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Paul Horsley Acoustics Ltd
Acoustics & Noise Control Consultancy

Acoustic Report

Noise Impact Assessment for the ASHP Installation at

ALDI Stores Ltd, Irvine

Our Reference – J3237

Revision - 0

Report by – Paul Horsley MIOA

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				[redacted]	[redacted]	[redacted]

Limitations

The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practice at that time.

All of the comments and opinions contained in this report, including any conclusions, are based on the information obtained by Paul Horsley Acoustics Ltd during our investigations.

There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been considered by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

Any diagram or opinion of the possible configuration of the findings is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

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b) the date on which the final report is delivered.

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1.0 Agent

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2.0 Site

ALDI Irvine
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3.0 Aims

The aim of this report is to determine the noise impact of the ASHP fixed plant installation at the above ALDI Store, in accordance with the requirements of BS4142:2014+A1:2019.

Provide mitigation recommendations, if necessary, for the additional plant in order to preserve the existing amenity of the nearby noise sensitive premises.

4.0 Location and Description of Noise Sources

The ALDI Store, Irvine is located within East Road Retail Park in the centre of Irvine town centre.

The site is best described as rectangular in shape occupying maximum dimensions of 70m x 85m and comprises of a single storey shopping unit, service dock area and customer carpark area to the north of the store building, with access from East Road to the west of the site. The existing plant is located at the southwestern corner of the store within an enclosed plant compound area.

The site is bounded to the north by further retail units occupying East Road Retail Park. The eastern site boundary is formed by Caledonian Car Park, a public car park. Beyond which are positioned the 4-storey residential flats at George Court. The western site boundary is formed by East Road, with residential and

retail shops along its length. The southern site boundary is formed by the garden of No 80 East Road, a residential property with a 2.5m high boundary wall surrounding the house. There are also shops and residential premises located along Bank Street to the south of the store.

The primary noise sources within the vicinity of the site are due to traffic movements along the local road network. The existing external plant installation is audible at the nearby residential premises. Seagulls are also a significant contributor to the soundscape.

The store is open from 08.00 hours to 22.00 hours Monday to Saturday and Sunday 09.00 to 20.00, with all plant and equipment operating to suit and the refrigeration equipment operating 24-hours on a demand basis.

5.0 Guidance on the Assessment of Noise Levels.

The purpose of any criterion or standard for environmental noise should be to safeguard against unacceptable levels of community response, deemed as a feeling of annoyance during daytime or disturbance at night. WHO defines annoyance as "a feeling of displeasure evoked by noise."

The main source of information relating to noise and the community response are field studies including noise measurements and social surveys. They attempt to establish a correlation between the two sets of results.

In the absence of any definitive guidance and in order to establish suitable noise criteria, it is necessary to rely on general guidance and assessment methods used for community noise sources. Discussions on the current methods are given below.

5.1 BS4142:2014 "Method for Rating and Assessing Industrial and Commercial Sound'

The standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

a) Sound from industrial and manufacturing processes:
b) Sound from fixed installations which comprise mechanical and electrical plant and equipment:
c) Sound from the loading and unloading of goods and materials at industrial and / or commercial premises: and
d) Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and / or commercial site.

The methods described in this British Standard use outdoor sound levels to assess the effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The standard compares sound from industrial / commercial sources with the background sound level.

In addition to the above, the standard states "Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level." Such features are considered by adding a correction to the specific sound level depending on the extent to which the distinguishing acoustic characteristics will attract attention. The standard states the following:

Tonality: For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of +2 dB for a tone that is just perceptible at the noise receptor, +4 dB where it is clearly perceptible, and +6 dB where it is highly perceptible. Where the subjective method is considered not sufficient for the determination of tonality, alternative methods including a one third octave band analysis method, which assesses the L_{zeq} sound pressure level in a one third octave band against adjacent one third octave bands. If a tone is identified, then a tonal correction of +6 dB should be applied.

A tone can be considered present where the difference between both adjacent one-third octave bands is as follows.

15dB difference between 25Hz – 125Hz
8dB difference between 160Hz – 400Hz
5dB difference between 500Hz – 10,000Hz

Impulsivity: A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of +3 dB for impulsivity, which is just perceptible at the noise receptor, +6 dB where it is clearly perceptible, and +9 dB where it is highly perceptible.
Other sound characteristics: Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.

Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be considered. If one feature is dominant, then it may be appropriate to apply a single correction. Where both features are likely to affect perception of response, the correction ought normally to be applied in a linear fashion.

Intermittency: When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time-period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over several shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.

BS4142 provides guidance on the assessment of noise impacts as below:

The significance of sound of an industrial / commercial nature depends upon both the margin by which the rating of the specific sound source exceeds the background sound level and the context in which the sound occurs. 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.

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following:

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d) 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 minimal impact, depending on the context.

The Standard introduces additional rating elements, these being subject assessments of tonality, and impulsivity of a sound source, with weighted rating values accordingly applied at the judgment of the assessor. The introduction of Uncertainty has been applied to the measured values; again, consideration of this is left to the professional executing the survey and assessment. However, steps are provided within the Standard for the reduction of uncertainty in both measurement and calculations of the sound source and rating value. Actual meteorological conditions are now required to be recorded and reported upon for the survey and report.

5.2 British Standard 8233:2014 'Sound insulation and noise reduction for buildings'

The scope of British Standard 8233: 2014: *Sound insulation and noise reduction for buildings* is the provision of guidance for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations; the primary intention of these is to guide the design of new buildings or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table below.

Indoor Ambient Noise Levels in Spaces When They Are Unoccupied

Activity	Typical Situations	Design Range LAeq, T dB	
		0700h to 2300h	2300h to 0700h
Resting	Living rooms	35	--
Dining	Dining Room / Area	40	--
Sleeping	Bedrooms	35	30

BS8233 states in Note 4 that:

"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,\ F}$ depending on the character and number of events per night. Sporadic noise events could require separate values."

As such it has been considered appropriate to define a limit for regular maximum indoor noise levels of 45 dB(A) with sporadic events not exceeding 50 dB(A).

BS8233 also suggests noise limits for external areas or a property such as gardens or balconies. It states that:

'For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq, T}$, with an upper guideline value of 55 dB $L_{Aeq, T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centre's or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.'

5.3 World Health Organisation 1999 'Guidelines for Community Noise'

This document provides a review of the effects of noise and a description of the principles of the WHO health criteria and guidelines for Community Noise.

The effects of noise in dwellings are identified as sleep disturbance, annoyance, and speech interference. For bedrooms, the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30 dB LAeq for continuous noise and 45 dB LAmax for sound events. At nighttime, outside sound levels about 1 metre from facades of living spaces should not exceed 45 dB LAeq, so that people may sleep with bedroom windows open. This value is equivalent to that specifies in the Criteria 12 document; however, it is now assumed that the noise reduction from outside to inside with the window open is 15 dB.

To enable casual conversation indoors during the daytime, the sound level of the interfering noise should not exceed 35 dB LAeq.

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB LAeq.

Table 1 of the document summarises the guideline values for community noise in specific environments and includes the noise indices to be adopted. Significantly, the corresponding time base to be used for the assessment is also included.

The relevant extracts of Table 1 are reproduced thus:

Specific Environment	Critical health effect (s)	LAeq dB	Time Base hours	LAMax dB
Outdoor living area	Serious annoyance, daytime, and evening	55	16	-
	Moderate Annoyance, Daytime, and evening	50	16	-
Dwelling, Indoors	Speech intelligibility & moderate annoyance daytime & evening.	35	16	-
	Sleep Disturbance, night-time	30	8	45
Outside Bedroom	Sleep disturbance, window open. (Outdoor Values)	45	8	60

5.4 Subjective Impression of Noise Level Differences

The following Table provides a semantic scale that may be used to "subjectively" rate changes in sound pressure level.

Table 1: Subjective effect of changes in sound pressure level

Change in sound level dB	Change in Power		Change in apparent loudness
	Decrease	Increase	
3	1/2	2	Just perceptible
5	1/3	3	Clearly noticeable
10	1/10	10	Half / Twice as loud
20	1/100	100	Much quieter / louder

After Bies and Hansen

This table is taken from Professor Colin H Hansen's publication "Fundamentals of Acoustics" page 41, for the Department of Mechanical Engineering, University of Adelaide.

This table also appears in "Engineering Noise Control" by Colin Hansen and David Bies, a comprehensive reference book, amongst others.

6.0 Design Targets

The baseline noise survey completed for the site in July 2023, reference J3202, concluded that the local environment was being influenced by traffic flow and seagulls throughout the survey period both of which were considered to be significant noise sources within the area.

The purpose behind any noise assessment is to rate noise produced to establish if nearby residential dwellings will be subjected to undue disturbance due to unwanted excessive external noise produced by the new fixed plant installation.

Below is a table relating the existing noise levels recorded at the closest dwellings to the site plant locations.

Reference	NSR	Location	Nighttime Recorded Noise Levels dB		
			LAeq	LA90	LAFMax
Residence	NSR 1	No 80 East Road	55.5**	45.0**	70.3*
Residence	NSR 2	No 41 Bank Street	54.6	54.0	63.1*
Residence	NSR 3	Flats at George Court	46.3	37.9	56.6*

Notes - * LAMax dB due to external sources at this location not ALDI plant noise. ** Excludes barrier attenuation considerations for the solid brick wall surrounding the property

The average recorded nighttime background level outside the premises of No 80 East Road, the premises located southwest of the store, was 45 LA_{90} dB with an ambient level of 55 LA_{eq} dB. These both are inclusive of the contribution of the existing plant located at the northeastern corner of the site.

Taking account of the subjective effect of noise level changes, we find that an increase in noise levels of +3 dB is just perceptible. Provided that any alterations or new plant operations when combined do not provide an increase in the baseline background level by more than +3 dB, then there will be no perceivable change in the pre-existing levels. This is provided that the new plant does not produce any specific acoustic charateristics.

Based upon the above information, and in order to not to increase the existing noise climate, it is advisable to set the output noise level design target for the newly installed plant contribution at -10 dB below the pre-existing background level outside the nearby premises. The table below indicates the output design target noise levels for the newly installed plant.

NSR	Assessment Location	Recorded Background Noise Levels dB		New Fixed Plant Operational Design Target Levels dB	
		Day LA90	Night LA90	Day LAeq	Night LAeq
NSR 1	No 80 East Street	54.0	45.0	44.0	35.0
NSR 2	No 41 Bank Street	53.0	54.0	43.0	44.0
NSR 3	Flats at George Court	46.0	38.0	36.0	28.0

Achievement of the above design target will ensure that there is no increase in the background level, when considered outside the noise sensitive residential premises.

7.0 Impact Assessment of ASHP Fixed Plant Installation

ALDI stores Irvine has introduced 8 No Vaillant AroTHERM 15kW ASHP units along the southern façade of the store at ground level.

The existing externally located fixed plant installation has not been altered following the refurbishment works as the new plant is supplementary to the existing units.

The new plant will operate accordingly for the area served as noted below.

7.1 Plant Noise Data

The noise data for the new ASHP plant installation is as follows:

Plant	Sound Level Data, dB
	Sound Pressure Level
Vaillant aroTHERM Unit 1 - 8 (New)	66 SWL(A) dB (Man'f Data) (Equivalent to 55 dBA at 1m Free field conditions)

Refer to the plant layout drawing for further details, a copy appearing in Appendix B of this report. The manufacturer's data sheet for the ASHP units is provided in Appendix C.

7.2 ASHP Plant Contribution Impact Assessment

To determine the noise contribution of the fixed plant items when considered at the closest residential premises to the installation, without the influence of external traffic or other sources, a calculation of the output noise level is required.

This calculation will address the distance; topography of the land; acoustic barrier; and specific siting of the plant.

Below is an assessment of the resulting specific contribution for all these parameters based upon un-mitigated daytime and nighttime periods for the ASHP fixed plant operations, assuming a worst-case scenario of all 8 No units working simultaneously.

Location	Daytime ASHP Plant Contribution LAeq dB	Nighttime ASHP Plant Contribution LAeq dB	Comments
No 80 East Road	28	28	Assessment accounts for 2.5m high perimeter wall barrier attenuation
No 41 Bank Street	30	30	Minimal barrier attenuation
George Court Flats	23	23	Minimal barrier attenuation

Refer to Appendix D for full calculation details.

As can be seen from the above, the new ASHP plant installation will have been shown to have achieved the design intent if it contributes no more than the limiting values set.

Inspection and comparison of the assessed contribution values indicates that the design intent has been achieved for the newly installed ASHP units for all locations.

The results above indicate that the ASHP plant installation will not result in elevated noise levels when considered at the closest residential premises considered, adding +0 dBA to the pre-existing background levels.

The design target proposed is for a -10 dB below existing background levels which has been demonstrated above.

Based upon the above results mitigation measures will not be required to achieve the design intent.

7.3 BS4142:2014+A1:2019 Assessments – Unmitigated

For robustness the following are assessments in accordance with BS4142:2014+A1:2019, which have been based upon the noise sensitive nighttime periods for the nearby residential premises.

All readings have been rounded to the nearest whole number.

7.3.1 BS4142:2014 Assessments

Description	Indices	NSR 1	NSR 2	NSR 3	Comments
Resultant Contribution Due to ASHP Plant	L_{Aeq} dB	28	30	23	Using Calculated values from above
Residual Sound Level	L_{Aeq} dB	56	55	46	Traffic and seagulls dominant sources.
Background Noise Level	L_{A90} dB	45	54	38	Background level consisted of the above.
Specific sound source contribution correction	L_{Aeq} dB	28	30	23	Value using calculated levels
Acoustic feature correction		+0 +0 +3	+0 +0 +3	+0 +0 +3	Tonality * Impulsivity ** Intermittency ***
Rating Level	dB	31	33	26	
Background Noise Level	$L_{A90\ dB}$	45	54	38	
Excess of Rating over background sound level	Plant - BG	-14 dB	-19 dB	-12 dB	
The excess rating values for the contribution of the ASHP installation ranges between -12 dB to -19 dB at nighttime and are all below the existing background activities therefore classified as not likely to produce any adverse impact due to the operation when considered outside the premises.					
Uncertainty of the assessment There is uncertainty in the calculation as it is based upon a noise value with a correction applied which may account for a minimal variation in the actual values for the plant at this location. The uncertainty is not significant as the rating is low, and the value is in context with the actual area. The measurements presented indicate that the confidence of the rating for the specific source since the values used are based upon measured data and the background is likewise based upon measured values adjacent to the residential premises under consideration during weather conditions considered acceptable for executing measurements.					

The justification for each acoustic penalty is provided below.

*Intermittency – No penalty has been applied for as there is not likely to be any adverse audibility in context the pre-existing background noise climate.

**Tonality – No penalty has been applied for as there is not likely to be any adverse tonality as the sound will be in context the pre-existing background noise climate.

***Impulsivity – A +3 dB impulsivity penalty has been applied as the sound may include variable operations of the plant which may produce a low impulsive sound when observed at the recipients position.

The rating values assessed, ranging between -12 dB to -19 dB for nighttime periods, are below the design target value of -10 dB below the existing background and as such not likely to be classified as providing any adverse comment from the nearby residential premises or give rise to justifiable complaints should they be forthcoming with respect to the newly installed ASHP plant installation.

7.4 Mitigation Recommendations

Based upon the results of the newly installed ASHP plant operations, the noise output has been assessed as operating at acceptable output levels when considered in accordance with BS4142:2014+A1:2019 rating methodology and as such no additional mitigation measures will be required.

8.0 Report Summary

Using the baseline noise survey data for the site, conducted in July 2023, it has been determined that the primary existing non-ALDI noise sources in the vicinity of the nearby residential premises are due to traffic flow along the local road network and seagulls overhead for both day and nighttime periods.

The installation of the 8 No Vaillant aroTHERM ASHP units to the store along the southern façade of the building has been assessed to determine its impact upon the nearby residential premises.

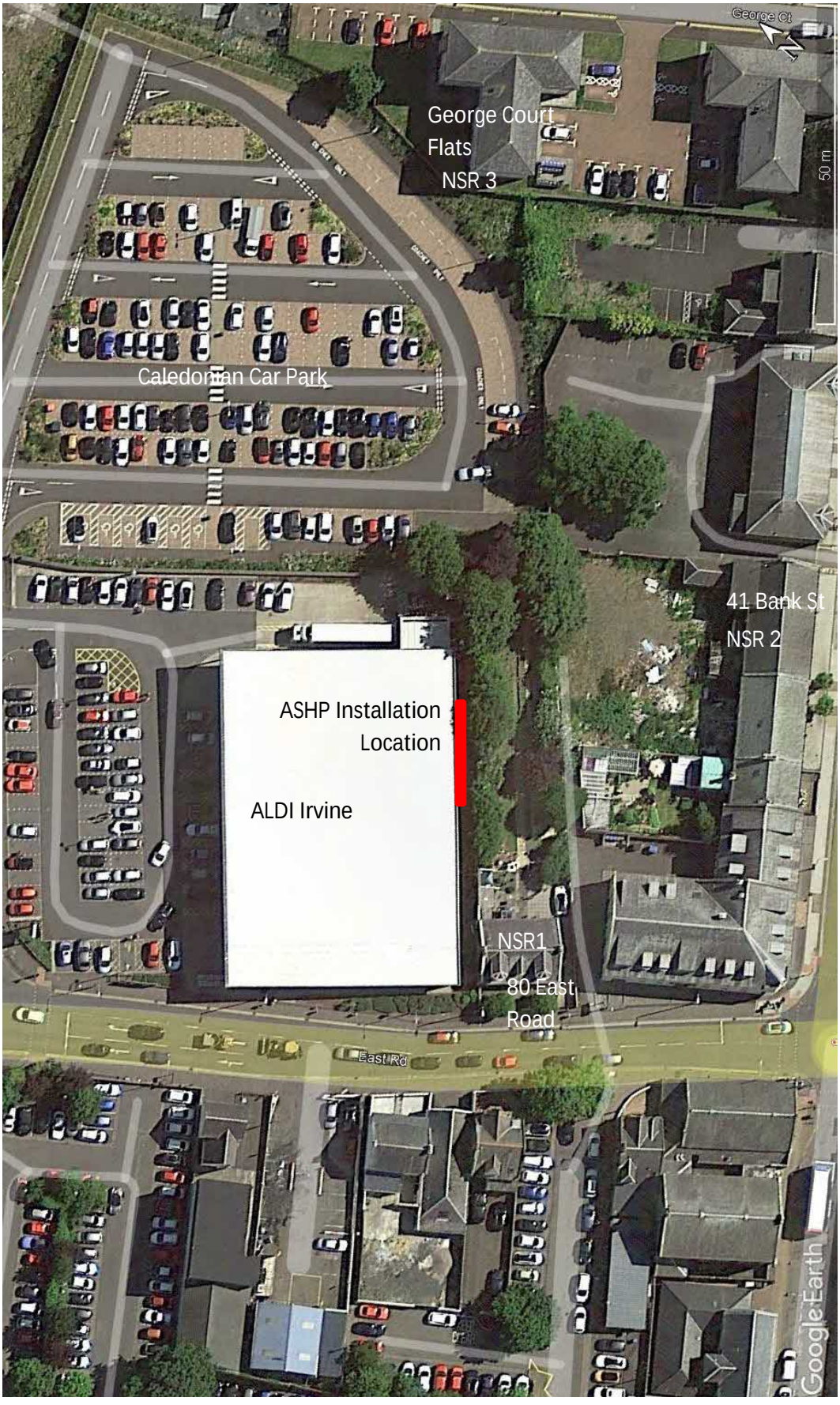
Design target values have been provided for the installation and determined as a maximum BS4142:2014+A1:2019 rating value of -10 dB below the pre-existing background noise climate. This low rating value will ensure that the new plant is not audible or unduly influencing the existing noise climate when considered at the nearby noise sensitive dwellings.

The ASHP plant's BS4142:2014+A1:2019 ratings have been completed and found to be producing values ranging between -12 dB to -19 dB below the existing background level, with the design intent set at achieving a minimum -10 dB rating value. Rating values of this magnitude are not likely to result in adverse comment and justifiable complaints due to the operation of the new ASHP plant.

No additional mitigation measures will be required for the ASHP installation as the design intent of achieving a rating value of -10 dB has been assessed.

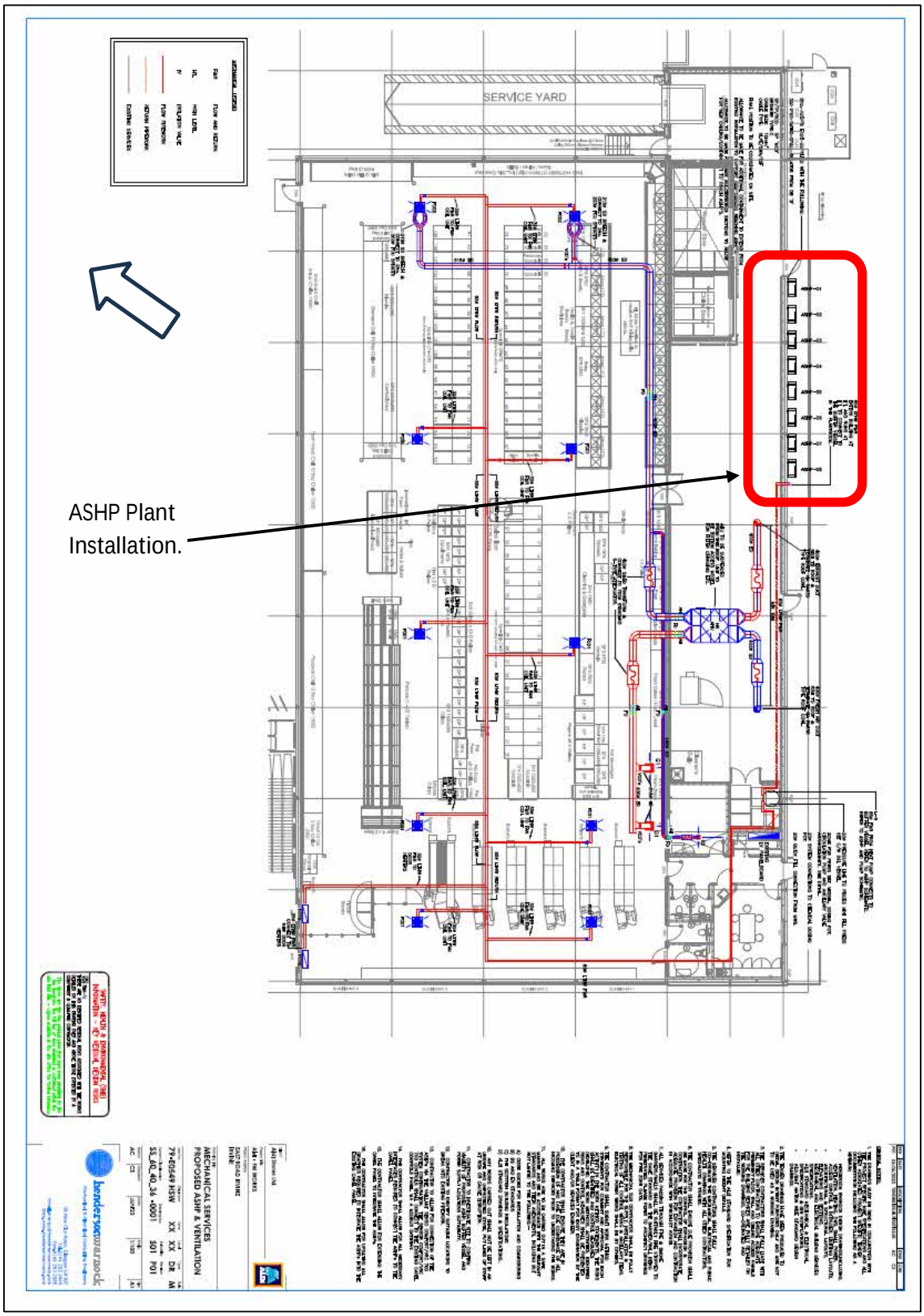
The rating values achieved have demonstrated achievement of the design intent and allow the plant to operate 24-hours daily on a demand basis without giving rise to undue loss of amenity or adverse comment from the nearby noise sensitive premises.

Appendix A Locational Plan and Survey Points



Appendix B Plant Installation Drawings

ASHP Location Along Southern Façade



Appendix C ASHP Plant Data Sheet

Technical Data	Unit	aroTHERM 5kW	aroTHERM 8kW	aroTHERM 11kW	aroTHERM 15kW
Article number		0020257346	0020257347	0020257348	0020257349
Heat pump type		Monoblock air-to-water heat pump			
Flow / return heating connections	BSP	1 ¼"			
Product dimensions, width	mm	980	1,103	1,103	1,103
Product dimensions, height	mm	840	975	975	1,380
Product dimensions, depth	mm	408	463	463	463
Net weight	kg	86	102	126	165
Hydraulic lines material		Copper			
Hydraulic connections material		Brass			
Hydraulic seals material		EPDM			
Plate heat exchanger material		AISI 304 stainless steel			
Pump casing material		Painted cast iron			
Supply voltage / frequency	V / Hz	230 / 50			
Fuse type C or D	A	16	16	20	32
Inverter controller fuse	A / V	HRC 20 / 550			
IP rating		IP 25			
Maximum inrush current	A	16	16	20	25
Maximum current consumption	A	16	16	20	25
Pump power consumption	W	15 - 70	15 - 70	15 - 70	6 - 87
Fan power consumption	W	15 - 42	15 - 42	15 - 76	17 - 76 (2 x fan)
Electrical classification		I			
Overvoltage category		II			
Fan rotational speed	rpm	550	550	700	600
Sound power level for A7/W35 according to EN 12102 and EN ISO 9614-1	dB(A)	58	59	65	65
Sound power level for A7/W45 according to EN 12102 and EN ISO 9614-1	dB(A)	58	59	65	65
Sound power level for A7/W55 according to EN 12102 and EN ISO 9614-1	dB(A)	58	60	66	66
Maximum DHW flow temperature	°C	60	63	63	63
Minimum air temperature (heating and cylinder charging)	°C	-15	-20	-20	-20
Maximum air temperature (heating)	°C	28			
Maximum air temperature (cylinder charging)	°C	46			
Maximum air flow	m^3/h	2,000	2,700	3,400	5,500
Energy-related Products at 35°C*	band	A++	A++	A+	A++
Energy-related Products at 55°C*	band	A+	A++	A+	A+

* when installed with a VRC 700 / VRC 700f

Heating Circuit	Unit	aroTHERM 5kW	aroTHERM 8kW	aroTHERM 11kW	aroTHERM 15kW
Minimum operating pressure	bar	1.0			
Maximum operating pressure	bar	3.0			
Heating circuit water contents in the heat pump	l	1.1	1.6	2.1	2.7
Minimum heating circuit water contents	l	17	21	35	60
Minimum volume flow rate	l/h	380	380	540	1,200
Nominal volume flow rate	l/h	860	1,400	1,900	2,590
Hydraulic pressure difference	mbar	640	450	300	370

NOTE: see page 26 for VRC 700 / VRC 700f system controls

Appendix D Impact Assessment Calculations

CALCULATION OF ASHP PLANT CONTRIBUTION AT No 80 EAST ROAD

Plant Reference	Noise Level at 1m, dBA	Distance to Recipient, m	Distance Correction, dB	Barrier Correction	Location Correction	Contribution Value, dBA
aroTHERM Unit No 1	55	36	-31	-10	3	17
aroTHERM Unit No 2	55	34	-31	-10	3	17
aroTHERM Unit No 3	55	32	-30	-10	3	18
aroTHERM Unit No 4	55	30	-30	-10	3	18
aroTHERM Unit No 5	55	28	-29	-10	3	19
aroTHERM Unit No 6	55	26	-28	-10	3	20
aroTHERM Unit No 7	55	24	-28	-10	3	20
aroTHERM Unit No 8	55	22	-27	-10	3	21
			Cumulative Fixed Plant Contribution			28

CALCULATION OF ASHP PLANT CONTRIBUTION AT No 41 BANK STREET

Plant Reference	Noise Level at 1m, dBA	Distance to Recipient, m	Distance Correction, dB	Barrier / Attenuation Correction	Location Correction	Contribution Value, dBA
aroTHERM Unit No 1	55	42	-32	-5	3	21
aroTHERM Unit No 2	55	42	-32	-5	3	21
aroTHERM Unit No 3	55	42	-32	-5	3	21
aroTHERM Unit No 4	55	42	-32	-5	3	21
aroTHERM Unit No 5	55	42	-32	-5	3	21
aroTHERM Unit No 6	55	42	-32	-5	3	21
aroTHERM Unit No 7	55	42	-32	-5	3	21
aroTHERM Unit No 8	55	42	-32	-5	3	21
			Cumulative Fixed Plant Contribution			30

CALCULATION OF ASHP PLANT CONTRIBUTION AT GEORGE COURT FLATS

rence	Noise Level at 1m, dBA	Distance to Recipient, m	Distance Correction, dB	Barrier / Attenuation Correction	Location Correction	Contribution Value, dBA
aroTHERM Unit No 1	55	80	-38	-5	3	15
aroTHERM Unit No 2	55	82	-38	-5	3	15
aroTHERM Unit No 3	55	84	-38	-5	3	15
aroTHERM Unit No 4	55	86	-39	-5	3	14
aroTHERM Unit No 5	55	88	-39	-5	3	14
aroTHERM Unit No 6	55	90	-39	-5	3	14
aroTHERM Unit No 7	55	92	-39	-5	3	14
aroTHERM Unit No 8	55	94	-39	-5	3	14
			Cumulative Fixed Plant Contribution			23