Sound Licensing Ltd.
Kemp House
152 City Road
London
EC1V 2NX

T: +44 (0) 20 7096 1555
www.soundlicensing.co.uk
enquiries@soundlicensing.co.uk

# NOISE IMPACT ASSESSMENT REPORT
# KITCHEN EXTRACTION SYSTEM

## 128B CAMDEN ROAD, LONDON, NW1 9EE

**FOR**

## MR O DOGAN

ISSUE STATUS: FINAL
DATE OF ISSUE: 15/03/2018
REPORT REF: 128B CAMDEN RD.NIA.REV01
AUTHOR: M LAUEZZARI, MIOA MIOL
CHECKED BY: C BANKS, AMIOA MIEMA
APPROVED: M LAUEZZARI, MIOA MIOL

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## 1. EXECUTIVE SUMMARY

It is proposed to install a new commercial kitchen extraction system to service the ground floor premise at 128B Camden Road, London, NW1 9EE.

Sound Licensing has previously undertaken an environmental noise survey at the site, on the 21/04 – 24/04/2017, in order to determine prevailing background noise levels that are representative of the nearest noise sensitive properties, which have been identified as the first and second floors of 159 St Pancras Way.

The results of the noise survey were considered reasonable given the location of the measurement position and the existing noise sources in the local vicinity.

Noise calculations of the extraction system have been undertaken using all available details and plans provided by the client and obtaining manufacturers' specifications wherever possible. The data and information forms the basis of the assessment.

Noise break-out limits for the extraction system have been proposed based on the methodologies of British Standard (BS)4142:2014. A robust, worst-case assessment of the noise levels associated to the proposed kitchen extract system has been undertaken.

The predicted noise impact due to the operation of the kitchen extract system ***"is an indication of the specific sound source having a low impact"***. The predicted noise level of the kitchen extraction system at the nearest noise sensitive properties complies with Camden Council's policy.

## 2. INTRODUCTION

128B Camden Road is proposing to install a new kitchen extraction system at the rear of the building, the noise from which could have the potential to affect existing noise sensitive properties nearby.

The purposes of this report are:

- To determine prevailing environmental noise levels affecting surrounding properties due to nearby noise sources (e.g. road traffic, aircraft etc);
- Based on the above, to present noise emission limits in accordance with the requirements of BS4142:2014 and Camden Council's Policy, and
- To undertake an assessment to demonstrate compliance with the Local Authority noise requirements.

Following this introductory section, a description of the site is given in Section 3. Section 4 gives a description of the environmental noise survey methodology, with noise criteria presented in Section 5. A description of the external noise emission limits is presented in Section 6. Details of the proposed kitchen extraction system are provided in Section 7. A noise impact assessment is presented in Section 8. Appendix A presents an explanation of the acoustic terminology used in this report, Appendix B presents data sheets and figures, Appendix C presents Full noise monitoring data.

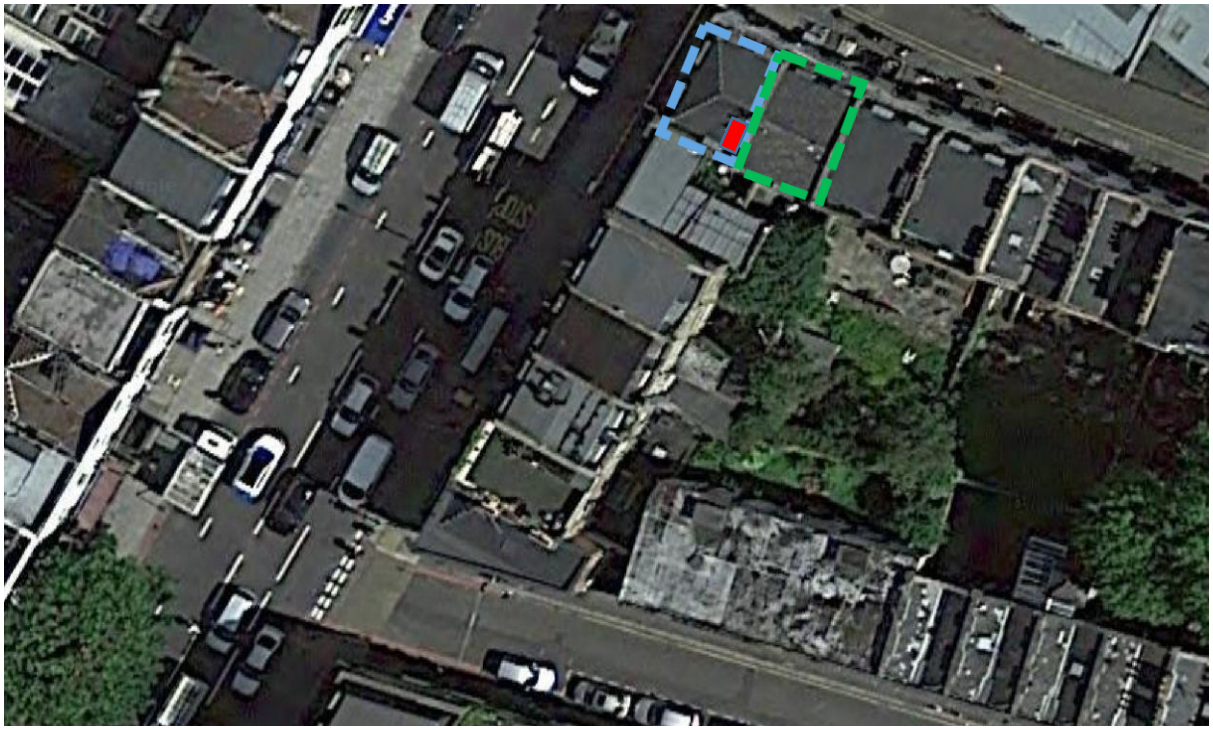
## 3. SITE DESCRIPTION

128B Camden Road (hereafter 'the site') is seeking planning permission for the installation of a new kitchen extraction system at the rear of the building. The site has 4 floors and is part of a number of mixed commercial & residential premises on the same street.

The nearest noise sensitive receptors to the proposed kitchen extraction system were noted to be the first floor rear windows at 159 St Pancras Way, at approximately 4 metres from the proposed flue terminus, there are no windows with direct line of sight. If the noise impact assessment details that there is an indication of the specific sound source having a low impact at these premises then it can be safely assumed it will be met at other properties of equal distance and/or those further away.

Figure 3.1 shows the site highlighted in blue with the nearest identified residential property highlighted in green and the proposed kitchen extract ductwork indicated in **red**.

**Figure 3.1 Site Location and Surrounding Land Use**



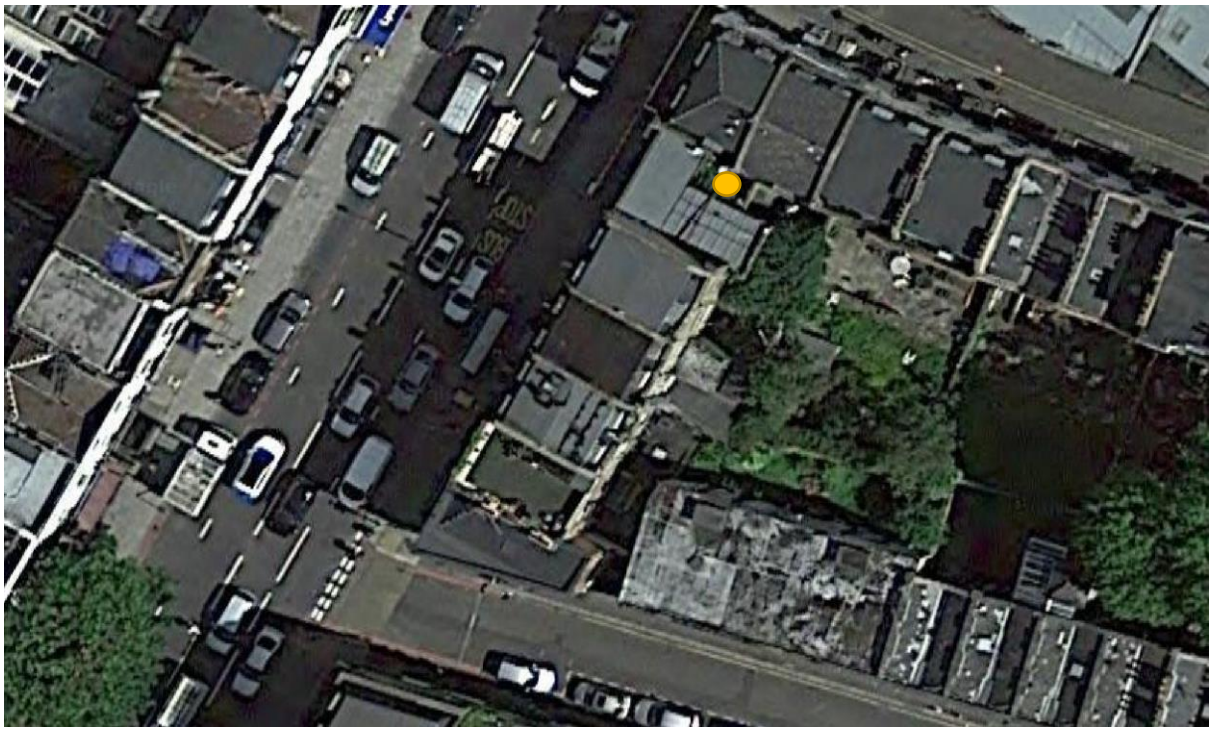
Source: Google maps

## 4. ENVIRONMENTAL NOISE SURVEY METHODOLOGY

An unmanned environmental noise survey was undertaken at a single measurement location at the rear of the site on the roof of the ground floor extension. The survey was undertaken between 16:45 on 21/04/17 and 14:00 on 24/04/17. A survey at this time covers both the weekday evening & weekend proposed operational period in which the kitchen extraction system may be operational.

$L_{Amax}$, $L_{Aeq}$ and $L_{A90}$ noise levels were measured throughout the noise survey in continuous 15-minute periods. 15 minute periods have been provided for this reference time period in accordance with BS4142:2014. The approximate measurement position is indicated in **orange** on Figure 4.1 below.

**Figure 4.1 Site Plan Showing Approximate Location of Measurement Position**



Source: Google maps

The sound level meter was positioned at first floor roof level approximately 1 metres from any wall/fence, therefore a 3dB(A) façade correction will be applied. The measurement position is considered representative of background noise levels at the nearest identified noise sensitive property.

The equipment used for the noise survey is summarised in Table 4.1.

**Table 4.1 Description of Equipment used for Noise Survey**

| Equipment | Description | Quantity | Serial Number |
|---|---|---|---|
| Larson Davis Sound Expert LxT | Type 1 automated logging sound level meter | 1 | 0004702 |
| Larson Davis 377B02 | ½" microphone | 1 | 159519 |
| Larson Davis | Pre-amplifier | 1 | 042610 |
| Larson Davis CAL200 | Class 1 Calibrator | 1 | 11867 |
| 5m Extension Cable | - | 1 | - |

The noise survey and measurements were conducted in accordance with BS7445-1:2003 '*Description and measurement of environmental noise. Guide to quantities and procedures'*.

Weather conditions at the start of the survey were warm (15$^{o}$C) with wind of below <5metres p/second. For the rest of the measurement period the weather remained dry with temperatures ranging between 6$^{o}$C and 15$^{o}$C These weather conditions were checked against and confirmed by the use of the Met Office mobile application available on smart phone technology. These conditions were maintained throughout the majority of the survey period and are considered reasonable for undertaking environmental noise measurements.

The noise monitoring equipment was field-calibrated before and after the noise survey period. No significant drift was recorded (>0.3). Equipment calibration certificates can be provided upon request.

## 5. NOISE SURVEY RESULTS AND OBSERVATIONS

### 5.1 Results

A summary of the measured typical background and average ambient noise levels during the proposed operational hours are shown in Table 5.1 below.

**Table 5.1 Measured minimum background and average ambient sound pressure levels**

| Period | Typical Ambient Sound Pressure Level $L_{Aeq,15min}$ (dB) | Typical Background Sound Pressure Level $L_{A90,1hour}$ (dB) |
|---|---|---|
| 10:00 - 23:00 | 50* | 44* |

*Façade corrected – 3dB

The typical background noise level at the measurement position during the survey, at the time in which the plant could be operational, was 44dB $L_{A90\ (1\ hour)}$.

### 5.2 Observations

Given that the noise survey was unmanned, noise sources could not be identified. However, at the beginning and end of the survey background noise was dominated by existing road traffic noise on the local road network. After analysis of the data no significant abnormal noise source(s) were identifiable.

## 6. EXTERNAL NOISE EMISSION LIMITS

### 6.1 Local Authority Requirements

The site lies within the jurisdiction of the Local Authority, the London Borough of Camden. Relevant policy from Camden's Local Plan, Adoption Version 2017, is reproduced below.

**Policy A4 Noise and vibration**

The Council will seek to ensure that noise and vibration is controlled and managed.

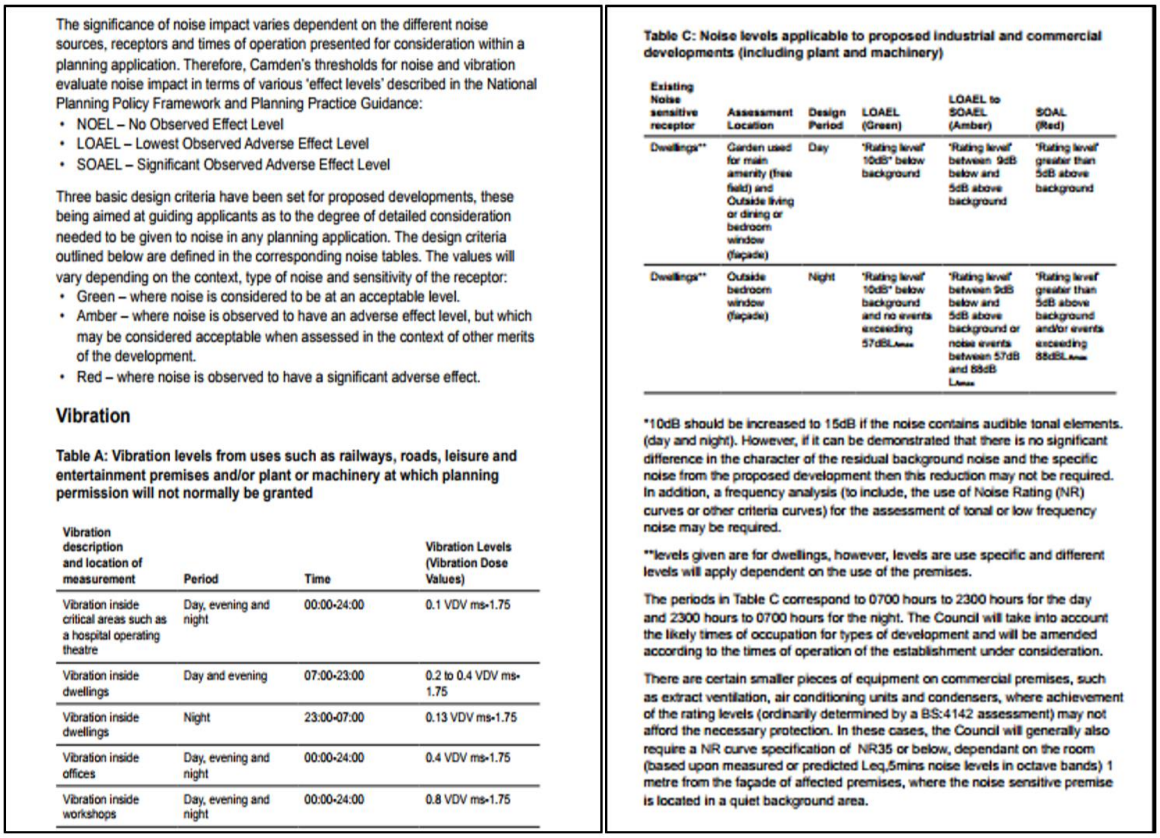
Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

a. development likely to generate unacceptable noise and vibration impacts; or
b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

**Industrial and Commercial Noise Sources**

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).



The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance:

- NOEL – No Observed Effect Level
- LOAEL – Lowest Observed Adverse Effect Level
- SOAEL – Significant Observed Adverse Effect Level

Three basic design criteria have been set for proposed developments, these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The design criteria outlined below are defined in the corresponding noise tables. The values will vary depending on the context, type of noise and sensitivity of the receptor:

- Green – where noise is considered to be at an acceptable level.
- Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.
- Red – where noise is observed to have a significant adverse effect.

**Vibration**

**Table A: Vibration levels from uses such as railways, roads, leisure and entertainment premises and/or plant or machinery at which planning permission will not normally be granted**

| Vibration description and location of measurement | Period | Time | Vibration Levels (Vibration Dose Values) |
|---|---|---|---|
| Vibration inside critical areas such as a hospital operating theatre | Day, evening and night | 00:00-24:00 | 0.1 VDV ms-1.75 |
| Vibration inside dwellings | Day and evening | 07:00-23:00 | 0.2 to 0.4 VDV ms-1.75 |
| Vibration inside dwellings | Night | 23:00-07:00 | 0.13 VDV ms-1.75 |
| Vibration inside offices | Day, evening and night | 00:00-24:00 | 0.4 VDV ms-1.75 |
| Vibration inside workshops | Day, evening and night | 00:00-24:00 | 0.8 VDV ms-1.75 |

**Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)**

| Existing Noise sensitive receptor | Assessment Location | Design Period | LOAEL (Green) | LOAEL to SOAEL (Amber) | SOAL (Red) |
|---|---|---|---|---|---|
| Dwellings** | Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade) | Day | 'Rating level' 10dB* below background | 'Rating level' between 9dB below and 5dB above background | 'Rating level' greater than 5dB above background |
| Dwellings** | Outside bedroom window (façade) | Night | 'Rating level' 10dB* below background and no events exceeding 57dB $L_{Amax}$ | 'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB $L_{Amax}$ | 'Rating level' greater than 5dB above background and/or events exceeding 88dB $L_{Amax}$ |

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

For the purposes of this report, an assessment has been undertaken in line with the above policy guidance and BS 4142:2014.

### Table 6.1 Maximum noise emission design target

Taking the noise monitoring data in Section 5 and Local Authority design requirements above, the following design target would normally be adopted for this project:

| Period | Typical Measured Background Noise Level $L_{A90,1hour}$ (dB) | Noise level at the nearest noise sensitive receptor, $L_{Aeq}$ dB | Tonal noise level at the nearest noise sensitive receptor, $L_{Aeq}$ dB |
|---|---|---|---|
| 10:00 - 23:00 | 44* | 34 | 29 |

*Including façade correction

These representative noise levels are considered appropriate for the assessment.

## 6.2 BS 4142:2014

BS 4142:2014 "Methods for rating and assessing industrial and commercial sound" presents a method for assessing the significance and possible adverse impact due to an industrial noise source, based on a comparison of the source noise levels and the background noise levels, both of which are measured or predicted at a noise sensitive receiver e.g. a residential property.

The rating level is compared to the background noise level and the significance of the new noise source likelihood of any adverse impact is determined in accordance with the following advice:

*"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occur. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

## 7. PROPOSED KITCHEN EXTRACTION SYSTEM AND ASSOCIATED NOISE LEVELS

It is proposed to install the following items of plant at the rear of the premise.

**Table 7.1 Proposed Kitchen extract plant**

| Make | Model | Reference Noise Level* |
|---|---|---|
| Helios | Gigabox 560/6/6 | 72dB LwA |

* Manufacturer's specification is provided in Appendix B.

It is proposed to install one Helios Fan internally with 500mm ducting to terminate at the rear façade of the building for extraction. The existing construction of the premise is substantial therefore breakout noise from the fan motor is not included in this assessment.

In reference to section 6 of this report, a penalty addition of 3dB for intermittency has not been applied in the calculations as it is considered that after mitigation has been installed the resultant noise level will be insufficient to attract attention at the residential receptor over the existing residual noise level (lowest recorded residual (47dB(A)$L_{Aeq,15min}$) is 13dB above the predicted specific noise level).

A penalty has not been applied for tonality as spectral data of the fan, as shown in the Appendix, shows no characteristics. Penalty additions have also not been applied for impulsiveness or any other unusual characteristics as kitchen extract plant of this type generally do not generate such features.

### 7.1 Directivity

A directivity correction should be applied as the extract duct aperture is to terminate at 90˚ in relation to the nearest residential windows. A duct opening of 500mm has been used.

Residential - 90°

| 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 4 | 6 | 7 | 14 | 17 | 19 |

*Directivity calculation – frequency (f) x duct opening (d) / speed of sound (c)

### 7.2 Silencer

It is recommended to install a silencer after the fan unit such as the model detailed below or a similar unit with equivalent acoustic performance.

A Helios RSD silencer (Model RSD 500/900) should be installed post fan, this will provide the following attenuation. The silencer should be Melinex lined.

| 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
|---|---|---|---|---|---|---|
| 6 | 8 | 14 | 16 | 13 | 13 | 9 |

## 8. NOISE IMPACT ASSESSMENT

This section presents calculations to predict the noise impact of the proposed kitchen extraction system, located at the rear of the site, at the nearest noise sensitive properties.

### 8.1 Proposed Operational Hours and Background Noise Levels

The kitchen extract system is proposed to operate between 10:00 to 23:00 hours initially for 6 days a week, as the exact days of operation have yet to be specified, monitoring has been carried out over the weekend period as this is likely to be the most sensitive.

As detailed in Section 6.1 of this report, the representative background noise level used in this assessment is 44dB $L_{A90\ (1hour).}$ The design range is 34dB $L_{Aeq}$ at the façade of the residential premises.

### 8.2 Nearest Noise Sensitive Properties

The nearest residential windows to the proposed kitchen extraction system were noted to be the first floor of 159 St Pancras Way at approximately 4 metres distance.

### 8.3 Description of Calculation Process

In accordance with the methodologies of BS4142:2014 and Camden Council Policy, calculations have been undertaken to predict noise levels in which the kitchen extraction system could be operational. As a worst case scenario, it has been assumed that the system will be operational continuously for the full 60 minutes thereby enabling a robust assessment. It has also been assumed that the system will be operating at the highest noise operating level. Given the distances between the proposed ductwork terminus to the sensitive receptors, point source calculations have been used.

### 8.4 Noise Level Predictions

Calculations to predict the noise of the kitchen extraction system operating at the window of the residential property is given below.

**Figure 8.1 - Kitchen extract system noise calculations at the first-floor window at 159 St Pancras Way**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Attenuation per double distance required = | | | | | **6** | dB | | | Metres | |
| ( 6dB for LpA recommended) | | | | | | Enter Distance = | | | **4** | |
| | | **Frequency Hz** | | | | | | | | |
| | | **63** | **125** | **250** | **500** | **1000** | **2000** | **4000** | **8000** | Total |
| | Helios 560/6/6 | 0 | 76.1 | 70.6 | 72.2 | 67 | 64.8 | 60 | 51.1 | 78.92 |
| | | | | | | | | | | 9.03 |
| | | | | | | | | | | 9.03 |
| | Total LW | 0.0 | 76.1 | 70.6 | 72.2 | 67.0 | 64.8 | 60.0 | 51.1 | 78.92 |
| | 'A' Weight | 0 | 16.1 | 8.6 | 3.2 | 0 | -1.2 | -1 | 1.1 | |
| | LWA (Power) | 0.0 | 60.0 | 62.0 | 69.0 | 67.0 | 66.0 | 61.0 | 50.0 | 73.20 |
| | LPA at New Dist' | 0.00 | 40.00 | 42.00 | 49.00 | 47.00 | 46.00 | 41.00 | 30.00 | 53.20 |
| | SILENCER(RSD500/900) | 0 | 6 | 8 | 14 | 16 | 13 | 13 | 9 | |
| | DUCT BENDS (1) | 0 | 1 | 6 | 8 | 4 | 3 | 3 | 3 | |
| | DUCT LENGTH, 1m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | DIRECTIVITY 90° | 0 | 0 | 4 | 6 | 7 | 14 | 17 | 19 | |
| | LPA After Insert | **0.00** | **33.00** | **24.00** | **21.00** | **20.00** | **16.00** | **8.00** | **-1.00** | **34.01** |

*Includes directivity correction & silencer attenuation

The rating noise level at the first-floor residential window at 159 St Pancras Way, with the kitchen extraction system operating, is **34dB** $L_{Aeq}$ which is 10dB(A) below the typical adopted background noise level (44dB $L_{A90, 1hour}$).

In accordance with BS 4142:2014 guidance, the rating noise ***"is an indication of the specific sound source having a low impact"***. *The lower the rating level is relative to the measured background level, the less likely it is that the specific sound source will have an adverse impact*.

The predicted maximum operating noise level of the kitchen extraction system is demonstrated to comply with Camden Council Policy.

## 8.5 Vibration

In addition to the control of airborne noise transfer, it is important to consider the transfer of noise as vibration to adjacent properties as well as any sensitive areas of the same building. Typical advice for controlling vibration from extraction fan units is that isolation from the supporting structure should be completed by the installation of either steel spring isolators or rubber footings.

### Uncertainty

The levels of uncertainty in the data and calculations are considered to be low given the robust exercise undertaken in noise monitoring and the confidence in the data statistical analysis. Manufacturers' data for the plant is highly likely to be robust. Detailed calculations and resultant noise levels at the residential location are considered to be confidently predicted.

## 9.0 Conclusion

Sound Licensing has undertaken an environmental noise survey at the site in order to determine prevailing background noise levels that are representative of the nearest noise sensitive properties. The operation of the kitchen extraction system, in accordance with BS4142:2014 guidance, indicates to creating a low impact. All worst case scenarios have been applied to the assessment. The predicted maximum operating noise level of the kitchen extraction system is demonstrated to comply with Camden Councils Policy.

## APPENDIX A – Acoustic Terminology

| Parameter | Description |
|---|---|
| Acoustic environment | Sound from all sound sources as modified by the environment |
| Ambient sound | Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far |
| Ambient sound level, La = LAeq,T | Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T |
| Background sound level, LA90,T | A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels |
| Decibel (dB) | A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ($20x10^{-6}$ Pascals). |
| Equivalent continuous A-weighted sound pressure level, LAeq,T | Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time |
| Measurement time interval, Tm | Total time over which measurements are taken |
| Rating level, LAr,Tr | Specific sound level plus any adjustment for the characteristic features of the sound |
| Reference time interval, Tr | Specified interval over which the specific sound level is determined |
| Residual sound | Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound |
| Residual sound level, Lr = LAeq,T | Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T |
| Specific sound level, Ls = LAeq,Tr | Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr |
| Specific sound source | Sound source being assessed |

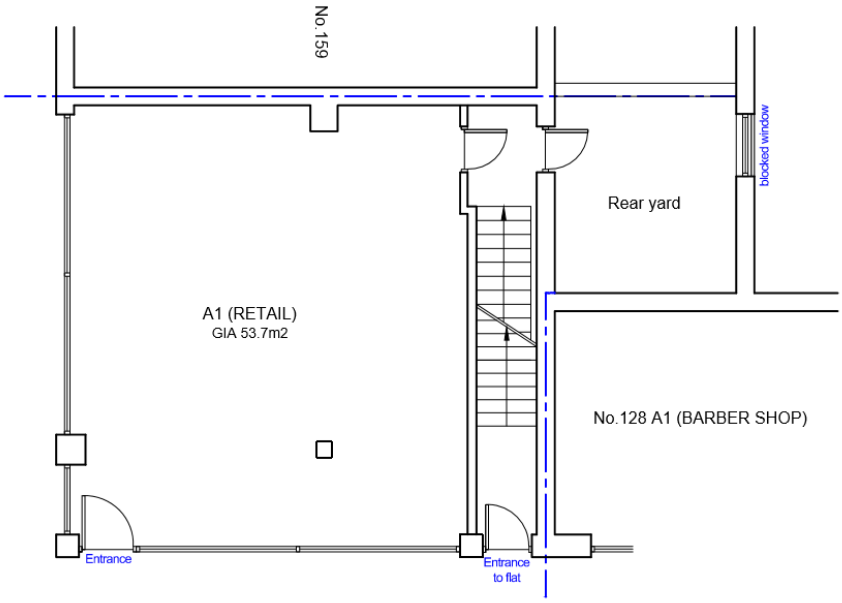
**References:**

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

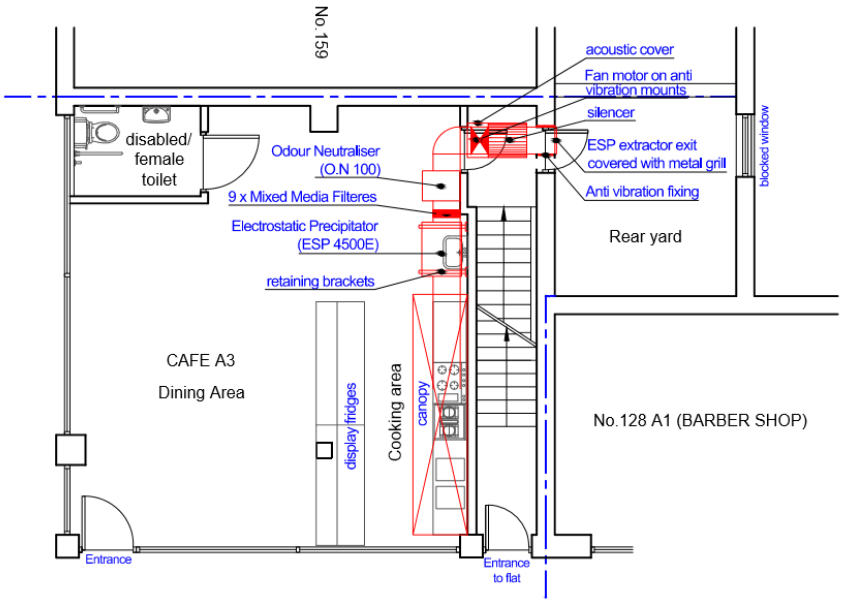
Camden's Local Plan, Adoption Version 2017

Red Book of Acoustics – Watson/Downey

## APPENDIX B – Data Sheets and Figures




GROUND FLOOR
(as existing)



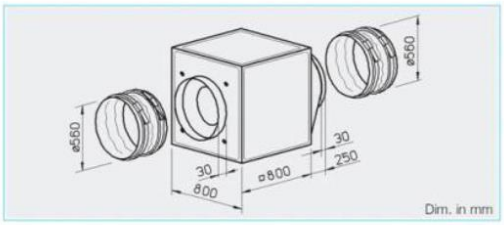

GROUND FLOOR
(as proposed)

* NO ALTERATIONS TO FRONT ELEVATION

## 560 mm ø GigaBox centrifugal fan

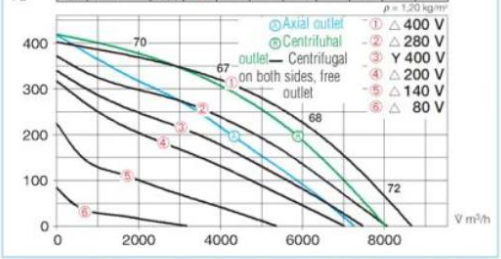
Helios

NEW!

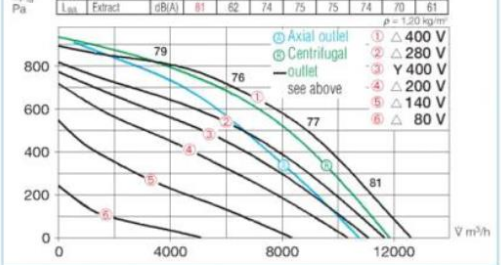

**GBD 560/6/6**

| Frequency | | Hz | Total | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
|---|---|---|---|---|---|---|---|---|---|---|
| $L_{wa}$ | Case breakout | dB(A) | 55 | 52 | 51 | 42 | 40 | 37 | 32 | 25 |
| $L_{wa}$ | Intake | dB(A) | 68 | 51 | 53 | 63 | 64 | 61 | 53 | 43 |
| $L_{wa}$ | Extract | dB(A) | 72 | 60 | 62 | 69 | 67 | 66 | 61 | 50 |




**GBD 560/4/4**

| 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 |




### Specification

**Casing**
Self-supporting frame construction made from aluminium hollow section. Double skinned, 20 mm strong side panel made from galvanised steel plate, soundproof and heat insulated through coating with non flammable mineral wool. Intake with mouth for ideal inlets as well as connectors and flexible sleeve for installation to ducts. Extract with spigot (from rectangular to circular) for low-loss escape and flexible sleeve for prevention of impact sound transfer. Simple positioning through load hooks as standard.

**Impeller**
Free-wheeling centrifugal high performance impeller with backwards curved polymer blades made from galvanised steel plate, direct powering. Energy-efficient at low noise development. It is dynamical together with the motor to DIN ISO 1940 T.1 – quality grade 2.5.

**Motor**
Maintenance-free external rotor motor in protection to IP 54. Thermal overload protection through built-in thermo contacts. Ball bearings and radio interference-free.

**Electrical connection**
Terminal box on the motor as standard, protection to IP 54.

**Motor protection**
Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

**Speed control**
All models are speed controllable using voltage reduction with transformer controller. The 3 ph.-models can operated on two speed controllers through Y/△ wiring (accessories to DS 2 or full motor protection unit M4). The voltage steps are given in the performance curve.

**Mounting**
Mounting position in any position and flexible installation through five possible discharge directions of the spigot.
For wall mounting the wall bracket has to be used (accessory). It is possible to set up an outlet water repellent roof and grille (acessory).

**Sound levels**
Above the performance curves the sound power levels are given in total and spectrum for:
- sound level case breakout
- sound level intake
- sound level extract

Within the performance curve the sound power level (on intake) is given for the transformer speed steps. In the table below there is also to find
- case breakout level at 4 m (free-field conditions).

### Accessory

**Wall bracket** for wall mounting.
GB-WK 560 Ref.No. 5626

**Water repellent extract grille.**
GB-WSG 560 Ref.No. 5640

**Water repellent roof outlet.**
GB-WSD 560 Ref.No. 5749

**Condensate tray** with spigot for duct/ hose connection.
GB-KW 560 Ref.No. 5645

**Reversing and on/off switch** for double-rotating Y/△-switchable 3 Phase fans.
Type DS 2 [2] Ref.No. 1351

| Type | Ref.No. | Air flow volume (FID) | R.P.M. | Sound press. level case breakout | Motor powering | Current full load | Current speed controlled | Wiring diagram | Maximum air flow temperature full load | Maximum air flow temperature controlled | Nominal weight (net) | 5 step transformer controller with motor protect.unit | Ref.No. | 5 step transformer controller without motor protect.unit | Ref.No. | Full motor protection unit using the thermal contacts | Ref.No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | V̇ m³/h | min⁻¹ | dB(A) at 4 m | kW | A | A | No. | +°C | +°C | kg | Type | | Type | | Type | |
| **2 speed motor, 3 Phase motor, 3~, 400 V, 50 Hz, Y/△-motor, protection to IP 54** | | | | | | | | | | | | | | | | | |
| **GBD 560/6/6** | 5522 | 7800/8640 | 690/870 | 35 | 0,51/0,80 | 0,90/1,90 | 1,90 | 867 | 60 | 60 | 80 | **RDS 4** | 1316 | **TSD 3,0** | 1502 | **M4**[1] | 1571 |
| **GBD 560/4/4** | 5521 | 11500/12590 | 1110/1350 | 44 | 1,70/2,50 | 2,80/4,80 | 4,90 | 867 | 55 | 45 | 90 | **RDS 7** | 1578 | **TSD 7,0** | 1504 | **M4**[1] | 1571 |

[1] incl. operation and reversing switch
[2] required full motor protection unit: model MD, No. 5849

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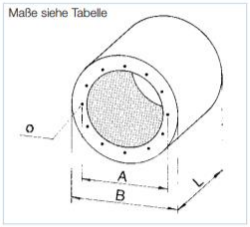
## Rohrschalldämpfer RSD

Helios

**Ausführung – Einbau**
Gehäuse aus verzinktem Stahlblech. Auskleidung mit hochwertiger Mineralwolle, die strömungsseitig mit einem Vlies gegen Abrieb ausgerüstet ist. Maße und Befestigungslochkreis aller Größen sind auf die Ventilatoren-Normdurchmesser (R 20) abgestimmt. Befestigungsbohrungen entsprechen DIN 24155, Bl. 2.

**Einfügungsdämmung**
Für größere Einfügungsdämmungen können mehrere Schalldämpfer mit gleichem Durchmesser hintereinander angeordnet werden.

**Druckverluste**
Die Strömungswiderstände der RSD-Schalldämpfer sind sehr gering. Bei der Anlagenberechnung wird der zweifache Rohrreibungswiderstand berücksichtigt.




RSD

| Hinweis | Seite |
|---|---|
| Auswahl-Schallberechnung | 434 |

| Type Nenn-Ø | Bestell-Nr. | Grund-länge | Abmessungen in mm L | A | B | Bohrung Ø | Gewicht ca. kg | Einfügungsdämmmaß $D_e$ dB 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | mittleres Dämmmaß |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RSD 225/ 300 | 8734 | 1 | 300 | 259 | 404 | 6 x M 6 | 7 | 2 | 5 | 9 | 14 | 13 | 8 | 6 | 8 |
| RSD 225/ 600 | 8735 | 2 | 600 | 259 | 404 | 6 x M 6 | 12 | 4 | 10 | 17 | 27 | 25 | 17 | 14 | 15 |
| RSD 225/ 900 | 8736 | 3 | 900 | 259 | 404 | 6 x M 6 | 17 | 7 | 13 | 25 | 33 | 31 | 20 | 16 | 20 |
| RSD 250/ 300 | 8737 | 1 | 300 | 286 | 404 | 6 x M 6 | 7 | 3 | 5 | 8 | 8 | 9 | 7 | 5 | 8 |
| RSD 250/ 600 | 8738 | 2 | 600 | 286 | 404 | 6 x M 6 | 12 | 5 | 10 | 16 | 24 | 19 | 14 | 10 | 15 |
| RSD 250/ 900 | 8739 | 3 | 900 | 286 | 404 | 6 x M 6 | 16 | 6 | 12 | 22 | 28 | 21 | 15 | 11 | 18 |
| RSD 280/ 400 | 8740 | 1 | 400 | 322 | 454 | 8 x M 8 | 10 | 4 | 5 | 8 | 14 | 9 | 8 | 6 | 8 |
| RSD 280/ 800 | 8741 | 2 | 800 | 322 | 454 | 8 x M 8 | 18 | 7 | 9 | 16 | 28 | 18 | 17 | 14 | 14 |
| RSD 280/1200 | 8742 | 3 | 1200 | 322 | 454 | 8 x M 8 | 25 | 9 | 12 | 23 | 37 | 23 | 20 | 16 | 18 |
| RSD 315/ 400 | 8743 | 1 | 400 | 356 | 504 | 8 x M 8 | 11 | 3 | 3 | 7 | 13 | 8 | 7 | 5 | 5 |
| RSD 315/ 800 | 8744 | 2 | 800 | 356 | 504 | 8 x M 8 | 19 | 6 | 8 | 14 | 26 | 16 | 12 | 9 | 12 |
| RSD 315/1200 | 8745 | 3 | 1200 | 356 | 504 | 8 x M 8 | 28 | 9 | 12 | 21 | 36 | 18 | 17 | 14 | 18 |
| RSD 355/ 400 | 8746 | 1 | 400 | 395 | 564 | 8 x M 8 | 13 | 3 | 4 | 7 | 11 | 7 | 6 | 4 | 6 |
| RSD 355/ 800 | 8747 | 2 | 800 | 395 | 564 | 8 x M 8 | 23 | 6 | 7 | 13 | 22 | 14 | 12 | 8 | 11 |
| RSD 355/1200 | 8748 | 3 | 1200 | 395 | 564 | 8 x M 8 | 33 | 8 | 11 | 17 | 29 | 18 | 15 | 10 | 17 |
| RSD 400/ 400 | 8749 | 1 | 400 | 438 | 564 | 12 x M 8 | 12 | 3 | 4 | 6 | 9 | 7 | 5 | 3 | 6 |
| RSD 400/ 800 | 8750 | 2 | 800 | 438 | 564 | 12 x M 8 | 21 | 6 | 6 | 12 | 18 | 13 | 12 | 8 | 9 |
| RSD 400/1200 | 8751 | 3 | 1200 | 438 | 564 | 12 x M 8 | 30 | 7 | 10 | 14 | 22 | 18 | 13 | 9 | 15 |
| RSD 450/ 400 | 8752 | 1 | 400 | 487 | 634 | 12 x M 8 | 17 | 4 | 5 | 8 | 10 | 8 | 7 | 5 | 8 |
| RSD 450/ 800 | 8753 | 2 | 800 | 487 | 634 | 12 x M 8 | 27 | 6 | 7 | 13 | 18 | 13 | 12 | 9 | 11 |
| RSD 450/1200 | 8754 | 3 | 1200 | 487 | 634 | 12 x M 8 | 38 | 8 | 10 | 18 | 23 | 17 | 14 | 10 | 15 |
| RSD 500/ 600 | 8755 | 1 | 600 | 541 | 714 | 12 x M 8 | 27 | 4 | 5 | 9 | 11 | 9 | 9 | 6 | 8 |
| RSD 500/ 900 | 8756 | 2 | 900 | 541 | 714 | 12 x M 8 | 36 | 6 | 8 | 14 | 16 | 13 | 13 | 9 | 12 |
| RSD 500/1200 | 8757 | 3 | 1200 | 541 | 714 | 12 x M 8 | 45 | 8 | 11 | 22 | 24 | 17 | 16 | 12 | 17 |
| RSD 560/ 600 | 8758 | 1 | 600 | 605 | 804 | 8 x M 10 | 32 | 3 | 5 | 9 | 9 | 8 | 8 | 6 | 8 |
| RSD 560/1200 | 8759 | 2 | 1200 | 605 | 804 | 8 x M 10 | 52 | 6 | 10 | 19 | 19 | 16 | 13 | 10 | 15 |
| RSD 630/ 600 | 8760 | 1 | 600 | 674 | 900 | 8 x M 10 | 44 | 3 | 5 | 8 | 8 | 8 | 7 | 5 | 8 |
| RSD 630/1200 | 8761 | 2 | 1200 | 674 | 900 | 8 x M 10 | 68 | 5 | 10 | 16 | 15 | 15 | 11 | 8 | 15 |
| RSD 710/ 600 | 8762 | 1 | 600 | 751 | 1000 | 8 x M 10 | 51 | 3 | 5 | 7 | 7 | 7 | 6 | 4 | 8 |
| RSD 710/1200 | 8763 | 2 | 1200 | 751 | 1000 | 8 x M 10 | 80 | 5 | 10 | 14 | 13 | 13 | 10 | 7 | 15 |
| RSD 800/ 600 | 8764 | 1 | 600 | 837 | 1100 | 12 x M 10 | 57 | 2 | 5 | 7 | 6 | 6 | 5 | 4 | 8 |
| RSD 800/1200 | 8765 | 2 | 1200 | 837 | 1100 | 12 x M 10 | 88 | 5 | 9 | 13 | 11 | 11 | 9 | 6 | 14 |
| RSD 900/ 900 | 8766 | 1 | 900 | 934 | 1220 | 12 x M 10 | 82 | 2 | 4 | 10 | 9 | 6 | 5 | 4 | 6 |
| RSD 900/1800 | 8767 | 2 | 1800 | 934 | 1220 | 12 x M 10 | 135 | 4 | 9 | 21 | 17 | 13 | 9 | 8 | 14 |
| RSD 1000/ 900 | 8768 | 1 | 900 | 1043 | 1350 | 12 x M 10 | 96 | 2 | 4 | 8 | 7 | 5 | 4 | 3 | 6 |
| RSD 1000/1800 | 8769 | 2 | 1800 | 1043 | 1350 | 12 x M 10 | 157 | 4 | 7 | 16 | 14 | 10 | 7 | 6 | 11 |
| RSD 1120/ 900 | 8770 | 1 | 900 | 1174 | 1350 | 12 x M 10 | 81 | 2 | 3 | 7 | 6 | 4 | 3 | 3 | 5 |
| RSD 1120/1800 | 8771 | 2 | 1800 | 1174 | 1350 | 12 x M 10 | 136 | 3 | 6 | 14 | 11 | 8 | 6 | 5 | 9 |
| RSD 1250/ 900 | 8772 | 1 | 900 | 1311 | 1460 | 12 x M 10 | 86 | 1 | 2 | 5 | 4 | 3 | 2 | 2 | 3 |
| RSD 1250/1800 | 8773 | 2 | 1800 | 1311 | 1460 | 12 x M 10 | 146 | 2 | 4 | 11 | 9 | 7 | 5 | 4 | 6 |

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**APPENDIX C – Noise Monitoring Data (Proposed Operating Hours)**

| Date | Time | $L_{Aeq,15\ mins}$ | $L_{A90,15\ mins}$ | $L_{Afmax}$ | $L_{A90,1hour}$ |
|---|---|---|---|---|---|
| 2017-04-21 | 16:45:00 | 55.3 | 47.6 | 70.5 | |
| 2017-04-21 | 17:00:00 | 53.0 | 47.3 | 68.1 | |
| 2017-04-21 | 17:15:00 | 53.0 | 46.6 | 72.6 | |
| 2017-04-21 | 17:30:00 | 53.0 | 46.5 | 69.3 | 47 |
| 2017-04-21 | 17:45:00 | 53.5 | 46.2 | 74.6 | |
| 2017-04-21 | 18:00:00 | 53.2 | 47.1 | 66.2 | |
| 2017-04-21 | 18:15:00 | 58.2 | 47.3 | 82.0 | |
| 2017-04-21 | 18:30:00 | 53.9 | 47.2 | 70.3 | 47 |
| 2017-04-21 | 18:45:00 | 52.8 | 47.4 | 67.7 | |
| 2017-04-21 | 19:00:00 | 56.6 | 48.5 | 68.0 | |
| 2017-04-21 | 19:15:00 | 54.1 | 47.7 | 75.7 | |
| 2017-04-21 | 19:30:00 | 52.9 | 47.3 | 72.5 | 48 |
| 2017-04-21 | 19:45:00 | 52.1 | 47.2 | 63.8 | |
| 2017-04-21 | 20:00:00 | 51.9 | 47.3 | 71.4 | |
| 2017-04-21 | 20:15:00 | 51.8 | 47.5 | 65.8 | |
| 2017-04-21 | 20:30:00 | 52.8 | 47.4 | 70.4 | 47 |
| 2017-04-21 | 20:45:00 | 54.8 | 47.6 | 75.5 | |
| 2017-04-21 | 21:00:00 | 53.9 | 47.5 | 72.1 | |
| 2017-04-21 | 21:15:00 | 52.8 | 46.2 | 68.3 | |
| 2017-04-21 | 21:30:00 | 51.7 | 45.9 | 67.4 | 47 |
| 2017-04-21 | 21:45:00 | 53.3 | 46.6 | 81.1 | |
| 2017-04-21 | 22:00:00 | 52.1 | 45.5 | 70.7 | |
| 2017-04-21 | 22:15:00 | 54.3 | 44.5 | 75.1 | |
| 2017-04-21 | 22:30:00 | 51.3 | 45.4 | 62.4 | 46 |
| 2017-04-21 | 22:45:00 | 51.2 | 45.3 | 63.6 | |
| 2017-04-22 | 10:00:00 | 52.7 | 45.9 | 76.7 | |
| 2017-04-22 | 10:15:00 | 52.3 | 46.2 | 65.2 | |
| 2017-04-22 | 10:30:00 | 51.0 | 46.0 | 62.4 | 46 |
| 2017-04-22 | 10:45:00 | 56.3 | 46.8 | 73.4 | |
| 2017-04-22 | 11:00:00 | 53.5 | 45.3 | 76.7 | |
| 2017-04-22 | 11:15:00 | 55.9 | 46.3 | 84.3 | |
| 2017-04-22 | 11:30:00 | 52.9 | 45.9 | 67.6 | 46 |
| 2017-04-22 | 11:45:00 | 51.8 | 47.5 | 61.7 | |
| 2017-04-22 | 12:00:00 | 54.1 | 46.4 | 76.5 | |
| 2017-04-22 | 12:15:00 | 51.9 | 47.5 | 63.8 | |
| 2017-04-22 | 12:30:00 | 51.8 | 46.4 | 66.3 | 47 |
| 2017-04-22 | 12:45:00 | 52.1 | 47.1 | 66.0 | |
| 2017-04-22 | 13:00:00 | 55.1 | 46.9 | 76.0 | |
| 2017-04-22 | 13:15:00 | 55.6 | 47.2 | 71.6 | |
| 2017-04-22 | 13:30:00 | 56.8 | 46.3 | 73.6 | 47 |
| 2017-04-22 | 13:45:00 | 55.3 | 46.7 | 72.6 | |
| 2017-04-22 | 14:00:00 | 52.7 | 47.0 | 66.7 | |
| 2017-04-22 | 14:15:00 | 52.1 | 46.3 | 73.0 | |
| 2017-04-22 | 14:30:00 | 52.4 | 46.8 | 66.9 | 47 |
| 2017-04-22 | 14:45:00 | 53.2 | 46.9 | 76.8 | |
| 2017-04-22 | 15:00:00 | 56.4 | 47.2 | 78.5 | |
| 2017-04-22 | 15:15:00 | 50.8 | 45.7 | 64.0 | |
| 2017-04-22 | 15:30:00 | 51.5 | 46.4 | 66.8 | 47 |
| 2017-04-22 | 15:45:00 | 51.1 | 46.4 | 62.2 | |
| 2017-04-22 | 16:00:00 | 52.2 | 46.7 | 66.8 | |
| 2017-04-22 | 16:15:00 | 51.1 | 45.9 | 76.7 | |

| Date | Time | $L_{Aeq,15\ mins}$ | $L_{A90,15\ mins}$ | $L_{Afmax}$ | $L_{A90,1hour}$ |
|---|---|---|---|---|---|
| 2017-04-22 | 16:30:00 | 53.2 | 46.8 | 74.2 | 46 |
| 2017-04-22 | 16:45:00 | 52.4 | 46.6 | 68.2 | |
| 2017-04-22 | 17:00:00 | 58.1 | 46.7 | 79.2 | |
| 2017-04-22 | 17:15:00 | 50.4 | 44.6 | 65.2 | |
| 2017-04-22 | 17:30:00 | 51.0 | 44.5 | 65.1 | 46 |
| 2017-04-22 | 17:45:00 | 51.5 | 44.3 | 67.9 | |
| 2017-04-22 | 18:00:00 | 52.1 | 45.2 | 68.2 | |
| 2017-04-22 | 18:15:00 | 53.9 | 46.3 | 71.3 | |
| 2017-04-22 | 18:30:00 | 54.7 | 45.5 | 77.3 | 45 |
| 2017-04-22 | 18:45:00 | 51.5 | 45.0 | 68.4 | |
| 2017-04-22 | 19:00:00 | 55.0 | 47.0 | 73.8 | |
| 2017-04-22 | 19:15:00 | 54.8 | 46.3 | 75.5 | |
| 2017-04-22 | 19:30:00 | 50.8 | 45.9 | 59.9 | 46 |
| 2017-04-22 | 19:45:00 | 53.6 | 46.7 | 78.1 | |
| 2017-04-22 | 20:00:00 | 54.7 | 46.6 | 70.0 | |
| 2017-04-22 | 20:15:00 | 53.8 | 46.8 | 72.0 | |
| 2017-04-22 | 20:30:00 | 51.6 | 46.0 | 71.3 | 47 |
| 2017-04-22 | 20:45:00 | 53.4 | 46.6 | 70.6 | |
| 2017-04-22 | 21:00:00 | 52.5 | 47.6 | 67.1 | |
| 2017-04-22 | 21:15:00 | 55.1 | 46.3 | 78.0 | |
| 2017-04-22 | 21:30:00 | 51.3 | 46.0 | 65.9 | 47 |
| 2017-04-22 | 21:45:00 | 53.8 | 45.7 | 72.3 | |
| 2017-04-22 | 22:00:00 | 53.1 | 45.3 | 69.7 | |
| 2017-04-22 | 22:15:00 | 52.5 | 45.0 | 72.2 | |
| 2017-04-22 | 22:30:00 | 55.6 | 45.3 | 78.9 | 45 |
| 2017-04-22 | 22:45:00 | 54.2 | 46.4 | 75.6 | |
| 2017-04-23 | 10:00:00 | 51.5 | 44.9 | 67.9 | |
| 2017-04-23 | 10:15:00 | 51.5 | 44.3 | 68.5 | |
| 2017-04-23 | 10:30:00 | 50.6 | 44.8 | 64.6 | 45 |
| 2017-04-23 | 10:45:00 | 53.0 | 45.5 | 68.7 | |
| 2017-04-23 | 11:00:00 | 50.5 | 45.0 | 68.9 | |
| 2017-04-23 | 11:15:00 | 53.4 | 44.7 | 76.1 | |
| 2017-04-23 | 11:30:00 | 53.4 | 44.9 | 70.8 | 45 |
| 2017-04-23 | 11:45:00 | 51.7 | 44.5 | 73.9 | |
| 2017-04-23 | 12:00:00 | 50.7 | 45.0 | 63.0 | |
| 2017-04-23 | 12:15:00 | 51.8 | 44.7 | 76.4 | |
| 2017-04-23 | 12:30:00 | 51.2 | 44.8 | 70.4 | 45 |
| 2017-04-23 | 12:45:00 | 51.0 | 45.0 | 62.8 | |
| 2017-04-23 | 13:00:00 | 51.6 | 46.6 | 65.0 | |
| 2017-04-23 | 13:15:00 | 51.9 | 47.0 | 63.4 | |
| 2017-04-23 | 13:30:00 | 51.1 | 46.8 | 61.4 | 46 |
| 2017-04-23 | 13:45:00 | 52.6 | 45.2 | 72.2 | |
| 2017-04-23 | 14:00:00 | 52.1 | 45.6 | 73.7 | |
| 2017-04-23 | 14:15:00 | 51.1 | 46.2 | 65.1 | |
| 2017-04-23 | 14:30:00 | 54.9 | 48.0 | 74.4 | 46 |
| 2017-04-23 | 14:45:00 | 54.1 | 46.0 | 73.3 | |
| 2017-04-23 | 15:00:00 | 54.3 | 47.3 | 76.7 | |
| 2017-04-23 | 15:15:00 | 53.1 | 47.1 | 67.9 | |
| 2017-04-23 | 15:30:00 | 55.3 | 47.2 | 80.0 | 47 |
| 2017-04-23 | 15:45:00 | 52.1 | 46.5 | 62.8 | |
| 2017-04-23 | 16:00:00 | 51.9 | 46.6 | 64.7 | |
| 2017-04-23 | 16:15:00 | 53.1 | 48.0 | 70.8 | |

| Date | Time | $L_{Aeq,15\ mins}$ | $L_{A90,15\ mins}$ | $L_{Afmax}$ | $L_{A90,1hour}$ |
|---|---|---|---|---|---|
| 2017-04-23 | 16:30:00 | 53.0 | 47.8 | 69.1 | 47 |
| 2017-04-23 | 16:45:00 | 52.8 | 47.6 | 72.5 | |
| 2017-04-23 | 17:00:00 | 55.4 | 49.7 | 74.4 | |
| 2017-04-23 | 17:15:00 | 54.5 | 48.6 | 67.5 | |
| 2017-04-23 | 17:30:00 | 55.1 | 47.4 | 75.7 | 48 |
| 2017-04-23 | 17:45:00 | 52.7 | 47.2 | 73.2 | |
| 2017-04-23 | 18:00:00 | 54.2 | 48.2 | 69.5 | |
| 2017-04-23 | 18:15:00 | 55.0 | 48.6 | 70.9 | |
| 2017-04-23 | 18:30:00 | 55.8 | 48.7 | 75.5 | 48 |
| 2017-04-23 | 18:45:00 | 55.4 | 47.5 | 75.3 | |
| 2017-04-23 | 19:00:00 | 58.2 | 49.5 | 74.6 | |
| 2017-04-23 | 19:15:00 | 54.9 | 46.6 | 73.0 | |
| 2017-04-23 | 19:30:00 | 57.0 | 47.4 | 75.3 | 48 |
| 2017-04-23 | 19:45:00 | 54.3 | 48.6 | 70.9 | |
| 2017-04-23 | 20:00:00 | 55.3 | 47.0 | 72.2 | |
| 2017-04-23 | 20:15:00 | 55.0 | 48.2 | 71.3 | |
| 2017-04-23 | 20:30:00 | 54.7 | 47.4 | 70.7 | 48 |
| 2017-04-23 | 20:45:00 | 51.8 | 46.0 | 70.5 | |
| 2017-04-23 | 21:00:00 | 51.0 | 46.6 | 64.1 | |
| 2017-04-23 | 21:15:00 | 51.2 | 45.8 | 67.6 | |
| 2017-04-23 | 21:30:00 | 50.4 | 45.5 | 62.9 | 46 |
| 2017-04-23 | 21:45:00 | 55.7 | 44.5 | 80.1 | |
| 2017-04-23 | 22:00:00 | 50.9 | 44.9 | 66.0 | |
| 2017-04-23 | 22:15:00 | 51.8 | 45.6 | 72.2 | |
| 2017-04-23 | 22:30:00 | 53.0 | 44.6 | 75.7 | 45 |
| 2017-04-23 | 22:45:00 | 49.9 | 44.0 | 65.9 | |
| 2017-04-24 | 10:00:00 | 55.2 | 46.8 | 66.2 | |
| 2017-04-24 | 10:15:00 | 54.9 | 47.3 | 75.5 | |
| 2017-04-24 | 10:30:00 | 53.7 | 47.3 | 73.4 | 47 |
| 2017-04-24 | 10:45:00 | 52.0 | 47.1 | 62.8 | |
| 2017-04-24 | 11:00:00 | 51.8 | 46.7 | 68.6 | |
| 2017-04-24 | 11:15:00 | 53.1 | 46.9 | 67.5 | |
| 2017-04-24 | 11:30:00 | 51.5 | 46.1 | 59.6 | 47 |
| 2017-04-24 | 11:45:00 | 51.6 | 46.8 | 66.5 | |
| 2017-04-24 | 12:00:00 | 51.8 | 47.2 | 63.9 | |
| 2017-04-24 | 12:15:00 | 52.7 | 47.6 | 67.3 | |
| 2017-04-24 | 12:30:00 | 52.4 | 46.5 | 71.9 | 47 |
| 2017-04-24 | 12:45:00 | 54.2 | 47.5 | 72.9 | |
| 2017-04-24 | 13:00:00 | 51.9 | 47.2 | 62.8 | |
| 2017-04-24 | 13:15:00 | 53.2 | 48.7 | 69.6 | |
| 2017-04-24 | 13:30:00 | 53.6 | 47.6 | 72.2 | 48 |
| 2017-04-24 | 13:45:00 | 53.7 | 48.0 | 66.7 | |