Aldi store

Victoria Avenue East
Manchester
M9 7HW

Plant Noise Impact Assessment

On behalf of

Project Reference: 90766| Revision: - | Date: 19th June 2023

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Document Information

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	Name	Qualifications	Initials	Date
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For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved

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1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Aldi Stores Limited to provide a noise impact assessment of plant serving the proposed Aldi store on Victoria Avenue East in Manchester.

1.2. An environmental noise survey was undertaken to establish prevailing noise levels affecting the development site. Plant noise levels have been predicted at the nearest noise-sensitive receptor and assessed against the requirements of the relevant planning condition.

1.3. To assist with the understanding of this report a glossary of acoustic terms can be found in **Appendix A**. An in-depth glossary of acoustic terms can be viewed online at http://www.acoustic-glossary.co.uk.

2.0 Site layout and development proposals

2.1. It is proposed to redevelop a site on Victoria Avenue East to provide a new Aldi store. The site has previously been occupied by a restaurant, which will be demolished as part of the redevelopment works.

2.2. Refrigeration plant will comprise a gas cooler, a compressor pack and two condensing units. This plant will operate at all times.

2.3. Two air source heat pumps will be installed from the outset, with provision for an additional unit in the future, if required. To provide a robust assessment it is assumed that all three may be installed. The ASHPs will operate only when the store is trading.

2.4. A plan of the proposed plant area is shown in **Appendix B**. Plant noise data is given in **Appendix D.**

3.0 Nearest noise sensitive receptors

3.1. The site lies between Victoria Avenue East and the M60 motorway.

3.2. The nearest residential premises are apartments at 261 Victoria Avenue East (Receptor R1), immediately to the northwest of the proposed store. The nearest residential windows are approximately 28m from the closest plant item. All plant items are screened from the closest windows by the store envelope.

3.3. Along the length of the north elevation of the residential building, progressively more plant items become unobscured, though the two condensing units, being furthest from receptor, are always

completely screened. This means that the plant noise level varies considerably across the north elevation. The highest sound level will result at approximately the middle-point of the elevation, where the air source heat pumps and the pack are visible but the other plant is screened.

3.4. All other residential properties in the area are at a significantly greater distance from the plant and are screened from it by the store building.

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

4.0 Environmental sound levels

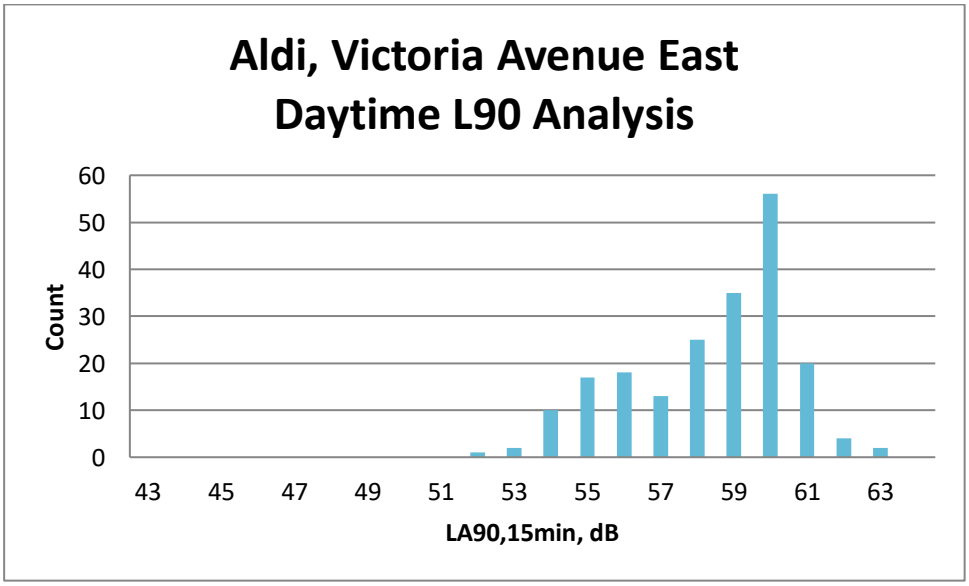
4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptor to the proposed loading bay during the quietest times at which activity will occur.

4.2. The results of the environmental sound survey are summarised in Table 1. 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)			
	$L_{Aeq(15mins)}$	$L_{Amax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
Daytime (07.00 – 23.00 hours)	56-65	61-89	58-68	52-63
Night-time (23.00 – 07.00 hours)	51-63	58-85	53-64	44-61

Figure 1 Histogram of L_{A90} background sound pressure levels, 07.00-23.00hrs



4.3. Further statistical analysis has been carried out on the daytime background (L_{A90}) data, and the

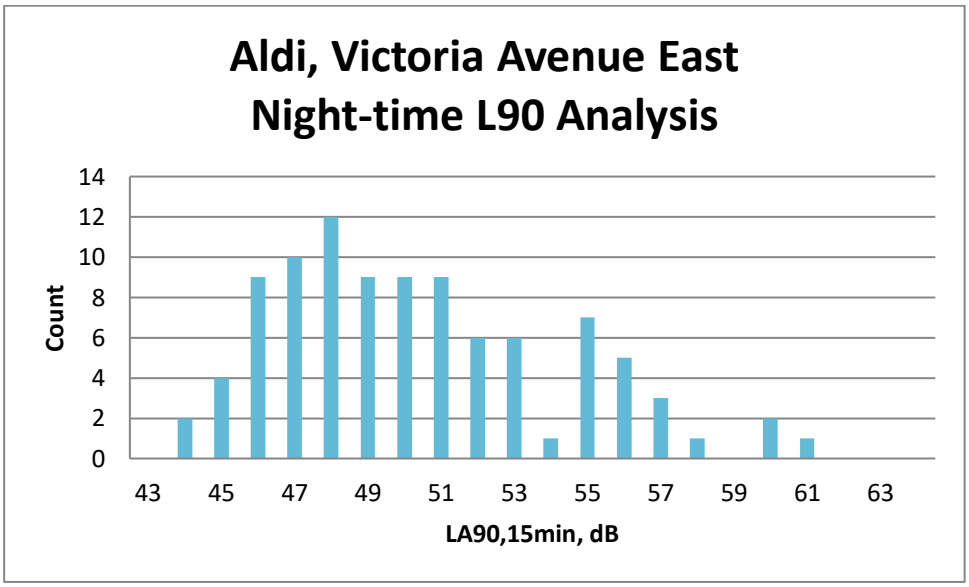
mean and median values are shown in Table 2 below.

Table 2 Statistical analysis of $L_{A90,15min}$ levels during the daytime period

dB, L_{A90} daytime period	
Mean	58
Mode	60
Median	59

4.4. From the histogram analysis, 55 dB has been selected to be a robust representation of the L_{A90} background sound pressure level during the daytime (07.00-23.00 hours).

Figure 2 Histogram of L_{A90} background sound levels, 23.00-07.00 hours



4.5. Further statistical analysis has been carried out on the daytime L_{Aeq} data, and the mean and median values are shown in Table 3 below.

Table 3 Statistical analysis of $L_{Aeq,15min}$ levels during the night-time period

dB, L_{Aeq} daytime period	
Mean	50
Mode	48
Median	50

4.6. From the histogram analysis, 45 dB has been selected to be a robust representation of the L_{A90} background sound pressure level during the night-time (23.00-07.00 hours).

4.7. Representative background sound levels are therefore considered to be:

- 50dB L_{A90} during the daytime (07.00 to 23.00 hours) and

- 45dB L_{A90} at night (23.00 to 07.00 hours)

5.0 Acoustic standards and guidance

Manchester City Council

5.1. Manchester City Council has granted permission for the development, subject to Conditions. Condition 24 a) in the Decision Notice 133148/FO/2022 states:

> *Any externally mounted ancillary plant, equipment and servicing to be installed shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to its installation, the scheme shall be submitted to and approved in writing by the City Council as Local Planning Authority in order to secure a reduction in the level of noise emanating from the site.*

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

5.2. BS 4142:2014+A1:2019[1] is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014 includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"* and *"sound from the loading and unloading of goods and materials at industrial and/or commercial premises"*.

5.3. The procedure contained in BS 4142:2014 is to quantify the *"specific sound level"*, which is the measured or predicted level of sound from the source in question over a one-hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.

5.4. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

5.5. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."*

5.6. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise*

[1] For brevity, references to "BS4142" and "BS4142:2014" should be understood as "BS 4142:2014 +A1:2019"

receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."

5.7. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

5.8. The standard does state that "*adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

5.9. The standard goes on to note that: *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

5.10. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

5.11. BS 4142:2014 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

6.0 Plant noise assessment

6.1. Plant noise levels have been predicted at the nearest residential windows (R1A) and the middle of the elevation, where the highest plant sound levels will be experienced (R1B). The assessment

includes corrections for distance, acoustic reflections and screening between the plant and receptor. As noted previously, the assessment of noise during the daytime includes three Air Source Heat Pumps (two installed from the outside and future provision for a third, if required). At night, only the refrigeration plant will operate.

6.2. It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. However, a penalty of 3dB as described in BS 4142:2014 has been applied for the possible presence of "*...characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment...*".

6.3. A summary of predicted plant noise levels is given in Table 4. Full calculations are shown in **Appendix E**.

Table 4 Plant noise assessment

Receptor	Period	Plant rating level at receptor, dB $L_{Ar,Tr}$	Background sound level, dB L_{A90}	Excess, dBA
R1A	Daytime (07.00-23.00hrs)	23	55	-32
	Night-time (23.00-07.00hrs)	21	45	-24
R1B	Daytime (07.00-23.00hrs)	31	55	-24
	Night-time (23.00-07.00hrs)	30	45	-15

6.4. The assessment shows that rating levels due to plant, at the nearest residential windows, will be at least 15 dBA below the background sound level and therefore comply with the requirements of Condition 24 a).

Context and uncertainties

6.5. As the standard advises, the estimated impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

- The assessments are undertaken at a single residential window. The impact on all other residential windows will be lower due to distance losses and noise screening provided by the building structure.

6.6. Where possible uncertainty in this assessment has been minimised by taking the following steps:

- The measurement of the background sound levels was undertaken over a period including the quietest times of the day and night.

- The sound level meter and calibrator used have a traceable laboratory calibration and were field calibrated before and after the measurements.
- Uncertainty in the calculated impact has been reduced by the use of a well-established calculation method.
- Care was taken to ensure that the measurement position was representative of the noise climate outside the nearby residential dwellings and not at a position where higher noise levels are present.

7.0 Conclusions

7.1. Noise Solutions Limited has been commissioned by Aldi Stores Limited to undertake an assessment of the noise impact of plant serving the proposed Aldi store along Victoria Avenue East in Manchester.

7.2. In support of these assessment works, a baseline noise survey was undertaken to determine the prevailing environmental noise levels at the nearest noise sensitive receptors to the store during representative periods.

7.3. Plant noise levels have been predicted at the nearest residential windows. The assessment shows that the rating level due to plant will be at least 15 dBA below the representative background sound levels and therefore comply with the requirements of Condition 24 a).

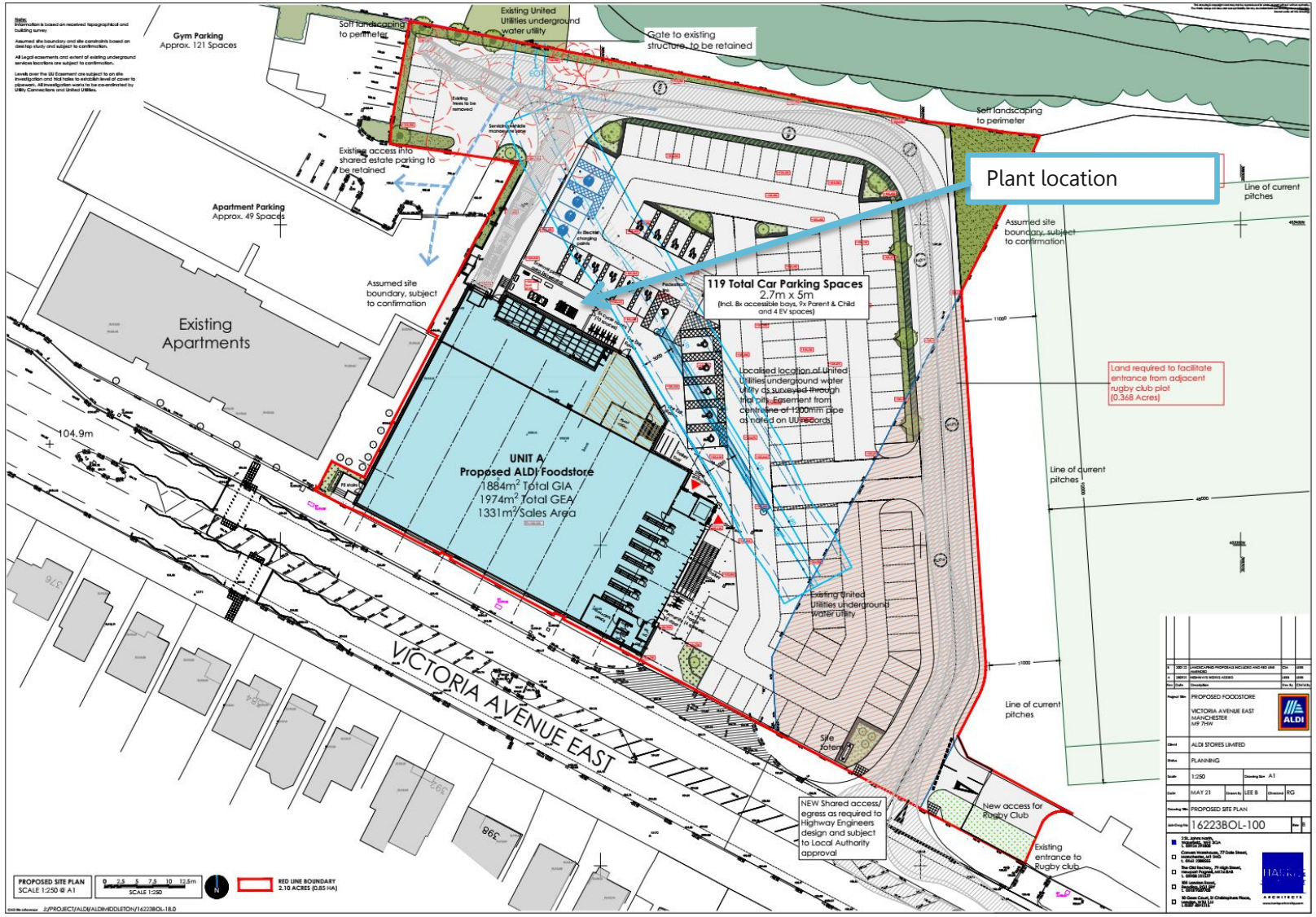
Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 $\log_{10}$ (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. Generally used to describe background noise level.

Appendix B Aerial photograph of site and plan of plant area

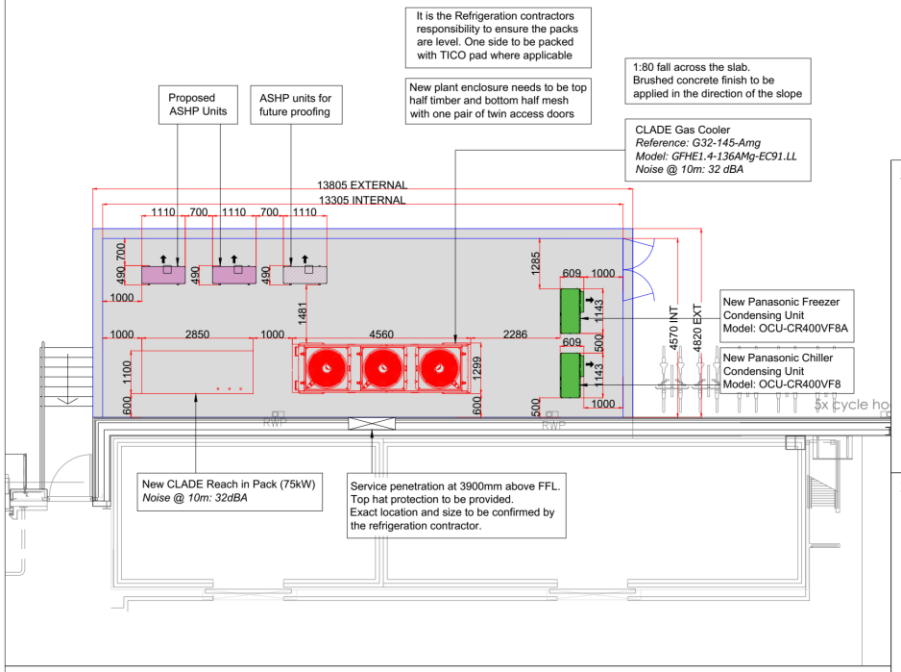


Store plan


Plant location
Gym Parking
Approx. 121 Spaces
Soft landscaping to perimeter
Existing United Utilities underground water utility
Gate to existing structure, to be retained
Existing access into shared estate parking to be retained
Apartment Parking
Approx. 49 Spaces
Assumed site boundary, subject to confirmation
119 Total Car Parking Spaces
2.7m x 5m
(Incl. 8x accessible bays, 9x Parent & Child and 4 EV spaces)
Existing Apartments
104.9m
Localised location of United Utilities underground water utility as surveyed through the pits. Easement from centreline of 1200mm pipe as noted on UU records.
UNIT A
Proposed ALDI Foodstore
1884m² Total GIA
1974m² Total GEA
1331m² Sales Area
Line of current pitches
Land required to facilitate entrance from adjacent rugby club plot (0.368 Acres)
Assumed site boundary, subject to confirmation
Existing United Utilities underground water utility
Site Totem
VICTORIA AVENUE EAST
NEW Shared access/ egress as required to Highway Engineers design and subject to Local Authority approval
New access for Rugby Club
Existing entrance to Rugby club
PROPOSED FOODSTORE
VICTORIA AVENUE EAST
MANCHESTER
M9 7HW
ALDI STORES LIMITED
PLANNING
1:250
A1
MAY 21
LEE B
RG
PROPOSED SITE PLAN
16223BOL-100
PROPOSED SITE PLAN
SCALE 1:250 @ A1
SCALE 1:250
RED LINE BOUNDARY
2.10 ACRES (0.85 HA)

Proposed plant layout

PROPOSED PLANT LAYOUT



Pack Noise Rating

Dorin 75kW-PFE-ULN Reach In Housing (32)	dB(A)	Octave Band Frequency (Hz)								
Noise Source		63.0000	125.0000	250.0000	500.0000	1000.0000	2000.0000	4000.0000	8000.0000	
CD4 75-7.3M	61	39	39	49	47	60	55	53	47	
CD4 75-7.3M	61	39	39	49	47	60	55	53	47	
CD4 90-9.2m	62	40	40	50	48	61	56	54	48	
CD 2000H	67	45	45	55	53	66	61	59	53	
LA47-A3p Vent Fan Inlet	50	39	42	46	42	43	45	44	34	
LA47-A3p Vent Fan Outlet	50	39	42	46	40	43	45	44	34	
Calculated Internal Sound Pressure Level	71	49	50	58	56	69	64	62	56	
*Correction for Internal Reflection/Frequency	5	5	5	5	5	5	5	5	5	
Total Internal Sound	76	54	55	63	61	74	69	67	61	
Attenuated Sound Pressure @ 1.0m	52	45	45	48	41	54	39	37	31	dB(A) LpA @1m
Attenuated Sound Pressure @10m	32	16	17	19	15	25	11	<10	<10	dB(A) LpA @10m

Sacrificial coating (Blygold) recommended- ☑ (Yes)

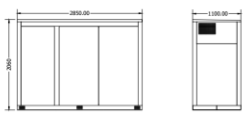
Freezer Condensing Unit Data



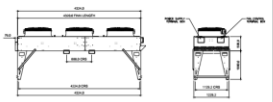
Chiller Condensing Unit Data

Type (HT: medium temp. LT: low temp.)			HT (7,5kW)
Standard model			OCU-CR400VF8
Anti corrosion coating model			OCU-CR400VF8SL
Power supply	Voltage	V	380/400/415
	Phase		Three Phase
	Frequency	Hz	50
Cooling capacity at ET -10°C AT 32°C		kW	6,90
Cooling capacity at ET -35°C AT 32°C		kW	---
Evaporator connection			Multiple [1]
Evaporation temperature	Min~Max	°C	-20~-5
Ambient temperature	Min~Max	°C	-15~+40
Refrigerant			R744
Design pressure liquid line		Mpa	8
Design pressure suction line		Mpa	8
User system external alarm. Digital input. Non-voltage contact			Yes
Liquid tube electromagnetic valve		Vac	380/400/415
Showcase operation ON/OFF signal. Digital input. Non-voltage contact			Yes
Modbus communication line (RS485)		Ports	2
Compressor type			2- stage rotary
Dimension	H x W x D	mm	948 x 1143 x 609
Net weight		Kg	TBC
Piping connections	Suction pipe	inch (mm)	1/2 (12,70)
	Liquid pipe	inch (mm)	3/8 (9,52)
Length of connection piping		m	TBC
Standard performance	Ambient temperature	°C	32
	Evaporating temperature	°C	-10 / -10
	Cooling capacity	kW	6,90 / 6,90
	Power consumption	kW	TBC / TBC
	Nominal load ampere	A	TBC / TBC
	Sound pressure level	dB(A)	33
PED			II
Air volume		m³/min	TBC
External static pressure		Pa	TBC
Heat recovery port			Yes
Drier filter liquid line, diameter 6,35mm			TBC
Drier filter liquid line, diameter 15,88mm			TBC
Necessary accessories			
Tube connector adaptor for vacuum and service	SPK-TU125		TBC
Suction filter, diameter 19,05mm (outer diameter welding)	S-008T		TBC

CLADE Reach-in Pack Housing (75kW)
Noise Level @ 10m: 32 dBA



CLADE Gas Cooler- G32-145-Amg GFHE1.4-136AMg-EC91.LL
Noise Level @ 10m: 32dB(A)



Weight (dry approx.): 735kg

Gas Cooler Data

Reference:	G32-145-Amg
Model:	GFHE1.4-136AMg-EC91.LL
GAS COOLER	
Coil Code:	1 x CO-48-6-2.31-4320
Performance Sub-Critical	
Capacity	118.8 kW
Ambient	10 °C, 50 %RH
Condensing Temp	20 °C
TD	10 K
Performance Supercritical	
Capacity	144.3 kW
Ambient	40°C
Gas Pressure	100 Bar
Gas Inlet	100°C
Gas Outlet	42°C
Volume flow Inlet	15 m3/hr
Volume flow Outlet	5 m3/hr
Mass Flow	2908 kg/hr
Pressure drop	140 kPa
DUMP COIL	
Coil Code:	N/A
Capacity	
Ambient	
Evaporating Temp	
TD	
AIR PERFORMANCE:	
Volume flow humid	7.3m3/s (26410m3/hr)
Height over sea level	0 m
Pressure	1013.25 hPa
Number of Fans	3
External Resistance	0 Pa
Supply	400v 3ph 50Hz/hz
Fan Type	EC - 910 mm diameter
Speed Design / Maximum	395 / 640 rpm
Total Power Input	484.5 W
Energy Rating	A
Full Load Current / Motor	1.1 A
Sound Power Level	63.8 dBA
Mean Sound Pressure @ 10m	32 dBA
PHYSICAL:	
Tube material	Copper - Plain
No Rows	6
Fin Material	Alum Mag
Fin Spacing	2.31 mm / 11 fpi
Surface	662.6 m2
Internal Volume	53.1 dm3
No Section / Coils	1 coil in 1 section
No Circuits	24
Connection Size	1 x 35 / 35
Unit Dimensions Width	1250 mm
Height + Fan	1175 mm
Length over headers	4620 mm
Weight (dry approx.)	735 kg

Note:

1. Exposed Refrigeration service to receive top hat protection by Builder.
2. Plant access doors and position to be agreed with refrigeration contractor.
3. Fire escape routes are to be maintained throughout and must not be obstructed at any time.
4. New Plant enclosure and Concrete base to accommodate the proposed plant

REV	DATE	DESCRIPTION	DRW	CHK
P01	26/01/2021	Layout updated with new 75kW CoolMag gas cooler, pack and Panasonic CUs.	SP	AC

Equipment Key:
- New Panasonic Condensing Units
- New ASHP Units
- New CLADE Refrigeration Pack & Gas Cooler

Builders Key:
- New plant enclosure
- New Concrete base

Client: Aldi Stores Ltd.
Project Title: MOSTON
Project Address: VICTORIA AVENUE EAST, MOSTON, MANCHESTER
Drawing Title: PROPOSED PLANT LAYOUT

Job No.	Originator	Zone	Level	Type	Role
79-E1529	WAVE	XX	00	DR	R
System Classification	Drawing No.		Suitability	Revision
En_60_60_00 -0001			A5	P01
Drawn	Checked	Date	Scale	Size
AD	GE	21-12-2021	1:50	A1

wave
an employee owned company
Unit 16G, Calcterdale Business Park
Club Lane, Ovenden
Halifax
HX2 DB
Tel: 07752 548083
E-Mail: garyw@wave-refrigeration.com

Appendix C Environmental sound survey

Details of environmental sound survey

C.1 Measurements of the existing background sound levels were undertaken between 12.45 hours on Friday 10 June and 15.30 hours on Monday 13 June 2022.

C.2 The sound level meter was programmed to record the A-weighted L_{eq}, L_{90}, L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the noise survey.

Measurement position

C.3 The representative measurement position was located on a lamp-post in the car park of the existing premises, at the same distance from the M60 motorway as the adjacent apartment building (location indicated on the site plan in **Appendix B**). 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 undertaken under free-field conditions. This location is approximately representative of the levels of road traffic noise at the closest noise sensitive receptors.

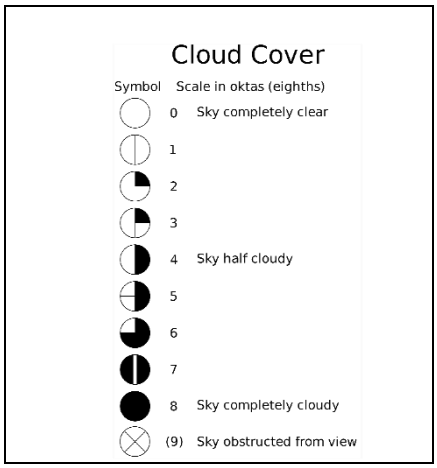
Equipment

C.4 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; 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	Svantek 971 / 111624	18/06/2021	Factory conformation certificate
Condenser microphone	ACO Pacific 7052E / 80036		
Preamplifier	Svantek SV 18 / 112639		
Calibrator	Svantek SV 33B / 83850	20/10/2021	1501134-1

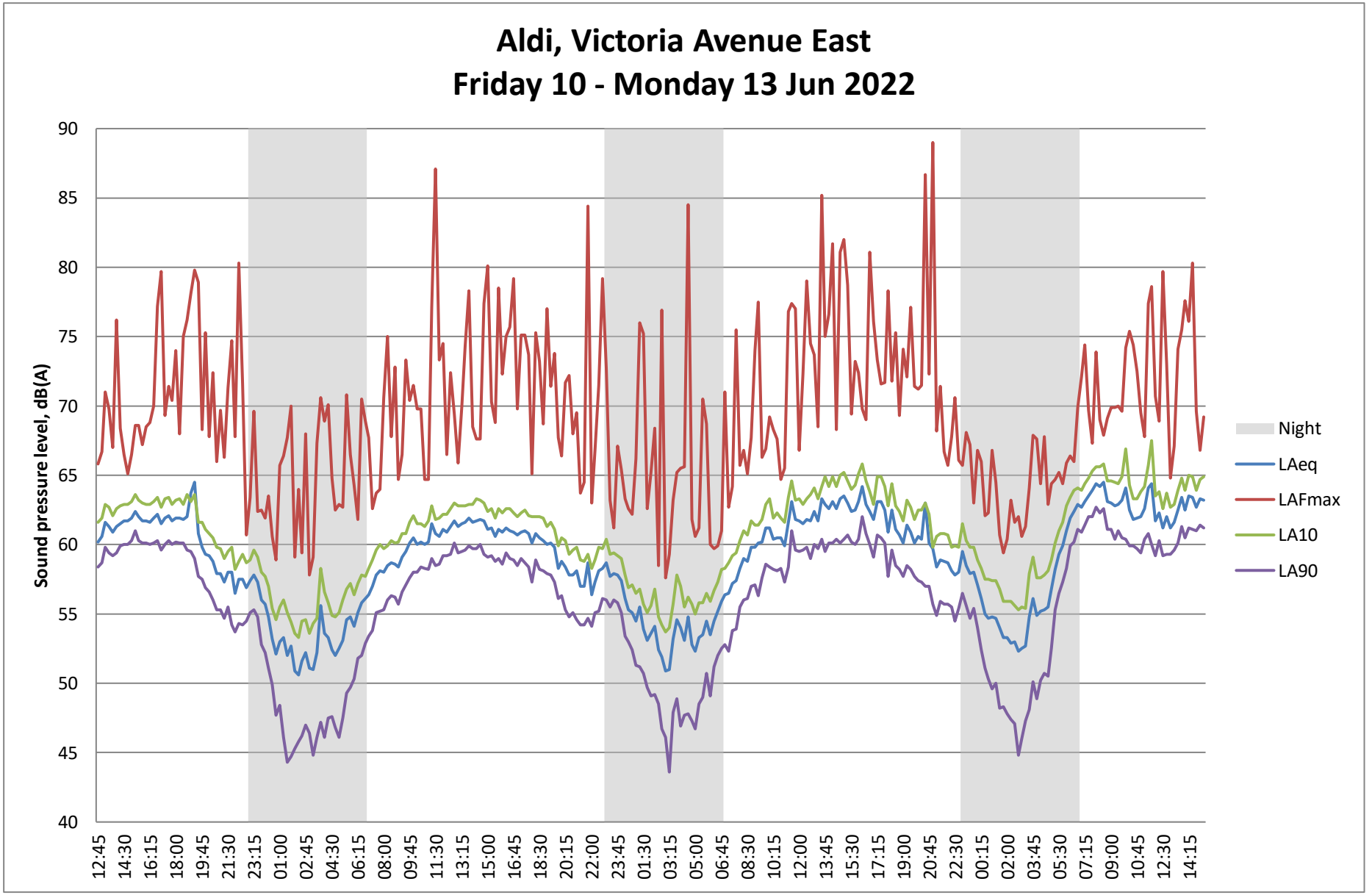
Weather conditions

C.5 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	**Date/Time**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	12.45 10 Jun - 15.30 13 Jun 2022	Temperature (°C)	19	17
		Precipitation:	No	No
		Cloud cover (oktas - see guide)	6	7
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	3	3
		Wind Direction	NW	NW
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

C.6 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which deliveries will be made. During the installation and removal of the sound level meter the noise climate was dominated by traffic on the M60 motorway. The results of the survey are presented in a time history graph overleaf.


Aldi, Victoria Avenue East
Friday 10 - Monday 13 Jun 2022
Sound pressure level, dB(A)
90
85
80
75
70
65
60
55
50
45
40
12:45
14:30
16:15
18:00
19:45
21:30
23:15
01:00
02:45
04:30
06:15
08:00
09:45
11:30
13:15
15:00
16:45
18:30
20:15
22:00
23:45
01:30
03:15
05:00
06:45
08:30
10:15
12:00
13:45
15:30
17:15
19:00
20:45
22:30
00:15
02:00
03:45
05:30
07:15
09:00
10:45
12:30
14:15
Night
LAeq
LAFmax
LA10
LA90

Appendix D Manufacturers' noise data

Plant	Make/model	Operating period	Quantity	Source sound pressure level	
				dB(A)	at (m)
Air Source Heat Pumps	Vaillant aroTHERM plus 12kW air to water heat pumps	Day and night	2 / 3*	52	1
Gas Cooler	CLADE GFHE1.4-136AMg-EC91.LL	Day and night	1	32	10
Pack	CLADE Reach-in pack 75kW	Day and night	1	32	10
Chiller Condensing Unit	Panasonic OCU-CR400VF8	Day and night	1	33	10
Freezer Condensing unit	Panasonic OCU-CR400VF8A	Day and night	1	36	10

**Two units are currently proposed, with a further unit to be installed in the future, if necessary*

Appendix E Plant noise calculations

Receptor R1A – closest windows

Plant	Source sound pressure level		Distance (m)	Correction (dB)	Directivity (dB)	Screening (dB)	BS4142 Feature (dB)	Rating level at receptor
	dB(A)	at (m)						
ASHP 1	52	1	28	-29	3	-15	3	14
ASHP 2	52	1	28	-29	3	-15	3	14
ASHP 3	52	1	29	-29	3	-15	3	14
Gas Cooler	32	10	27	-9	3	-15	3	14
Pack	32	10	25	-8	3	-15	3	15
Chiller condensing unit	33	10	32	-10	3	-15	3	14
Freezer condensing unit	36	10	34	-11	3	-15	3	16
Rating level (day – all plant running)								**23**
Rating level (night – refrigeration plant running)								**21**

Receptor R1B – worst-affected windows

Plant	Source sound pressure level		Distance (m)	Correction (dB)	Directivity (dB)	Screening (dB)	BS4142 Feature (dB)	Rating level at receptor
	dB(A)	at (m)						
ASHP 1	52	1	45	-33	3	0	3	25
ASHP 2	52	1	47	-33	3	0	3	25
ASHP 3	52	1	48	-34	3	0	3	24
Gas Cooler	32	10	48	-14	3	-8	3	16
Pack	32	10	45	-13	3	0	3	25
Chiller condensing unit	33	10	53	-14	3	-10	3	15
Freezer condensing unit	36	10	54	-15	3	-10	3	17
Rating level (day – all plant running)								**31**
Rating level (night – refrigeration plant running)								**30**