

Warren Court, London NW1

# Plant Noise Assessment

Report 15/0688/R2

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## Attachments

### **15/0688/SP1-1**

Site Plan detailing measurement and assessment positions

### **15/0688/TH01 & TH02**

Time history graphs illustrating unattended survey results

### **15/0688/SCH1**

Plant Noise Calculations.

## **Glossary of Acoustic Terms**

 End of Section



## 1 Introduction

- 1.1 Planning permission is being sought for the replacement and extension of the current 6<sup>th</sup> floor at Warren Court, Tottenham Court Road, London, NW1 3AA. It is proposed to install new mechanical services plant in order to service the new development.
- 1.2 Due to a lack in opportunity to undertake a representative noise survey due to reduced levels of activity as a result of the Coronavirus pandemic, details of an historical noise survey conducted at the site as part of a previous planning application (ref: 2016/5317/P) have been used to quantify typical background noise levels representative of those at nearby noise sensitive locations.
- 1.3 Based on these results, appropriate building services plant noise limits to meet the requirements of the local planning authority have been derived.
- 1.4 This report sets out the methodology and results of the historical survey, along with the derived plant noise limits and subsequent assessment results.

## 2 Site Description

- 2.1 The site address is Warren Court, Tottenham Court Road, London, NW1 3AA. The site sits above the Warren Street underground station and currently features a ground level plus six further storeys. The site is the easternmost building within a block surrounded by the A400, Tottenham Court Road to the east, the A501, Euston Road to the north and Warren Street to the south.
- 2.2 Beyond the A400 to the east is the western section of the University College Hospital, which forms the north-westernmost section of the University College London campus. To the south of the site, running along the A400 is a large five storey hotel, with retail units surrounding its ground floor demise.
- 2.3 To the north of the site, across the A501, Euston Road is a complex consisting of several large office blocks, the most notable of which is Euston Tower. Immediately to the northeast of the site is the intersection between the A400, Hampstead Road, and the A501. Continuing down the A501 to the east is London Euston train station.
- 2.4 Traffic around site is busy, with the site being located at the corner of a busy junction between the A400 and A501, as well as being on the edge of the congestion charge zone. Due to the site's location above the Warren Street underground station, there is also a large amount of footfall around the site.
- 2.5 The nearest noise sensitive premises to the proposed plant location are considered to be the residential flats across Warren Street to the south which rise to five levels above ground, and the eastern facing windows on the fourth floor of the adjoining building to the west.



2.6 The site and surrounding area are shown on attached site plan 15/0688/SP1-1.

### 3 Background Noise Survey

#### 3.1 Methodology

- 3.1.1 An unattended noise survey was undertaken at the site commencing at 1215 hours on Wednesday 10<sup>th</sup> February 2016 and continued until 1445 hours on Thursday 11<sup>th</sup> February 2016.
- 3.1.2 Measurements of background noise levels were taken from free field positions overlooking Warren Street and Euston Road. This has been illustrated in attached site plan 15/0688/SP1-1, and more detailed descriptions can be found below:
- MP1 – Free-field position, protruding approximately 1.5m from 7<sup>th</sup> floor rooftop level, overlooking Warren Street to the south
  - MP2 – Free-field position, protruding approximately 1.5m from 6<sup>th</sup> floor rooftop level, overlooking A501, Euston Road
- 3.1.3 These positions were selected to quantify background noise levels representative of those at the nearest noise sensitive receptors to the proposed mechanical services plant.
- 3.1.4 Measurements of the  $L_{Aeq}$ ,  $L_{Amax}$  and  $L_{A90}$  indices were recorded over consecutive 15-minute periods for the duration of the survey using the equipment listed within table T1 (see attached Glossary of Acoustic Terms for an explanation of the noise units used).

Item	Manufacturer	Type
Sound Level Analyser x2	Rion	NL-52
Acoustic Calibrator x2	Rion	NC-74
Weatherproof windshield x2	Rion	WS-15

T1 Equipment used during unattended noise survey.

- 3.1.5 The microphones were fitted within weatherproof enclosures, and the sound level meters were calibrated before and after the survey in order to confirm an acceptable level of accuracy. No significant drift was noted to have occurred.
- 3.1.6 The weather conditions when setting up the noise monitoring equipment were overcast and cool, with damp roads and some breeze. When collecting the equipment, the weather was overcast and cold with dry roads and some breeze. These conditions are deemed acceptable and are not considered to have affected measurement results.



### 3.2 Results

- 3.2.1 The results of the previous noise measurements are presented in attached time history figures 15/0688/TH01 & TH02.
- 3.2.2 The noise climate on the site was dominated by traffic noise from Euston Road and the A400. Public transport announcements could also be heard clearly, though it was not possible to localise them.
- 3.2.3 The minimum background noise levels recorded during the day and night time measurement hours during the survey duration are set out in table T2 below.

Location	Minimum Background Noise Level, dB(A)	
	Daytime (0700-1900)	Night time (24-hour)
MP1 7 <sup>th</sup> floor rooftop level, overlooking Warren Street	61	58
MP2 6 <sup>th</sup> floor rooftop level, overlooking Euston Road	66	63

T2 Lowest measured background noise levels,  $L_{A90}$ .

- 3.2.4 Despite this survey being undertaken during 2016, we are not aware of any significant changes in the local environment that would give rise to a materially altered noise climate from that which we have detailed above. As such, we anticipate that the results set out within this document will remain representative of normal conditions.

## 4 Plant Noise Limits

- 4.1 The site falls within the jurisdiction of the London Borough of Camden.
- 4.2 Policy A4 of the London Borough of Camden's *Local Plan 2017* relates specifically to noise:

*We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity.*

*Planning conditions will be imposed to require that plant and equipment which may be a source of noise is kept working efficiently and within the required noise limits and time restrictions.*



*Conditions may also be imposed to ensure that attenuation measures are kept in place and are effective throughout the life of the development.*

- 4.3 With regard to noise from new mechanical services plant, Appendix 3 of the Local Plan sets out the following:

*“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 (15 dB if tonal components are present) should be considered as the design criterion).”*

- 4.4 The appendix goes on to state a table with various criteria. Based on this guidance, the following plant noise limits (based on not exceeding the LOAEL Camden has suggested) are to apply here:

Location	Noise Emission Limit, dBA	
	(for plant with no distinguishing features)	
	Daytime (0700-2300)	Night time (2300-0700)
Properties to south and west of site overlooking Warren Street	51	48
Properties to east and north of site on Tottenham Court Road and Euston Road	56	53

T3 Plant noise emission limits at the nearest residential properties.

- 4.5 The noise limits are to apply at 1m from the outside of nearby residential windows. Any plant with a tonal component out of character with the existing environment would be subject to a further 5dB penalty in line with the guidance set out above.

## 5 Plant Noise Assessment

### 5.1 Proposed Plant Items

- 5.1.1 The plant items proposed to be installed are four external heat pump inverters to provide both heating and cooling to the apartments. The plant will be located on the roof of the building towards the centre of one half of the building, adjacent to a rooftop riser upstand.
- 5.1.2 The four units will be the same make and model as follows:



- Mitsubishi MXZ-4F80VF2 Inverter heat pump

5.1.3 The manufacturers test data states the unit has a sound power level of  $L_w$  65dBA. The sound spectrum for heating operation (which is louder than for cooling) as pressure levels at 1m [ $L_p$ ] are shown in the table below which is  $L_p$  55dBA as a single figure rating):

Unit	$L_p$ (dB) @ Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Mitsubishi MXZ-4F80VF2	55.0	58.5	52.0	51.5	51.5	46.0	3.0	30.0

T4 Noise Data (sound pressure levels @ 1m).

- 5.1.4 For the purposes of our assessment we have shifted the sound spectrum of the pressure levels set out within table T4 to match that of the single figure power level to give a sound power spectrum.
- 5.1.5 It can be seen that the noise data indicates the plant could produce a tonal noise component around the 125Hz centre band and therefore we have reduced the noise limits as presented in table 4 above by 5dB so they are set 15dB below background, in line with Camden's guidance (as set out in section 4).
- 5.1.6 We note that the condenser units will be installed on anti-vibration pads to avoid the potential of structure borne noise. The pads will provide a static deflection of 2mm under the weight of the unit. Example products include 'Tico' pad and Mason UK 'Waffle' pad.

## 5.2 Methodology

- 5.2.1 Noise levels have been calculated at two assessment positions, which can be seen on the attached figure 15/0688/SP1-1 and are described below:
- AP1: Residences in eastern façade of building directly to west (4<sup>th</sup> floor level)
  - AP2: Residences in northern façade of building to south (5<sup>th</sup> floor level)
- 5.2.2 The units will benefit from significant acoustic screening to the receptors to the west as they are being located behind a central building riser upstand. We have simply taken a basic 5dB line-of-sight screening loss, when in practice the losses are likely to be significantly higher. Although the roof of the building may also provide screening to receptors to the south, we have not accounted for any screening in our calculation.
- 5.2.3 Any receptors to the north or east are further away from the plant than those to the south (AP2) which we have assessed without screening. Therefore, if the noise limits are met at MP2 they will be met at all other locations to the north or east.



- 5.2.4 We note that with the plant being on the roof of the building, the units will be well screened from accommodation at lower floors of the building the plant serves; therefore such locations have not been considered further.
- 5.2.5 The assessment has taken into account radiation, screening, distance losses and façade reflections as appropriate.
- 5.2.6 Although the units are likely to be mainly used in daytime hours for cooling, we have compared the units operating at 100% duty on heating mode (which produce higher noise levels than on cooling) against the night time noise limits.

### 5.3 Assessment Results

- 5.3.1 Based on the assessment methodology detailed above, the noise levels shown in the table below have been calculated at the assessment positions (the limit stated including a further 5dB reduction to those set out previously within table T3 to account for potential tonality):

Location	Predicted Noise Level, dB(A) <i>Plant Noise Emission Limit, dB(A)</i>
AP1: Building to west	39 (43)
AP2: Building to south	39 (43)

T5 Predicted plant noise emission levels at assessment positions

- 5.3.2 The table shows that noise levels are predicted to meet the noise emission criteria at all receptor locations without the need for specific mitigation; the riser upstand proving sufficient screening to receptors to the west and distance alone being sufficient to reduce levels to all other surrounding locations (including to the north and east who are further away from the plant than AP2).
- 5.3.3 Full assessment calculations are attached within schedule 15/0688/SCH1.



## 6 Conclusions

- 6.1 It is proposed to install new mechanical services plant as part of extension works at Warren Court, Tottenham Court Road, London, NW1 3AA.
- 6.2 Cole Jarman have undertaken a noise survey at the site to quantify typical background noise level at a position representative of the nearest noise sensitive premises to the proposed plant locations. Plant noise limits have been set to apply at the nearby premises based on the results of the survey and the requirements of the local authority.
- 6.3 The proposed plant installation, comprising four external inverter heat pump units located centrally on the roof of the building behind a riser upstand, has been assessed. The assessment shows that the noise limits will be met at all receiver locations and therefore the development will not have an adverse impact on the existing noise climate at the surrounding residential receptors.

 End of Section



## Glossary of Acoustic Terms

### $L_{Aeq}$ :

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A)  $L_{eq}$ .

### $L_{Amax}$ :

The maximum A-weighted sound pressure level recorded over the period stated.  $L_{Amax}$  is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the  $L_{Aeq}$  noise level. Unless described otherwise,  $L_{Amax}$  is measured using the “fast” sound level meter response.

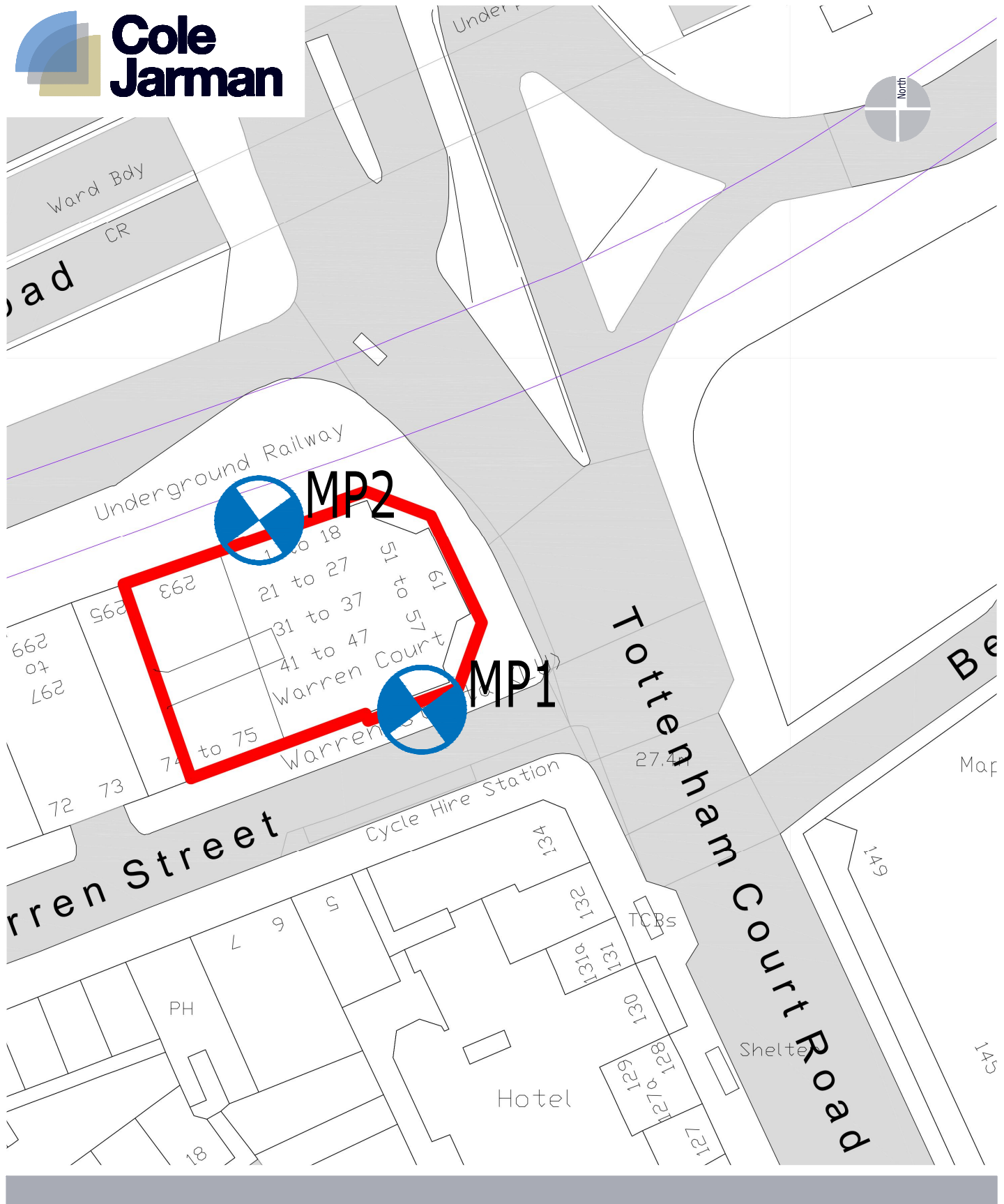
### $L_{A10}$ & $L_{A90}$ :

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The  $L_{An}$  indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified.  $L_{A10}$  is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly  $L_{A90}$  gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

$L_{A10}$  is commonly used to describe traffic noise. Values of dB  $L_{An}$  are sometimes written using the alternative expression dB(A)  $L_n$ .

### $L_{AX}$ , $L_{AE}$ or SEL

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event.  $L_{AX}$  values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of  $L_{Aeq}$  for the total noise. The  $L_{AX}$  term can sometimes be referred to as Exposure Level ( $L_{AE}$ ) or Single Event Level (SEL).



Title: Site Plan detailing survey measurement positions

Figure 15/0688/SP1

Project: Warren Court, London NW1

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Scale: Not to scale

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Figure 15/0688/TH01

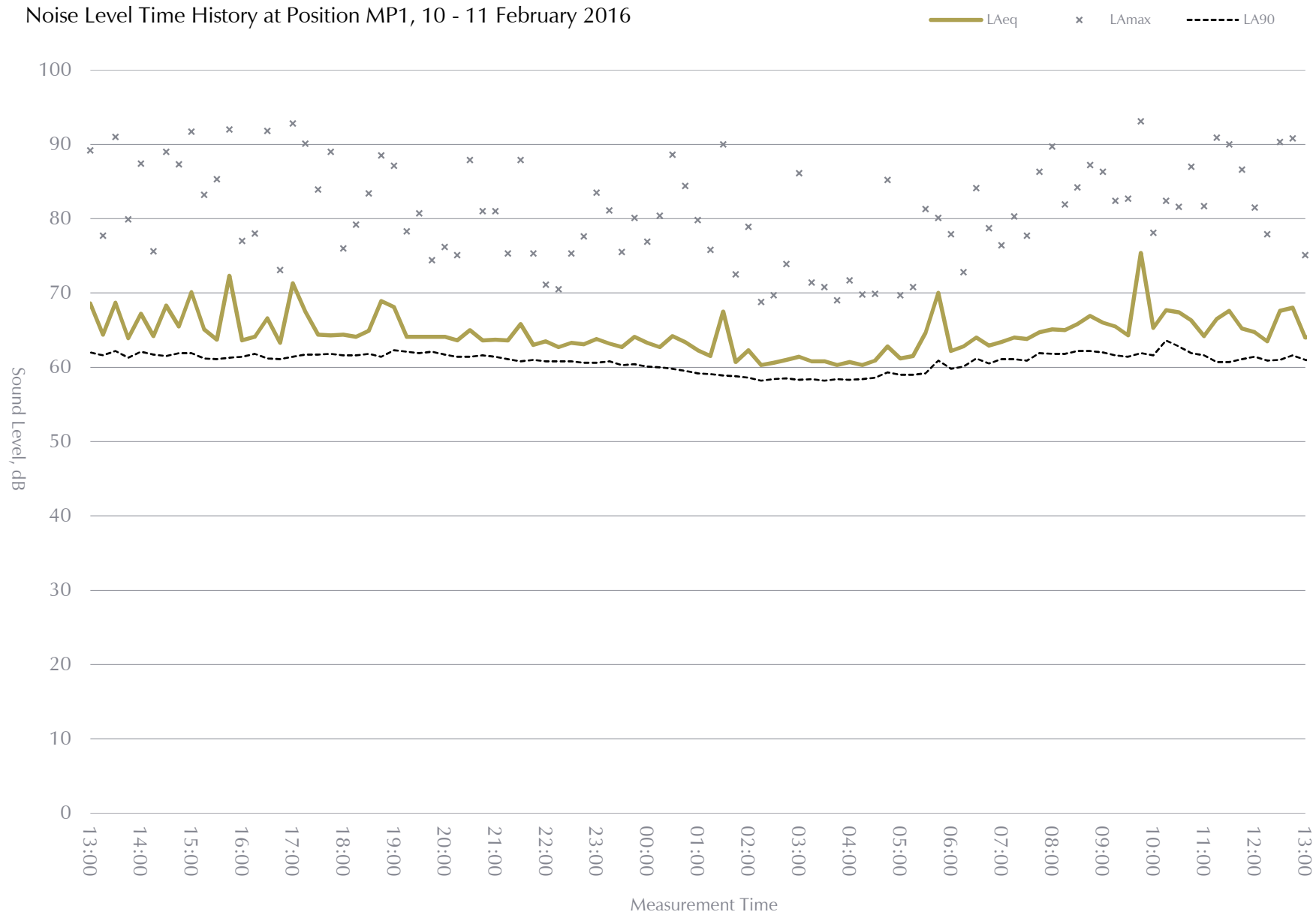
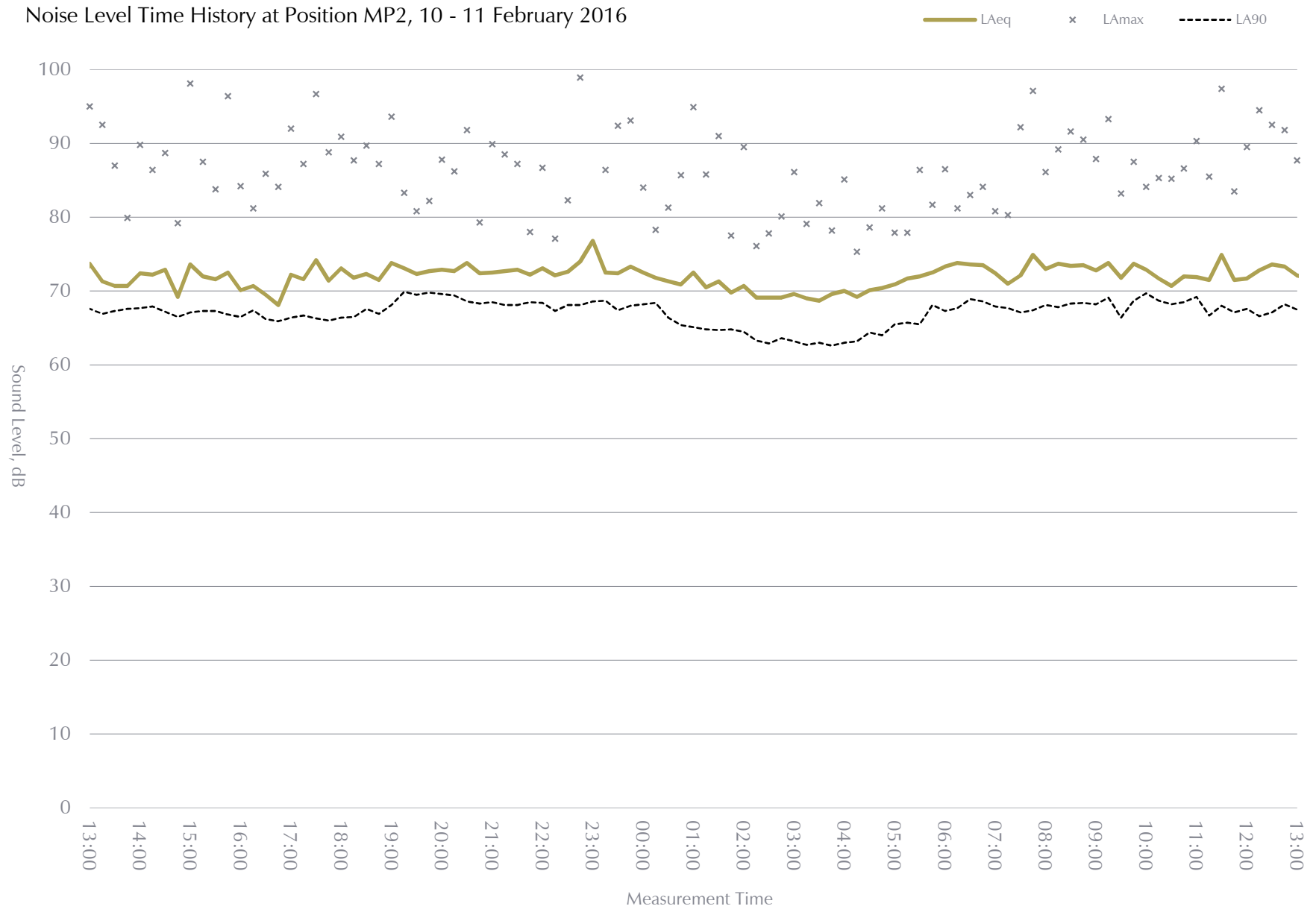




Figure 15/0688/TH02





## Plant Noise Assessment Calculations

## Assessment Position 1: Building to West

Item	Noise Level (dB) @ Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Sound Power Level (65dBA)	65	68.5	62	61.5	61.5	56	49	40
4 Units	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Radiation Loss (Quarter Spherical)	-5	-5	-5	-5	-5	-5	-5	-5
Distance Loss (17m)	-24.6	-24.6	-24.6	-24.6	-24.6	-24.6	-24.6	-24.6
Screening Loss (Line of sight)	-5	-5	-5	-5	-5	-5	-5	-5
Façade Correction (yes)	3	3	3	3	3	3	3	3
Total (39dBA)	39.4	42.9	36.4	35.9	35.9	30.4	23.4	14.4

T1 Plant Noise Calculation to AP1

## Assessment Position 2: Building to South

Item	Noise Level (dB) @ Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Sound Power Level (65dBA)	65	68.5	62	61.5	61.5	56	49	40
4 Units	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Radiation Loss (Quarter Spherical)	-5	-5	-5	-5	-5	-5	-5	-5
Distance Loss (30m)	-29.5	-29.5	-29.5	-29.5	-29.5	-29.5	-29.5	-29.5
Screening Loss (None)	0	0	0	0	0	0	0	0
Façade Correction (yes)	3	3	3	3	3	3	3	3
Total (39dBA)	39.5	43.0	36.5	36.0	36.0	30.5	23.5	14.5

T2 Plant Noise Calculation to AP2

