Part of the KP Acoustics Group

VRI Suite, Police Station,
5 The Oaks,

Planning Compliance Report
Report 31559.PCR.01

AXIS Europe PLC

KP acoustics

Report 31559.PCR.01 Revision History		
Revision	**Written by**	**Checked by**
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Disclaimer

Contents

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned to undertake a noise impact assessment of a proposed plant unit installation serving the building at Ruislip Police Station.

An environmental noise survey has been undertaken on site and the background noise levels measured have been used to determine daytime and night-time noise emission criteria for the proposed plant, in agreement with the planning requirements of the London Borough of Hillingdon.

This report presents the overall methodology and results from the environmental survey, followed by calculations to demonstrate the feasibility of the plant unit installation to satisfy the emissions criterion at the closest noise-sensitive receiver. Mitigation measures will be outlined as appropriate.

2.0 SITE SURVEYS

2.1 Site Description

The site consists of a small outhouse to the main police station. It is located on the Oaks, a mostly residential street. The main police station is to the east of the site, residential gardens to the south, and the residential street and neighbours to the west.

Initial inspection of the site revealed that the dominant noise source being onsite road traffic noise from the surrounding roads.

2.2 Environmental Noise Survey Procedure

Continuous automated monitoring was undertaken for the duration of the noise survey between 10:00 on 14/12/2025 and 10:00 on 15/12/2025.

The environmental noise measurement position, proposed plant installation location, and the closest noise sensitive receiver relative to the plant installations are described within Table 2.1 and shown within Figure 2.1.

Icon	Descriptor	Location Description
1	Noise Measurement Position 1	The microphone was installed on a tripod approximately 2m from the rear window of the property at ground floor level.
	Nearest noise sensitive receptors	Rear façade properties on King Edwards Road and 4 The Oaks.

Icon	Descriptor	Location Description
	Proposed plant installation location	Proposed plant installations are outlined in Section 5.1.

Table 2.1 Measurement positions and descriptions

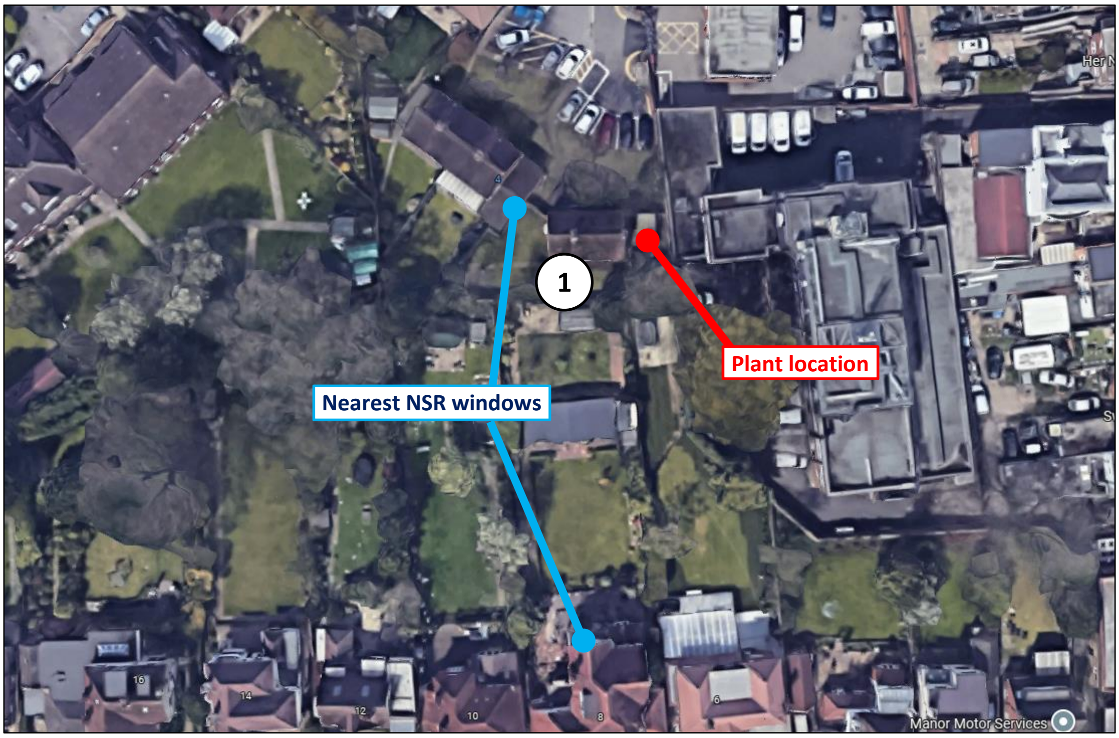

Figure 2.2 Site measurement positions (Image Source: Google Maps)

The choice of the position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver and the proposed plant installation.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.2.

<table>
<tr><th colspan="2">Measurement instrumentation</th><th>Serial no.</th><th>Calibration Date</th><th>Cert no.</th></tr>
<tr><td rowspan="4">Noise Kit 21</td><td>NTI Audio XL2 Class 1 Sound Level Meter</td><td>A2A-21099-E0</td><td rowspan="3">11/07/2024</td><td rowspan="3">TCRT24/1525</td></tr>
<tr><td>Free-field microphone NTI Acoustics MC230A</td><td>A23571</td></tr>
<tr><td>Preamp NTI Acoustics MA220</td><td>10996</td></tr>
<tr><td>NTI Audio External Weatherproof Shroud</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="2">B&K Type 4231 Class 1 Calibrator</td><td>2147411</td><td>10/09/2025</td><td>UCRT25/2295</td></tr>
</table>

Table 2.2 Measurement instrumentation

3.0 RESULTS

The $L_{Aeq,5min}$, $L_{Amax,5min}$ and $L_{A90,5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 31559.TH1.

Representative background noise levels for daytime and night-time are shown in Table 3.1; these have been derived from the measured $L_{A90,5min}$ levels based on the guidance of BS4142: 2014 Section 8.1.4. Analyses of the measured $L_{A90,5min}$ levels are shown in 31559.Daytime L90.TH1 and 31559.Night-time L90.TH1 attached.

Time Period	Representative Measured Background Noise Level L_{A90}
Daytime (07:00-23:00)	45 dB(A)
Night-time (23:00-07:00)	37 dB(A)

Table 3.1 Representative background noise levels

4.0 NOISE ASSESSMENT GUIDANCE

4.1 Local Authority Guidance

We understand the policy of the London Borough of Hillingdon is typically as noted in the condition below for a similar plant installation (*Application Ref 66891/APP/2022/594*

"No development shall take place until an assessment to show that the rating level of any plant & equipment, as part of this development, will be at least 5 dB below the background level measured outside of any window of any dwelling has been submitted to and been approved in writing by the Local Planning Authority. The assessment must be carried out by a

suitably qualified acoustic consultant/engineer and be in accordance with British Standard BS4142: 2014."

4.2 Noise Emissions Criterion

As the proposed plant could be used at any time of the daytime period, the criterion has been set as shown in Table 4.1 in order to comply with the above requirements.

Time Period	Plant Noise Emissions Criterion at Nearest Residential Receiver
Daytime (07:00 – 23:00)	≤ 40 dB(A)

Table 4.1 Proposed noise emissions criterion

5.0 NOISE IMPACT ASSESSMENT

5.1 Proposed Plant Installations

It is understood that the proposed plant installation comprises 2no. Daikin RXYSCQ-TV1, located outside the existing plantroom as shown below.

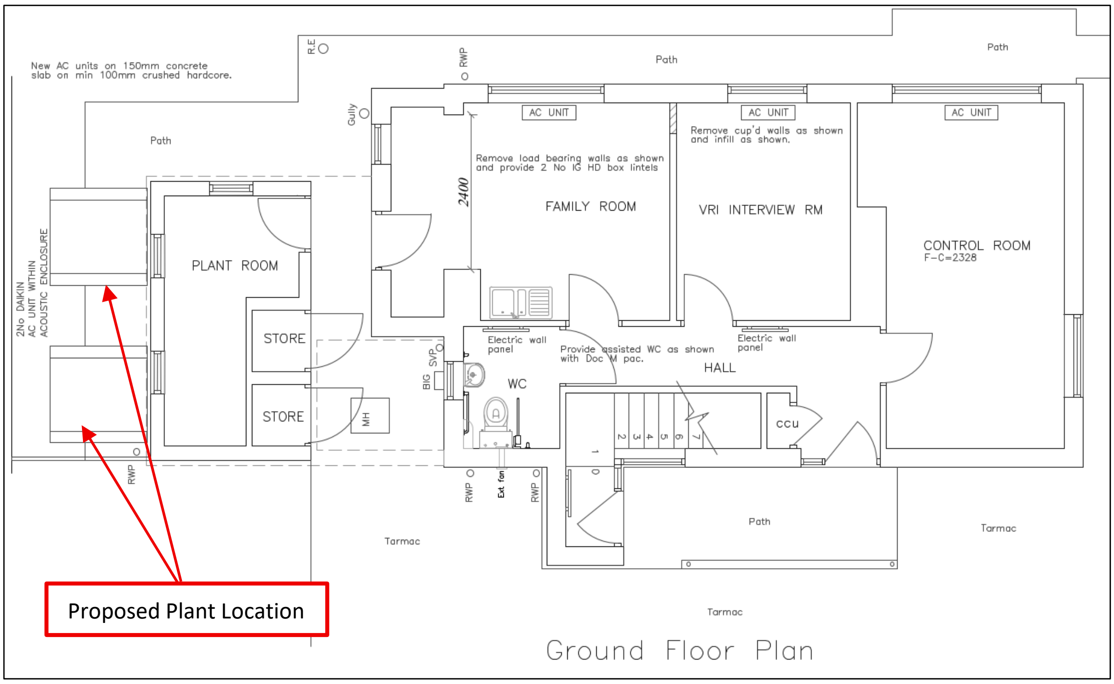

Figure 5.1 Site plan showing External AC Unit Locations.

The noise emission levels as provided by the manufacturer for the units are shown in Table 5.1.

Unit	Descriptor	Sound Level at Octave Frequency Band (Hz)								Overall (dBA)
		63	125	250	500	1k	2k	4k	8k	
Daikin RXYSCQ-TV1	SPL@1m (dB)	49	53	49	52	46	40	33	25	52

Table 5.1 Plant units noise emission levels as provided by the manufacturer

The closest noise sensitive receivers to the proposed installation location have been identified as:

- The residential house at 4 The Oaks, window to the front façade (Heavily screened by the VRI suite building)
- The rear windows of residential houses on King Edwards Road

5.2 Calculations

Taking all acoustic corrections into consideration, the noise level contribution expected at the closest residential windows from the proposed plant would be as shown in Table 5.2. Detailed calculations are shown in Appendix B.

Receiver	Criterion	Noise Level at 1m From the Worst-case Noise Sensitive Window
Rear Windows Of King Edwards Road	40 dB(A)	24 dB(A)
4 The Oaks	40 dB(A)	9 dB(A)

Table 5.2 Predicted noise level and criterion at nearest noise sensitive location

As shown in Appendix B and Table 5.2, the noise levels from predicted are capable of meeting the criterion set out in this report.

6.0 ANTI-VIBRATION MOUNTING STRATEGY

We note this is not required to meet the requirements of the Local Authority, only to control noise to the application property and therefore should not be conditioned although is good practice guidance.

In the case of all plant units, appropriate anti-vibration mounts should be installed in order to ensure that vibrations do not give rise to structure-borne noise. Appendix C outlines detailed advice in order to ensure that the system installer selects the appropriate anti-vibration mount for the installation.

It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail.

7.0 CONCLUSION

An environmental noise survey has been undertaken by KP Acoustics Ltd. The results of the survey have enabled criteria to be set for noise emissions.

Using manufacturer noise data, noise levels are predicted at the nearby noise sensitive receivers for compliance with current requirements.

Calculations show that noise emissions from plant would meet the requirements of the Local Authority set out in this report.

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B

VRI Suite Ruislip

PLANT NOISE EMISSIONS CALCULATIONS

	Frequency, Hz								dB(A)
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Rear Windows Of King Edwards Road									
Daikin RXYSCQ-TV1 SPL at 1m	49	53	49	52	46	40	33	25	52
2no. Units	3	3	3	3	3	3	3	3	
Distance Loss	-33.8	-33.8	-33.8	-33.8	-33.8	-33.8	-33.8	-34	
Reflections	3	3	3	3	3	3	3	3	
Sound Pressure Level at Receiver due to All Units, dB	**21**	**25**	**21**	**24**	**18**	**12**	**5**	**-3**	**24**
4 The Oaks									
Daikin RXYSCQ-TV1 SPL at 1m	49	53	49	52	46	40	33	25	52
2no. Units	3	3	3	3	3	3	3	3	
Distance Loss	-26	-26	-26	-26	-26	-26	-26	-26	
Reflections	3	3	3	3	3	3	3	3	
Barrier Loss	-14	-17	-20	-23	-25	-25	-25	-25	
Sound Pressure Level at Receiver due to All Units, dB	**15**	**16**	**9**	**9**	**1**	**-5**	**-12**	**-20**	**9**

Design Criterion	**40**

APPENDIX C

ANTI-VIBRATION MOUNTING REFERENCE DOCUMENT

1.0 GENERAL

1.1.1 All mountings must provide suitable static deflection when under the equipment weight. Mounting selection should allow for any eccentric load distribution or torque reaction so that the design deflection is achieved on all mountings under operating conditions.

1.1.2 A positioning or restraining device should be provided where required, to prevent the equipment position changing if its load changes (e.g. during maintenance). The device shall consist of a stud passing through an oversize hole with a nut and locknut providing restraint, with a fibre or neoprene washer fitted between nut and restraining member leaving a clearance of at least 3mm.

1.1.3 It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail. Particular attention should be paid to mountings which will be exposed to atmospheric conditions to prevent corrosion.

1.1.4 All mountings shall be colour coded, or otherwise marked, to indicate their load capacity, to facilitate identification during installation.

1.1.5 Where use of resilient supports allows omission of pipe flexible connections for vibration/noise isolation, it shall be the Mechanical Services Consultant's or Contractor's responsibility to decide whether such devices are required to compensate for misalignment or thermal strain.

2.0 MOUNTINGS

2.1 Caged Spring Type

2.1.1 Each mounting shall consist of cast or fabricated telescopic top and bottom housings enclosing one or more helical steel springs as the principal isolation elements and shall incorporate a built-in levelling device. The housing should be designed to permit visual inspection of the springs after installation, i.e. the spring must not be totally enclosed.

2.1.2 The springs shall have an outside diameter of not less than 75% of the operating height and be selected to have at least 50% overload capacity before becoming coil-bound.

2.1.3 The bottom plate of each mounting shall have bonded to it a rubber/neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.1.4 Mountings incorporating snubbers or restraining devices shall be designed so that the snubbing, damping, or restraining mechanism is capable of being adjusted to have no significant effect during the normal running of the isolated machine.

2.1.5 All nuts, bolts or other elements used for adjustment of a mounting shall incorporate locking mechanisms to prevent the isolator going out of adjustment due to vibration or accidental or unauthorised tampering.

2.2 Open Spring Type

2.2.1 Each mounting shall consist of one or more helical steel springs as the principal isolation elements and shall incorporate a built-in levelling device.

2.2.2 The springs shall be fixed or otherwise securely located to cast or fabricated top and bottom plates, shall have an outside diameter of not less than 75% of the operating height, and shall be selected to have at least 50% overload capacity before becoming coil-bound.

2.2.3 The bottom plate shall have bonded to it a rubber/ neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.3 Rubber/Neoprene Type

2.3.1 Each mounting shall consist of a steel top plate and base plate completely embedded in oil resistant rubber/neoprene. Each mounting shall be capable of being fitted with a levelling device and should have bolt holes in the base plate and a threaded metal insert in the top plate so that they can be bolted to the floor and equipment where required.

2.4 Hangers

2.4.1 Hangers shall incorporate a helical steel spring or neoprene in shear element, as required, located securely in a steel cage. The clearance hold at the bottom of the cage should allow lateral movement of the lower anger rod of at least 15 degrees included angle.

2.4.2 If hangers incorporate a positions device, this should include a locking mechanism to prevent the hanger going out of adjustment either due to vibration or tampering.

3.0 PLANT BASES

3.1 A.V. Rails

3.1.1 An A.V. Rail shall comprise a steel beam with two or more height-saving brackets. The steel sections must be sufficiently rigid to prevent undue strain in the equipment and if necessary, should be checked by the Structural Engineer.

3.2 Steel Plant Bases

3.2.1 Steel plant bases shall comprise an all-welded steel framework of sufficient rigidity to provide adequate support for the equipment and be fitted with isolator height saving brackets. The frame depth shall be approximately $1/10^{th}$ of the longest dimension of the equipment with a minimum of 150 mm. This form of base may be used as a composite A.V. rail system.

3.3 Concrete Inertia Base (for use with steel springs)

3.3.1 These shall consist of an all-welded steel pouring framework with height saving brackets, and a frame depth of approximately $1/12^{th}$ of the longest dimension of the equipment, with a minimum of 100 mm. The bottom of the pouring frame should be blanked off, and concrete (2300 kg/m^3) poured in over steel reinforcing rods positioned 35 mm above the bottom. The inertia base should be sufficiently large to provide support for all parts of the equipment, including any components which over-hang the equipment base, such as suction and discharge elbows on centrifugal pumps.

3.3.2 A typical rule of thumb is that the ratio of mass of the base to mass of the supported equipment should be 1.5 : 1.0 for most conventional equipment, including pumps. However, this could rise to 5.0 : 1.0 for equipment with large lateral out-of-balance forces.

3.4 Concrete Split Plinth Bases

3.4.1 These should comprise a concrete inertia base of sufficient size to permit support for all parts of the equipment, including any components which overhang the equipment base, such as suction and discharge elbows on centrifugal pumps. The inertia base should be cast onto a permanent bottom shuttering and supported on the specified neoprene mounts or pads, the whole resting on a plinth as required. It should be noted that the construction of concrete bases on cork, expanded polystyrene or mineral wool slabs is not normally permitted. Where neoprene pads are used, small areas of pad must be equally spaced to provide the correct deflection. The supplier should advise the correct number, dimensions and locations of such pads.