

Rev. 1.1.

07/03/2019



Noise Impact Assessment

Project Reference Number: PA176

Report Reference Number: IB1512161NR

Client: Mohammed Tarhini

Site: 178 Kilburn High Road, London, NW6 4JD

Project Consultant	Proofing Consultant
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Project Information

Peak Acoustics have been commissioned to undertake the assessment detailed within this report. Below is a summary of pre-commencement requirements and comments as communicated to Peak Acoustics by involved parties, this information forms the basis of the assessment and report.

Client Contact	Francois Ziade on 15/12/2016.
Client Requirement	The client has requested a noise assessment of the proposed kitchen extraction equipment at 178 Kilburn High Road, London, NW6 4JD.
Site details as communicated by client.	It is proposed to convert the current A1 shop into A3 food and drink establishment. Peak Acoustics have been informed by the client that a kitchen extraction system will be installed with associated ductwork and rooftop exhaust. 2 No. condenser units are to be added to the side of the building to serve the chiller room and freezer. (Added to report March 2019).
Selected Methodology	To assess the noise impact of the proposed kitchen extraction equipment on the nearest sensitive receptor, Peak Acoustics will undertake measurement and assessment using BS4142:2014.
Methodology Justification	'BS4142:2014 – Methods for rating and assessing industrial and commercial sound' is a recognised standard for determining the noise impact of fixed plant machinery via relation of noise emissions to the measured background noise level on site.
Local Authority Contact	N/A
Local Authority Consultation	N/A
Local Authority Guidance/Unitary Development Plans/Unique or bespoke standards	N/A

Revision History

Rev.	Author	Date	Description
0.0	I. Baxter	23/12/2016	First edition acoustic report
1.0	T. Hegan	05/03/2019	Report updated to include condenser units
1.1	T. Hegan	07/03/2019	Amended plans shown in Appendices. Amended distances in calculations.

Assessment Summary

A noise assessment has been undertaken at 178 Kilburn High Road, London, NW6 4JD. This is to assess the impact of proposed kitchen extraction equipment on the nearest sensitive receptor.

The nearest sensitive receptor (NSR) has been identified as the 2nd floor side window of 178 Kilburn High Road, being closest to the extraction flue located at 3rd floor roof level.

Background noise levels have been recorded on site and measured at their lowest as **49.3dB L_{A90, 1hr}** (between 22:00 – 23:00), during the opening hours of the site.

The sound rating level at the NSR from the extraction system is determined to be **25.0dB L_{Ar}**. This is 24.3dB below the background level and is therefore classed as **Low Impact** in line with BS4142:2014.

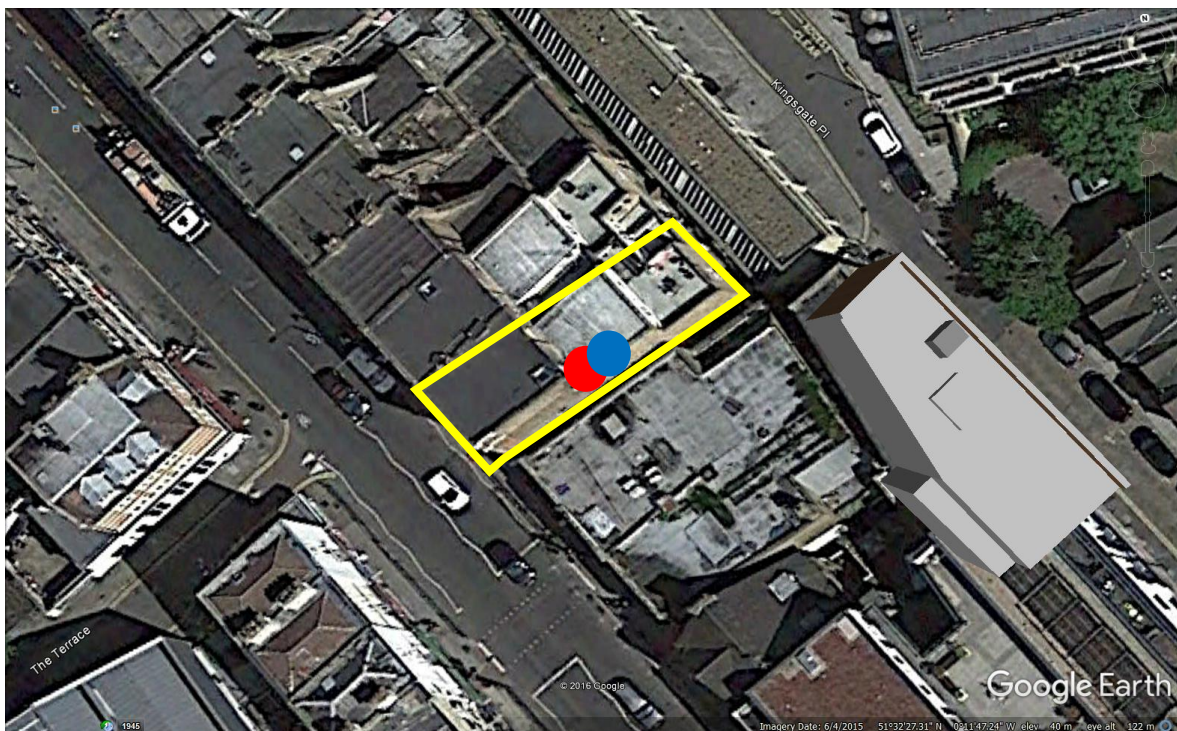
The Rating Level of the condenser units, which are located closer to the residential windows, is **56.3 dB L_{Ar}** at the worst-affected window. This would be classified as adverse impact with regard to BS4142:2014. Mitigation has been recommended in the form of acoustic enclosures for the outdoor condenser units, each offering 9 dB insertion loss. This would reduce the Rating Level to 2 dB below the background noise level and would result in a low noise impact with regard to BS4142:2014.




1. Subjective Impressions

- 1.1 Background noise levels were measured at a representative location to the NSR, taken to be the side window of the 2nd floor dwelling of 178 Kilburn High Road located approximately 6m from the kitchen extraction exhaust (see **Appendix G** for detailed location drawings).
- 1.2 The primary noise sources on site were identified as vehicle traffic on Kilburn Main Road. Secondary noise sources were noted as pedestrians and distant traffic.

2. Measurement Location

- 2.1 Background noise measurements were taken outside at 2nd floor roof level to the rear of the building at a representative location to the NSR.
- 2.2 The measurement location is shown below.



-  Site location
-  Background measurement location
-  NSR location

3. Measurement Equipment

- 3.1 Measurements were undertaken using a Svantek 971 Class 1 Sound Level Meter. SN: 40305. Full equipment details can be found in **Appendix B**.
- 3.2 The calibrator reference level was 113.0dB and calibration levels were measured at 112.25 before and after 112.28 after measurement (0.03dB drift). Full calibration details can be found in **Appendix D**.

4. Weather Conditions

- 4.1 Weather conditions were deemed acceptable for environmental noise measurements; detailed weather conditions are given in **Appendix C**.

5. Measurement Procedure

- 5.1 Background measurements were conducted over a weekday period from 19th – 20th December. Full measurement times and durations can be found in **Appendix A**.
- 5.2 Measurements were taken outside at 2nd floor roof level at a distance of at least 1m from any reflective surface.
- 5.3 Background noise measurements were obtained in 5min time intervals.
- 5.4 Measured noise levels are shown graphically in **Appendix E** and are typical of an environmental noise climate dominated by road traffic due to the noticeable decrease in noise levels across the night and early morning.

6. Specific Sound Level

- 6.1 The kitchen extraction fan is located internally at ground floor level with associated ductwork and exhaust located at 3rd floor roof level.
- 6.2 A silencer is proposed to reduce the noise output at the exhaust.
- 6.3 The extraction system exhaust is located approximately 6m away from the nearest residential window.
- 6.4 The proposed extraction fan, Helios GBW 560/4 has a stated extract noise level of 73.0dB L_{Aeq} at 1m. The proposed silencer is Quiet-Duct 3LFS(900). Full specifications can be found in **Appendix F**.

6.5 The proposed silencer reduces the extract noise level to 50.9dB L_{Aeq} as calculated below:

Frequency, Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	Sum, dB L_{Aeq}
Fan Exact, dB L_{eq}	54.0	66.0	67.0	67.0	66.0	62.0	53.0	70.0
Silencer Reductions, dB	13.0	23.0	28.0	27.0	21.0	17.0	14.0	-
Silenced Fan, dB L_{eq}	41.0	43.0	39.0	40.0	45.0	45.0	39.0	50.9

6.6 Attenuation through the ductwork will also occur. A table of likely resultant noise attenuation is shown below:

Description	Sound level reduction (500Hz)
Ductwork 90° bend	3dBA
Extraction unit grill	4dBA
Main ductwork (per meter)	0.3dBA
Branch ductwork (per meter)	0.5dBA

6.7 Taking the figures in the table above as an estimation for the likely broadband attenuation, with two 90° bends, approximately 11m of ductwork and an end grille, the total attenuation from ductwork would be 13.3dB resulting in a noise level at the extraction flue of 37.6dB L_{Aeq} .

6.8 This is then distance corrected to the NSR approximately 6m away:

$$L_2 = L_1 - 20 \cdot \log(r_1/r_2)$$

$$L_2 = 37.6 - 20 \cdot \log(6/1)$$

$$L_2 = 22.0\text{dB } L_{Assl}$$

(Point source distance attenuation is applied, $20 \cdot \log(r_1/r_2)$, where r_1 is the distance between the noise source and NSR and r_2 is the distance between microphone and noise source)

6.9 The resulting specific sound level of the extraction system at the NSR is **22.0dB L_{Assl}** .

6.10 It is also proposed to install 2No. new condenser units which shall serve the freezer room and cold room. The information gathered from the client and manufacturer website is summarised below with further information shown in **Appendix F**.

Ref.	Description	Outdoor Unit	Manufacturer Noise Detail	Sound Power Level (derived from data)
C1	Chiller Room. Unit MKP-M-001	Maxkold NFR075DL	31 dB(A) at 10m (free-field)	62
C2	Freezer Room. Unit MKP-L-005	Maxkold NFR250DL	35 dB(A) at 10m (free-field)	66

6.11 Specific Sound Levels of the condenser units, which are each to be located approximately 3m from the nearest residential window, have been calculated in accordance with the method shown in **Appendix H**. Levels are shown below and have been based on the worst-affected window which is located nearer to the louder of the two condenser units.

Ref.	Outdoor Unit	Specific Sound Level dB L _{Assl}	Cumulative Specific Sound Level, dB L _{Assl}
C1	Maxkold NFR075DL	50.5	53.3
C2	Maxkold NFR250DL	50.0	

7. Rating Level

- 7.1 The specific sound level is to be corrected for intermittency due to the units not being in continuous operation. A + 3dB correction is applied to both the extraction system and condenser unit noise.
- 7.2 From an informed subjective analysis of the 1/1 octave band frequency data of the proposed fan (see **Appendix F** for details) it has been determined that the specific sound level of the extraction system will not be tonal. No Penalty is applied for tonality.
- 7.3 Condenser units typically emit a broadband, aerodynamic sound without dominant tonal components.
- 7.4 The kitchen extraction system and condenser units will not emit impulsive noise, therefore no penalty is applied for impulsivity.
- 7.5 This gives a Rating Level at the NSR of **25.0dB L_{Ar}** for the extraction system.
- 7.6 The Rating Level of the condenser units is **56.3 dB L_{Ar}** at the worst-affected NSR window.

8. Background Sound Level

- 8.1 Background noise levels were measured over a weekday period from 19th – 20th December.
- 8.2 The proposed opening times of the premises are 09:00 – 23:00.
- 8.3 Background noise levels were measured at their lowest during the proposed opening times as **49.3dB L_{A90, 1hr}** between 22:00 – 23:00.

9. BS4142:2014 Assessment Outcome

- 9.1 The sound Rating Level of the extraction system is **24.3dB** below the background level at the NSR. This is indicative of a *Low Impact* under BS4142:2014.
- 9.2 The sound Rating Level of the condenser units is **7.0 dB** above the background level at the worst affected receiver location. This is indicative of *adverse impact* under BS4142:2014. Mitigation against noise from this source is therefore recommended.

10. Mitigation

- 10.1 It is recommended to place all new condenser units within acoustic enclosures offering an insertion loss of **9 dB**. It is expected that this could be achieved without compromising the air flow requirements to the fans.
- 10.2 An example of a manufacturer that produces such enclosures is *Environ*.
- 10.3 The proposed mitigation would reduce the Rating Level of the condenser units to 47.3 dB at the worst-affected residential window. This would be 2 dB below the background level and classed as 'low impact' in relation to BS4142:2014.

11. Further Considerations

- 11.1 **Noise Management Plan** - To protect nearby residents from unnecessary noise nuisance due to associated activities, a noise management plan should be established. This may include but not be limited to the following:
- The staff should monitor the doors and ensure they are kept closed during all hours of the operation.
 - Any music played within the premises should not be above comfortable conversation volume and should have the low frequencies attenuated, as lower frequencies have higher flanking properties.
- 11.2 **Deliveries** - Due to multiple commercial businesses, including shops and cafes being located along High Street, the influence of deliveries to the proposed development will be imperceptible within the current noise climate. It is recommended to approach delivery companies who work in accordance with the 'Quiet Deliveries Scheme' outlined by the Department of Transport, as the methodologies within the document and relevant training aim to minimise both disturbance on the roads as well as noise disturbances to nearby residents.

12. Uncertainty

- 12.1 Uncertainty can arise when a calculated method, such as distance correction and noise level summation, is used to determine an overall noise level at a NSR location, however it is an accepted method when there are no specific noise sources on site that can be measured.
- 12.2 The monitoring equipment is subject to a 1dB error margin, however calibration checks before and after measurements demonstrate that the error margin remained consistent throughout the measurement procedure.

13. Conclusion

- 13.1 A Noise Impact Assessment has been conducted at 178 Kilburn High Rd. This was to assess the noise impact of a proposed extraction system and two No. condenser units.
- 13.2 The Rating Level of the proposed extraction system would be significantly below the background noise level and therefore does not require mitigation in order to achieve a *low impact* rating in accordance with BS4142:2014.
- 13.3 The Rating Level of the proposed condenser units would be 7.0 dB above the background noise level and therefore indicative of *adverse* impact with reference to BS4142:2014. Mitigation has been recommended which would reduce the Rating Level to below the background level in order to achieve a *low impact* rating.

APPENDIX A - Measurement Details					
Measurement	Kit	Start Date	Start Time	End Date	End Time
M1	A2	19/12/2016	13:23	20/12/2016	12:03

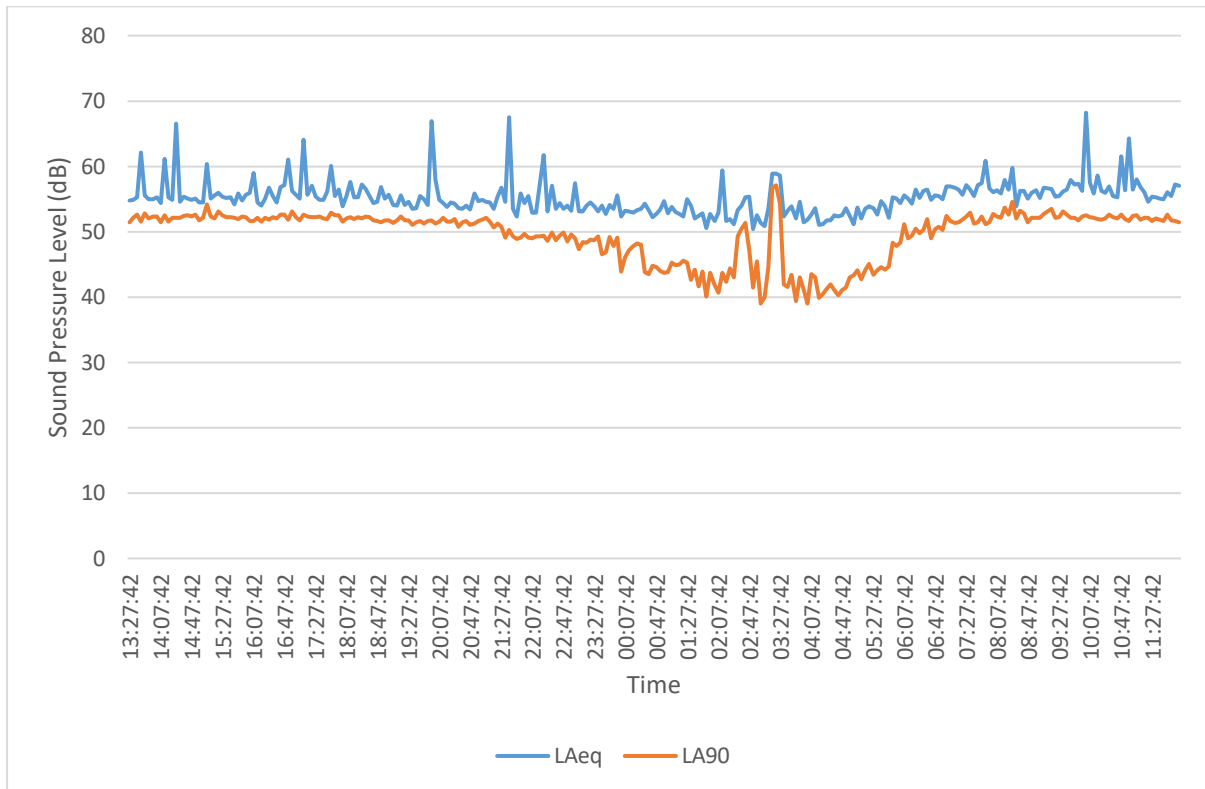
APPENDIX B - Equipment Details					
Kit	Equipment	Make	Model	Class	Serial Number
A2	Sound Meter	Svantek	971	1	40305
A2	Pre-Amp	Svantek	SV12L	1	32484
A2	Calibrator	Svantek	SV31	1	43806

APPENDIX C - Meteorology Details							
Measurement	Date	Temp C	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
M1	19/12/2016	5	1.7	NE	95	0.8	6/8
M1	20/12/2016	6	2.5	E	86	0.0	7/8

APPENDIX D - Calibration Details					
Measurement	Calibrator Ref Level (dB)	Level Before (dB)	Deviation Before (dB)	Level After (dB)	Deviation After (dB)
M1	113.0	112.25	0.75	112.22	0.78

APPENDIX E – Noise Measurement Details

Measured Background Noise Levels, Graph: 19th – 20th December 2016



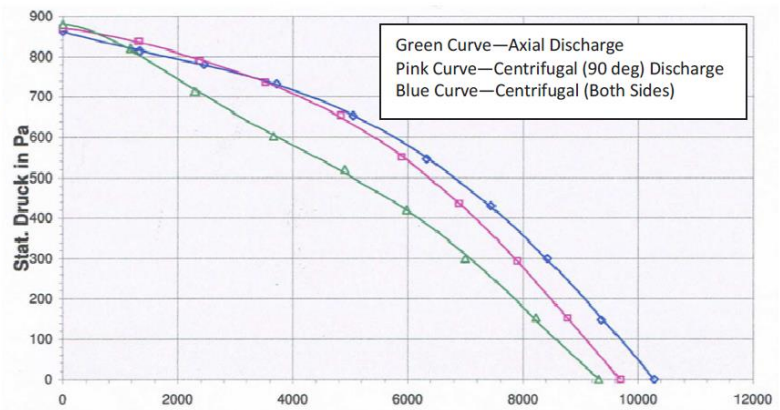
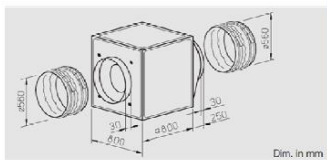
APPENDIX F – System Specifications

Proposed Extraction Fan

GigaBox centrifugal fan 560 mm ø



GBW 560/4



Δp_{stat}
Pa

Frequency	Hz	Total	125	250	500	1k	2k	4k	8k
L _{WA} Case breakout	dB(A)	64	64	64	48	50	46	43	37
L _{WA} Intake	dB(A)	77	57	66	69	74	70	64	55
L _{WA} Extract	dB(A)	81	62	74	75	75	74	70	61

(Correction of -8dB applied to convert sound power level, hemispherical, to sound pressure level)

Proposed Extraction Fan Silencer (Highlighted)

Dynamic Insertion Loss (DIL) Ratings: Forward (+) / Reverse (-) Flow

IAC LFS Model (length in mm)	Octave Band	1	2	3	4	5	6	7	8
	Hz	63	125	250	500	1K	2K	4K	8K
	Silencer Face Velocity, m/s	Dynamic Insertion Loss, dB							
3LFS (900)	-10	8	14	25	29	27	20	16	12
	-5	7	13	23	28	26	20	16	14
	0	8	13	23	28	27	21	17	14
	+5	9	12	22	28	27	21	18	14
	+10	7	11	21	25	25	21	17	14
4LFS (1200)	-10	11	19	31	36	35	24	18	13
	-5	10	17	29	35	34	24	19	15
	0	11	17	28	34	34	25	20	15
	+5	11	16	27	32	34	24	20	15
	+10	9	14	25	29	31	25	19	15
5LFS (1500)	-10	13	23	36	42	42	28	19	14
	-5	13	21	35	41	41	28	21	15
	0	13	20	33	39	41	28	22	16
	+5	12	19	31	36	40	27	22	16
	+10	10	17	28	33	37	29	20	16

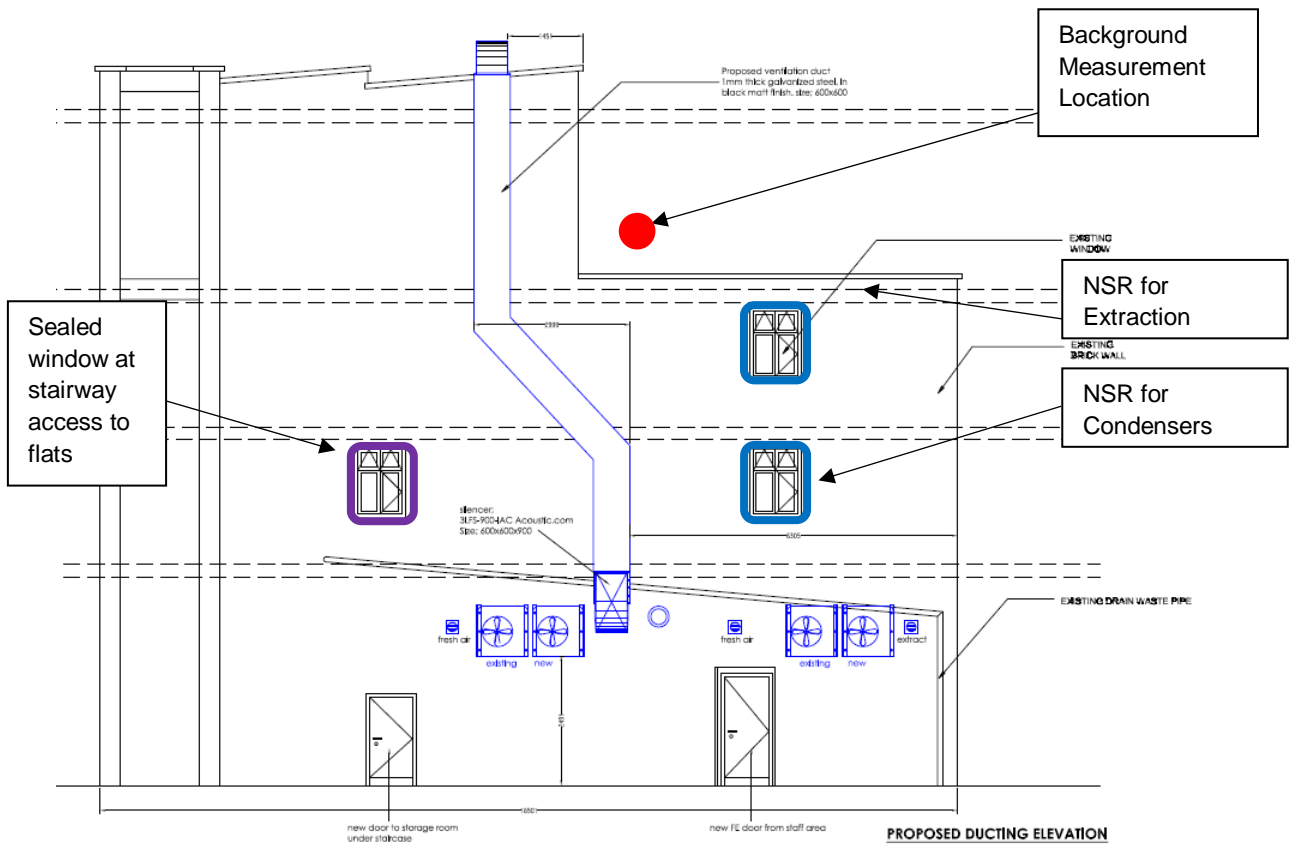
Proposed Condenser Units

Model Number	Packaged Condensing Unit	Cooler	No of Cooler Fans	Condensing Unit HP	Approx Room Volume (m ³)	System Capacity (kW)	TEV Model	Orifice No	Controller	Liquid Line Size	Suct Line Size	Max Pipe Run
MKP-M-001	NFR075DL	LFJ7.5/2.0M	1	0.75	10 - 14	2.0	Danfoss TES-2	2#	CM-B (3M)	3/8	1/2	15 M
MKP-L-005	NFR250DL	LFJ7.0/1.8L	1	2.5	8	1.9	Danfoss TES-2	2#	CM-B (6M)	3/8	5/8	15 M

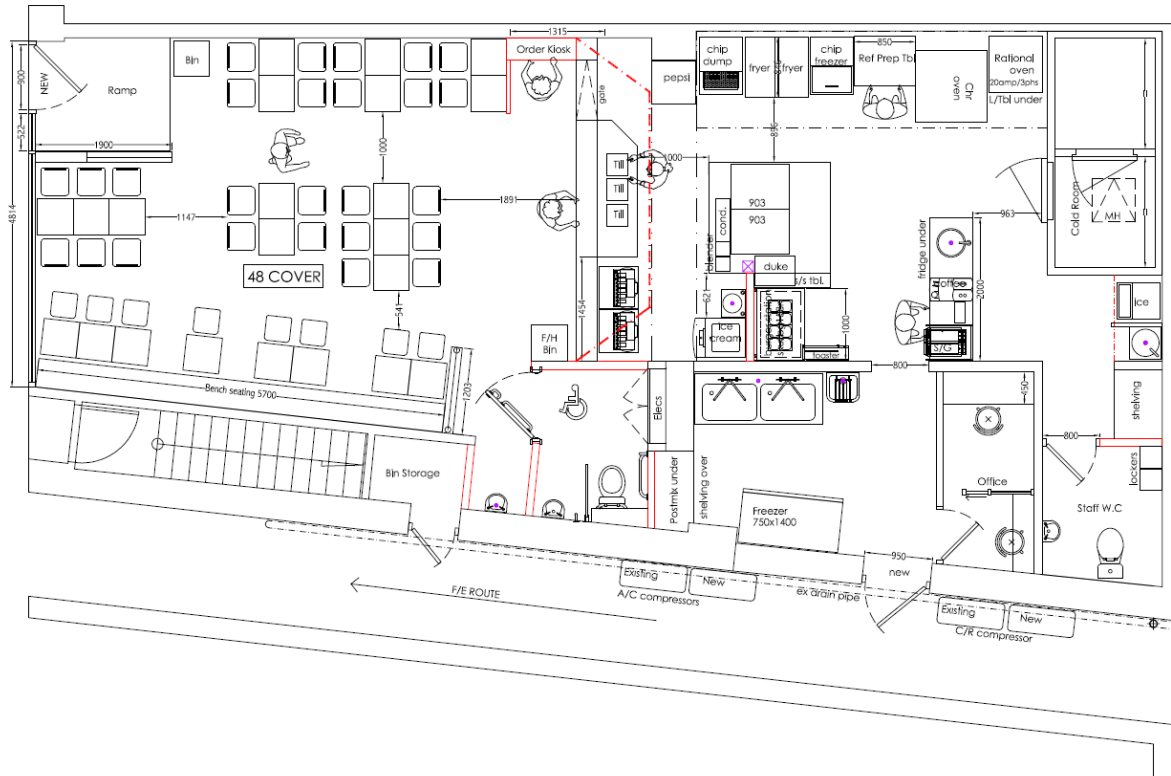
Description						Description					
Model			NFR075DL			Model			NFR250DL		
Compression Model			QXD-13K			Compression Model			QXD-36K		
HP			0.75			HP			2.5		
Noise Rating **			31			Noise Rating **			35		
Dimensions mm (L*W*H*)			920 x 380 x 530			Dimensions mm (L*W*H*)			920 x 380 x 530		
Pipe size (inch)		Liquid	3/8			Pipe size (inch)		Liquid	3/8		
		Suction	1/2					Suction	5/8		
Net kg			42			Net kg			52		
Electrical Data		Supply	230v-1ph-50hz			Electrical Data		Supply	230v-1ph-50hz		
		FLA /ph	4.0					FLA /ph	8.0		
Duty Watts R404a Evaporating @*						Duty Watts R404a Evaporating @*					
-5 °C	-10 °C	-15 °C	-20 °C	-25 °C		-5 °C	-10 °C	-15 °C	-20 °C	-25 °C	
2000	1680	1380	1140	940		4170	3450	3010	2530	2000	
* Duty at +32°C ambient. ** DBA @ 10m in free field conditions - manufacturer's data.						* Duty at +32°C ambient. ** DBA @ 10m in free field conditions - manufacturer's data.					

APPENDIX G – Duct Plans

Proposed Side Duct Elevation & Roof Duct Layout



Internal Layout Showing Freezer and Cold Rooms



APPENDIX H – Calculation of Specific Sound Level of Condenser Units

Calculation to NSR 1 (Window Closest to Loudest Unit) - Proposed										BS4142 Corrections					
Item	Element	LwA	r1	r2	Dist. Atten.	Surfaces Effect	Enclosure	LAs	Total LAs	Ton'y	Imp'y	Int'y	LAr	BG	Excess
		dB	m	m	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
C1	NFR075DL	62	1	3	-9.54	9.00	0.00	50.5	53.3	0	0	3	56.3	49.3	7.0
C2	NFR250DL	66	1	5	-13.98	9.00	0.00	50.0							
Calculation to NSR 1 (Window Closest to Loudest Unit) - Mitigated										BS4142 Corrections					
Item	Element	LwA	r1	r2	Dist. Atten.	Surfaces Effect	Enclosure	LAs	Total LAs	Ton'y	Imp'y	Int'y	LAr	BG	Excess
		dB	m	m	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
C1	NFR075DL	62	1	3	-9.54	9.00	-9.00	41.5	44.3	0	0	3	47.3	49.3	-2.0
C2	NFR250DL	66	1	5	-13.98	9.00	-9.00	41.0							

Notes:

+ 9 dB surfaces effect assumed as a worst-case scenario due to units being located within a reflective void area.