

# SPS ASSOCIATES LTD

1 NORTHWAYS PARADE - PROPOSED OFFICE CONVERSION

PLANT NOISE IMPACT ASSESSMENT

R1839-REP01B-SJW

15 APRIL 2020

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PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# REPORT DETAILS

Project	1 Northways Parade - Proposed Office Conversion						
Client	SPS Associates Ltd						
	4th Floor 100 Fenchurch Street, London, England, EC3M 5JD						
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1 NORTHWAYS PARADE - PROPOSED OFFICE CONVERSION

PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# SUMMARY

Red Acoustics Ltd has been commissioned by SPS Associates Ltd to provide a plant noise impact assessment for the proposed fixed plant and equipment to be installed at the proposed office conversion at 1 Northways Parade, Swiss Cottage.

The target plant Rating Levels have been set based on long-term environmental noise data collected by an unattended noise survey. The proposed plant noise limit Rating Levels for daytime and night-time periods have been determined based on achieving a level that equates to the Lowest Observed Adverse Effect Level (LOAEL) or less.

The typical measured  $L_{A90,15min}$  sound levels during the daytime and night-time periods (07:00 - 23:00 and 23:00 - 07:00) between the 4th and 10th March 2020 are 54dB and 45dB respectively.

Camden Borough Council have specified plant noise limits that are equivalent to the Noise Policy Statement for England requirements and provides policy recommendations to allow a decision to be made.

Existing Noise Sens- itive Receptor	Assessment Loca- tion	Design Period	NOEL to LOAEL	LOAEL to SOAEL	SOAEL
Dwellings	Garden used mainly for amenity (free-field) and outside living or dining or bedroom window (facade)	Day	Rating Level 10dB below the measured background L <sub>A90,t</sub> sound level.	Rating level between 9dB below and 5dB above background LA90,t sound level	Rating Level greater than 5dB above back- ground L <sub>A90,t</sub> sound level
Dwellings	Outside bedroom window (facade)	Night	Rating Level 10dB below measured back- ground L <sub>A90,1</sub> sound level and no events exceeding 57dB L <sub>AFmax</sub>	Rating level between 9dB below and 5dB above background LA90,t sound level and events between 57 - 88dB LAFmax	Rating Level greater than 5dB above back- ground L <sub>A90,t</sub> sound level and events greater than 88dB LAFmax
	Policy Recommendation		No specific meas- ures required	Mitigate and reduce to a minimum	Avoid and prevent



PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

The following Rating Levels are proposed for achieving compliance with NOEL to LOAEL, where no specific measures are required:

- Daytime (07:00 23:00) 44dB LAR, Tr measured over a 1hr time base.
- Night-time (23:00 07:00) 35dB L<sub>Ar,Tr</sub> measured over a 15min time base.

Based on drawn information provided by the client and manufacturer plant noise and attenuator data supplied by the project M&E engineer, a CadnaA 3D noise propagation model has been used to assess the impact of the proposed plant items against the target criteria.

Noise impact assessments indicate that compliance with the target criteria cited by Camden Borough Council will be achieved and no adverse impact is expected from normal operation of all plant items.

1 NORTHWAYS PARADE - PROPOSED OFFICE CONVERSION PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# CONTENTS

1.0 INTRODUCTION	1
2.0 SITE DESCRIPTION	2
3.0 PLANNING POLICY AND DESIGN CRITERIA	6
4.0 ENVIRONMENTAL NOISE SURVEYS	9
5.0 RECOMMENDED PLANT NOISE LEVELS	11
6.0 PROPOSED PLANT DETAILS	12
7.0 CADNAA NOISE PROPAGAION MODELLING & NOISE IMPACT ASSESSMENT	14
8.0 CONCLUSION	19
APPENDIX A: NOISE SURVEY DETAILS	20



1 NORTHWAYS PARADE - PROPOSED OFFICE CONVERSION PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# 1.0 INTRODUCTION

Red Acoustics Ltd has been commissioned by SPS Associates Ltd to undertake a plant noise impact assessment for the proposed fixed plant and equipment to be installed at the proposed office conversion at 1 Northways Parade, Swiss Cottage.

This report presents the results of an unattended environmental noise survey and recommends Rating Levels to achieve an outcome of Lowest Observed Adverse Effect Level (LOAEL) or less. Based on drawn information provided by the client and manufacturer plant noise data supplied by the project M&E engineer, a CadnaA 3D noise propagation model has been used to assess the impact of the proposed plant items against the target criteria.



PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# 2.0 SITE DESCRIPTION

The proposed development site comprises of the redevelopment of an undercroft garage into office accommodation. The garage is located below the multi-unit residential buildings, Northways Parade, Swiss Cottage. Access to the development is via a shared access from Finchley Road.

External plant is proposed to be located on the roof of the existing building. Figure 2.1 presents the site location plan. Figure 2.2 present the proposed office layout and Figure 2.3 presents the roof plant and proposed plant area layout.

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### Figure 2.1: Site Location Plan



Figure 2.2: Proposed Office Layout Plan - Lower Ground Floor



Figure 2.3: Proposed Roof Plant Area











PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# 3.0 PLANNING POLICY AND DESIGN CRITERIA

National Planning Practice is guided by the National Planning Policy Framework. With regard to Noise the Framework states the following:

Planning policies and decisions should take account of the acoustic environment and consider:

- whether or not a significant adverse effect is occurring or likely to occur;
- whether or not an adverse effect is occurring or likely to occur and;
- whether or not a good standard of amenity can be achieved.

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

The terms 'significant adverse impact' and 'other adverse impacts' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE) which states:

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

No Observed Effect Level : This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

Lowest Observed Adverse Effect Level : This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

Significant Observed Adverse Effect Level : This is the level above which significant adverse effects on health and quality of life occur.

These are summarised in Table 3.1 below.



### PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

### **Table 3.1:** Explanation of Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Levels	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Lowest Observed Adverse Effect Level	Mitigate and reduce to a minimum
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect Level	Avoid

It should be noted that no specific noise limits for NPPF have been defined in Table 3.1 above, however, guidance from other acoustic standards may be employed to determine suitable levels within the overall principal of the National Planning Policy Framework.

# **Camden Borough Council Planning Guidance**

Camden Borough Council have published guidance for assessing noise from fixed pant and equipment and provides guidance on Rating Level values for each particular outcome in terms of Noise Policy for England requirements. Table 3.2 below presents a summary of the guidance and corresponding outcome in line with Noise Policy for England requirements.



# PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# Table 3.2: Camden Borough Council Plant Noise Target Criteria

Existing Noise Sens- itive Receptor	Assessment Loca- tion	Design Period	NOEL to LOAEL	LOAEL to SOAEL	SOAEL
Dwellings	Garden used mainly for amenity (free-field) and outside living or dining or bedroom window (facade)	Day	Rating Level 10dB below the measured background L <sub>A90,t</sub> sound level.	Rating level between 9dB below and 5dB above background LA90,t sound level	Rating Level greater than 5dB above back- ground Lago,t sound level
Dwellings	Outside bedroom window (facade)	Night	Rating Level 10dB below measured back- ground L <sub>A90,1</sub> sound level and no events exceeding 57dB L <sub>AFmax</sub>	Rating level between 9dB below and 5dB above background L <sub>A90,t</sub> sound level and events between 57 - 88dB L <sub>AFmax</sub>	Rating Level greater than 5dB above back- ground L <sub>A90,1</sub> sound level and events greater than 88dB L <sub>AFmax</sub>
	Policy Recommendation		No specific meas- ures required	Mitigate and reduce to a minimum	Avoid and prevent



PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# 4.0 ENVIRONMENTAL NOISE SURVEYS

A background unattended noise survey has been undertaken between the 4th and 10th March 2020. Figure 4.1 presents the measurement location. Figures 4.2 and 4.3 present the daytime and night-time LA90,15min survey data respectively.

Figure 4.1: Survey Locations



Based on the survey data presented below the typical daytime and night-time LA90,15min level is 54dB and 45dB respectively.





Figure 4.2: Daytime LA90,15min dB







PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# 5.0 RECOMMENDED PLANT NOISE LEVELS

The following Rating Levels are proposed for achieving compliance with NOEL to LOAEL, where no specific measures are required:

- Daytime (07:00 23:00) 44dB L<sub>Ar,Tr</sub> measured over a 1hr time base.
- Night-time (23:00 07:00) 35dB L<sub>Ar,Tr</sub> measured over a 15min time base.

The Rating Level should include any specific acoustic feature corrections for tonality, impulsivity or other sound characteristic in the absence of tones and impulses that would make it readily distinguishable against the ambient background sound character as well as any corrections for intermittency in addition to the feature corrections.

The Rating Level shall apply to the facade at all nearby noise sensitive properties.

Adopting and complying with the proposed Rating Levels will ensure that noise from fixed plant will not exceed the threshold of Lowest Observed Adverse Effect Level as defined in the Noise Policy Statement for England and will not require any specific control measures.

To ensure compliance with the above, a further study is required to ensure that when the Mechanical and Electrical Services Engineers specify appropriate units as well as any attenuation measures (if required).

PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW



# 6.0 PROPOSED PLANT DETAILS

The current plant layout is shown in Figure 2.4 above and comprises 7no. Condensing Units (CU), 1no. Air Handling Unit (AHU) with 2no. Air Source Heat Pump (ASHP). Units are provided by the manufacturer as combinations of smaller units. Table 6.1 below details the octave band noise data information provided by the manufacturer. Each larger unit is broken down into the individual component units.

### Table 6.1: Octave Band Noise Data - Proposed Plant Items

			Sound Level Noise Spectrum (dB)								
Code	Unit description	Parameter	63	125	250	500	1k	2k	4k	8K	dBA
CU01	REYQ16U	Lw	94	90	86	86	77	75	73	71	86
CU01a	REYQ20U	Lw	97	87	87	88	82	77	74	75	88
CU02	REYQ8U	Lw	88	81	79	78	72	68	64	59	79
CU02a	REYQ12U	Lw	90	85	83	81	77	74	76	68	84
CU02b	REYQ18U	Lw	93	84	82	83	77	74	74	70	84
CU03	RZAG100NV1	Lw	69	67	65	68	58	53	49	45	67
CU04	RZAG100NV1	Lw	69	67	65	68	58	53	49	45	67
ASHP	RYMQ20U	Lw	71	65	66	63	59	54	53	47	65
ASHPa	RYMQ12U	Lw	90	85	83	81	77	75	76	68	84
AHU	RHE1000HD RDX01	Break-out L <sub>w</sub>	67	78	52	52	57	53	48	36	64
AHU	RHE10000HD RDX01	Supply In- Duct L <sub>w</sub>	69	86	76	71	72	65	60	53	76
AHU	RHE10000HD RDX01	Extract In- Duct L <sub>w</sub>	66	84	69	80	77	71	71	61	81

During the daytime (07:00-23:00hrs) all plant items will be operational. During night-time periods (23:00-07:00hrs) only CU03 will be operational.



### PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

For compliance with the target noise criterion, additional attenuation measures are proposed. Table 6.2 below shows the attenuator insertion loss data and associated regenerated noise which has been applied to the CadnaA noise model.

### Table 6.2: Attenuator Octave Band Insertion Loss & Regenerated Noise Data

			Sound Level Noise Spectrum (dB)							
Code	Unit description	Parameter	63	125	250	500	1k	2k	4k	8K
AT001	REYQ16U	Insertion Loss	4	7	14	27	21	14	10	7
AT002	REYQ20	Insertion Loss	4	7	14	27	21	14	10	7
AT003	REYQ8	Insertion Loss	3	6	13	25	19	12	9	7
AT004	REYQ12	Insertion Loss	4	7	14	27	21	14	10	7
AT005	REYQ18	Insertion Loss	4	7	14	27	21	14	10	7
AT006	RYMQ20	Insertion Loss	4	7	14	27	21	14	10	7
AT007	RYMQ12	Insertion Loss	4	7	14	27	21	14	10	7
AT008	RZAQ	Insertion Loss	3	9	14	27	28	18	11	6
	Caice	Insertion Loss	5	6	9	14	20	20	20	20
SS300	Acoustic Louvre For Condensor Fresh Air Intake	Regenerated sound power level at 2m/s face velocity. L <sub>w</sub>	66	58	51	47	45	43	39	28
		Insertion Loss	5	10	18	28	36	28	24	14
Allaway SL450	DRDX01 Supply Intake	Regenerated sound power level, L <sub>w</sub>	49	49	44	45	44	43	42	35
	RHE10000H	Insertion Loss	5	10	18	28	36	28	24	14
Allaway SL450	DRDX01 Extrcat Discharge	Regenerated sound power level, L <sub>w</sub>	49	49	44	45	44	43	42	35

Sound Design<sup>1</sup> has been used to assess the ductbourne sound power noise transfer between AHU plant items and the Duct terminus/duct breakout using specialist approved calculation algorithms. The resultant data has then be used in the CadnaA noise propagation model as detailed in section 8.0 below.

<sup>&</sup>lt;sup>1</sup> <u>https://www.sounddesign.online/</u>

PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# 7.0 CADNAA NOISE PROPAGAION MODELLING & NOISE IMPACT ASSESSMENT

CadnaA has been used to predict the level of noise from the proposed plant items and associated attenuator data. The software implements the ISO 9613-2 prediction methodology and is considered to be the industry standard software to predict environmental noise propagation.

The development and its surroundings are modelled from drawn details and google earth imagery as well as terrain data from DEFRA/Environment Agency. Each plant item is modelled as a point source or line source for noise radiated from ducts. Manufacturer noise data for each plant item is then used to assess noise emanating from each item. The model is then used to predict the resultant noise incident on surrounding buildings and receiver positions.

Figure 7.1 below shows a screenshot of the model built.

### Figure 7.1: CadnaA 3D View





1 NORTHWAYS PARADE - PROPOSED OFFICE CONVERSION

PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

Figure 7.2 below shows the resultant impact on the adjacent noise sensitive spaces with all plant operating as proposed for daytime use (07:00-23:00hrs). As shown by the facade levels, the expected level is less than or equal to 43dBA.

### Figure 7.2: CadnaA Noise Impact Prediction - Daytime Operation



Figure 7.3 below shows the resultant impact on the adjacent noise sensitive spaces with all plant operating as proposed for night-time use (23:00-07:00hrs). As shown by the facade levels, the expected level is less than or equal to 18dBA.



1 NORTHWAYS PARADE - PROPOSED OFFICE CONVERSION

PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW





It is noted that the impact on nearby noise sensitive dwellings varies with position in the buildings as the combined sources benefit from a proposed screen around the plant area. This provides screening to the lower floors affected by noise from the plant items however the upper floors do not benefit as much from screening.

# **Plant Noise Ingress Assessment**

By taking into account the acoustic characteristics of the daytime and night-time facade plant noise levels, predictions can also be made of the likely noise ingress into the nearest noise sensitive dwelling.

To calculate the plant noise ingress into the nearest noise sensitive dwelling(s) the sound reduction provided by the existing dwelling facade can be determined.

Table 7.1 identifies the minimum Sound Reduction Index of a basic double glazed window (4mm float/ 16mm cavity/ 4mm float). The identified sound reductions shown in Table 7.1 relates to the composite sound reduction of the assumed glazing, frames and seals, and the cavity closer between the frames and the structural opening.



PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

Table 7.1: Minimur	n Sound Reduction	Index of Windows
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	Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)						
Glazing Configuration	63	125	250	500	1k	2k	4k
4 mm float /16 mm cavity /4 mm float	19	24	20	25	35	38	35

The sound reduction provided by the external wall, which is assumed to be a traditional cavity masonry wall construction giving a sound reduction a 55dB R<sub>w</sub>. The vent is assumed to be a standard non acoustic slot vent.

Figures 7.4 and 7.5 below show the predicted L<sub>Amax,f</sub> internal noise level as a Noise Rating Curve (NR) inside the residential spaces against suitable target daytime and night-time CIBSE plant noise criterion for Living Room & Bedroom Spaces respectively.



### Figure 7.4: Predicted Internal Residual Plant Lfeq Noise Level - Receptor 1 (lower floor level)



PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW





Figures 7.4 and 7.5 above indicate that the predicted daytime and night-time internal plant noise levels with windows open and closed will satisfy suitable target CIBSE part noise criterion for living room and bedroom spaces. No further noise mitigation is proposed at this stage.



1 NORTHWAYS PARADE - PROPOSED OFFICE CONVERSION

PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# 8.0 CONCLUSION

Plant noise Rating Levels have been recommended for daytime and night-time periods based on the measured background sound levels. The recommended Rating Levels will ensure that the Lowest Observed Adverse Effect Level is achieved at residential and sensitive facades.

A CadnaA 3D noise propagation has been constructed to predict and assess the impact of noise from the proposed plant items. Recommendations have been made to explore further options to reduce the overall noise impact to levels that would be acceptable to the local planning authority.

Noise impact has been assessed on nearby receptor locations for daytime and night-time operation. Impact predictions indicate that compliance with the local authority criterion will be achieved and the residual internal plant noise levels will also comply with suitable CIBSe guidelines for plant noise in living room and bedroom spaces as applicable.

At this stage no further mitigation is proposed.

**):** red acoustics

1 NORTHWAYS PARADE - PROPOSED OFFICE CONVERSION

PLANT NOISE IMAPCT ASSESSMENT - R1839-REP01B-SJW

# APPENDIX A: NOISE SURVEY DETAILS

Location

1 Northways Parade, Swiss Cottage

**Survey Dates** 

4th - 10th March 2020

Weather

Weather during the surveys was relatively dry, cool and with wind speeds less than 5ms<sup>-1</sup>

**Personnel Present During Surveys** 

Johnathan Whittle BA (Hons) Pg. Dip IOA MIOA

# **Methodology and Instrumentation**

Before and after the measurements the sound level meters were check calibrated to an accuracy of  $\pm 0.3$ dB using the associated field. The calibrator produces a sound pressure level of 94 dB re 2x10<sup>-5</sup> Pa @ 1kHz. Calibration certificates can be supplied if requested.

### Table A1: Instrumentation Used

Survey Location & Date	Kit No	Equipment Description	Type Number	Manufacturer	Serial Number
All survey locations		Sound Level Meter	CR:171B Type 1	Cirrus	G056973
	RED05	Sound Calibrator	CR:515 Type 1	Cirrus	59150
		Outdoor Microphone	MK:224	Cirrus	210642D
		Outdoor Preamplifier	MK:170	Cirrus	187