RF 84678/PIA_Rev A

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Prepared by: Christy Ponsford



Noise Solutions Ltd

Unit 6, LDL Business Centre, Station Road West, Ash Vale, GU12 5RT.

Tel: +44(0)1252-519881 Fax: +44(0)1252-540482

Reg. No.3483481 Registered in England and Wales

Email: sales@noisesolutions.co.uk Web site: www.noisesolutions.co.uk



1.0 Introduction

Noise Solutions Ltd has been commissioned by Uplands Retail to undertake a plant commissioning noise survey at the site of the M Local store, 31 London Road, Waterlooville. The impact of the plant noise on the nearest residential receptors has been assessed to determine if Havant Borough Council's noise emissions criteria have been achieved.

2.0 Site Layout and Development

The M Local store occupies the ground floor of a three-storey building (former public house) on the western side of London Road, near to the junction with Purbrook Gardens. The first floor to the south of the building (overlooking the car park and plant area) includes the store office and staff facilities, while the upper floors to the north of the building include a residential flat. The plant area is located externally towards the southern boundary of the site.

The plant area includes one refrigeration condenser (with attenuation installed on the fans) along with three air conditioning (AC) units. The plant is surrounded by a hit-and-miss fence while an acoustic screen is installed between the ACs and refrigeration unit. The side of the acoustic screen facing the ACs is absorptive and acoustic wall lining behind the AC units has been installed to negate the plant noise reflections.

The proposed refrigeration plant operates 24 hours a day. With the exception of the cash office AC, which will run 24 hours a day, the AC units will operate only during the daytime period when the store is open.

The plant consists of the following units:

- Refrigeration condenser: Box Clever ABX00121
- Sales floor AC1: Hitachi RAS-8HRNSE
- Sales floor AC2: Hitachi RAS-5HVRNS3E
- Cash office AC: Hitachi RAC50-50WPA

Photographs of the plant and mitigation measures have been provide in Appendix A.

3.0 Nearest Residential Properties

The area surrounding the site is a mix of residential and commercial properties. The most affected residential properties (R1) are the double-storey residential properties to the south of the site approximately 6-10m from the items of plant.

There is no line of sight between the ACs and R1 due to existing buildings. There is no screening between the top of the refrigeration fan attenuators there is however acoustic screening (i.e. no line of sight) between the main refrigeration pack and R1 due to the installed acoustic screen.

The topography of the surrounding area is such that London Road is a hill inclining northwards. Appendix B contains a plan showing the site and surrounding area.

4.0 Noise surveys

4.1. Noise Measurement Period

Measurements of the existing background noise level were taken between 22.00 and 23.00 hours on Monday 23rd and 01.00 and 02.00 hours on Tuesday 24th September 2013.

Weather conditions were ideal for the most part with the temperature between 12°C and 14°C, clear sky and little or no breeze, so accurate minimum background noise levels can be assessed.

The plant noise measurements were undertaken between Thursday 10th July 22.30 hours and Friday 11th July 2014 00.20 hours. The weather conditions were conducive to the measurement of noise.

4.2. Measurement Position

The measurement position during the environmental noise survey was located to the north of the site along Purbrook Gardens approximately 24m from the junction with London Road. This location is considered to be representative of the noise climate at the facades of the nearest residential properties to the site. This measurement was chosen in order to avoid patron noise from the public house.

In accordance with BS 7445-2:2003 '*Description and measurement of environmental noise – Part 2 : Guide to the acquisition of data pertinent to land use*', the measurements were taken at least 3.5m from any reflecting surface with the microphone positioned at a height of approximately 1.5m above the ground.

Measurements for the plant noise survey were taken approximately in line with R1 (around 3m from the plant area) at a height of approximately 4m above ground level under free-field conditions. Measurements of the plant item turned 'on' and 'off' were recorded. It should be noted that traffic and neighbouring plant (e.g. boiler flue) contributed to the background noise level during the plant noise survey.

4.3. Noise Measurement Equipment

Details of the equipment used during the course of both noise surveys have been provided in Table 1, below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.1 dB) in the calibration level was noted.

Table 1: Details of noise measurement equipment

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 949 / 12262	09/04/2013	14245
Condenser microphone	SV22 / 4012444		
Preamplifier	Svantek SV12L / 13163		
Calibrator	Svantek SV 40A / 10847	09/04/2013	14244

4.4. Noise Level Measurements

The following broadband noise parameters were measured over 10-minute intervals during the environmental noise survey while a shorter measurement interval period was used during the plant noise survey to reduce the influence of extraneous noise events (e.g. vehicles driving past);

$L_{Aeq,T}$	The “A” weighted equivalent continuous noise level
$L_{A90,T}$	The “A” weighted level exceeded for 90% of the sample period
$L_{A10,T}$	The “A” weighted level exceeded for 10% of the sample period
L_{Amax}	The “A” weighted maximum noise level

4.5. Environmental Noise Survey Results

The results of the noise survey are considered to be representative of typical background noise levels at the façades of the nearest residential receptors to the proposed plant.

The results of the survey are shown in Appendix C.

The noise climate at the measurement position was dominated by constant road traffic from the A3M, intermittent local traffic along London Road and occasional aircraft flyovers. The background noise level ranges are shown in the table below.

Table 2: Summary of noise survey results

Measurement period	Range of noise levels over measurement period, dB			
	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Evening (22:00 - 23:00 hours)	69 - 74	53 - 56	57 - 61	41 - 43
Night-time (01:20 - 02:20 hours)	67 - 72	43 - 52	40 - 55	33 - 36

The lowest background noise level during the evening period was measured to be 41dB $L_{A90(10mins)}$.

The lowest background noise level during the night-time period was measured to be 33dB $L_{A90(10mins)}$.

5.0 Local Authority Requirements

Havant Borough Council require that noise from external building services plant be no louder than a level 10dB below the prevailing background noise level at the nearest noise sensitive residential property. The corresponding daytime and night-time noise emissions limits, against which proposed equipment may be assessed, are shown in the following table.

Table 3 Plant noise emission limits at residences

Time	L _p , dB(A)
Daytime (07.00 – 23.00)	31
Night-time (23.00 – 07.00)	23

6.0 Noise Impact Assessment

Cumulative plant noise levels have been predicted at the most affected noise sensitive receptors (R1) based on the plant noise measurements undertaken. Noise levels have been predicted taking into account directivity of sound propagation and the distance between source and receiver. Due to the measurement position in relation to the plant and the hit-and-miss fence between the plant and the measurement position, no screening has been assumed to be included in the measurements; therefore all screening has been predicted and included in the calculations.

Noise level predictions during the daytime period have been based on the condenser and all three AC units operating simultaneously. Night-time noise level predictions have been based on the condenser and the cash office AC operating and the sales floor AC units being switched off. In addition, based on the onsite observations, as detailed below, further aspects have been assumed in the calculations.

6.1. On site observations

- The majority of the noises from the refrigeration condenser emanated from the pack as the fans have been attenuated. The pack is therefore considered the main noise source. Based on the pack location in relation to the acoustic screen and residential window a minimum reduction of 5dB has been included in the predictions.
- Sales floor AC1 was the most dominant AC, while the noise level emissions from the cash office AC and sales floor AC2 together were barely audible above the prevailing ambient noise level at the measurements position (note the measurements position is closer to the ACs than R1 and is unscreened).

Table 4, below, summarises the assessment of predicted plant noise levels. The full set of calculations can be found in Appendix D.

Table 4 Assessment of predicted noise levels

Plant	Predicted noise level at R1, dB(A)	Criterion, dB(A)	Excess, dB
Daytime (07.00 – 23.00)	31	31	0
Night-time (23.00 – 07.00)	23	23	0

The noise level predictions demonstrate that cumulative noise emissions from the external plant, inclusive of the mitigation measures installed, complies with Havant Borough Council's noise requirements at the most affected noise sensitive receptor (R1) during the daytime and night-time periods.

7.0 Summary

Noise Solutions Ltd has been commissioned by Uplands Retail to undertake a plant noise survey at the site of the M Local store, 31 London Road, Waterlooville. The survey was required to determine the existing plant noise level at the noise sensitive receptors nearest to the site.

In addition to the above, environmental noise measurements at a representative location had previously been undertaken in order to determine the existing background noise levels in the absence of plant from the store.

Based on the plant noise measurements, cumulative noise levels for the plant, inclusive of the mitigation measures installed, have been predicted at the most affected noise sensitive receptor locations and assessed using Havant Borough Council's noise emissions criteria.

Predictions demonstrate that noise emissions from the plant comply with Havant Borough Council's noise requirements at R1 during the daytime and night-time period.

APPENDIX A
Plant photographs



Figure A1. Condenser an acoustic screen (prior to the installation of hit-and-miss fence and ACs)



Figure A2. Condenser an acoustic screen (prior to the installation of hit-and-miss fence and ACs)



Figure A1. View between tallest AC unit and R1

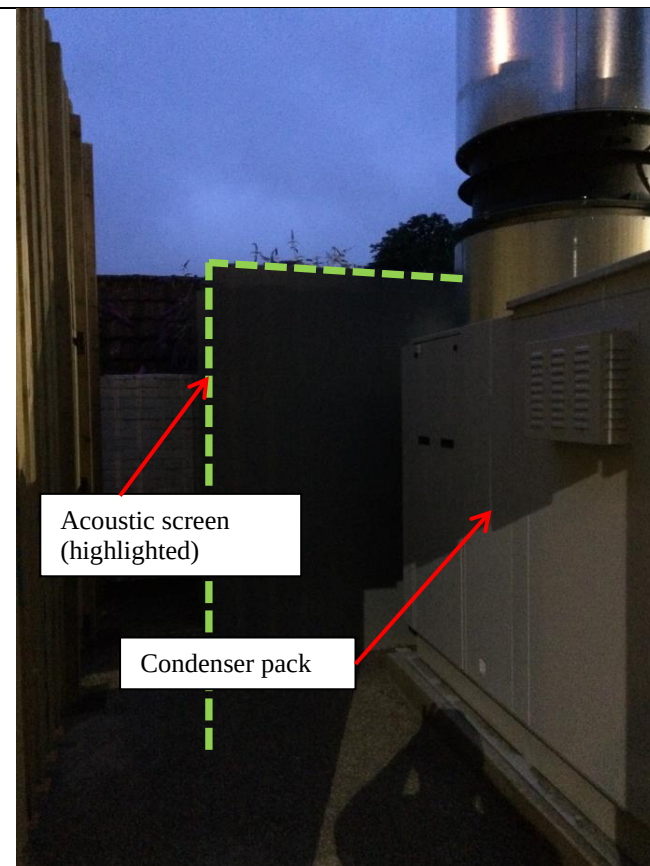
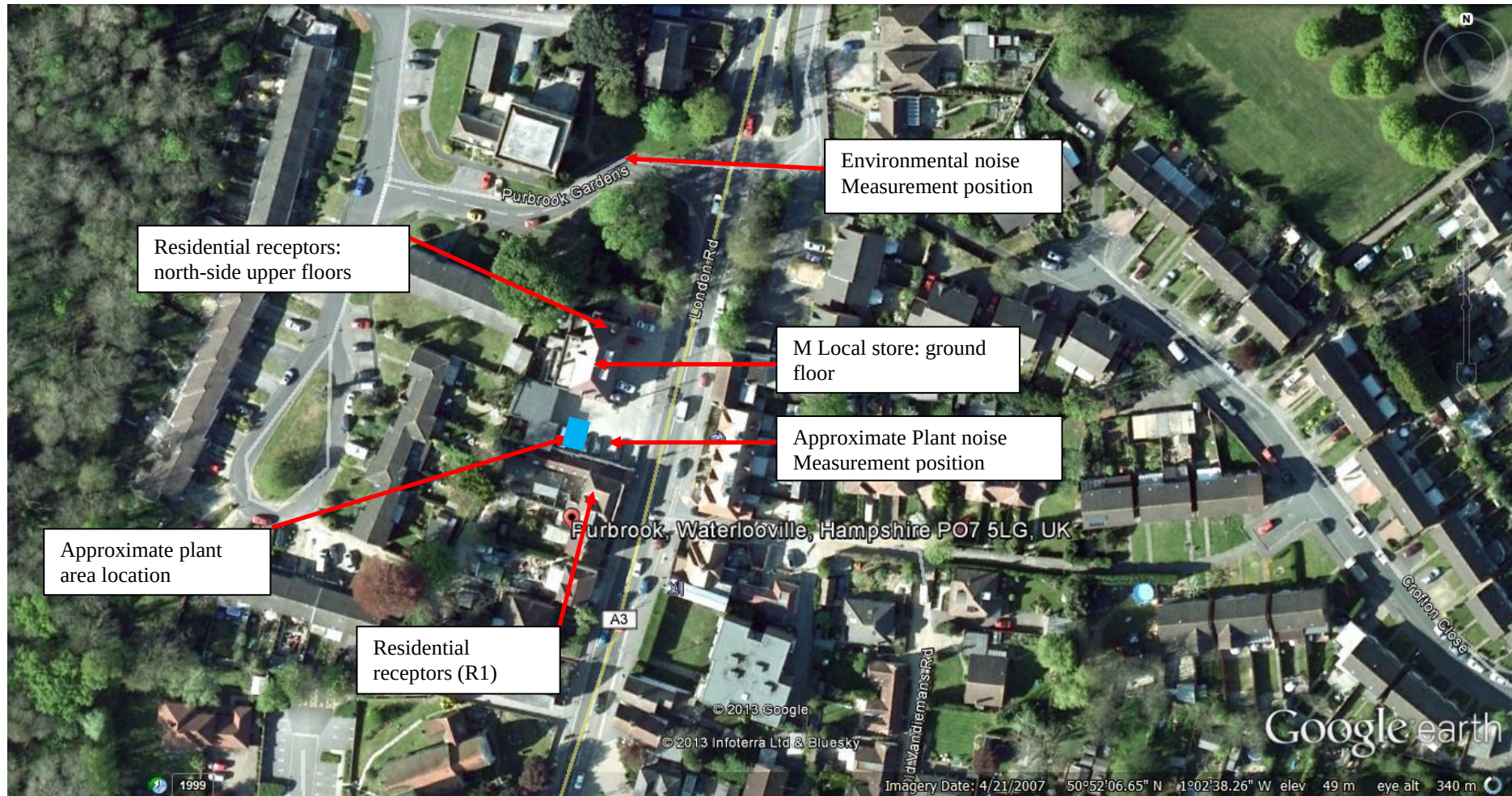


Figure A2. Refrigeration condenser and acoustic screen

APPENDIX B
Site Plan



APPENDIX C
Environment noise data, dBA

	Time	L_{Max}	L_{eq}	L₁₀	L₉₀
Mon 23 rd Sept 2013	22:00 – 22:10	71.7	56	60.1	42.9
	22:10 – 22:20	70.1	56.4	61.2	43.2
	22:20 – 22:30	69.3	55.2	59.6	42.7
	22:30 – 22:40	69.9	53.4	56.9	42.0
	22:40 – 22:50	70.6	54.5	58.4	41.2
	22:50 – 23:00	73.5	54.4	57.8	40.8

	Time	L_{Max}	L_{eq}	L₁₀	L₉₀
Tuesday 24 th Sept 2013	01:20 – 01:30	71.5	47.9	40.9	33.5
	01:30 – 01:40	67.4	47.6	44.1	33.3
	01:40 – 01:50	70.8	52.2	52.4	34.1
	01:50 – 02:00	67.7	42.5	39.6	35.8
	02:00 – 02:10	67.6	51.4	55.1	34.2
	02:10 – 02:20	69.5	46.4	41.5	33.4

APPENDIX D Calculations

Receptor R1 Daytime

Plant	Plant noise level (corrected for background)		Distance		Directivity	Screening	Resultant at receptor (dBA)
	Noise level (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	
Refrigeration	36.9	3.5	10	-9.1	0	-5	23
All AC ¹	43.9	3	6	-6.0	0	-8	30

Note:1) AC noise dominated by AC1

CUMULATIVE: 31

Night-time

Plant	Plant noise level (corrected for background)		Distance		Directivity	Screening	Resultant at receptor (dBA)
	Noise level (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	
Refrigeration	36.9	3.5	10	-9.1	0	-5	23
Cash office AC only	25.4	6	9	-3.5	0	-10 ¹	12

Note 1): greater screening provided due to the smaller size of the unit

CUMULATIVE: 23