



Acoustic Consultancy Partnership Ltd

Ground Floor, Building 1000, Lakeside North Harbour

Western Road, Portsmouth, Hampshire, P06 3EZ

Acoustic Consultancy Report

Noise Impact Assessment for Fixed Plant

Proposed Asda Store – Littlehampton Road, West Worthing

Client: Asda Stores Ltd
Asda House
Great Wilson Street
Leeds
LS11 5AD

Project: Proposed Asda Store
Littlehampton Road
West Worthing
West Sussex

Our Ref: 10405

Revision: -

Report Prepared By N. Fowler M.I.O.A.

Date: 2nd April 2012



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EXECUTIVE SUMMARY

Acoustic Consultancy Partnership Ltd have been appointed by Asda Stores Ltd to undertake a noise impact assessment for the fixed plant at the proposed Asda development in Littlehampton Road, West Worthing.

We have been provided with the Practical Acoustics Ltd environmental noise survey report 4011.ENS.WAS.01 dated 2nd March 2012. This survey was undertaken to determine the existing noise climate affecting the nearest residential properties during the day/evening and night time periods.

The Local Authority have requested a noise impact assessment and confirmed the following requirements. *"A suitable Noise assessment should be carried out in accordance with BS4142:Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas. The Noise Assessment should include proposals to mitigate all identified significant adverse impacts (as defined by "Explanatory Note to the Noise Policy Statement for England"; Department for the Environment, Food and Rural Affairs).*

In the absence of any specific planning condition relating to fixed plant noise, we have undertaken an assessment based on the cumulative plant noise levels not exceeding the lowest measured background noise level, during the operating period of the plant, at the facade of the nearest noise sensitive properties. The day/evening and night time background noise levels, taken from the Practical Acoustics Ltd report, are as follows.

38 dB L_{AeqT} during the day/evening (07.00-23.00)

25 dB L_{AeqT} during the night (23.00-07.00)

The above levels will form the target combined plant noise levels for the operating period of the plant. Our experience gained over many years assessing this type of plant re-affirms that if the combined noise level for all the plant items does not exceed the lowest measured background noise level L_{A90T} , then the individual plant items would not be distinguishable and would not require an acoustic feature correction. In addition the combined plant noise level is not corrected for plant operating diversity thus providing a worst case scenario.

Therefore the combined plant target noise levels at the Receptor Positions would be as follows:



38 dB L_{AeqT} during the day/evening (07.00-23.00)

25 dB L_{AeqT} during the night (23.00-07.00)

The achievement of the target noise levels would ensure no significant adverse impacts as defined in the Noise Policy Statement for England.

A summary of the predicted **unattenuated** combined day/evening and night time total plant noise levels, at the nearest residential properties, indicated the target noise levels would be exceeded at all Receptor Positions during the day and night time periods

Based on the attenuator performance figures and screening barrier attenuation given in the Report, the predicted **attenuated** combined day/evening and night time total plant noise levels, at the nearest residential properties, would be as follows.

Receptor Position	Time Period	Combined ASDA Plant Noise Level, dBA	Target noise level dBA
RPA	Day/evening (07.00-23.00)	35	38
	Night (23.00-07.00)	22	25
RPB	Day/evening (07.00-23.00)	33	38
	Night (23.00-07.00)	20	25
RPC	Day/evening (07.00-23.00)	40	38
	Night (23.00-07.00)	30	25

Table 9 – Combined Attenuated Plant Noise Levels and Target Noise Levels

It can be seen that the target noise levels stated in Section 5.4, and confirmed in Table 9 above, would be achieved at the existing properties, Receptor Positions RPA and RPB, but would be marginally exceeded at the proposed residential development, Receptor Position RPC.

The marginal infringement at RPC is due to the operation of the eight refrigeration packs at ground level on the eastern elevation. The units have soft start EC fans fitted as standard with electronic fan night set back and, coupled with the full screening around the units, we are unaware of any further mitigation measures that can be practically adopted to these units.



1.0 Introduction

- 1.1 Acoustic Consultancy Partnership Ltd have been appointed to undertake a noise impact assessment for the fixed plant at the proposed Asda store at Littlehampton Road, West Worthing.
- 1.2 Environmental noise monitoring has been undertaken by Practical Acoustics Ltd and we are in receipt of their environmental noise survey report 4011.ENS.WAS.01 dated 2nd March 2012. This survey was undertaken to determine the existing noise climate affecting the nearest residential properties during the day/evening and night time periods.

The results would be used to assess against an appropriate noise criteria, as required by the Local Authority for the new plant items to be installed at the proposed Asda store.
- 1.3 This report considers the potential impact of the proposed plant items upon potentially sensitive existing and proposed noise receptors in the vicinity of the site.
- 1.4 This assessment, of the potential plant noise from the development, has been carried out with reference to British Standards and other government guidance as considered appropriate.
- 1.5 Technical terms or references are occasionally used within this report. To assist the reader, a Glossary of Terminology is included in Appendix 1.



SECTION A - GENERAL

2.0 Site Layout and Nearest Residential Properties

- 2.1 The proposed plant is located at various positions on and around the store building. We have provided a table later in this report that identifies the location and operating period of each plant item. Depending on plant location and the Receptor Position, it will be necessary to include within our assessment calculations, distance correction and barrier losses due to line of sight protection.
- 2.2 The nearest existing noise sensitive properties are bungalows in Glenbarrie Way to the east of the proposed store and a bungalow "Huntley" to the north east of the store adjacent to the eastern boundary of the customer car park.
- 2.3 The nearest proposed noise sensitive properties would be the two storey dwellings "Jenkins Yard Development" on land to the east of the store between Glenbarrie Way and the store. This development is not under construction

3.0 Project Data

- 3.1 Our noise impact assessment is based on the current site plan and roof plan provided by HGP Architects. Plant drawings and plant noise data has been provided by Engineering Services Partnership Ltd.

4.0 Proposed Hours of Operation

- 4.1 Generally HVAC plant items would operate 07.00-23.00 hours and the refrigeration plant would operate 24 hours, seven days a week, upon demand. We have provided a table later in this report in section 9.0 that identifies the location and operating period of each plant item.



5.0 External Noise Criteria

- 5.1 The Local Authority have requested a noise impact assessment and confirmed the following requirements. *"A suitable Noise assessment should be carried out in accordance with BS4142:Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas. The Noise Assessment should include proposals to mitigate all identified significant adverse impacts (as defined by "Explanatory Note to the Noise Policy Statement for England";Department for the Environment, Food and Rural Affairs).*
- 5.2 The lowest measured background noise levels have been provided in the Practical Acoustics Ltd report dated 2nd March 2012 as given below.

Period	Lowest Measured Background, dB $L_{A90(5min)}$
Day (07.00-23.00)	38
Night (23.00-07.00)	25

Table 1 – Lowest Measured Background Noise Levels

- 5.3 The above levels will form the target combined plant noise levels for the operating period of the plant. Our experience gained over many years assessing this type of plant re-affirms that if the combined noise level for all the plant items does not exceed the lowest measured background noise level L_{A90T} , then the individual plant items would not be distinguishable and would not require an acoustic feature correction. In addition the combined plant noise level is not corrected for plant operating diversity thus providing a worst case scenario.
- 5.4 Therefore the combined plant target noise levels at the Receptor Positions would be as follows:
- 38 dB L_{AeqT} during the day/evening (07.00-23.00)**
25 dB L_{AeqT} during the night (23.00-07.00)
- 5.5 The achievement of the target noise levels would ensure no significant adverse impacts as defined in the Noise Policy Statement for England.



SECTION B – FIXED PLANT

6.0 Receptor Position

- 6.1 We have adopted three Receptor Positions to ensure the most affected noise sensitive properties around the site are considered. These are detailed below.

Receptor Position RPA	The bungalow "Huntley" to the north east of the store adjacent to the eastern boundary of the customer car park.
Receptor Position RPB	Bungalows in Glenbarrie Way to the east of the proposed store
Receptor Position RPC	Proposed two storey dwellings "Jenkins Yard Development" on land to the east of the store between Glenbarrie Way and the store.

7.0 Assessment Prediction Parameters

- 7.1 Calculations are based on our in-house software package which provides the individual plant item noise levels at each of the Receptor Positions enabling an overall combined plant noise level to be determined. The calculations are based on standard methodology and take into account the distance correction and the barrier effects, where appropriate, of screens and the building.



8.0 Plant Noise Data

8.1 The manufacturers noise data used within this assessment is given below.

Plant	Sound Power Level, dB							
	63	125	250	500	1k	2k	4k	8k
AHU 1	59.6	70.8	76.7	81.9	82.4	76.9	75.2	68.3
AHU 2	59.6	70.8	76.7	81.9	82.4	76.9	75.2	68.3
AHU 3	59.6	70.8	76.7	81.9	82.4	76.9	75.2	68.3
EF01 Bakery	89	86	85	78	76	71	66	62
EF03 Deli Canopy	85	95	77	75	79	80	76	70
EF12 Customer Kitchen	-	104	86	80	83	82	78	76
Heat Recovery Unit 01	51.5	52.5	48	44.5	41	36	29	29.5
Heat Recovery Unit 02	58.5	55.5	52.5	49.5	46.5	39	29.5	28.5
Heat Recovery Unit 03	62.5	59	54.5	51.5	50.5	42.5	37	29
Heat Recovery Unit 04	66	62.5	58	55	54	46	40.5	33.5
Heat Recovery Unit 05	66	62.5	58	55	54	46	40.5	33.5
Heat Recovery Unit 06	66	62.5	58	55	54	46	40.5	33.5

Table 2 – Plant Sound Power Levels

Plant	Sound Pressure level, dB							
	63	125	250	500	1k	2k	4k	8k
EF6-Cleaners Lp at 3m	41 dBA							
EF7-Baby Change Lp at 3m	41 dBA							
EF8-Disabled Toilet Lp at 3m	42 dBA							
EF9-Female Toilet Lp at 3m	41 dBA							
EF10-Male Toilet Lp at 3m	41 dBA							
EF11-Security Lp at 3m	42 dBA							
Condenser 1-Lp at 10m	40 dBA							
Chiller 1-Lp at 6m	32 dBA							
Chiller 2-Lp at 6m	32 dBA							
CU01-Lp at 1m	59	59	52	52	51	45	44	34
CU02-Lp at 1m	59	59	52	52	51	45	44	34
CU03-Lp at 1m	52	50	52	48	37	39	38	31
CU04-Lp at 1m	23	37	43	48	48	45	40	33
CU05-Lp at 1m	23	37	43	48	48	45	40	33
CU07-Lp at 1m	46	52	44	42	39	34	29	20
CU08-Lp at 1m	51	49	50	47	46	42	38	30
CU09-Lp at 1m	51	49	50	47	46	42	38	30
CU010-Lp at 1m	51	49	50	47	46	42	38	30
CU011-Lp at 1m	23	37	43	48	48	45	40	33

Table 3 – Plant Sound Pressure Levels

Type	No of Units	Sound pressure level dBA
Refrigeration Mk2 packs with EC fans	9	52 dBA at 10m (day) 47 dBA at 10m (night)

Table 4 – Plant Sound Pressure Levels for Refrigeration Packs



9.0 Plant Locations and Operating Hours

9.1 As stated earlier in this report, individual plant are to be installed in various positions on and around the store building. Also not all plant will operate continuously. We give below the locations and plant operating hours that have been used as part of our noise impact assessment.

Plant	Location	Operating Hours
Pack 1	Ground level east elevation	Continuous
Pack 2	Ground level east elevation	Continuous
Pack 3	Ground level east elevation	Continuous
Pack 4	Ground level east elevation	Continuous
Pack 5	Ground level east elevation	Continuous
Pack 6	Ground level east elevation	Continuous
Pack 7	Ground level east elevation	Continuous
Pack 8	Ground level east elevation	Continuous
Pack 9	Roof top plant platform	Continuous
Condenser 1	Roof top plant platform	Continuous
Chiller 1	North east corner under mansard roof	Continuous
Chiller 2	North east corner under mansard roof	Continuous
CU01	Low level on southern elevation	07.00-23.00
CU02	Low level on southern elevation	Continuous
CU03	Low level on southern elevation	07.00-23.00
CU04	Low level on southern elevation	07.00-23.00
CU05	Low level on southern elevation	07.00-23.00
CU07	Roof top plant platform	07.00-23.00
CU08	Roof top plant platform	07.00-23.00
CU09	Roof top plant platform	07.00-23.00
CU10	Roof top plant platform	07.00-23.00
CU11	Low level on southern elevation	07.00-23.00
AHU 1	Roof top plant platform	07.00-23.00
AHU 2	Roof top plant platform	07.00-23.00
AHU 3	Roof top plant platform	07.00-23.00
EF01	Wall discharge on southern elevation	03.00-23.00
EF03	Wall discharge on southern elevation	05.00-23.00
EF06	Wall discharge on western elevation	07.00-23.00
EF07	Wall discharge on northern elevation	07.00-23.00
EF08	Wall discharge on northern elevation	07.00-23.00
EF09	Wall discharge on northern elevation	07.00-23.00
EF010	Wall discharge on northern elevation	07.00-23.00
EF011	Wall discharge on northern elevation	07.00-23.00
EF012	Roof top plant platform	07.00-23.00
HRU01	Intake & discharge at roof level	07.00-23.00
HRU02	Intake & discharge at roof level	07.00-23.00
HRU03	Intake & discharge at roof level	07.00-23.00
HRU04	Intake & discharge at roof level	07.00-23.00
HRU05	Intake & discharge at roof level	07.00-23.00
HRU06	Intake & discharge at roof level	07.00-23.00

Table 5 – Plant Locations and Operating Hours



10.0 Resultant Plant Noise Levels

- 10.1 A summary of the predicted **unattenuated** combined day/evening and night time total plant noise levels, at the nearest residential properties, are given below together with the relevant target noise level.
- 10.2 It should be noted that the combined levels given below allow for all plant operating simultaneously with no diversity, except where plant is controlled by pre-set electronic time clock control. This is a worst case scenario.

Receptor Position	Time Period	Combined ASDA Plant Noise Level, dBA	Target noise level dBA
RPA	Day/evening (07.00-23.00)	43	38
	Night (23.00-07.00)	33	25
RPB	Day/evening (07.00-23.00)	41	38
	Night (23.00-07.00)	35	25
RPC	Day/evening (07.00-23.00)	51	38
	Night (23.00-07.00)	46	25

Table 6 – Unattenuated Combined Plant Noise Levels and Target Noise Levels

- 10.3 It can be seen that the target noise levels stated in Section 5.4, and confirmed in Table 6 above, would not be achieved at any Receptor Positions during day or night time periods. Mitigation measures have therefore been recommended in section 11.0.
- 10.4 It should be noted that our calculations do not take into account the proposed 2.7m high barrier to the Jenkins Yard Development which is shown in the Sound Planning Ltd report dated 27th January 2010. This barrier has been proposed to achieve a noise exposure category NEC "B" throughout the site. It is shown to return approximately half the length of the western boundary from the south western corner and would not offer protection to the properties at the north western corner of the development.
- 10.5 It should also be noted that we have not allowed for any partial screening afforded to the properties in Glenbarrie Way if the Jenkins Yard Development is undertaken.



11.0 Recommendations

11.1 To reduce the combined noise levels at the Receptor Positions attenuation should be provided to the following plant items.

A) In duct attenuators on the atmosphere side of extract fans EF01, EF03 and EF12.

The attenuation performances for the extract fans, shown in Table 7, are as follows:

Plant	Insertion Loss Required, dB							
	63	125	250	500	1k	2k	4k	8k
EF01	8	11	22	46	45	33	21	15
EF03	8	20	22	46	45	33	25	15
EF12	8	20	22	46	45	33	25	15

Table 7 – Extract Fan Attenuator minimum insertion loss figures

B) Localised acoustic screening to the eight refrigeration packs at ground level on the eastern elevation. The solid screen would need to be three sided with a height of 3.0m and the door should also be solid construction with no gaps around the periphery and a removable, rebated, centre mullion on double doors. The screen is to be solid modular construction comprising 18g steel outer skin, 100mm thick absorbent infill, bagged with Melinex and retained by a perforated metal inner skin facing the units. The bottom of the screen is to terminate at ground level with no gap. Also required is to be 150mm thick acoustic wall lining on the outer face of the store wall covering full internal area of the screen, up to a minimum height of 3m.

Receptor Position	Insertion Loss Required, dB							
	63	125	250	500	1k	2k	4k	8k
RPA	-7.8	-9.6	-11.8	-14.4	-17.1	-20.0	-20	-20
RPB	-7.8	-9.6	-11.8	-14.4	-17.1	-20.0	-20	-20
RPC	-7.6	-9.2	-11.4	-13.9	-16.6	-19.5	-20	-20

Table 8 – Barrier Attenuation to Receptor Position



- 11.2 Based on the attenuator performance figures and barrier attenuation given above the predicted combined day/evening and night time total plant noise levels, at the nearest residential properties, would be as follows.

Receptor Position	Time Period	Combined ASDA Plant Noise Level, dBA	Target noise level dBA
RPA	Day/evening (07.00-23.00)	35	38
	Night (23.00-07.00)	22	25
RPB	Day/evening (07.00-23.00)	33	38
	Night (23.00-07.00)	20	25
RPC	Day/evening (07.00-23.00)	40	38
	Night (23.00-07.00)	30	25

Table 9 – Combined Plant Noise Levels and Target Noise Levels

- 11.3 It can be seen that the target noise levels stated in Section 5.4, and confirmed in Table 9 above, would be achieved at the existing properties, Receptor Positions RPA and RPB, but would be marginally exceeded at the proposed residential development, Receptor Position RPC.
- 11.4 The marginal infringement is due to the operation of the eight refrigeration packs at ground level on the eastern elevation. The units have soft start EC fans fitted as standard with electronic fan night set back and, coupled with the full screening around the units, we are unaware of any further mitigation measures that can be practically adopted to these units.



Appendix 1

Glossary of Terminology

$L_{Aeq,T}$

The "A" weighted parameter defined as the equivalent continuous sound pressure level over a defined time period "T". It is the sound pressure level equivalent to the acoustic energy of the fluctuating sound signal. The $L_{Aeq,T}$ is therefore the average sound pressure level over a given time period. It is commonly used to describe ambient noise.

$L_{A90,T}$

The "A" weighted parameter defined as the sound pressure level exceeded for 90% of the measurement period "T". It is generally used to describe the prevailing background noise level or the underlying noise level.

$L_{A10,T}$

The "A" weighted parameter defined as the sound pressure level exceeded for 10% of the measurement period "T". It is generally used to describe traffic noise.

$L_{Amax,T}$

The "A" weighted maximum measured level during a given time period "T".

Ambient Noise

Total encompassing sound in a given situation at a given time usually being composed of sound from many sources near and far.

Background Noise Level

The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval.



Appendix 2

Noise Impact Assessment Methodology

We give below a summary of the various British Standards and other published documents that provide guidance on noise impact assessment methodology and noise criteria that can be considered relevant to store plant noise.

BS 4142:1997 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

This British Standard describes a method of determining the level of a noise of an industrial nature, together with procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity.

The external $L_{Aeq,T}$ noise level from "factories, or industrial premises, or fixed installations, or sources of an industrial nature in commercial premises" is measured or calculated. The $L_{A90,T}$ background noise level is also measured, without the specific noise source operating. The "rating level" of the noise source is established, including a +5dB correction if the noise source contains any "acoustic features" (distinguishable note, impulsive characteristic or irregular enough to attract attention). The rating level is then compared to the background noise level, and the likelihood of complaints is predicted as follows.

- A rating level of around +10 dB above the background level indicates that complaints are likely
- A rating level of around +5 dB above the background level is of marginal significance
- If the rating level is more than 10 dB below the background noise level then this is a positive indication that complaints are unlikely.

