Plant Noise Assessment
Planning Report

Client:	BJA
Project:	The Co-operative Store Broad Oak Botley SO30 2FU
Our Reference:	RF 85447/NIA
Date of Report:	8 October 2015
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1.0 Introduction

Noise Solutions Ltd (NSL) has been commissioned by BJA to undertake a plant noise impact assessment for the proposed plant at the existing Co-operative Store, located on Broad Oak in Botley.

An environmental sound survey has been undertaken to establish the prevailing background sound levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.

Cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptors and assessed using the typical requirements of the local authority.

2.0 Details of development proposals

The existing Co-operative Store occupies a single storey unit on the north side of Broad Oak. All existing plant is to be decommissioned and removed.

The refrigeration plant (condenser and pack) serving the Co-operative Store is to be located externally on the east side of the site.

The proposed refrigeration plant will operate 24 hours a day; however the condenser will operate at a reduced setting during the night-time period (23:00 – 07:00 hours) when the store is closed. Appendix A contains a table with the manufacturer published sound pressure levels for the proposed plant.

3.0 Nearest noise sensitive receptors

The area surrounding the site is mixed residential and industrial, with the nearest noise sensitive properties being the offices (Reference R1) to the west of the store. It has been assumed that the nearest office windows will have direct line of sight to the plant. There are also residential properties to the south of the store.

Appendix B contains an aerial photograph showing the site and surrounding area.

4.0 Baseline Conditions

An environmental sound survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors during the typically quietest times when the plant may operate.

The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in Appendix C.

Table 1 Summary of survey results

Measurement period	**Range of recorded sound pressure levels (dB)**			
	$L_{Amax(10mins)}$	**$L_{Aeq(10mins)}$**	**$L_{A10(10mins)}$**	**$L_{A90(10mins)}$**
Evening (22.00 - 23.00 hours)	66-75	54-57	57-60	47-50
Night-time (01.00 - 02.00 hours)	60-70	46-50	46-52	43-43

5.0 Plant noise emission criteria

Typically local authorities do not consider commercial premises to be as sensitive to noise as residential properties and, therefore, emissions criteria are generally relaxed at these locations.

It is considered appropriate to control plant noise levels to meet the recommended internal noise levels provided in BS8233: *2014 'Guidance on sound insulation and noise reduction for buildings'* for indoor amenity within office spaces. The standard states a range of noise levels for various spaces used for 'study and work requiring concentration' between 35 and 50dB L_{Aeq}.

BS8233 gives general guidance on the expected sound insulation performance of a given building façade, with details of how various elements can affect the overall performance. Concerning windows, it states that:

> *If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15dB.*

This implies that should windows on a noise affected façade be openable, a sound insulation value of 15dB should be applied to the whole façade to an internal room being assessed. It should be noted that a sound insulation performance of 20dB is expected for non-openable standard double glazed windows.

Based on the above and assuming a worst case internal criterion of 35dB L_{Aeq} and the office windows do not open, cumulative plant noise levels at the façade of the nearest commercial premises should not exceed 55dB L_{Aeq}.

6.0 Plant noise impact assessment

The cumulative plant noise level at the most affected noise sensitive receptors has been predicted. The assessment has considered the directivity of sound propagation, as well as screening and distance losses between the source and the receiver.

The predictions during the daytime period have been based on the proposed refrigeration plant operating simultaneously at full capacity. Night-time predictions have been based upon the refrigeration pack operating at a reduced setting.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics providing it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. In order to be robust, however, a +3 dB feature correction has been applied to the noise level predictions as advised in BS4142.

Table 2 overleaf, summarises the results of the assessment at the most affected properties (R1) located to the east of the plant. Table 3 overleaf, summarises the results of the assessment at the most affected residential properties (R2) located to the east of the plant. All other nearby receptors benefit from increased distance/screening to the plant such that compliance with the local authority's requirements will be guaranteed. The full set of calculations can be found in Appendix D.

Table 2 Assessment of predicted noise levels at Receptor R1 (offices)

Period	Predicted rating level at receptor, L_{Aeq} (dB)	Design criterion (dB)	Difference (dB)
Daytime (07.00 - 23.00 hours)	55	55	0
Night-time (23.00 - 07.00 hours)	51	N/A	N/A

Table 3 Assessment of predicted noise levels at Receptor R2 (residential)

Period	Predicted rating level at receptor, L_{Aeq} (dB)	Design criterion (dB)	Difference (dB)
Daytime (07.00 - 23.00 hours)	31	50	-19
Night-time (23.00 - 07.00 hours)	26	50	24

7.0 Summary

Noise Solutions Ltd (NSL) has been commissioned by BJA to undertake a plant noise emissions impact assessment for the proposed new plant at the existing Co-operative Store located on Broad Oak in Botley.

An environmental sound survey has been undertaken to establish the prevailing background sound levels around the site.

The cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptor locations and assessed using the guidance from BS8233: *2014 'Guidance on sound insulation and noise reduction for buildings'.*

The results of the assessment demonstrate that cumulative plant noise emissions from the proposed external plant should be acceptable to Eastleigh Borough Council during both the daytime and night-time periods. Therefore the external plant proposals should not be a reason for refusal of planning permission.

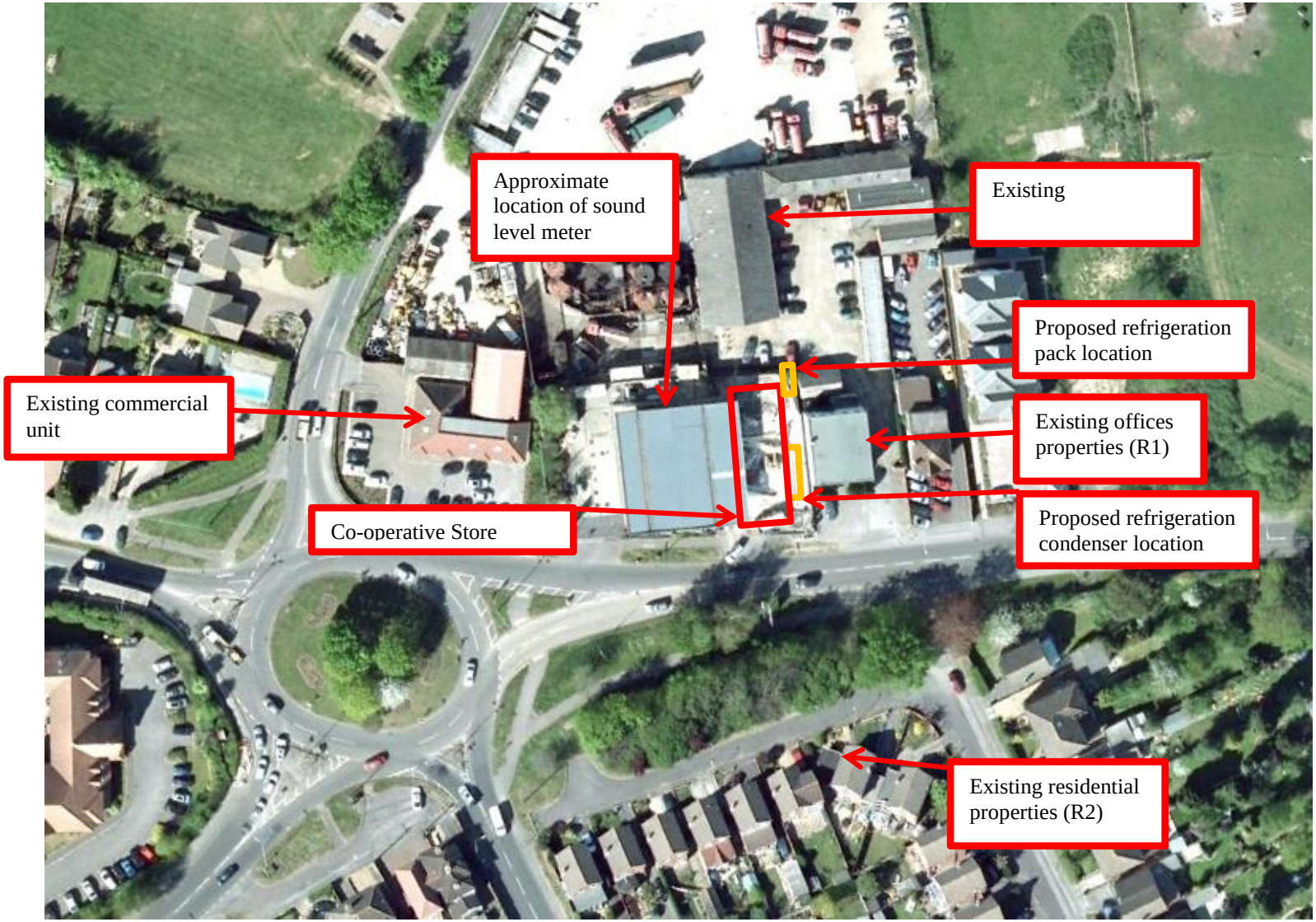
APPENDIX A

Plant information and manufacturer published sound pressure levels

Plant item	Make/Model	Quantity	Sound Pressure Level	
			dBA	**Distance (m)**
Refrigeration pack	Arctic Circle / CPPA4dSU-055-DT-S	1	37	dBA @ 10m
			34	dBA @ 10m
Refrigeration condenser	Arctic Circle / RF-MC102L3H-091E360	1	32	dBA @ 10m

APPENDIX B

Aerial photograph showing relevant points for the assessment



Courtesy of Google Maps (www.google.maps)

APPENDIX C

Details of environmental sound survey

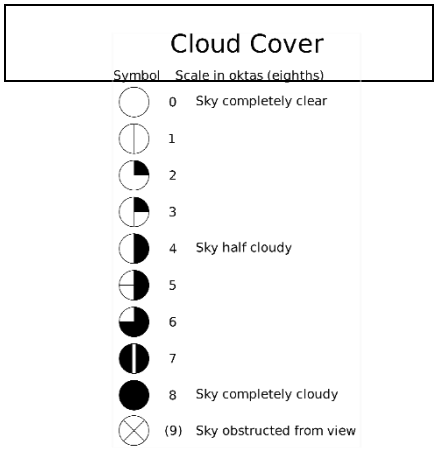
C.1. Measurement period

Measurements of the existing background sound levels were undertaken between 22:00 and 23:00 hours on Thursday 23th July and between 01:00 and 02:00 hours on Friday 24th July 2015.

The sound level meter was programmed to record the A-weighted L_{eq}, L_{90}, L_{10} and L_{max} noise indices for consecutive 10-minute sample periods for the duration of the survey.

C.2. Weather Conditions

Weather conditions were determined both at the start and on completion of the surveys. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site during the two surveys.

			Weather Conditions	
Measurement Location	**Date/Time**	**Description**	**Daytime Survey**	**Night-time Survey**
1	22:00-23:00 23/10/2015-01:00-02:00 24/10/2015	Temperature (°C)	15	11
		Precipitation:	Dry	Dry
		Cloud cover (oktas - see guide)	1	5
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	Calm	Calm
		Wind Direction	Calm	Calm
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

C.3 Measurement position

The sound level meter was positioned adjacent to the nearest noise sensitive receptors (location indicated on the site plan in Appendix A). In accordance with BS 7445-2:1991 *'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'*, the measurements were taken under free-field conditions with the microphone positioned at a height of approximately 1.5 m above ground level.

C.4. Equipment

Details of the equipment used during the survey is provided in the table below. The sound level meter was calibrated before and after the survey(s); no significant change (+/-0.2 dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Rion NL-31 / 00593605	27/01/2014	14412
Condenser microphone	Rion UC-53A / 316131		
Preamplifier	Rion NH-21 / 30365		
Calibrator	Rion NC-74 /35094453	27/01/2014	14411
Weather monitor	KESTREL 3000 Anemometer	Not applicable	Not applicable

C.5. Results

The results of the survey are considered to be representative of typical prevailing sound pressure levels at the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate. The noise climate during the survey period was dominated by local road traffic movements. The results of the survey are presented in a time history graph/table overleaf.

APPENDIX C
(CONTINUED)

Date	Time	L_{Amax} (dB)	L_{Aeq} (dB)	L_{A10} (dB)	L_{A90} (dB)
Thursday 23th July 2015	22:00 – 22:10	71.2	56.3	59.5	50.2
	22:10 – 22:20	66.9	56.2	59.4	49.4
	22:20 – 22:30	72.2	55.5	58.2	47.9
	22:30 – 22:40	75.4	56.8	60.2	47.9
	22:40 - 22:50	65.6	53.8	57.4	46.9
	22:50 - 23:00	70.5	53.5	56.7	47.8
Friday 24th July 2015	01:00 – 01:10	66.4	49.2	49.9	43.0
	01:10 – 01:20	70.4	49.2	47.9	42.6
	01:20 – 01:30	65.2	49.6	51.7	43.4
	01:30 – 01:40	66.5	46.9	46.2	43.3
	01:40 – 01:50	66.7	47.7	47.5	42.6
	01:50 – 02:00	60.0	45.5	47.3	42.5

APPENDIX D

Plant noise emission impact predictions at receptor R1 (offices)

Plant item	Source noise level		Distance correction		Directivity correction (dB)	Screening correction (dB)	BS4142 correction (dB)	Resultant at receptor R1, L_{Aeq} (dB)
	Noise level, L_{Aeq} (dB)	Reference distance (m)	Distance to receptor (m)	Correction (dB)				
Proposed refrigeration pack	37	10	4	8	6	0	3	54
	34	10	4	8	6	0	3	51
Proposed refrigeration condenser	32	10	3	10	6	-5	3	46
							Cumulative daytime:	**55**
							Cumulative night-time:	**51**

Plant noise emission impact predictions at receptor R2 (residential)

Plant item	Source noise level		Distance correction		Directivity correction (dB)	Screening correction (dB)	BS4142 correction (dB)	Resultant at receptor R1, L_{Aeq} (dB)
	Noise level, L_{Aeq} (dB)	Reference distance (m)	Distance to receptor (m)	Correction (dB)				
Proposed refrigeration pack	37	10	70	-17	6	0	3	29
	34	10	70	-17	6	0	3	26
Proposed refrigeration condenser	32	10	60	-16	6	-5	3	25
							Cumulative daytime:	**31**
							Cumulative night-time:	**26**