

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicatess Ltd	Ref:	4151



Project:	26-30 West Street, Reading		
Client:	Mleczko Delicatess Ltd		
Report Title:	Environmental Noise Assessment		
Author:	John Gillott MIOA	Date:	02/02/2018
Checked:	Patrick Shortt M.Sc. MIOA	Date:	02/02/2018
Revision:	0		
Report Status:	For Planning		
Reference:	4151_ENA_0		

This report has been prepared by Paragon Acoustic Consultants Ltd with all reasonable care and diligence within the terms of the contract with our client. We disclaim any responsibility to our client and others in respect of any matters outside the scope of the above. We accept no responsibility to third parties to whom this report, or any part, thereof is made available. Any such party relies upon the report at their own risk.

Paragon Acoustic Consultants Ltd
 Unit 12b Southview Business Park, Caversham,
 Reading RG4 5AF
 Tel: 0118 944 8444



Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicatessy Ltd	Ref:	4151

Contents

1.0	Introduction	1
2.0	Site Description and Proposed Plant Location.....	1
2.1	Site Description	1
2.2	Proposed Plant Location	1
3.0	Existing Noise Climate.....	3
3.1	Road Traffic.....	3
3.2	Rail Traffic	3
3.3	Aircraft.....	3
3.4	Mechanical Noise Sources.....	3
3.5	Construction Noise	3
4.0	Environmental Noise Survey	3
4.1	Measurements.....	3
4.2	Weather during survey period	4
4.3	Instrumentation.....	4
4.4	Results	4
5.0	Evaluation of External Noise Criteria.....	5
5.1	Residential Properties	5
5.2	Commercial Properties.....	5
5.3	External Noise Criteria	7
6.0	Review of Proposed Plant	7
6.1	Introduction.....	7
6.2	Plant Noise Data	7
6.2.1	Two number Air Conditioning units.	7
6.2.2	One number "Condenser Minus" unit.	8
6.2.3	One number "Condenser Plus" unit.....	9
6.2.4	One unit containing "Compressor units plus/minus"	9
6.3	Predicted Plant Noise Levels	10
6.4	Noise mitigation to plant.....	10
6.4.1	Two number Air Conditioning units.	10
6.4.2	One number "Condenser Minus" unit.	12
6.4.3	One number "Condenser Plus" unit.....	12
6.4.4	One unit containing "Compressor units plus/minus".	12
6.5	Vibration	13
6.6	Predicted Plant Noise Levels	13
7.0	Conclusions.....	14

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicatess Ltd	Ref:	4151

Appendix A:	Site Plan.....	i
Appendix B:	Recorded Survey Data.....	iii
Appendix C:	Calculation sheets	iv

Table 1: Lowest representative background sound levels.....	5
Table 2: Limiting Noise Criteria applicable at the affected premises	7
Table 3: Predicted Noise Levels at nearest affected premises.....	10
Table 4: Minimum insertion loss requirements for each enclosure.....	11
Table 5: Limiting Sound Pressure Level for the Condenser Minus	12
Table 6: Limiting Sound Pressure Level for the Condenser Plus	12
Table 7: Limiting Sound Pressure Level for the Compressor units plus/minus	13
Table 8: Predicted Noise Levels at nearest affected premises.....	13

Figure 1: Proposed Plant Location.....	2
Figure 2: Graphical Survey Data.....	4
Figure 3: BS8233:2014 table of typical noise levels in non-domestic buildings	5
Figure 4: BS8233:2014 table of indoor ambient noise levels	6
Figure 5: DEFRA NANR16 Summary of findings	6
Figure 6: LG UU37W units noise levels	8
Figure 7: Condenser Minus unit noise levels	8
Figure 8: Condenser Plus unit noise levels.....	9
Figure 7: Compressor units plus/minus unit noise levels.....	9

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicatessy Ltd	Ref:	4151

1.0 Introduction

As part of works to the retail property proposed at 26-30 West Street, Reading, it is proposed that a number of items of refrigeration and air-conditioning plant be installed at the rear of the site within a yard area.

Paragon Acoustic Consultants Ltd has been commissioned to conduct an environmental noise survey to obtain statistical noise data to characterise the existing local background and ambient noise climate at the site and to derive noise limits to atmosphere based on Local Authority Noise Policy and other relevant guideline documents.

If deemed necessary, effective mitigation measures shall be introduced as necessary to achieve the Local Authority Noise Policy requirements.

This practice has been advised that the operational period of the proposed refrigeration plant will be 24 hours, and the air conditioning plant daytime only.

2.0 Site Description and Proposed Plant Location

2.1 Site Description

The site under consideration is situated at 26-30 West Street, Reading and is located on the ground floor. Above the ground floor lie a further four storeys comprising serviced apartments that are operated by the House of Fisher. It is considered appropriate that these areas are considered as residential accommodation and are considered to be the nearest noise sensitive properties to the proposed mechanical plant locations.

The "yard" at the rear of the ground floor premises comprises a thin strip of land extending to the width of the site under consideration. The windows of the rear façade of the House of Fisher serviced apartments overlook the yard.

To the north beyond the yard lie areas associated with the adjacent retail outlet. It is noted from the council valuation list that there are residential flats at 1st and 2nd floor of number 42 West Street. To the west lie the roof areas of retail outlets with their frontage on Broad Street. To the south lie the rear facades of properties on Broad Street.

The site is illustrated by plan in Appendix A.

2.2 Proposed Plant Location

Extracts of drawings indicating the proposed plant location is shown below

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicatess Ltd	Ref:	4151

3.0 Existing Noise Climate

3.1 Road Traffic

The site is situated within a location that is shielded from major road vehicular traffic due to the surrounding buildings. Nonetheless, middle distance road traffic low frequency “rumble” and individual “event” type emissions were audible to the surveyor.

3.2 Rail Traffic

Rail traffic was not observed during the manned period at the start and end of the survey.

3.3 Aircraft

Aircraft over flights were observed sporadically during the manned survey at the start and end of the period. Their contribution to the background noise climate will have been included within the measurements taken.

3.4 Mechanical Noise Sources

Two existing condensers were noted to be located within the rear yard, however, during the manned periods at the start and end of the survey these did not appear to be operational.

3.5 Construction Noise

Construction noise was clearly audible at the monitoring position, this being associated with the nearby works at the old “Primark” site and with the site under consideration. Construction noise will normally not be evident from 18:00 – 07:00 hours, and this concurs with the measurements shown in the graphical survey data herein.

4.0 Environmental Noise Survey

4.1 Measurements

The noise monitoring took place between the following dates / times:

- Start : 01/02/2018 at 12:16 hours
- End : 02/02/2018 at 10:30 hours

The noise monitoring was generally un-manned and was undertaken at the location as described below.

- **MP1:** Within the yard at the rear of the site.

The measurement location is illustrated on the site layout drawing in Appendix A.

Various statistical broad-band and spectral sound pressure level measurements were obtained during the survey. A measurement time interval $T_m = 15$ minutes was used for sampling. Measurements of the percentile level $L_{A90,T}$ were made using time weighting F as per clause 3.4 of BS 4142:2014.

The quantities recorded included:

- **L_{Aeq} :** the equivalent continuous A-weighted sound pressure level over the measurement period
- **L_{Amax} :** the maximum A-weighted sound pressure level for the measurement period
- **L_{A10} :** the A-weighted sound pressure level exceeded for 10% of the measurement period

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczo Delicacies Ltd	Ref:	4151

- **L_{A90}**: the A-weighted sound pressure level exceeded for 90% of the measurement period

4.2 Weather during survey period

The weather conditions at the start of the manned period of the survey were dry and cold with a slight breeze. At the end of the survey the weather conditions were similar. The weather forecast did not indicate that adverse weather conditions would occur for the survey duration.

4.3 Instrumentation

Sound pressure level measurements were obtained using the following instrumentation complying with the Type 1 specification of BS EN 60804, BS EN 60651, BS EN 60942, BS EN 61260, and BS EN 61672-1:

- Norsonic Type 118 Sound level analyser, serial number 31663
- Norsonic Type 1225 ½" microphone

Additionally, the following equipment was used:

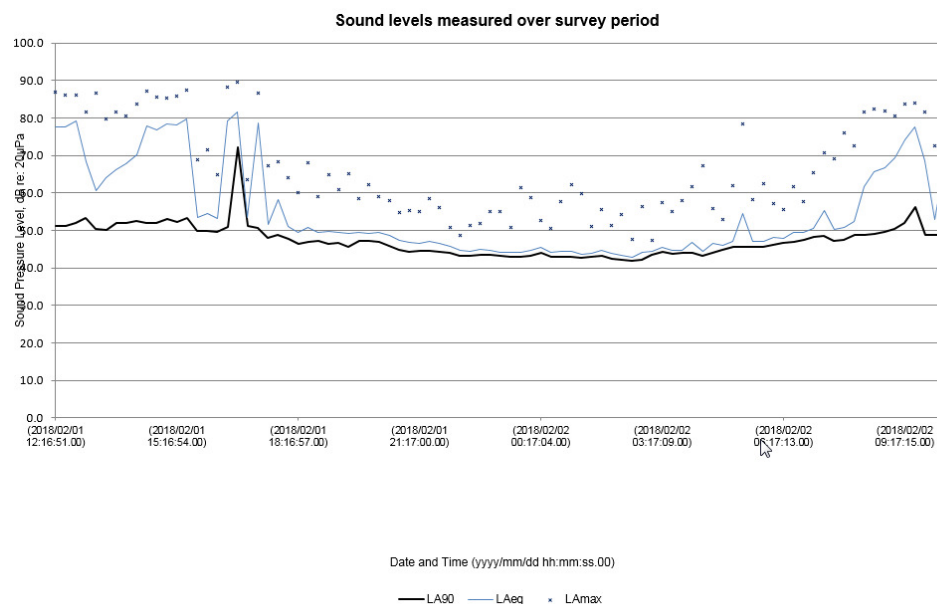
- Weather protection kit
- NOR 1212 microphone outdoor protection kit
- Tripod

Calibration checks were made prior to and after completion of measurements using a Norsonic Type 1251 acoustical calibrator complying with Class 1 of BS EN 60942, calibration level 114.0 dB ± 0.3 dB, @ 1.0 kHz. All instrumentation carries a current manufacturer's certificate of conformance a copy of which is available upon request.

4.4 Results

The recorded survey data is shown within Appendix B. Broadband sound pressure level data over the survey period (L_{A90} background levels, L_{Aeq} and L_{Amax} measurements) are shown graphically below:

Figure 2: Graphical Survey Data



Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicatessy Ltd	Ref:	4151

The lowest representative daytime and night-time background sound levels obtained are summarised below:

Table 1: Lowest representative background sound levels

Measurement Position	Daytime 07:00-23:00 $L_{A90,(15\text{ min})}$	Night-time 23:00-07:00 $L_{A90,(15\text{ min})}$
MP1 measurement position	43 dB	42 dB

5.0 Evaluation of External Noise Criteria

The local vicinity contains mixed commercial and residential premises, both of which must be given due consideration in terms of acceptable levels of noise exposure from the new plant.

5.1 Residential Properties

It is necessary to consider the requirements of the Local Authority. This practice has recently contacted Mr Ross Jarvis who is a Senior Technical Officer with the Environmental Protection & Nuisance Department of Environment & Neighbourhood Services at Reading Borough Council. Mr Jarvis advised that:

"We ask that the specific noise level for all new mechanical plant is 10 below background noise level at the nearest noise sensitive premises. There may be some situations where this cannot be achieved so there may be some flexibility where this is justifiable, for example where there are very low background noise levels, etc. Reasons should be clearly stated within any assessment conclusion".

5.2 Commercial Properties

In order to maintain the amenity of the occupants of any affected commercial properties, it is considered acceptable to assess noise emissions in line with the guidelines provided in BS 8233:2014

Figure 3: BS8233:2014 table of typical noise levels in non-domestic buildings

Table 6 Typical noise levels in non-domestic buildings

Activity	Location	Design range dB $L_{Aeq, T}$
Speech or telephone communications	Department store	50 – 55
	Cafeteria, canteen, kitchen	
	Concourse	45 – 55
Study and work requiring concentration	Corridor, circulation space	
	Library, gallery, museum	40 – 50
	Staff/meeting room, training room	35 – 45
Listening	Executive office	35 – 40
	Place of worship, counselling, meditation, relaxation	30 – 35

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczo Delicately Ltd	Ref:	4151

Figure 4: BS8233:2014 table of indoor ambient noise levels

Table 2 Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important

Objective	Typical situations	Design range $L_{Aeq,T}$ dB
Typical noise levels for acoustic privacy in shared spaces	Restaurant	40 – 55
	Open plan office	45 – 50
	Night club, public house	40 – 45
	Ballroom, banqueting hall	35 – 40
	Living room	35 – 40

NOTE See *Noise control in building services* [28] and *BS EN ISO 3382*.

In view of the details presented above it is considered reasonable to adopt a noise criterion of 45 dB $L_{Aeq,T}$ for commercial office space in the proximity of the site.

It is also reasonable to consider a noise criterion external to commercial property windows that takes account of the internal design range, plus the loss expected through an openable window. In a research study conducted for DEFRA NANR116: "Open/Closed Window Research", numerous references are provided which quantify losses through open and partially open windows:

Figure 5: DEFRA NANR16 Summary of findings

Information Source	Summary of Findings
PPG 24 (1994) ^[2]	A reduction of 13 dB(A) from the facade level is assumed for an open window
WHO (1999) ^[4]	A reduction of 15 dB from the facade level is assumed for a partially open window. (no reference)
BS 8233 (1999) ^[5]	Windows providing rapid ventilation and summer cooling are assumed to provide 10 - 15 dB attenuation (no specific reference)
BRE Digest 338 (1988) ^[6]	A partly open window has an averaged level difference, $D_{1m,av100-3150}$ of 15 dB
DoE Design Bulletin 26 (1972) ^[7]	A reduction of 5 dB(A) with a window wide open
Nelson - Transportation Noise (1987) ^[8]	Sound insulation of an open single window is 5 – 15 dB. (theoretical)
Mackenzie & Williamson DoE Report (1972–73) ^{[9],[10]}	A vertical sliding sash window open 0.027 m ² (summer night-time ventilation) and 0.36 m ² (daytime summer ventilation) provided a sound level reduction of 16 and 11 dB(A) respectively. (Lab Study)
Kerry and Ford (1973 – 74) ^{[11],[12]}	A horizontal sliding sash window open 25 mm and 200 mm provided averaged sound reduction indices, R_{av} of 14 and 9 dB respectively. (Field Study)
Lawrence and Burgess (1982 – 83) ^{[13],[14]}	A vertical sliding sash open 9% of the total façade provided a sound reduction index R_w 10 dB. (Field study)
Hopkins (2004) ^[15]	Road traffic noise reductions through window openings resulted in reductions of between $D_{2m,n,T}$ 8 and 14 dB. (Field Study)

Table 1.1 Summary of open-window acoustic transmission literature

The findings of the study are referenced in this report to substantiate the use of a 13dB(A) loss through a partially open window.

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicatess Ltd	Ref:	4151

5.3 External Noise Criteria

The derived external noise criteria which the mechanical plant shall be required to achieve are given in Table 2 shown below:

The nearest windows are that of the House of Fisher serviced apartments in the floor above the plant area. These serviced apartments are let out nightly and are considered to be of residential use.

Table 2: Limiting Noise Criteria applicable at the affected premises

Plant Location	Receptor	Daytime 07:00-23:00 $L_{Aeq,(15\ min)}$	Night-time 23:00-07:00 $L_{Aeq,(15\ min)}$
Within the rear "yard"	House of Fisher serviced apartment windows, at 1.0m external to the window	33 dB	32 dB
	Commercial at 1.0m external to the window	53 dB L_{Aeq}	

6.0 Review of Proposed Plant

6.1 Introduction

The new plant will comprise the following:

- Two number Air Conditioning units. The two number Air Conditioning units proposed are wall mounted air conditioning condenser units type LG UU37W units.
- One number "Condenser Minus" unit. Comprising a twin fanned condenser
- One number "Condenser Plus" unit. Comprising a twin fanned condenser
- One unit containing "Compressor units plus/minus". Comprising an enclosure housing the compressor units.

6.2 Plant Noise Data

Apart from the two number Air Conditioning units, the plant noise data advised for the proposed equipment is limited to single figure broadband noise data. As such, calculations of their noise emissions to the nearest noise sensitive receiver have only been possible in single figure dBA levels.

The noise data advised for each item of plant is summarised in the following sections

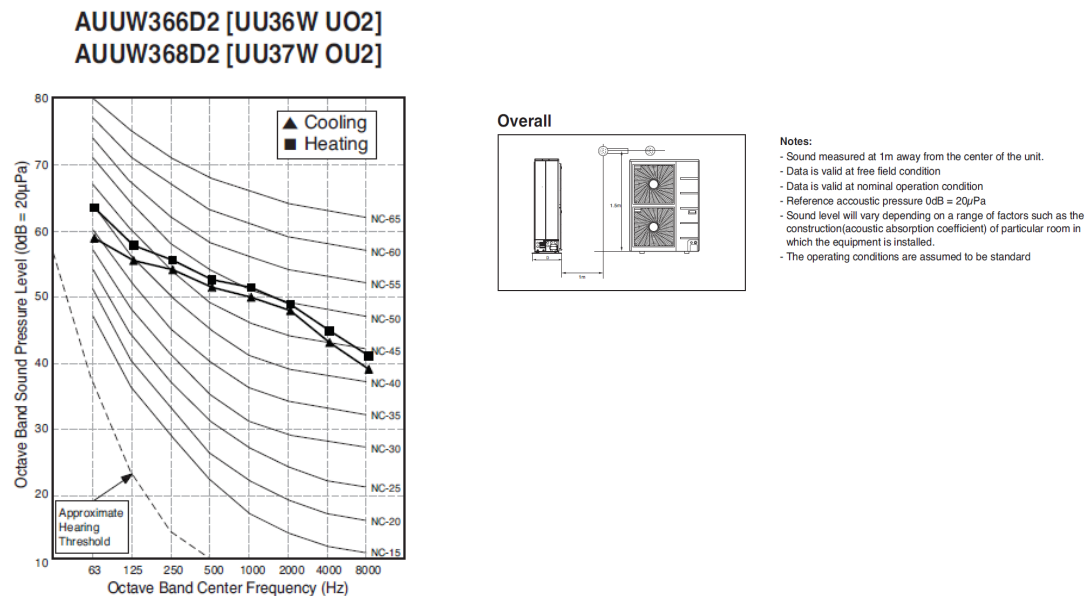
6.2.1 Two number Air Conditioning units.

The two number Air Conditioning units proposed are wall mounted air conditioning condenser units type LG UU37W units.

Spectral noise data was available for the two type LG UU37W units. The noise data is reproduced as follows:

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicacies Ltd	Ref:	4151

Figure 6: LG UU37W units noise levels



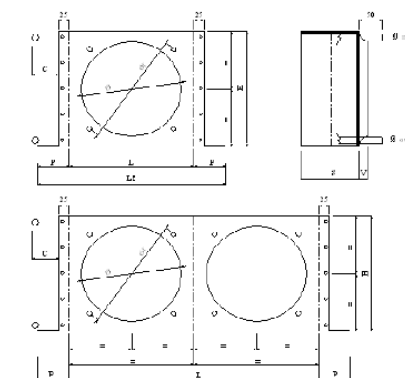
6.2.2 One number “Condenser Minus” unit.

Comprising a twin fanned condenser

Noise data advised is summarised as follows:

Figure 7: Condenser Minus unit noise levels

Blok skraplacza typ LH124_dane techniczne



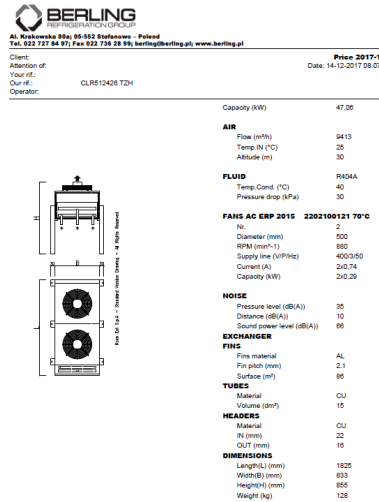
Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczo Delicacies Ltd	Ref:	4151

6.2.3 One number "Condenser Plus" unit.

Comprising a twin fanned condenser

Noise data advised is summarised as follows:

Figure 8: Condenser Plus unit noise levels



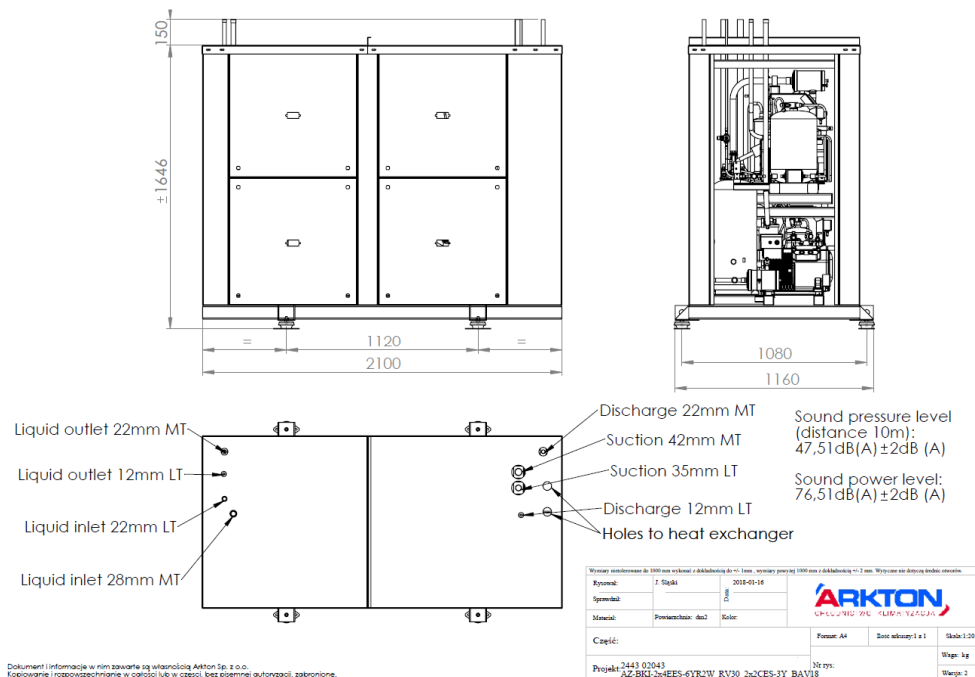
On the basis of the above the noise data for the unit is 35 dBA at 10 metres, corresponding to a sound power level of 66 dBA.

6.2.4 One unit containing "Compressor units plus/minus".

Comprising an enclosure housing the compressor units.

Noise data advised is summarised as follows:

Figure 9: Compressor units plus/minus unit noise levels



Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczo Delicately Ltd	Ref:	4151

On the basis of the above the noise data for the unit is 47.51 dBA at 10 metres, corresponding to a sound power level of 76.51 dBA.

6.3 Predicted Plant Noise Levels

Calculations have been carried out using the data presented earlier within this report to predict the resultant sound pressure levels due to airborne transmitted noise outside the nearest exposed noise assessment position, and corresponding to the quietest period of plant operation. It is reiterated that the noise data used is typically single figure broad band.

The predicted results are summarised below:

Table 3: Predicted Noise Levels at nearest affected premises

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted Lp	Derived noise limit Day / night
As stated in the Section 6.0 herein.	Windows of House of Fisher serviced apartments	2.5-4 metres depending on the plant	Yes	66 dB	33 / 32 dB

Predictions are based on the plant operating normally at the noise levels detailed herein, and it is considered that the noise emitted from the proposed plant will not be intermittent, impulsive, contain tones or other characteristics sufficient to attract attention at the assessment locations.

It can be seen that the proposed plant will not maintain the derived noise limit.

It is unlikely that significantly quieter equipment is available for equipment of similar capacity and it is understood that other locations are not available for the plant. As such, it is considered appropriate to propose noise mitigation measures to the condensers.

6.4 Noise mitigation to plant

With the exception of the air conditioning condensers, all other plant noise data has been provided as single figure dBA data. As such, the noise mitigation measures cannot be accurately specified in terms of the required 1/1 octave band spectral content 63 to 8K Hz.

The 1/1 octave band spectral noise mitigation performance is given for the two Air Conditioning units. In view of limited noise data for other plant limiting noise levels have been specified in order that the client can consider how to mitigate each item of plant in order to meet with the limiting noise levels.

It is taken that the distances from the proposed plant to the residential windows above will remain the same as the present proposals. If plant is moved or the noise mitigation scheme brings the plant and attenuation closer to the residential windows the assessment would require revision and the limiting noise levels / mitigation may have to be increased.

6.4.1 Two number Air Conditioning units.

The two proposed air conditioning condenser units type LG UU37W shall be moved to ground level and shall be enclosed as follows:

An acoustic enclosure shall be used to house the each condenser unit. A specialist supplier shall provide fit for purpose acoustic enclosures to provide the following minimum acoustic performance:

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicatessy Ltd	Ref:	4151

Table 4: Minimum insertion loss requirements for each enclosure

Quantity	1/1 octave band centre frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Minimum insertion loss (dB)	17	18	21	29	35	38	39	39

The above acoustic performance is based on that claimed by Environ Technologies Ltd who produce enclosures for condensers. Website address <http://www.environ.co.uk/>

The insertion loss is hereby defined as the difference in sound pressure level with and without the enclosure in place. In order for this potential reduction in acoustic performance to be evaluated, the chosen enclosure supplier shall submit their product acoustic test data to Paragon Acoustic Consultants Limited prior to procurement / manufacture. Test data shall be provided for all of the proposed hardware products used in the construction of the enclosure and shall be obtained from an independent UKAS accredited test laboratory to provide proof that the foregoing acoustic performance will be maintained.

The dimensions of the enclosure are to be determined by the noise mitigation hardware supplier and agreed with the client.

Paragon Acoustic Consultants has considered the acoustic performance of the enclosure. The introduction of this type of structure has implications in other areas of design. As such, the client shall employ the services of other specialists to take responsibility for other areas of design associated with the introduction of such a structure. The following list is provided as an example of other areas to be considered as a minimum:

Airflow to and from condensing units: The installation of an enclosure will restrict the airflow around the condensing units. This will potentially give rise to two adverse effects as follows:

- The resistance to airflow will increase
- Heated discharge air from the condenser coils may re-circulate back into the condenser coils

The supplier of close fitting enclosure and the mechanical services consultant shall guarantee that their enclosures shall not adversely affect the performance of condensing units.

Structural: A suitably qualified consultant shall assess all structural loading as necessary.

Aesthetics: The visual appearance of the enclosures is to be agreed by the client's architect. The architect shall also consider all necessary statutory approvals and address design issues not covered by the relevant specialist consultant.

Alteration to existing services: The installation of each enclosure may require alteration to certain of the existing mechanical and electrical services in the vicinity of the proposed enclosure. In addition, the condensing units may require to be moved into close fitting enclosures. The client shall co-ordinate any such works.

Delivery and installation access: The enclosure supplier shall make appropriate arrangements for the delivery and installation of enclosures, including equipment such as cranes and scaffolding requirements.

Guarantees: The client shall obtain the necessary guarantees that the enclosure will meet the minimum insertion loss requirements as specified by this practice in the foregoing section. In addition, the client shall obtain all other guarantees as required.

Maintenance / repair / replacement: The enclosures shall allow maintenance / repair / replacement of the condensing unit equipment enclosed.

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicacies Ltd	Ref:	4151

Warrantees: The client shall ensure that the warrantees provided by the condensing unit supplier/manufacture are not invalidated by the introduction of the noise mitigation works.

Submission of final enclosure designs: The final design of the enclosures shall be submitted to Paragon Acoustic Consultants for comment prior to manufacture.

6.4.2 One number “Condenser Minus” unit.

In order to reduce noise emissions the Condenser Minus will require noise reduction at the source, i.e., a suitably designed acoustic enclosure. The client shall employ a specialist acoustic hardware company to provide all necessary noise mitigation measures to the plant to maintain the limiting sound pressure levels stipulated in the following Table.

Table 5: Limiting Sound Pressure Level for the Condenser Minus

Plant item	Limiting Sound pressure level (dB Re: 2×10^{-5} Pa) measured at 3 metres from the Condenser Minus plant in all directions and under all operating conditions when measured under unobstructed hemispherical conditions above a reflective plane.
Condenser Minus	21 dBA

In addition, noise emissions from the plant shall not contain any distinguishable, discrete or continuous tone, or display any distinct impulses irregular enough to attract attention.

6.4.3 One number “Condenser Plus” unit.

In order to reduce noise emissions the Condenser Plus will require noise reduction at the source, i.e., a suitably designed acoustic enclosure. The client shall employ a specialist acoustic hardware company to provide all necessary noise mitigation measures to the plant to maintain the limiting sound pressure levels stipulated in the following Table.

Table 6: Limiting Sound Pressure Level for the Condenser Plus

Plant item	Limiting Sound pressure level (dB Re: 2×10^{-5} Pa) measured at 3 metres from the Condenser Plus plant in all directions and under all operating conditions when measured under unobstructed hemispherical conditions above a reflective plane.
Condenser Plus	19 dBA

In addition, noise emissions from the plant shall not contain any distinguishable, discrete or continuous tone, or display any distinct impulses irregular enough to attract attention.

6.4.4 One unit containing “Compressor units plus/minus”.

In order to reduce noise emissions the Compressor units plus/minus will require noise reduction at the source, i.e., a suitably designed acoustic enclosure. The client shall employ a specialist acoustic hardware company to provide all necessary noise mitigation measures to the plant to maintain the limiting sound pressure levels stipulated in the following Table.

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicacies Ltd	Ref:	4151

Table 7: Limiting Sound Pressure Level for the Compressor units plus/minus

Plant item	Limiting Sound pressure level (dB Re: 2 X 10 ⁻⁵ Pa) measured at 3 metres from the Compressor units plus/minus plant in all directions and under all operating conditions when measured under unobstructed hemispherical conditions above a reflective plane.
Compressor units plus/minus	22 dBA

In addition, noise emissions from the plant shall not contain any distinguishable, discrete or continuous tone, or display any distinct impulses irregular enough to attract attention.

6.5 Vibration

It is recommended that the client provisions for appropriate vibration isolation mountings for the proposed mechanical plant items. It is recommended that the plant be installed on vibration isolation mounts providing a minimum of 98% isolation efficiency at all forcing frequencies using an isolation mount system approved by the plant supplier. In addition, all pipework should be suitably isolated from the building structure.

6.6 Predicted Plant Noise Levels

Calculations have been carried out to predict the noise levels at the nearest exposed noise assessment position including the insertion loss effect of the noise mitigation indicated previously in Section 6.4.1 and the achievement of the limiting noise levels at 3m as given in 6.4.2, 6.4.3 and 6.4.4. The predicted results are summarised below:

Table 8: Predicted Noise Levels at nearest affected premises

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted Lp	Derived noise limit
As stated in the Section 6.0 herein.	Windows of House of Fisher serviced apartments	2.5-4 metres depending on the plant	Yes	32 dB	33 / 32 dB

It can be seen that the proposed plant and associated required noise mitigation measures to meet the details given in Section 6.4.1, 6.4.2, 6.4.3 and 6.4.4. would maintain the Local Authority Noise Policy requirements for third party residential properties.

Example calculation sheets to the most exposed residential receivers are included in Appendix C for reference.

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicatess Ltd	Ref:	4151

7.0 Conclusions

A background noise survey has been undertaken to determine the noise climate likely to exist in the vicinity of the yard at the rear of the site where the positioning of new mechanical plant is proposed.

Appropriate external criteria have been identified on the basis of Local Authority noise policy, and predictions of the proposed mechanical plant noise emissions have been undertaken. Predictions indicate that the noise mitigation measures will be required in order to meet with the derived noise limits and as such specification for the noise mitigation measures for air conditioning units and limiting noise levels to be achieved by the refrigeration plant has been provided herein.

Following implementation and achievement of the noise mitigation and limiting noise levels recommended, it is predicted that its noise emissions will meet the existing noise policy operated by Reading Borough Council and as such, reservations would not be expected from the planning authority on the grounds of noise.

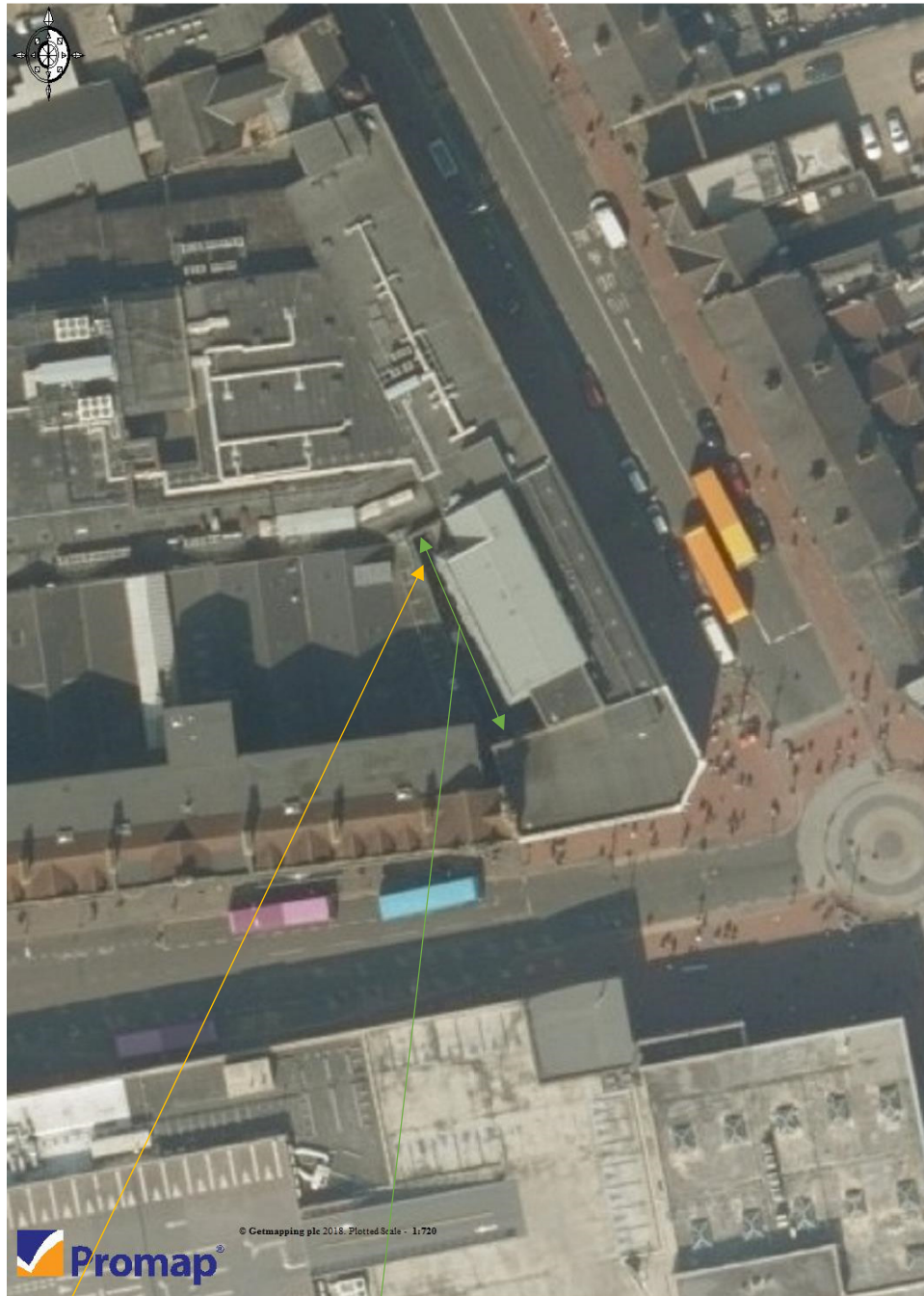
Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczo Delicately Ltd	Ref:	4151

Appendix A: Site Plan



See Next page for Aerial view and measurement position

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicacies Ltd	Ref:	4151



MP 1

Rear "Yard"

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicacies Ltd	Ref:	4151

Appendix B: Recorded Survey Data

[illegible]

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczo Delicately Ltd	Ref:	4151

Appendix C: Calculation sheets

project	26-30 West Street, Reading - Mleczo Delicately Ltd									
date	01/02/2018									
Plant	Plant item: all plant									
Frequency								dBA		
Summary of all attenuated plant with limiting levels given										
1 and 2 WALL MOUNTED AIR CONDITIONING CONDENSER UNITS										
Plant 3 FLOOR STANDING FRIDGE CONDENSER UNIT										
Plant 4 COLD ROOM COMPRESSOR UNIT ENCLOSED IN SOUND ABSORBING CASING										
Plant 5 CONDENSER UNIT										
Predicted noise level at the receiver position above the plant area										
								dBA		
Plant 1 and 2 - Air Conditioning								27		
Plant 3: Condenser Minus								26		
Plant 4 : Compressor units plus / minus								26		
Plant 5: Condenser plus								26		
Predicted combined noise level at the receiver								32		

project	26-30 West Street, Reading - Mleczo Delicately Ltd									
date	01/02/2018									
Plant	Plant item: WALL MOUNTED AIR CONDITIONING CONDENSER UNITS									
Frequency	63	125	250	500	1000	2000	4000	8000	dB(A)	
known / estimated sound power level	75	69	67	64	63	60	56	52	68	
Q correction	2									
Distance (m)	3.5	Distance from source to receiver in metres								
Light well width (m)	22	Metres								
Light well depth (m)	2	Metres								
Light well height (m)	5	Metres								
Estimated rev time to use (s)*	1	(seconds)								
Number of sources of same lw	2	(at the same distance)								
Calculated sound pressure level at receiver	61	55	53	50	49	46	42	38	54	
Direct sound pressure level calculated	59	53	51	48	47	44	40	36		
Rev sound pressure level calculated	58	52	50	47	46	43	39	35		
Insertion loss to lw	17	18	21	29	35	38	39	39		
Calculated Lp after insertion loss	44	37	32	21	14	8	3	-1	27	

project	26-30 West Street, Reading - Mleczo Delicately Ltd									
date	01/02/2018									
Plant	Plant item: Condenser minus									
Frequency									dBA	
limiting lp at 3 m hemispherical									21	
Correction to an LW									17.5	
known / estimated sound power level									38.5	
Q correction	4									
Distance (m)	4	Distance from source to receiver in metres								
Light well width (m)	22	Metres								
Light well depth (m)	2	Metres								
Light well height (m)	5	Metres								
Estimated rev time to use (s)*	0.7	(seconds)								
Number of sources of same lw	2	(at the same distance)								
Calculated sound pressure level at receiver									26	dBA
Direct sound pressure level calculated									24	
Rev sound pressure level calculated									22	

project	26-30 West Street, Reading - Mleczo Delicately Ltd									
date	01/02/2018									
Plant	Plant item: Compressor units plus / minus									
Frequency									dBA	
limiting lp at 3 m hemispherical									22	
Correction to an LW									17.5	
known / estimated sound power level									39.5	
Q correction	4									
Distance (m)	3	Distance from source to receiver in metres								
Light well width (m)	22	Metres								
Light well depth (m)	2	Metres								
Light well height (m)	5	Metres								
Estimated rev time to use (s)*	0.7	(seconds)								
Number of sources of same lw	1	(at the same distance)								
Calculated sound pressure level at receiver									26	dBA
Direct sound pressure level calculated									25	
Rev sound pressure level calculated									20	

Project:	26-30 West Street, Reading	Date:	02/02/2018
Client:	Mleczko Delicacies Ltd	Ref:	4151

project	26-30 West Street, Reading - Mleczko Delicacies Ltd						
date	01/02/2018						
Plant	Plant item: Condenser plus						
Frequency					dBA		
limiting lp at 3 m hemispherical					19		
Correction to an LW					17.5		
known / estimated sound power level					36.5		
Q correction	4						
Distance (m)	2	Distance from source to receiver in metres					
Light well width (m)	22	Metres					
Light well depth (m)	2	Metres					
Light well height (m)	5	Metres					
Estimated rev time to use (s)*	0.7	(seconds)					
Number of sources of same lw	1	(at the same distance)					
Calculated sound pressure level at receiver					26	dBA	
Direct sound pressure level calculated					25		
Rev sound pressure level calculated					17		