



AIRTIGHT & NOISECHECK LIMITED

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ACOUSTIC TESTING REPORT FOR

FOURTEEN INVESTMENTS LTD

29 OAKWOOD CENTRE

DOWNLEY ROAD

HAVANT

HAMPSHIRE

PO9 2NP

SITE ADDRESS:

THE FOX

PROSPECT LANE

WEST LEIGH

HAVANT

HAMPSHIRE

PO9 5PA

A handwritten signature in grey ink, appearing to read 'Michael Vine', located below the site address.

Acoustic Engineer:

Michael Vine

Date: 13-14 March 2013

AIRTIGHT & NOISECHECK BUILDING ACOUSTIC TESTING

Contents

1.	Customer Name.....	3
2.	Site Address.....	3
3.	Equipment Used.....	3
4.	Measurement Procedure.....	3
5.	Executive Summary.....	4
6.	Objective.....	5
7.	Calibration.....	5
8.	Site Layout & Microphone Positions.....	5
9.	Hours of Operation.....	6
10.	Description of Testing.....	6
11.	Results Table.....	6
12.	Results Conclusion.....	7
13.	Sound Insulation.....	8
14.	Site Plan.....	9
15.	Google Earth Image.....	10
16.	Acoustic Definitions.....	11
17.	Barrier Attenuation & Sound Propagation.....	12
18.	Raw Data attached separately	



Test Engineer:

Michael Vine

Date: 13-14 March 2013

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Customer Name:

Fourteen Investments Ltd
29 Oakwood Centre
Downley Road
Havant
Hampshire
PO9 2NP

Date: 13-14 March 2013

Site Address:

The Fox
Prospect Lane
West Leigh
Havant
Hampshire
PO9 5PA

Acoustic Engineer:

Mr. Michael Vine

Equipment used:

Nor121 Environmental Analyser – Serial No 31399, Calibration due March 20th 2013.

Analyser complies with the following standards:

IEC 60651 type 1

IEC 60804 type 1

IEC 61260 class 1

IEC 225

ANSI S1.4 – 1985 type 1

ANSI S1.43 – 1997 type 1

ANSI S1.11 – 1986 order 3 type 1D

Norsonic production standard set for the Nor121

Measurement Microphone (Gras 40AF) – Serial No 54968, Cal due June 2013

Measurement Procedure:

The following parameters were measured:

The external noise levels were measured for a period of 24hours between the hours of 1030hrs on Wednesday 13th March to 1030hrs on Thursday 14th March 2013. This was performed to determine the current ambient noise levels apparent at the proposed site. Therefore setting a target level for the proposed plant that is to be installed.



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Executive Summary:

Airtight & Noisecheck Ltd were instructed by Fourteen Investments Ltd to undertake a Noise Impact Assessment to determine the impact (if any) the proposed plant would have on the proposed residential dwellings in the area.

The local authority attached the following condition to the planning application:

Condition 10: Prior to the occupation of the dwellings, the Public House shall be insulated against the emission of noise in accordance with a scheme submitted to and approved by the LPA. Such noise insulation shall be thereafter maintained and operated in accordance with the agreed scheme. Any new plant installed subsequent to the approval shall not increase background levels of noise as measured at the boundaries of the site without the approval of the LPA. Reason: To ensure that the buildings, structures and plant are adequately sound proofed in the interests of the amenities of the occupants of nearby premises and having due regard to policy DM10 of the Havant Borough Core Strategy 2011 which forms part of the Local Development Framework and National Planning Policy Framework, March 2012.

Based on this condition the local authority have requested that the proposed plant shall not increase the existing noise levels at the boundary of the residential dwellings. This report shows that the proposed plant should not increase the likelihood of complaints for the future residents and that the requirements of the local authority have been met.

The plant is to be situated at the opposite end of the site and enclosed by a rigid timber fence, these elements show that the specific noise level produced should not increase the likelihood of complaints. The specific noise levels of the plant have been compared to the background noise levels, the necessary barrier attenuation and propagation equations have been calculated and it indicates that the plant should not pose a nuisance to future residents. In addition to the plant being assessed, the facade and the separating floor of the retail unit will need to be upgraded to ensure noise breakout is minimal, this report lists some specifications that should ensure this is the case although no exact specification has been decided upon as yet.

The noise level for the plant has been taken directly from the manufacturer's data, however the plant has not been installed as yet so a further test may be required upon completion to ensure the requirements have been met.



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1 Objective:

1.1 The objective of the acoustic procedure is to measure the current ambient noise levels associated with the site, from this report a target level will be set at the proposed boundary between the retail unit and the residential gardens. The purpose of the target level is to ensure that the plant that is to be installed will not increase background noise levels at the residential boundary.

1.2 The proposed scheme involves a mixed use development with both retail and residential units being erected. The current noise emissions are the traffic using the local road network and the children using the school.

2 Calibration:

2.1 The measurement microphone was calibrated both before and after the testing procedure and there was no drift recorded.

3 Site Layout & Microphone Position:

3.1 The Fox is a former public house and car park situated on the corner of Prospect Lane and Baybridge Road, West Leigh, Havant. Prospect Lane runs immediately to the West of the site and Baybridge Road immediately to the South. There are existing residential dwellings located to the North, West & East of the site and a school located to the South. The Fox is a large detached building set in the South East corner of the site and the car park is located to the West & North of the building.

3.2 The proposed developments is for 7no 3 bedroom purpose built residential dwellings to be located at the Northern edge of the site in a terrace formation. The Public House is to become a retail convenience store with a residential dwellings situated at first floor. The store will have 4 x plant installed to operate the chillers and air conditioning units, these will be located at the Southern edge of the site on the Western facade of the proposed convenience store. They will be enclosed by a rigid timber fence approximately 1.8metres high and 1metre from the units (noise source).

3.3 The plant being installed is:

- 3 x Daikin RZQG140L7V1 - Size 1430mm high x 940mm wide x 320mm depth – dB(A) is 52 @ 1M - These units are to be on for 24hours.
- 1 x Daikin RZQG71L7V1 – Size 990mm high x 940mm wide x 320mm depth – dB(A) is 48 @ 1M - This units is only one whilst the store is open.

3.4 The boundary between the residential garden and the retail area will be approximately 12metres away from the plant and the residential facade will be approximately 26metres away, therefore for the purpose of propagation equations and barrier attenuation these distances will be used.

4 Microphone Location One (nearest noise sensitive facade):

4.1 The microphone was positioned on the flat roof of the current public house at the approximate boundary between the retail unit and the residential garden, therefore offering a fair reflection of the ambient noise levels in this location. It was in excess of 1.5metres from the flat roof and in excess of 3.5metres from any other reflective surface.



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5 Hours of Operation:

5.1 The convenience store will be open between the hours of 0600-2300hrs every day, however the plant serving the chiller units are to be in operation 24hours a day so the lowest LA90 (background noise) level will be determined from this period.

6 Description of Testing:

6.1 The ambient noise levels were measured at the proposed residential boundary for a period of 24hours to establish the current noise levels in this location with no plant in operation, this will establish the target level for the plant.

6.2 The combined noise level of the plant is 57dBA at 1metre, therefore the noise levels at distance can be calculated using a propagation equation.

6.3 The proposed plant will not be in the direct line of sight for the residential dwellings and will be enclosed by a rigid timber fence, there is also a 1.8metre high solid block wall to be built at the garden boundary of the residential dwellings which will offer further attenuation. The dwelling at first floor level will also be protected from the plant as the building will act as a barrier. The plant is to be positioned at ground floor level on the Western facade of the building, and the flat is located in excess of 12metres away on the opposite aspect of the building, the natural screening offered by the building and the directionality of the units should ensure the noise levels at first floor are satisfactory.

7 Noise Levels:

7.1 Noise Level at boundary

SPL of Combined noise source	Barrier Attenuation	Distance attenuation	Noise level at boundary	Lowest LA90 Value	Target Level	Difference	Criteria Met
57dBA	-12dB	-22dB	22dBA	35dBA	25dBA	-13 below LA90	Yes

7.2 Noise Level at Residential Facade

SPL of Combined noise source	Barrier Attenuation	Distance attenuation	Noise level at boundary	Lowest LA90 Value	Target Level	Difference	Criteria Met
57dBA	-12dB	-28dB	17dBA	35dBA	25dBA	-18 below LA90	Yes

The noise levels were measured in 5minute intervals and the above have been taken from the raw data at the necessary times to get direct comparison.

7.3 The above tables clearly indicate that the proposed plant should not increase the likelihood of complaints for the residential dwellings or gardens. The propagation equations have been performed using standard equations for a point source and the barrier attenuation has been calculated using the barrier attenuation equation. The tables indicate that the noise levels at the boundary will be -13dBA below the lowest LA90 and at the residential facade they will be -18dBA below the lowest LA90 and the target level of -10dB below the background noise level has been met.



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Lowest LA90 Value	Time Period
35dBA	Many 5min periods between 2200-0500hrs

7.3 The above table shows the lowest measured LA90 value during the 24hour measurement period. The raw data has been attached.

7.4 BS4142 - Rating Industrial Noise affecting mixed residential and industrial areas states that complaints would be unlikely if the specific noise source is -10dB below the lowest LA90 value, therefore based on the noise levels measured and the predicted attenuation of the barrier and distance propagation complaints should be unlikely.

8 Results Conclusion:

8.1 Based on the noise levels measured and the attenuation offered by both the distance and barrier complaints should be unlikely for the future residents. The most noise sensitive area is the habitable rooms (bedrooms) and these are situated in excess of 26metres from the plant.

8.2 In addition to the proposed timber fence being erected around the plant, there is also to be a solid block wall being built at the boundary of the gardens and retail unit, this wall is to be 1.8metres high and this wall should offer further sound attenuation for the residents.

8.3 Due to the location of the gardens and dwellings in relation to the plant, no correction for reflection will be added to the levels, this is because the dwellings are not directly facing the plant, however even if the reflection correction was applied to the noise levels then the specific noise source would still be -10dBA below the lowest background noise levels.

8.4 Based on the calculations and predicted noise levels the proposed installation of the plant should not increase the likelihood of complaints for the future residential dwellings. The results indicate that the specific noise levels should be in excess of -10dB below the lowest background noise levels. This level exceeds the requirements of the local authority who requested that the background noise levels not be increased at the boundary of the dwellings.



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2 Sound Insulation:

9.1 The existing facade is believed to be a cavity wall system that would already offer the sound reduction levels listed in the following paragraph. It is a robust construction due to the fact that the previous use for the venue was a Public House.

9.2 Parts of the facade of the proposed convenience store will need to be upgraded to ensure noise breakout does not occur. It is anticipated that the majority of the windows will be blocked up using a system similar to 'Dense aggregate concrete block cavity wall with 50mm cavity and wall ties of the butterfly wire type. Plaster finish on both sides. Joints in blockwork well filled'. Overall mass per unit area not less than 415 Kg/m² should offer a sound reduction of between 54-60dBA 'Code of Practice BS8233: 1999, Page 46 – Table E.2 – Airborne sound insulation of walls and partitions'. Also a cavity wall system comprising of 7N concrete blocks (two separate frames), have a sound reduction of approximately 53dB (predicted weighted sound reduction index values of Celcon Blockwork – from H&H Celcon).

9.3 The above facade specification should increase the level of attenuation currently offered by the windows and existing openings (cellar doors and rear fire escape doors etc).

9.4 Some of the walls may also be upgraded with a wall lining system, this will increase the sound attenuation offered even further.

9.5 If any of the windows are to be retained or replaced then at least double glazed units should be installed, this type of windows should offer a sound reduction value of between 30-35dB.

9.6 The flat roof will comprise of something similar to - Flat timber joists roof, asphalt on boarding, 12mm plasterboard ceiling, thermal insulation - BS8233: 1999 Table 11 - The sound insulation of roofs, page 28. This system has a weighted sound reduction R_w of 45dB, this level should be exceeded due to the more robust ceiling being installed below.

10 Separating Floor:

10.1 The existing ceiling between the ground floor public house and first floor dwelling will have to be upgraded to ensure it complies with 'Approved Document E - The resistance to the passage of sound'. An airborne sound insulation test procedure will have to be carried out on the floor to ensure it satisfies the requirements of ADE which is a $D_{nT,w} + C_{tr}$ in excess of 43dB for dwellings formed by material change of use, however due to the fact that the ground floor will be a convenience store the sound attenuation may need to be in excess of 50dB. The following system should ensure this figure is met:

- Plywood Glued not screwed to floorboards
- Timber Joists
- Existing lathe & Plaster Ceiling
- Void
- MF Suspended Ceiling with RW3 60Kg/m³ mineral wool slab laid on top
- 2 x 15mm Acoustic/Fireline plasterboard fixed to underside with staggered joints and acoustic mastic
- Plaster Finish

10.2 We have tested the above system many times and it should achieve a $D_{nT,w} + C_{tr}$ in excess of 50dB. The final specification should be verified before commencement and the design and workmanship should be inspected to ensure it is installed correctly.



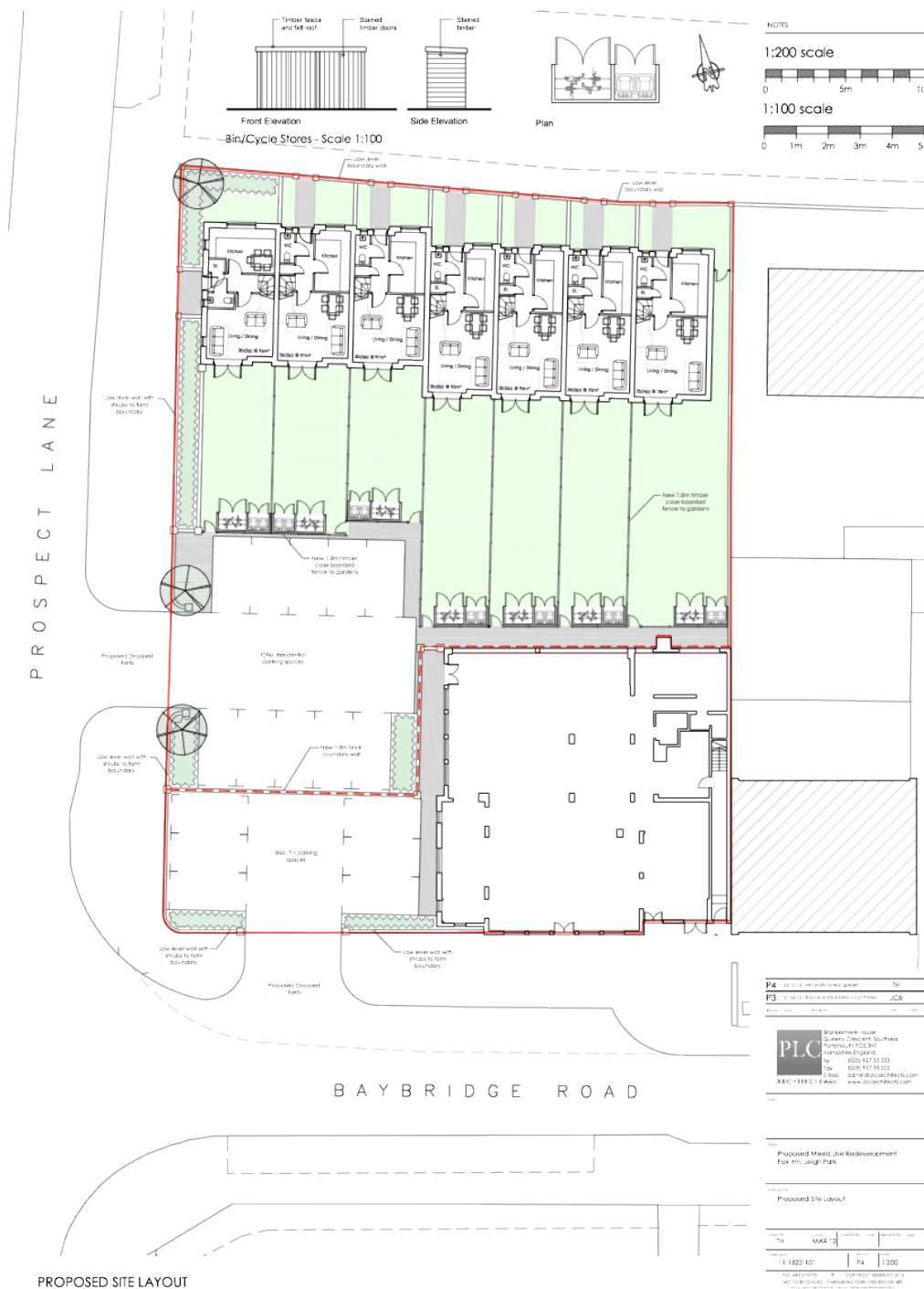
Acoustic Engineer:

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Test Date: 13-14th March 2013

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11 Site Plan



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Test Date: 13-14th March 2013

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12 Google Earth Image



Michael Vine

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APPENDIX

Continuous equivalent noise level, LAeq — The steady noise level (usually in dBA) which, over the period of time under consideration, contains the same amount of sound energy as the time varying noise.

LAm_{ax} - The maximum value that the A-weighted sound pressure level reaches during a measurement period.

dB (A) — The A-weighted sound pressure level.

Decibel (dB) — A unit used for many acoustic qualities to indicate the level of sound with respect to a reference level.

A-weighting — A frequency weighting that relates to the response of the human ear.

Background noise level — Prevailing noise level in a specified environment measured in the absence of the noise being studied.

Habitable Room – A room used for sleeping or recreation/relaxation

D_{ne,w} Weighted element normalised level difference – A single-number quantity which characterises the airborne sound insulation of a small building elements.

EPU – Environmental Protection Unit

R_w Weighted sound reduction index – A single-number quantity which characterises the airborne sound insulation of a material or building element measured in the laboratory.

LA₁₀ – The A-weighted noise level exceeded for 10% of the measurement duration.

LA₉₀ - The A-weighted noise level exceeded for 90% of the measurement duration.

British Standards & associated documents:

Code of Practice: BS8233: 1999 - Sound Insulation and noise reduction for buildings.

World Health Organization (WHO) - Guidelines for Community Noise.

BS4142: Method for Rating industrial noise affecting mixed residential and industrial areas: 1997



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Barrier Attenuation:

The attenuation offered by the barrier has been calculated using the following equation:

$$\text{barrier attenuation} = -1(10\log(3 + ((40 * p_d * f_0 / 344))))$$

The barrier height is 1.8metres

Source Height is 1metre

Receiver Height is 1metre

Source distance to barrier is 1m

Receiver distance to barrier is 12m and 26m

Sound Propagation Equation for a point source

The noise produced from the plant is deemed a point source and the levels can be calculated at distance using the following equation:

$$L_2 = L_1 - 20 \log (r_2/r_1)$$

Where:

L2 = Predicted noise level at nearest noise sensitive façade.

L1 = Noise level at source

R2 = distance to nearest noise sensitive façade

R1 = distance to original noise level



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