Acoustics
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Project

Hertfordshire Constabulary Dog Kennels
Acoustic Planning Report

Prepared for

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Version	Date	Comments	Approved by
P1	02/10/2023	-	Jenny Wilkin BMus (Hons) MIOA

Summary

I have assessed noise from fixed plant associated with the new Hertfordshire Constabulary Kennels building to show compliance with the planning condition issues to you by Hertfordshire Council.

When assessed in accordance with BS 4142:2014+2019, the results of our assessment indicate that noise from the plant will have a low impact during the daytime and night-time. Therefore, noise should not be a reason to refuse planning consent.

Contents

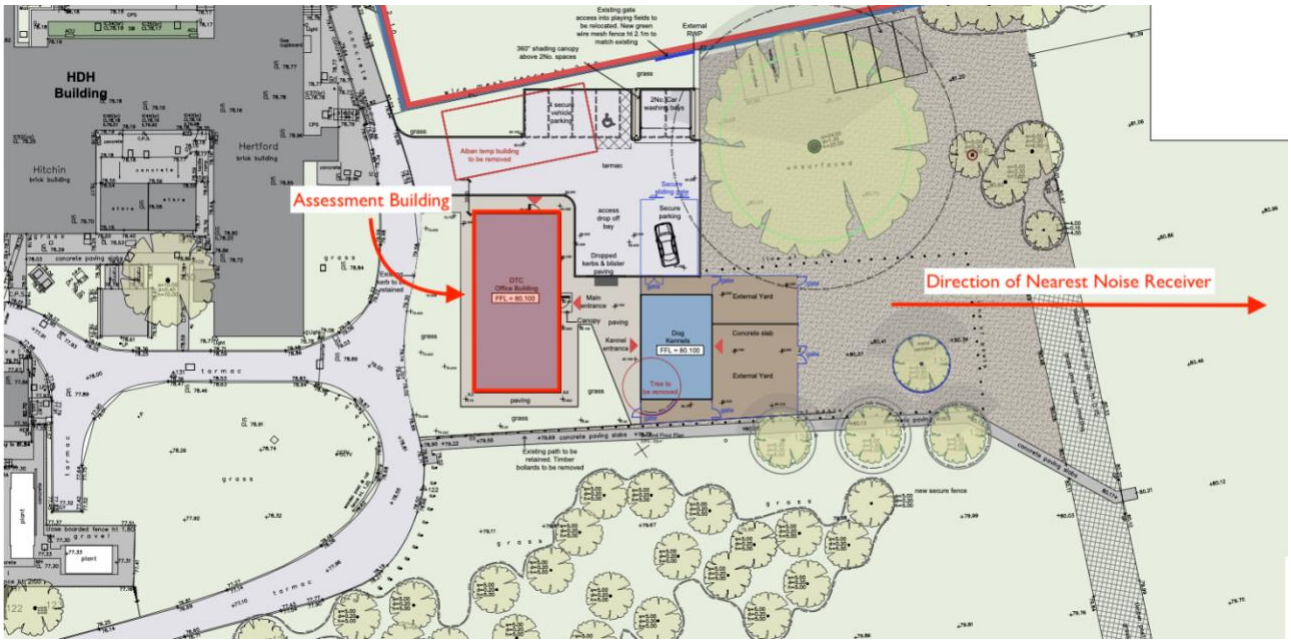
1.0 Introduction

Willmott Dixon Construction Limited are building a new police dog kennel office at the Hertfordshire Constabulary headquarters at Stanborough Rd, Welwyn Garden City. SRL Technical Services has been commissioned by Willmott Dixon to assess the plant noise from this building to the nearest noise sensitive receivers as per the planning condition and in accordance with BS4142: 2014+A1:2019.

AECOM have done a noise survey to measure noise around the site to be used as a benchmark against which the noise from the new mechanical plan will be assessed.

It has not been clarified to us or Willmott Dixon if any of the plant will operate 24 hours a day, however, this report shows this would not affect the outcome of the assessment if it does. See Figure 1 for a layout drawing of the site.

Figure 1: Site Layout



2.0 Criteria and noise guidance

2.1 BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

BS4142:2014+A1:2019 *'Methods for rating and assessing industrial and commercial sound'* provides a method to assess whether "sound of an industrial and/or commercial nature" is likely to have an adverse impact at noise-sensitive receptors.

BS4142's assessment methodology considers how loud the noise is and its character (e.g. whether it contains hisses, bangs, or clicks). The assessment is then based on how loud (and how annoying) the source noise is compared with the existing background noise at the receptor.

The following corrections can potentially be applied for the acoustic character:

Impulsivity – a correction of up to +9dB can be applied depending on how impulsive the specific noise is:

- +3dB if the impulsivity is just perceptible at the receptor
- +6dB if the impulsivity is clearly perceptible at the receptor, and
- +9dB if the impulsivity is highly perceptible at the receptor

Tonality – a correction of up to +6dB can be applied depending on how tonal the specific noise is:

- +2dB for a tone which is just perceptible at the receptor
- +4dB for a tone which is clearly perceptible at the receptor, and
- +6dB for a tone which is highly perceptible at the receptor

If the source is both tonal and impulsive it is usual to only apply the correction for the characteristic which is most dominant.

Intermittency – when the noise source has identifiable on/off conditions (e.g. an item of plant which switches on and off), and these on/off conditions are readily distinguishable against the residual acoustic environment, a correction of up to +3dB can be applied.

Other sound characteristics – where the noise source is not tonal or impulsive but has another characteristic that is readily distinguishable against the residual acoustic environment, a correction of up to +3dB can be applied.

The Rating Level is determined by applying acoustic corrections to the Specific Noise Level, and then the Rating Level is compared with the measured background level. The difference between the Rating Level and the typical background level can then be interpreted using the following guidance from BS4142:

- If the Rating Level is +10dB or more above the background level, this indicates a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on context.
- 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.

2.2 Planning condition

The planning condition states:

Phase 1 - Prior to the installation of new plant and equipment for the development, the applicant shall submit to, for approval in writing by the Local Planning Authority, details relating to a scheme to mitigate the noise from new plant and equipment. The impact of new plant and equipment should be assessed in accordance with BS4142: 2014+A1:2019. When noise sources show signs of tonality we require noise levels to be 10dB below background noise level at the nearest receptor location. In instances where the noise source presents no tonality we require the noise level to be 5dB below the background noise level at the nearest receptor location

3.0 Noise Survey

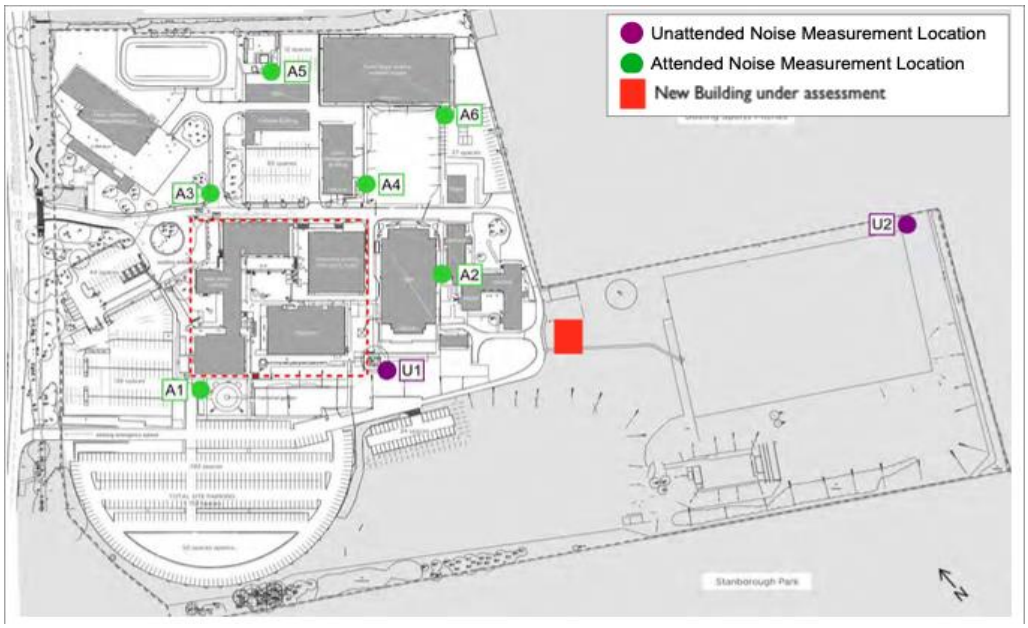
Figure 2 shows the nearby noise sensitive receptors which are approximately 300m to the east of the proposed new building. The nearest boundary of these receptors has been taken as the assessment point.

Figure 2: Nearest noise sensitive receptors

SRL Technical Services has been instructed to use the noise level data captured during a noise survey done by AECOM between 15th April 2021 at 12:30 to 20th April 2021 at 13:30 at two locations to assess the noise impact.

See Figure 3, an extract from AECOM report "60600329_External Noise Survey May 2021" for the measurement locations.

Figure 3: Noise measurement positions



Railway line approx. 30m to the east.

Closest façade on Eddington Crescent approx. 100m to the east.

(See Figure 2)

Measurement positions U1 and U2 are the unattended measurement positions where noise logging was done. These measurements were done at a height of 2m above the ground. The measurements were done over a period of 44 consecutive hours. The results of this survey have been used as a basis for this assessment. The measured daytime and night-time background noise levels measured at the nearby noise sensitive receptors are shown in Table 1.

The distance from measurement location, U2, to the nearest noise sensitive receivers at Eddington Crescent, is about the same as the distance between U2 and the railway line. The dominant noise source at this position is the train line that runs approximately 45m to the west of the houses. Therefore, the measurements taken at position U2 are representative of the noise levels at nearest noise sensitive receivers at Eddington Crescent.

Table 1: Measured Background Noise Levels

Noise Sensitive Receptor Location	Daytime Background Noise Level (07:00hrs to 23:00hrs)	Night-time Background Noise Level (23:00hrs to 07:00hrs)
U1	49 dB $L_{A90,1\ hour}$	50 dB $L_{A90,1\ hour}$
U2 / Eddington Crescent Houses	38 dB $L_{A90,1\ hour}$	40 dB $L_{A90,15mins}$

4.0 Mechanical Plant

The only external plant being installed as part of this development is a "bank" of solar photovoltaic panels, which will be on the roof of the building. The accompanying inverter unit is being installed inside the building. The photovoltaic panels and inverter unit are not expected to produce any appreciable noise.

However, there are internal plant items that are ducted to or exhaust to the environment through the façade. Figure 4 shows the site layout and building orientation and Figure 5 gives a description of the plant that has been assessed. The East façade of the building faces the nearest noise sensitive receivers at Eddington Crescent.

Figure 4: Site layout and building orientation

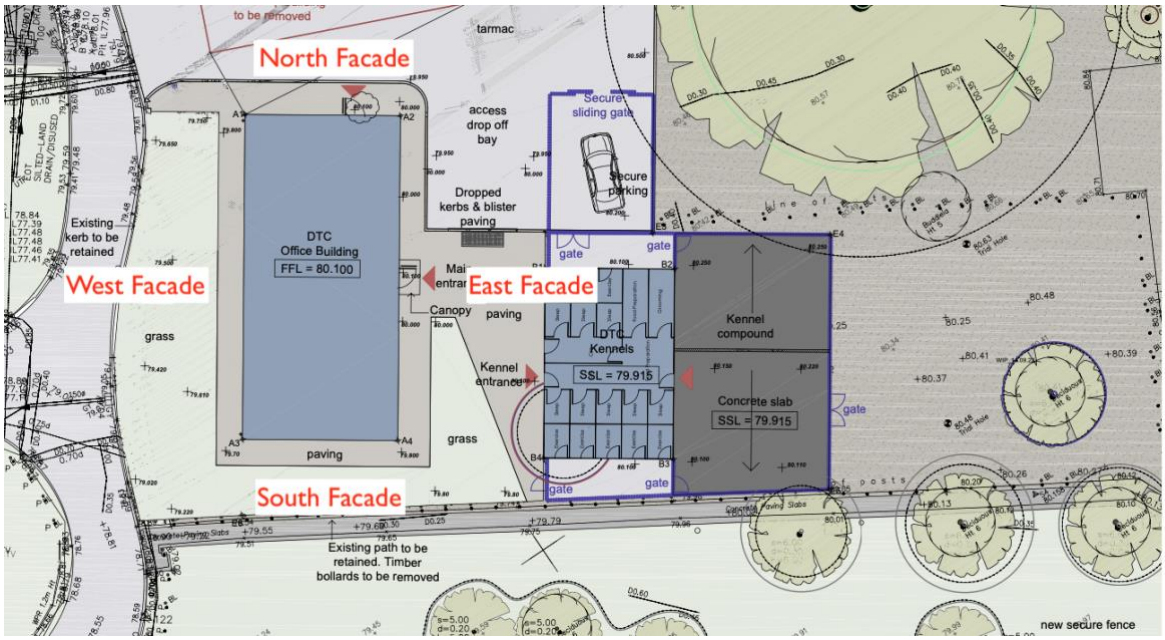
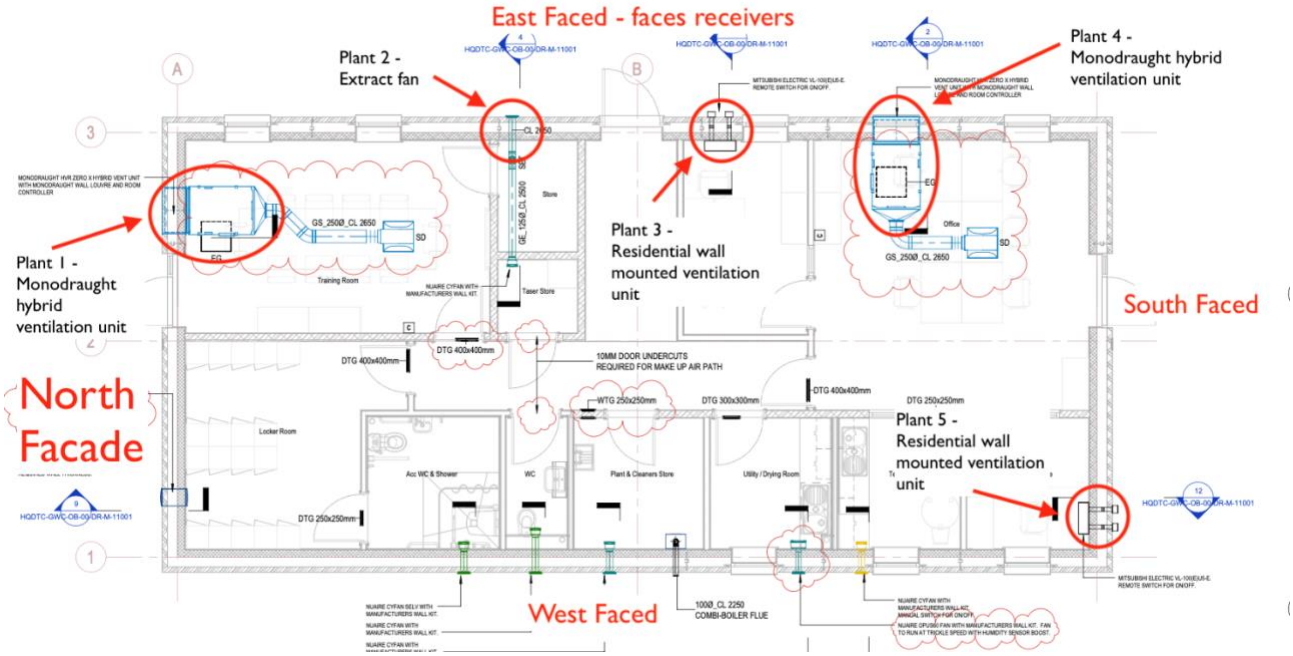


Figure 5: Mechanical plant items



The plant items assessed include:

- Roof Mounted Plant
  - Solar PV Panel – (Zero noise expected)
- Plant ducted to the east façade
  - Extract Fan (NUAIRE CYFAN with manufacturers wall kit)
  - Mechanical Ventilation hybrid unit (Monodraught HVR Zero-X hybrid vent unit)
  - Mechanical Ventilation wall mounter residential unit (Mitsubishi Electric VL-100(E)U5-E)
- Plant ducted to the north façade
  - Mechanical Ventilation hybrid unit (Monodraught HVR Zero-X hybrid vent unit)
  - Mechanical Ventilation wall mounter residential unit (Mitsubishi Electric VL-100(E)U5-E)

The hybrid ventilation units are very quiet (sound power < 40dBA) as are the small extract fans and the residential wall mounted units. Therefore, I don't expect these plant items to increase the cumulative noise levels at the building.

The solar panels on the roof and associated inverter unit are not expected to produce any appreciable noise.

5.0 Assessment

For this assessment, I have used the typical background noise levels based on the typical lowest background L_{A90} measurement during the night-time at the nearest noise-sensitive receptors.

Table 2 shows the Rating Level noise limits used in this assessment at the nearest noise sensitive receiver position, which is based on the measured background noise levels.

Table 2: Rating Level Limits

Noise Sensitive Receptor Location	Daytime Background Noise Level (07:00hrs to 23:00hrs)	Night-time Background Noise Level (23:00hrs to 07:00hrs)
Eddington Crescent Houses	≤ 38 dB $L_{Ar,Tr}$	≤ 40 dB $L_{Ar,Tr}$

The reported noise data for each piece of plant is given in Table 3 below.

Table 3: Plant noise – noise level data

Plant Item	Noise Level	Notes
Nuaire Cyfan	35 L_w	Sound power level
Mitsubishi Electric VI-100	38 dBA	Sound pressure level assumed to be measured at 1m
Monodraught HVR zero x hybrid	35 LwA	A-weighted sound power level

I have used this data to predict the noise levels at the facades of the nearest noise-sensitive receptors.

Table 4, below, shows the BS4142:2014+A1:2019 assessment of the plant noise levels at the nearest noise sensitive receiver of the nearby noise sensitive receptors during the daytime and night-time.

Table 4: Plant Noise Assessment to Nearest Noise Sensitive Receiver

	Daytime	Night-time
Highest predicted Specific Noise Level (dB L_{Aeq})	18	18
Acoustic character correction (dB)	0[1]	0[1]
Plant noise Rating Level (dB $L_{Ar,Tr}$)	18	18
Typical lowest measured background noise level (dB L_{A90})	38	40
Difference (dB)	-20	-18
Impact	Low	Low

[1] As the plant noise levels are predicted to be significantly below the prevailing background noise level, it is unlikely that any plant will have any distinctive noise characteristics which are present at the receptor locations. No character penalties have therefore been applied to the specific noise levels. Even if there was any tonality, the predicted rating level is still less than 10dB below the background noise level as requested by the Local Authority.

When assessed in accordance with BS 4142:2014+2019, the results of my assessment indicate that noise from the plant will have a low impact during the daytime and night-time at the nearest noise sensitive receptors.

Table 3 demonstrates that the rating level of the proposed plant during the daytime and night-time is lower than the background noise level satisfying the requirements of the Planning Condition.

Appendix A - Glossary of Acoustic Terminology

dB

Decibel: the unit used to describe sound levels and level differences, using a logarithmic scale. The large linear range of human hearing is compressed into a more manageable range which represents more closely to the response of the ear. Decibels are always the ratio between two numbers. Sound Pressure in Pascals becomes "Sound Pressure Level re 2×10^{-5} Pa" in decibels. Sound Power in watts becomes "Sound Power Level re 10^{-12} W" in decibels. For sound level difference (or sound reduction or sound insulation), it is the ratio of the amount of sound energy incident upon a partition and the amount of that energy which passes out through the other side of the partition. The result is stated as a "decibel reduction".

dB(A)

A-weighting: This is an electronic filter which attenuates sound levels at some frequencies relative to the sound levels at other frequencies. The weighting is designed to produce the relative response of a human ear to sound at different frequencies. The A-weighted sound level is therefore a measure of the subjective loudness of sound rather than physical amplitude. A-weighting is used extensively and is denoted by the subscript A as a L_{A10}, L_{Aeq} etc. (Levels given without the subscript A are linear sound levels without the A-weighting applied, e.g. L_{10}, L_{eq} etc.).

Background noise level, $L_{A90,T}$

The level at a specific location and time in the absence of specific sound sources (e.g. items of plant or machinery in the context of a BS4142 assessment). Measured as an L90, representing the sound level exceed for 90% of the time.

Rating level, $L_{Ar,Tr}$

Specific sound level plus any adjustment for the characteristic features of the sound.

Specific sound source

Sound source being assessed.

Specific sound level, $L_S = L_{Aeq,Tr}$

Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.

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