



## Plant Noise Impact Assessment

Client: Butler Associates

Project: Pizza Express  
255 West End Lane  
London  
NW6 1XN

Our Reference: RF85517/PNIA

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## **1.0 Introduction**

Noise Solutions Ltd has been commissioned by Butler Associates to undertake a noise impact assessment for proposed plant associated with the Pizza Express Delivered, 255 West End Lane, London, NW6 1XN.

An environmental noise survey has been undertaken to establish the environmental noise levels representative of the proposed site and the nearest noise sensitive receptor. Noise levels for the proposed plant installations have been predicted at the nearest noise sensitive receptors to the site and assessed using the London Borough of Camden Council noise emissions criteria.

## **2.0 Details of development**

The proposed Pizza Express Delivered is to occupy the ground floor and basement of an existing building on the corner of West End Lane (to the east) and Dennington Park Road (to the north).

Proposals include for the installation of an AC unit, two refrigeration condensers, an air supply system, a kitchen extract system and smaller ancillary extracts serving the staff areas and toilets. The AC and refrigeration units are to be located externally within the proposed yard adjacent to the kitchen extract.

The supply and extract fans are to be housed internally. Ductwork for the kitchen extract system will exit the side of the building discharging at roof level. The supply fan ductwork will terminate out of the western elevation adjacent to Dennington Park Road.

The proposed kitchen extract system is to be fitted with a suitable atmospheric-side attenuator to ensure the relevant noise criteria is achieved. A horizontal acoustic screen will be installed above the AC and refrigeration condenser units to protect the nearby residential windows of the flats above the proposed restaurant at 255 West End Lane. All proposed plant is to be fitted with suitable anti-vibration mounts to prevent structure-borne noise and vibration affecting the adjoined premises.

The delivery service will operate between 11:00 and 24:00 hours. During this time all AC, refrigeration, supply and extract plant will be operational. Outside of these hours only the refrigeration plant will be operational.

Appendix A contains manufacturer supplied noise data for the selected plant items.

## **3.0 Nearest noise sensitive receptors**

The area surrounding the site contains mainly commercial premises. The nearest and most affected residential receptors are expected to be the flats above the proposed takeaway (R1) at 255 West End Lane, the flats opposite (R2) above 204 West End Lane and the flats (R3) at Dennington House on Dennington Park Road. The Hampstead Synagogue (R4) is adjacent to the proposed takeaway on Dennington Park Road.

Appendix B contains a plan showing the site and surrounding area.

## 4.0 Existing noise climate and plant noise design criteria

### 4.1. Environmental noise survey

An environmental noise survey was undertaken at a location representative of the nearest noise sensitive receptor. The results of the noise survey have been summarised in Table 1, below. The full set of measurement results and details of the survey methodology can be found in Appendix C.

*Table 1 Summary of noise survey results*

Measurement period	Range of noise levels over measurement period (dB)			
	L <sub>Aeq</sub> (10mins)	L <sub>Amax</sub> (10mins)	L <sub>A10</sub> (10mins)	L <sub>A90</sub> (10mins)
Evening (23.00 - 24.00 hours)	59-63	72-82	64-66	46-51
Night-time (02.00 - 03.00 hours)	55-58	69-75	59-62	38-42

### 4.2. Plant noise design criteria

The London Borough of Camden Council policy DP28 specifies that cumulative plant noise greater than 5dB below the L<sub>A90</sub> background 1m from a noise sensitive façade will not be granted planning permission, or 10dB below the L<sub>A90</sub> background level if the noise has a distinguishable discreet note.

Based on the above, the cumulative plant noise rating level at 1m from any nearby noise sensitive window should not exceed:

- 41dB L<sub>Aeq</sub> during opening hours (11.00 – 24.00 hours);
- 33dB L<sub>Aeq</sub> out-of-hours (00.00 – 11.00 hours);

## 5.0 Noise impact assessment

Noise emissions from proposed plant have been predicted at the nearest noise sensitive receptors (R1), (R2), (R3) and (R4) based on the manufacturer noise data given in Appendix A.

Predictions have been based on the acoustic screen to the AC and refrigeration plant achieving 5dB of attenuation and the extract vent attenuator achieving the insertion losses as shown in Table 2 below.

Predictions have been based on the refrigeration condensers (chiller and freezer) and AC condenser units operating simultaneously and at full capacity during operational hours.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics providing it is well maintained. All proposed AC and refrigeration plant is inverter driven and, therefore, will gently ramp up and down depending on demand. The ventilation plant will run continuously during operational hours. As a result, penalties for acoustic characteristics have not been applied to noise level predictions for the proposed plant.

Noise from the proposed ventilation systems has been predicted taking into account in-duct sound power levels, ductwork system losses and directivity/distance corrections. Noise breakout from the extract fan has not been taken into account as this is to be installed internally. Predictions are inclusive of the following atmospheric-side attenuation fitted to the systems;

*Table 2 Insertion losses for suitable atmospheric-side attenuation*

Attenuator	Insertion loss (dB)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Kitchen extract	6	13	23	36	34	34	33	27

*Note: alternative attenuator selections may be suitable provided the overall emissions criteria area achieved.*

Noise emissions from the proposed smaller ancillary extract systems, which will discharge at the rear of the building, have not been predicted. These smaller systems will be fitted with suitable atmospheric-side attenuators as required such that, cumulatively, compliance with the Council's noise criteria will be achieved.

Table 3, below, summarises the assessment of predicted noise levels at receptors R1, R2, R3 and R4. The full set of calculations can be found in Appendix D.

*Table 3 Assessment of predicted noise rating levels at receptors R1, R2 and R3*

Receptor	Period	Predicted plant noise level, $L_{Aeq}$ (dB)	Applicable Criteria, $L_{Aeq,T}$ (dB)	Difference (dB)	Compliance achieved (Y/N)
R1	11.00 - 24.00 hours (opening hours)	41	41	0	Y
	00:00 – 11:00 (out of hours)	32	32	0	Y
R2	11.00 - 24.00 hours (opening hours)	30	41	-11	Y
	00:00 – 11:00 (out of hours)	21	32	-11	Y
R3	11.00 - 24.00 hours (opening hours)	29	41	-12	Y
	00:00 – 11:00 (out of hours)	20	32	-12	Y
R4	11.00 - 24.00 hours (opening hours)	27	41	-14	Y
	00:00 – 11:00 (out of hours)	18	32	-14	Y

The above assessment demonstrates that cumulative plant noise levels will meet the London Borough of Camden Council emissions criteria at the nearest noise sensitive properties. Predictions are inclusive of a suitable screen installed above the AC and

refrigeration units, and an attenuator on the extract discharge. All plant and associated ductwork/pipework will be fitted with suitable anti-vibration mounts.

It should be noted that the above assessment is based on all plant operating simultaneously during opening hours and uses a design criterion based on the lowest measured background noise level during the quietest time of the night. Given that the plant will not operate simultaneously 100% of the time (particularly in the evening when ambient temperatures are lower and demands on the refrigeration and AC systems are likely to be reduced) the above assessment is considered to be representative of the worst case.

## **6.0 Summary**

Noise Solutions Ltd has been commissioned by Butler Associates to undertake acoustic assessments for the new plant associated with Pizza Express Delivered, 255 West End Lane, London.

Predictions have been based on the acoustic screen above the AC and refrigeration plant achieving 5dB of attenuation and the extract vent attenuator achieving the insertion losses as shown in Table 2. In addition all plant will be fitted with suitable anti-vibration mounts.

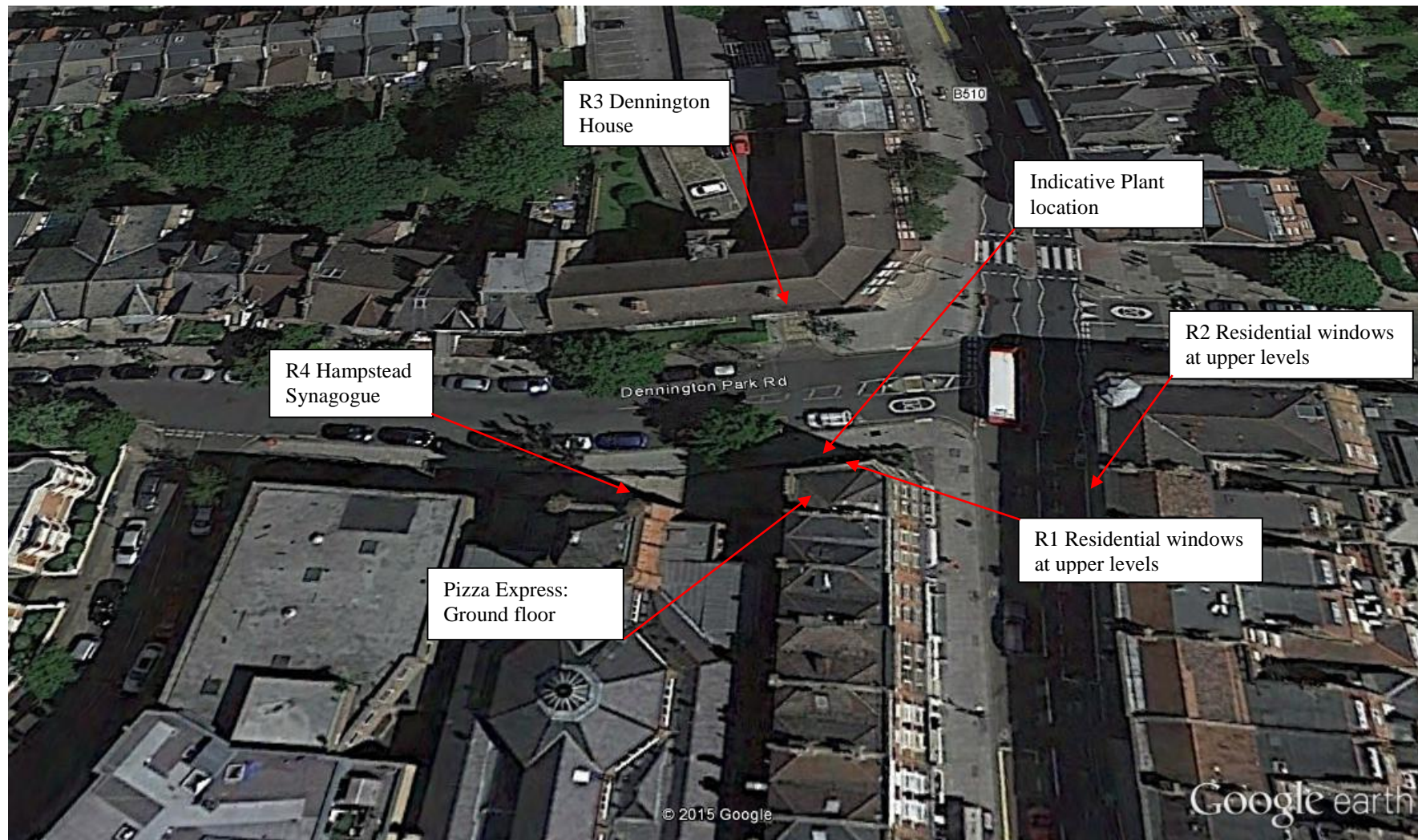
Noise level predictions demonstrate the cumulative noise emissions from proposed plant will comply with typical London Borough of Camden Council requirements at the nearest noise sensitive property.

Given the results of the above assessment, noise should not be grounds for refusal of planning permission.

### Appendix A – Proposed Plant Data

Description	Make/Model	Quantity	Notes	dB								dBA
				63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
AC	Daikin/RZQSG100L8	1	Heating (L <sub>p</sub> @ 1m)	55	62	60	55	51	46	42	33	57
			Cooling (L <sub>p</sub> @ 1m)	54	58	56	51	47	42	37	29	53
Kitchen extract	Helios Gigabox 560/4/4	1	Case breakout (L <sub>w</sub> ) <sup>1</sup>	-	80	73	51	50	45	42	38	67
			In-duct L <sub>w</sub> (outlet) <sup>1</sup>	-	78	83	78	75	73	69	62	80
			In-duct L <sub>w</sub> (inlet) <sup>1</sup>	-	73	75	72	74	69	63	56	77
Kitchen Supply	Custom AHU	1	L <sub>w</sub> @ louvre									24
Chiller condenser	RCS QH1 27 50EC	1	L <sub>p</sub> @ 10m									26
Freezer condenser	RCS QL1 27 150EC	1	L <sub>p</sub> @ 10m									26

## Appendix B – Site Plan



## Appendix C – Details of environmental survey

### C.1. Measurement period

Measurements of the existing background noise level were taken between 23.05 and 24.05 hours on Tuesday 25<sup>th</sup> August and between 02.00 and 03.00 hours on Wednesday 26<sup>th</sup> August 2015. The sound level meter was programmed to record the A-weighted  $L_{eq}$ ,  $L_{90}$ ,  $L_{10}$  and  $L_{max}$  noise indices for consecutive five-minute sample periods for the duration of the noise survey.

Weather conditions, whilst not actively measured, were conducive to the measurement of noise. There was no precipitation during the course of the survey and road surfaces in the surrounding area were dry.

### C.2. Measurement position

The measurement position was located on Fawley Road close to the nearest noise sensitive premises (location indicated on the site plan in Appendix B). In accordance with BS 7445-2:1991 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use', the measurements were taken under free-field conditions with the microphone positioned at a height of approximately 1.5 m above ground level.

### C.3. Noise measurement equipment

Details of the equipment used during the course of the noise survey have been provided in the table below. The sound level meter was calibrated before and after the survey; no significant change ( $\pm 0.1$  dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Rion NL-31 / 00593604	08/08/2014	1408386
Condenser microphone	Rion UC-53A / 316132		
Preamplifier	Rion NH-21 / 30366		
Calibrator	Rion NC-74 / 35094453	27/01/2014	14411

All equipment had valid calibration certificates at the time of the survey, which can be provided on request.

### C.4. Results

The results of the noise survey are considered to be representative of typical prevailing noise levels at the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.

The noise climate at the measurement position was dominated by road traffic from West End Lane with occasional trains. Pedestrian activity was also observed during the evening period. The results of the noise survey have been provided below.



**Appendix C (continued)**  
**Environmental noise survey results**

<b>Date</b>	<b>Start Time</b>	<b>End Time</b>	<b>L<sub>AFmax</sub> (dB)</b>	<b>L<sub>Aeq</sub> (dB)</b>	<b>L<sub>A10</sub> (dB)</b>	<b>L<sub>A90</sub> (dB)</b>
25/08/2015	23:05	23:15	77.2	61.9	65.3	50.8
25/08/2015	23:15	23:25	82.1	62.9	65.1	51.0
25/08/2015	23:25	23:35	73.8	60.3	63.5	48.3
25/08/2015	23:35	23:45	77.0	61.5	65.5	48.5
25/08/2015	23:45	23:55	71.9	59.3	64.0	46.9
25/08/2015	23:55	24:05	72.6	60.6	64.9	45.7

<b>Date</b>	<b>Start Time</b>	<b>End Time</b>	<b>L<sub>AFmax</sub> (dB)</b>	<b>L<sub>Aeq</sub> (dB)</b>	<b>L<sub>A10</sub> (dB)</b>	<b>L<sub>A90</sub> (dB)</b>
26/08/2015	02:00	02:10	73.2	55.7	59.8	39.3
26/08/2015	02:10	02:20	70.8	54.7	59.0	41.8
26/08/2015	02:20	02:30	75.1	55.9	60.0	40.9
26/08/2015	02:30	02:40	74.3	57.5	62.3	37.9
26/08/2015	02:40	02:50	71.3	55.3	59.7	39.8
26/08/2015	02:50	03:00	69.3	55.6	61.1	37.5

## Appendix D– Noise Level Predictions

RECEPTOR R1 Flat above 255 West End Lane

Plant	Source noise level		Distance correction		Directivity correction (dB)	Screening correction (dB)	Noise level at receptor, $L_{Aeq}$ (dB)
	Noise level (dBA)	Distance (m)	Distance (m)	Correction (dB)			
AC 1	57	1	4	-12	0	-5	40
chiller	26	10	4	8	0	-5	29
freezer	26	10	4	8	0	-5	29
Kitchen extract discharge	See separate calculation sheet						30
Supply inlet	See separate calculation sheet						6

Cumulative daytime: 41  
Cumulative night-time: 32

RECEPTOR R2 Flats above Sainsbury's 204 West End Lane

Plant	Source noise level		Distance correction		Directivity correction (dB)	Screening correction (dB)	Noise level at receptor, $L_{Aeq}$ (dB)
	Noise level (dBA)	Distance (m)	Distance (m)	Correction (dB)			
AC 1	57	1	25	-28	0	0	29
chiller	26	10	25	-8	0	0	18
freezer	26	10	25	-8	0	0	18
Kitchen extract discharge	See separate calculation sheet						14
Supply inlet	See separate calculation sheet						0

Cumulative daytime: 30  
Cumulative night-time: 21

RECEPTOR R3 Flats at Dennington House

Plant	Source noise level		Distance correction		Directivity correction (dB)	Screening correction (dB)	Noise level at receptor, $L_{Aeq}$ (dB)
	Noise level (dBA)	Distance (m)	Distance (m)	Correction (dB)			
AC 2	57	1	19	-26	-3	0	28
chiller	26	10	19	-6	-3	0	17
freezer	26	10	19	-6	-3	0	17
Kitchen extract discharge	See separate calculation sheet						17
Supply inlet	See separate calculation sheet						0

Cumulative daytime: 29

Cumulative night-time: 20

RECEPTOR R4 Hampstead Synagogue

Plant	Source noise level		Distance correction		Directivity correction (dB)	Screening correction (dB)	Noise level at receptor, $L_{Aeq}$ (dB)
	Noise level (dBA)	Distance (m)	Distance (m)	Correction (dB)			
AC 2	57	1	14	-23	-3	0	26
chiller	26	10	14	-3	-3	0	15
freezer	26	10	14	-3	-3	0	15
Kitchen extract discharge	See separate calculation sheet						19
Supply inlet	See separate calculation sheet						0

Cumulative daytime: 27

Cumulative night-time: 18

Extract Fan Vent

Description	Notes	L <sub>eq</sub> (dB)								L <sub>Aeq</sub> (dB)
		63	125	250	500	1K	2K	4K	8K	
R1 - Flat above 255 West End Lane										
Source noise level	L <sub>w</sub>	0	78	83	78	75	73	69	62	81
System losses		-11	-7	-3	-1	-2	-3	-4	-4	
Atmospheric side attenuator	I.L	-6	-13	-23	-36	-34	-34	-33	-27	
Directivity correction	0°,135°	-1	-1	-3	-6	-9	-8	-8	-8	
Distance correction	3m	-18	-18	-18	-18	-18	-18	-18	-18	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at receptor	L <sub>p</sub>	-35	40	37	18	13	10	6	5	30

R2 - Flats above Sainsbury's 204 West End Lane										
Source noise level	L <sub>w</sub>	0	78	83	78	75	73	69	62	81
System losses		-11	-7	-3	-1	-2	-3	-4	-4	
Atmospheric side attenuator	I.L	-6	-13	-23	-36	-34	-34	-33	-27	
Directivity correction	0°,90°	0	0	0	0	-4	-7	-7	-7	
Distance correction	6m	-36	-36	-36	-36	-36	-36	-36	-36	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at receptor	L <sub>p</sub>	-53	23	21	5	-1	-8	-11	-12	14

R3 - Flats at Dennington House										
Source noise level	L <sub>w</sub>	0	78	83	78	75	73	69	62	81
System losses		-11	-7	-3	-1	-2	-3	-4	-4	
Atmospheric side attenuator	I.L	-6	-13	-23	-36	-34	-34	-33	-27	
Directivity correction	0°,90°	0	0	0	0	-4	-7	-7	-7	
Distance correction	6m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at receptor	L <sub>p</sub>	-50	25	24	8	1	-5	-9	-10	17

R4 Hampstead Synagogue										
Source noise level	$L_w$	0	78	83	78	75	73	69	62	81
System losses		-11	-7	-3	-1	-2	-3	-4	-4	
Atmospheric side attenuator	I.L	-6	-13	-23	-36	-34	-34	-33	-27	
Directivity correction	0°,90°	0	0	0	0	-4	-7	-7	-7	
Distance correction	6m	-31	-31	-31	-31	-31	-31	-31	-31	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at receptor	$L_p$	-48	28	26	10	4	-3	-6	-7	19

Supply Fan

Receptor	Sound Power at Louvre (dBA)	Distance correction		Façade correction (dB)	Screening correction (dB)	Noise level at receptor, $L_{Aeq}$ (dB)
		Distance (m)	Correction (dB)			
R1	24	3	-18	0	0	6
R2	24	25	-36	0	0	0
R3	24	19	-34	0	0	0
R4	24	14	-31	0	0	0