

Sainsbury's Local

Durham Road

Ferryhill

DL17 0EX

Plant Noise Impact Assessment

On behalf of



Project Reference: 91104 | Revision: - | Date: 17th November 2022

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Document Information

Project Name Sainsbury's Local, Chilton, Ferryhill, DL17 0EX

Project Reference 91104

Report Title Plant Noise Impact Assessment

91104/NIA **Doc Reference**

Date 17th November 2022

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For and on behalf of Noise Solutions Ltd

Revision	Date	Description	Prepared	Reviewed/ Approved

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Executive Summary

Noise Solutions Limited has been appointed to provide a noise impact assessment of replacement plant to be installed at the existing Sainsbury's Local store on Durham Road.

The assessment shows that noise from the proposed plant will meet the local authority's usual requirements and will therefore be acceptable.



1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned by AB Group to provide a noise impact assessment of replacement plant being installed at the existing Sainsbury's Local Store on Durham Road in Chilton, Ferryhill.
- 1.2. 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.
- 1.3. Plant noise levels have been predicted at the nearest noise-sensitive receptor and assessed against the local authority's usual requirements.
- 1.4. 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 www.acoustic-glossary.co.uk.

2.0 Details of development proposals

- 2.1. The Sainsbury's Local store occupies the ground floor on the commercial unit on Durham Road, with the plant being installed externally within the plant yard at the east end of the building.
- 2.2. Plant will comprise three air conditioning (AC) units and a refrigeration pack and gas cooler. The AC plant will operate only when the store is open; the refrigeration plant will operate at all times but will typically run at reduced duty at night.
- 2.3. A site plan showing the site and surrounding area and the noise monitoring location used in this assessment is presented in Appendix B. The proposed store layout is shown in Appendix C.
- 2.4. Plant noise levels are shown in Appendix E. The proposed plant layout is shown in Appendix F. Plant noise will be mitigated by the provision of a close-boarded timber fence on the boundary with the pack and absorptive wall-lining in that area.

3.0 Nearest noise-sensitive receptors

- 3.1. The surrounding area is predominantly residential in nature.
- 3.2. The nearest residential receptors to the plant are the houses on Beverley Gardens, to the south and east of the store (Receptor R1). The closest façade is approximately 13m from the plant area. First floor flats at the front of the building (Receptor R2) are further from the external plant and are screened from it by the store building.



3.3. An aerial photograph showing the site and surrounding area is provided in Appendix B.

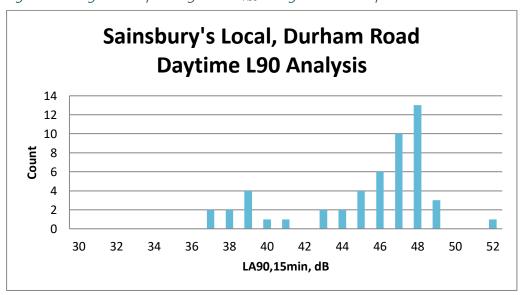
4.0 Existing noise climate

- 4.1. An environmental noise survey was undertaken to establish the typical background sound levels. Measurements were made at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant during the quietest times at which the plant will operate.
- 4.2. The results of the survey are summarised below. The full set of measurement results and details of the survey methodology are presented in **Appendix D**.

Table 1 Summary of survey results

Measurement	Range of recorded sound pressure levels (dB)				
period	L _{Aeq(15mins)}	L _{AFmax(15min)}	L _{A10(15mins)}	L _{A90(15mins)}	
Daytime (07.00 – 23.00 hours)	41-60	49-85	43-60	37-52	
Night-time (23.00 – 07.00 hours)	34-47	44-65	37-48	30-45	

Figure 1 Histogram of operating hours L_{A90} background sound pressure levels



4.3. Further statistical analysis has been carried out on the data, and the mean, mode 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 45			
modal	48		
median	47		



4.4. From the histogram analysis, 39dB has been selected to be a robust representation of the background noise level during the daytime period.

Sainsbury's Local, Durham Road **Night-time L90 Analysis** 7 6 5 Count 4 3 2 1 0 30 32 34 36 38 40 42 44 46 48 50 52 LA90,15min, dB

Figure 2 Histogram of non-operating hours L_{A90} background sound pressure levels

4.5. Further statistical analysis has been carried out on the data and the mean, mode and median values are shown in Table 3 below.

Table 3 Statistical analysis of L_{A90,15min} levels during the night-time period

dB, L _{A90} night-time period				
mean 35				
modal	32			
median	34			

- 4.6. Again, from the histogram analysis, 31dB has been selected to be a robust representation of the background sound level during the night-time period.
- 4.7. The following values, therefore, are considered as representative of the existing background sound pressure levels at nearby noise sensitive premises:
 - 39dB L_{A90} during daytime period (07.00 23.00 hours);
 - 31dB L_{A90} during the night-time period (23.00 07.00 hours).

5.0 Noise assessment criteria

Durham County Council

5.1. Durham County Council's requirements for plant noise are indicated within their Technical Advice Note – Noise¹. The TAN-Noise requires that the noise level resulting from new plant at

¹ Undated – copy received 15 March 2018



1m from the nearest noise-sensitive receptor must be no more than 5dBA higher than the prevailing background ($L_{A90,1hr}$) sound level during the day (07.00 to 23.00), and no higher than the prevailing background ($L_{A90,15min}$) sound level during the night (23.00 to 07.00).

National Planning Policy Framework

- 5.2. A new edition of NPPF was published in July 2021 and came into effect immediately. The original National Planning Policy Framework (NPPF²) was published in March 2012, with revisions in July 2018 and February 2019 this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 2021 revised edition contains no new directions or guidance with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the July 2021 edition.
- 5.3. Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by (amongst others) "preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability."
- 5.4. The NPPF goes on to state in Paragraph 185:

"planning policies and decisions should ...

- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, and avoid noise giving rise to significant adverse impacts on health and quality of life;
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason ...
- 5.5. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE³).
- 5.6. Paragraph 2 of the NPPF states that "planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise."
- 5.7. Paragraph 12 of the NPPF states that "The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-

² National Planning Policy Framework, DCLG, March 2012

³ Noise Policy Statement for England, DEFRA, March 2010



date development plan, but only if material considerations in a particular case indicate that the plan should not be followed".

5.8. Paragraph 119 states that "Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land".

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

- 5.9. BS 4142:2014 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".
- 5.10. 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.
- 5.11. 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.
- 5.12. 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."
- 5.13. 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 receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."
- 5.14. 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.
- 5.15. 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."
- 5.16. 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."
- 5.17. 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."
- 5.18. 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.

Proposed criteria

5.19. Based on the above criteria the noise rating level for the proposed plant at the nearest residential windows should not exceed the limits in the table below.

Table 4 Proposed plant noise emissions level limits at nearest receptors

Period	Cumulative plant noise rating level, dB(A)
Daytime period (07:00 – 23:00 hours)	44
Night-time period (23:00 – 07:00 hours)	31

6.0 Plant noise impact assessment

6.1. Plant noise levels have been predicted at the nearest noise-sensitive receptor, taking account of the distance between the plant and the closest windows, acoustic screening provided by the close-boarded fence adjacent to the pack and acoustic reflections from the wall of the store building (where applicable).



- 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. To be robust, however, a +3dB feature correction as advised 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 the predicted plant noise levels is given in Table 5. Full calculations are shown in **Appendix G**.

Table 5 Plant noise assessment

Receptor	Period	Predicted rating level, dB L _{Ar,Tr}	Proposed criterion, dB L _{Ar,Tr}	Excess, dBA
R1	Daytime (07.00 – 23.00 hours)	40	44	-4
KI	Night-time (23.00 – 07.00 hours)	29	31	-2

Context and uncertainties

- 6.4. BS 4142:2014 notes that 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 assessment is undertaken at the nearest residential windows. The impact on all other residential premises will be lower due to distance losses and, where applicable, screening between the plant and the receptor due to intervening buildings.
- 6.5. 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 traceable laboratory calibrations and the meter was 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 **Summary**

- 7.1. Noise Solutions Ltd (NSL) has been commissioned by AB Group to provide a noise impact assessment of replacement plant being installed at the existing Sainsbury's Local Store on Durham Road in Chilton, Ferryhill.
- 7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at a location representative of the noise climate outside the nearest noise sensitive receptors to the proposed site.
- 7.3. The assessment shows that noise from the proposed plant will comply with the local authority's usual requirements and should therefore be acceptable.

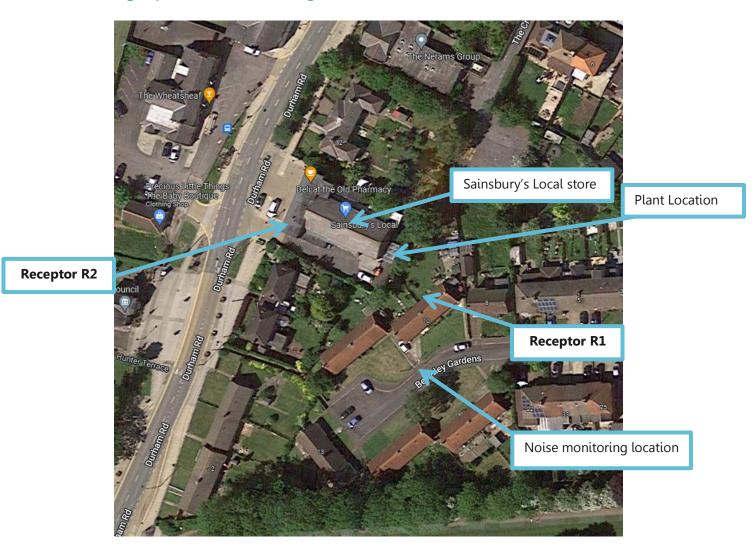


Appendix A Acoustic terminology

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 log10 (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 $20\mu Pa$. 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 that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.



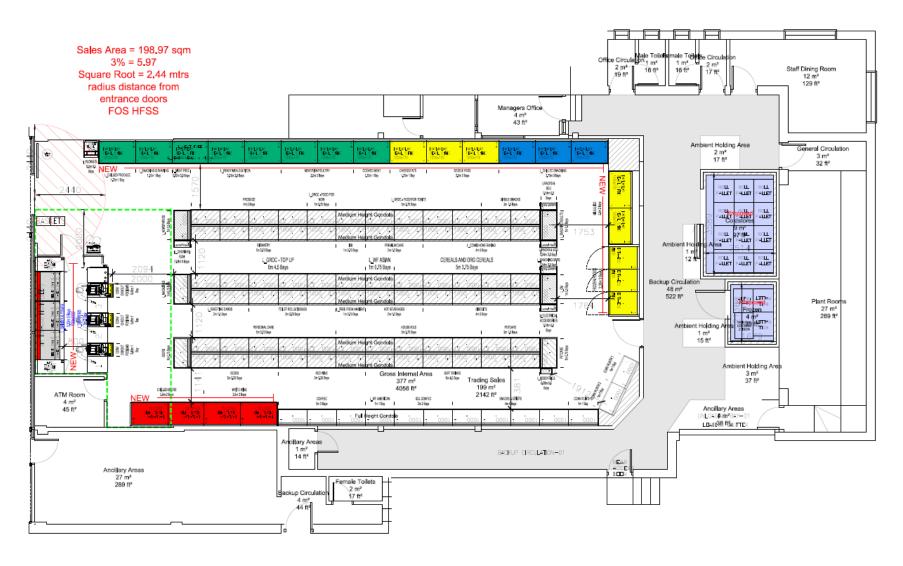
Appendix B Photograph of site showing areas of interest



Photograph 1 Courtesy of Google Earth



Appendix C Store layout drawing





Appendix D Environmental sound survey

Details of environmental sound survey

- D.1 Measurements of the existing background sound levels were undertaken between 13.45 hours on Wednesday 26th October and 10.30 hours on Thursday 27th October 2022.
- D.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 fifteen-minute sample periods for the duration of the survey.

Measurement position

- D.3 The sound level meter was positioned on a lamppost along Beverly Gardens south of the site.

 The approximate location of the microphone is indicated on the plan in Appendix B.
- D.4 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.

Equipment

D.5 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.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 971A / 124655		Factory
Condenser microphone	ACO Pacific 7152 / 84710	26/07/2022	conformation certificate
Preamplifier	Svantek SV18A / 126200		continuate
Calibrator	Svantek SV33B / 125706	09/09/2022	Factory conformation certificate

Weather conditions

D.6 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.

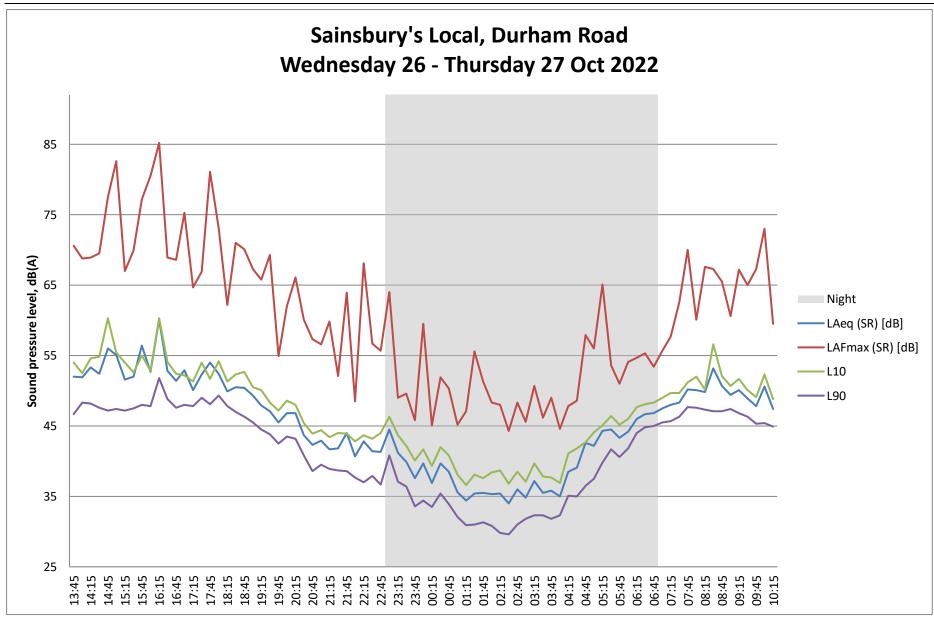


	Weather Conditions					
Measurement Location	Date/Time	Date/Time Description		End of Survey		
As indicated on Appendix B	13.45 26 Oct - 10.30 27 Oct 2022	Temperature (°C)	16	13		
		Precipitation:	No	Yes		
		Cloud cover (oktas - see guide)	4	8		
Symbol Scale	ud Cover in oktas (eighths) sy completely clear	Presence of fog/snow/ice	No	No		
1 2 () 3		Presence of damp roads/wet ground	Yes	Yes		
	ry half cloudy	Wind Speed (m/s)	4	2		
5 6 7 8 Sky completely cloudy (9) Sky obstructed from view		Wind Direction	NE	N		
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	-	-		

Results

- D.7 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 the plant will operate.
- D.8 The noise sources affecting the area were noted to be predominately traffic from the main road, aircraft noise, pedestrian noise and birdsong.





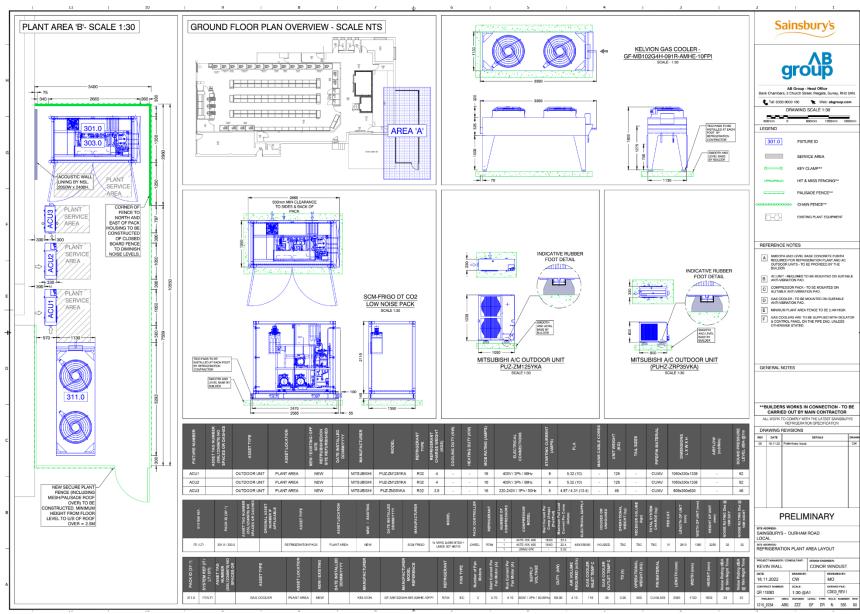


Appendix E Plant noise levels

Plant Ref		Operating Hours	Sound pressure level
ACU1, ACU2	Mitsubishi PUZ-ZM125YKA	Daytime	52dBA at 1m (each)
ACU3	Mitsubishi PUZ-ZM35YKA	Daytime	46dBA at 1m
IT1/LT1 Gas Cooler	Kelvion GF-MB102G4H-091-AMHE-10FPI	Day and night	23dBA at 10m
IT1/LT1 Pack	SCM Frigo 1xMWS 2x096 MTDX + UMCE 007 HBT/S	Day and night	32dBA at 10m



Appendix F Proposed plant layout





Appendix G Plant noise predictions

Receptor R1 – Rear of houses on Beverly Gardens

Plant item	Source Sound level (dBA)	Distance		Directivity		BS 4142:2014	Cumulative plant rating
		Distance to Receptor (m)	Correction (dB)	Correction (dB)	Screening (dB)	feature correction	level at receptor L _{Aeq} (dB)
ACU1*	52 @ 1m	13	-22	3	0	3	36
ACU2*	52 @ 1m	13	-22	3	0	3	36
ACU3*	46 @ 1m	13	-22	3	0	3	30
Gas cooler	23 @ 10m	13	-2	0	0	3	24
Pack	32 @ 10m	13	-2	0	-5	3	28
Combined rating level (day)							40
Combined rating level (night)							29

^{*}Operate only during store opening hours