Castlehaven Row Ltd

# Camden Wharf

## Noise Impact Assessment

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# Contents



## Appendices

# Executive summary

It is proposed to extend the existing Camden Wharf building, primarily to provide space for a new Restaurant at Level 4, as well as additional office space.

The development is located is situated along Regent's Canal and opposite Camden Lock Market.

This noise impact assessment assesses the proposed re-development in terms of potential effects from entertainment and building services noise.

Consideration has been given to the London Borough of Camden (LBC) noise and vibration Policy DP28. A noise survey has been conducted to identify noise sources within the local area and to evaluate the baseline noise environment.

Noise limits have been specified for building services noise that can be secured by a suitably worded planning condition and delivered during detailed design of the development. The noise limits have been developed in accordance with LBC guidance.

Mitigation has been developed for the building envelope and building services equipment which will continue to be developed during detailed design development.

On the basis of this assessment, the development is not considered likely to give rise to a significant adverse impact on health and quality of life in relation to noise, in accordance with paragraph 123 of the NPPF.

# 1 Introduction

Arup has been commissioned by Castlehaven Row Ltd to provide acoustic consultancy services in support of the planning application for the proposed extension to the existing Camden Wharf building, London. The development is in the London Borough of Camden and is situated along Regent's Canal and opposite Camden Lock Market.

This report details the initial noise survey carried out to quantify the existing background noise climate around the building. These noise levels have been used to provide noise emissions limits for new mechanical services plant in accordance with the London Borough of Camden (LBC) noise emissions policy.

# 2 Noise emission criteria

LBC's noise and vibration Policy DP28 which states noise level targets for "places of entertainment" and "plant and machinery" in Tables D and E respectively. These Tables are produced in Figure 1 and Figure 2.

| Noise description and measurement location | Period | Time | Sites adjoining places of entertainment |
|---|---|---|---|
| Noise at 1 metre external to a sensitive façade | Day and evening | 0700-2300 | $L_{Aeq}$, 5m shall not increase by more than 5dB* |
| Noise at 1 metre external to a sensitive façade | Night | 2300-0700 | $L_{Aeq}$, 5m shall not increase by more than 3dB* |
| Noise inside any living room of any noise sensitive premises, with the windows open or closed | Night | 2300-0700 | $L_{Aeq}$, 5m (in the 63Hz Octave band measured using the 'fast' time constant) should show no increase in dB* |
| * As compared to the same measure, from the same position, and over a comparable period, with no entertainment taking place | | | |

Figure 1: Noise levels from places of entertainment at which planning permission will not be granted - extract from DP28

| Noise description and location of measurement | Period | Time | Noise level |
|---|---|---|---|
| Noise at 1 metre external to a sensitive façade | Day, evening and night | 0000-2400 | 5dB(A) <LA90 |
| Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade. | Day, evening and night | 0000-2400 | 10dB(A) <LA90 |
| Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade. | Day, evening and night | 0000-2400 | 10dB(A) <LA90 |
| Noise at 1 metre external to sensitive façade where LA90>60dB | Day, evening and night | 0000-2400 | 55dB$_{LAeq}$ |

Figure 2: Noise levels from plant and machinery at which planning permission will not be granted - extract from DP28

# 3 Baseline Noise Survey

An environmental noise survey has been undertaken to determine the noise in the vicinity of the proposed redevelopment. Attended noise measurements were taken at street level at the two adjacent sensitive receptors to determine the lowest background noise at those locations. A noise logger was subsequently installed on site because of design changes resulting from design development.

Attended measurements (Locations 1 and 2) and the unattended logger measurements (Location 3) are shown in Figure 3. Measurement Location 1 was located to the west of Camden Wharf at 1m from the façade of Holiday Inn. Measurement location 2 was located to the northeast of Camden Wharf approximately 6m from the kerb of Camden High Street. Measurement location 3 was located at the east end of the Level 1 plant shelf overlooking the rear of premises on Camden High Street.

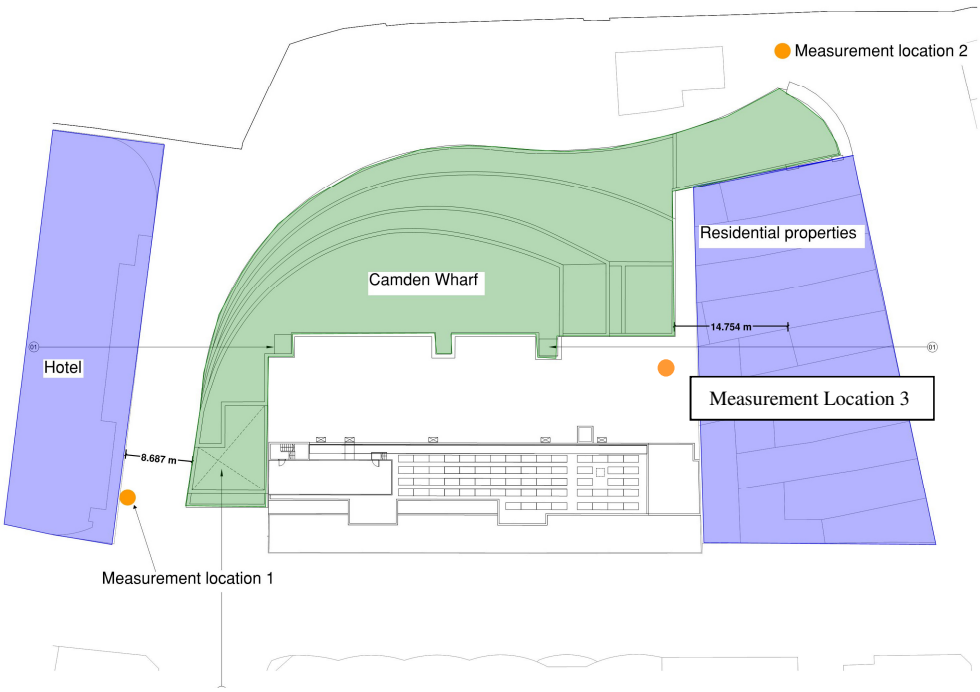


Figure 3: Measurement location plan

## 3.1 Noise sources and observations

The noise source that dominated the ambient noise levels at Location 1 was road traffic on Jamestown Road during the day. Other sources of noise included pedestrian noise, occasional aircraft. The night time noise levels were dominated by existing building services plant and distant road traffic.

The source that dominated the ambient noise levels at Location 2 was the traffic noise on Camden High Street during the day and night. Other sources of noise included pedestrian noise, occasional aircraft, loading and unloading at night and freight train at night.

The source that dominated the ambient noise levels at Location 3 was existing building services noise from a variety of premises.

Table 1 presents the lowest ambient ($L_{Aeq}$) noise levels at Locations 1 - 3. These values are most pertinent to the assessment of entertainment noise.

| Time | Lowest measured ambient noise level, $L_{eq, 5\ mins}$ | | |
|---|---|---|---|
| | Hotel - location 1 | Residential properties - Location 2 | Residential properties - Location 3 |
| Weekday (07:00 – 23:00) | 61 dBA | 67 dBA | 57 dBA |
| Night (23:00 – 07:00) | 55 dBA | 61 dBA | 56 dBA |
| Night (23:00 – 07:00) at 63Hz | 61 dB | 66 dB | 66 dB |

Table 1: Lowest measured ambient noise level

Table 2 presents the lowest background ($L_{A90}$) noise levels at Locations 1 - 3. These values are most pertinent to the assessment of building services noise.

| Time | Lowest measured background noise level, $L_{A90, 5\ mins}$ | | |
|---|---|---|---|
| | Hotel - location 1 | Residential properties - Location 2 | Residential properties - Location 3 |
| Weekday (07:00 – 23:00) | 56 | 60 | 57 |
| Night (23:00 – 07:00) | 45 | 51 | 56 |

Table 2: Lowest measured background noise

# 4 Entertainment noise emissions

For the restaurant aspect of the proposed development, noise may occur as a result of entertainment noise. The anticipated noise emissions have been calculated based upon initial assumptions but can only be fully quantified once a tenant for the restaurant has been secured and the design of the development is further developed.

The approach taken has therefore been to define noise emission limits to which the development will be designed and provide the findings of the initial design development.

## 4.1 Design Criteria

Based on the guidance set out in Figure 1 and the baseline noise survey, the noise targets for entertainment noise at each measurement Location are presented in Table 3.

For the daytime the entertainment noise limit is no more than 3dBA above the lowest measured baseline value, in order to ensure that combined levels do not increase by more than 5dBA.

For the night-time the entertainment noise limit is parity with the lowest measured baseline value, in order to ensure that combined levels do not increase by more than 3dBA.

For the night-time the entertainment noise limit at 63Hz is no more than 10dB below the lowest measured baseline value (at 63 Hz), in order to ensure that combined levels do not increase appreciably.

| **Time** | **Noise Emissions Limits at Receptors, $dBL_{eq.5m}$** | | |
|---|---|---|---|
| | **Hotel - location 1** | **Residential properties - Location 2** | **Residential properties - Location 3** |
| Day (07:00 – 23:00) | 64 dBA | 70 dBA | 60 dBA |
| Night (23:00 – 07:00) | 55 dBA | 61 dBA | 56 dBA |
| Night (23:00 – 07:00) at 63Hz | 51 dB | 56 dB | 56 dB |

Table 3: Entertainment noise emission limits

## 4.2 Initial assessment

Calculations have been conducted based upon Restaurant type operating noise levels as presented in Table 4. Maximum operational noise levels for the restaurant space would be stipulated in the restaurant tenant's lease.

| **Noise source** | **Octave band centre frequency (Hz)** | | | | | | | | **A** |
|---|---|---|---|---|---|---|---|---|---|
| | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **8k** | |
| Restaurant | 68 | 66 | 69 | 72 | 70 | 67 | 62 | 52 | **74** |

Table 4: Restaurant operating noise levels

For the purposes of noise calculations standard 6mm/12mm/6mm glazing ($R_w32$) and standard cladding with dry lining ($R_w45$) has been modelled. The roof build-up (shown in Figure 4) is expected to achieve in excess of $R_w45$.

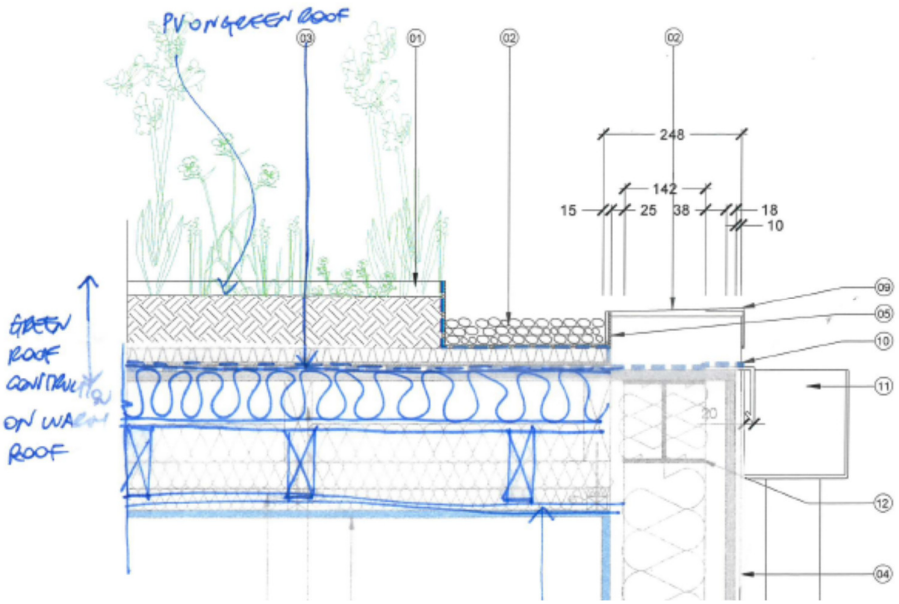


Figure 4: Proposed roof build-up

Calculations indicate that no further enhancements would be required for the building envelope in relation to the operating noise levels presented in Table 4. If higher operating noise levels are required by the tenant then enhancement to the building envelope may be required.

The mitigation of entertainment noise is considered to be uncontroversial in this instance and could be secured by a suitably worded planning condition.

By implementing the proposed limits through the specification and design of the building envelope, the noise impacts would be not significant.

The restaurant area will be located above existing office space. Calculations based on the floor construction show that airborne noise levels would less than 30dB$L_{Aeq,T}$. Design noise levels in the range of 35 – 40 dB$L_{Aeq,T}$ for an Executive office are advised by BS8233: 2014 – 'Guidance on sound insulation and noise reduction for buildings'. Impact noise will require controlled by a resilient layer between the top side of the floor and any cosmetic floor coverings. The requirement and specification for a resilient floor covering would be stipulated in the restaurant tenant's lease.

# 5 Building Services environmental noise emissions

For the proposed development, noise may occur as a result of building services equipment. The anticipated noise emissions have been calculated based upon initial plant selections but can only be fully quantified once the design of the development is further developed.

The approach taken has therefore been to define noise emission limits to which the development will designed and provide the findings of the initial design development.

## 5.1 Design Criteria

Based on the guidance set out in Figure 2 and the baseline noise survey, the noise targets for building services plant are presented in Table 5.

| Time | Noise Emissions Limits at Receptors, $dBL_{Aeq}$* | | |
|---|---|---|---|
| | Hotel - location 1 | Residential properties - Location 2 | Possible residential properties - Location 3 |
| Day (07:00 – 23:00) | 51 | 55 | 52 |
| Night (23:00 – 07:00) | 40 | 46 | 51 |

* These limits would need to be reduced by 5dB if plant items were considered likely to exhibit a tonal or impulsive character.

Table 5: Building services plant noise emission limits

## 5.2 Initial assessment

Calculations have been conducted for initial plant sections and locations. Table 6 presents sound level limits for the proposed plant items / enclosures to satisfy LBC's noise policy.

| Plant | Noise limit within the enclosure dB(A) $L_w$ |
|---|---|
| Chillers | 75* |
| Kitchen extract | 85 |
| South west plant hosting a number of items | 73 |
| GF louvers serving heating and cooling plant | 65** |

Table 6: Sound level limits for proposed plant items/ enclosures

*Sound power level limit per chiller inclusive of enclosure attenuation

**Sound pressure level in dB(A) at 1m from the louvre

The mitigation of building services noise is considered to be uncontroversial in this instance and could be secured by a suitably worded planning condition.

By implementing the proposed noise limits through specification and design of the building services, the noise impacts would be not significant.

# 6 Conclusions

A noise impact assessment has been conducted for the proposed re-development in terms of the potential effects resulting from entertainment and building services noise.

Consideration has been given to the London Borough of Camden (LBC) noise and vibration Policy DP28. A noise survey has been conducted to identify noise sources within the local area and to evaluate the baseline noise environment.

Baseline noise levels are quite high, commensurate with an urban environment. Noise levels to the north-eastern elevation are much lower.

Limits have been specified for entertainment and building services noise to atmosphere, which can be secured by a suitably worded planning condition and delivered during detailed design of the development. The noise limits have been developed by reference to LBC guidance.

Mitigation has been developed for the building envelope and building services equipment which will continue to be developed during detailed design development.

On the basis of this assessment, the development is not considered likely to give rise to a significant adverse impact on health and quality of life in relation to noise, in accordance with paragraph 123 of the NPPF.

# Appendix A

Glossary of Acoustic Terminology

# A1 Glossary of Acoustic Terminology

## Decibel (dB)

The ratio of sound pressures which we can hear is a ratio of $10^6$:1 (one million:one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' ($L_p$) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

## dB(A)

The unit used to define a weighted sound pressure level, which correlates well with the subjective response to sound. The 'A' weighting follows the frequency response of the human ear, which is less sensitive to low and very high frequencies than it is to those in the range 500Hz to 4kHz.

In some statistical descriptors the 'A' weighting forms part of a subscript, such as $L_{A10}$, $L_{A90}$, and $L_{Aeq}$ for the 'A' weighted equivalent continuous noise level.

## Equivalent continuous sound level

An index for assessment for overall noise exposure is the equivalent continuous sound level, $L_{eq}$. This is a notional steady level which would, over a given period of time, deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating levels can be described in terms of a single figure level.

## Frequency

Frequency is the rate of repetition of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the hertz (Hz), which is identical to cycles per second. A 1000Hz is often denoted as 1kHz, eg 2kHz = 2000Hz. Human hearing ranges approximately from 20Hz to 20kHz. For design purposes the octave bands between 63Hz to 8kHz are generally used. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. For more detailed analysis, each octave band may be split into three one-third octave bands or narrow frequency bands.

## Maximum noise level

The maximum noise level identified during a measurement period. Experimental data has shown that the human ear does not generally register the full loudness of transient sound events of less than 125ms duration and fast time weighting (F) has an exponential time constant of 125ms which reflects the ear's response. Slow time weighting (S) has an exponential time constant of 1s and is used to allow more accurate estimation of the average sound level on a visual display.

The maximum level measured with fast time weighting is denoted as $L_{Amax,\,F}$. The maximum level measured with slow time weighting is denoted $L_{Amax,S}$.

## Sound pressure level

The sound power emitted by a source results in pressure fluctuations in the air, which are heard as sound.

The sound pressure level ($L_p$) is ten times the logarithm of the ratio of the measured sound pressure (detected by a microphone) to the reference level of 2 x $10^{-5}$Pa (the threshold of hearing).

Thus $L_p$ (dB) = 10 log $(P_1/P_{ref})^2$ where $P_{ref}$, the lowest pressure detectable by the ear, is 0.00002 pascals (ie $2x10^{-5}$ Pa).

The threshold of hearing is 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB(A) or more and a change of 3dB is only just detectable. A change of 10dB is subjectively twice, or half, as loud.

## Statistical noise levels

For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation. The $L_{10}$, the level exceeded for 10% of the time period under consideration, and can be used for the assessment of road traffic noise (note that $L_{Aeq}$ is used in BS 8233 for assessing traffic noise). The $L_{90}$, the level exceeded for 90% of the time, has been adopted to represent the background noise level. The $L_1$, the level exceeded for 1% of the time, is representative of the maximum levels recorded during the sample period. A weighted statistical noise levels are denoted $L_{A10}$, $dBL_{A90}$ etc. The reference time period (T) is normally included, e.g. $dBL_{A10,\,5min}$ or $dBL_{A90,\,8hr}$.

# Typical levels

Some typical dB(A) noise levels are given below:

| Noise Level, dB(A) | Example |
|---|---|
| 130 | Threshold of pain |
| 120 | Jet aircraft take-off at 100m |
| 110 | Chain saw at 1m |
| 100 | Inside disco |
| 90 | Heavy lorries at 5m |
| 80 | Kerbside of busy street |
| 70 | Loud radio (in typical domestic room) |
| 60 | Office or restaurant |
| 50 | Domestic fan heater at 1m |
| 40 | Living room |
| 30 | Theatre |
| 20 | Remote countryside on still night |
| 10 | Sound insulated test chamber |

# Appendix B

Baseline noise survey details

# B1 Introduction

An environmental noise survey has been undertaken to determine the noise climate in the vicinity of the proposed redevelopment in Camden, London. Measurements have been made to enable the assessment of noise from proposed new sources forming part of the redevelopment affecting existing residential / hotel uses.

# B2 Methodology

Attended daytime noise measurements were taken between 11:00 and 16:00 on 6 June 2016 and night-time measurements between 01:00 and 03:00 on 7 June 2016 by Rawan Serhan (Associate Member of the Institute of Acoustics).

Unattended noise measurements were taken between 16:17 on 17 August and 15:07 on 18th August 2016.

The noise monitoring locations are shown in Figure 3.

All measurements during the survey were made over 5 minute periods in accordance with LBC's policies.

$L_{Aeq}$, $L_{A10}$, $L_{A90}$, and $L_{Amax}$ values were all stored. Octave band spectra were also recorded at all locations. All broadband measurements were A-weighted and used a fast time constant (0.125s). The equipment used is detailed in Table B1.

| Equipment | Manufacturer | Type | Serial number |
|---|---|---|---|
| Attended measurements | | | |
| Precision grade noise logging sound level meter | Norsonic | 140 | 1403425 |
| ½" diameter pre-polarised condenser microphone | Norsonic | 1225 | 98510 |
| Type 1 sound pressure level calibrator | Norsonic | 1251 | 33849 |
| Preamplifier | Norsonic | 1209 | 12578 |
| Unattended measurements | | | |
| Precision grade noise logging sound level meter | Rion | NL-52 | 00231671 |
| Type 1 sound pressure level calibrator | Rion | NC-74 | 34336008 |

Table B1: Noise survey equipment

The microphone was located at approximately 1.5m above the ground. The sound level meter and microphone are Type 1 confirming to BS EN 61672-1: 2003. The calibration of the sound level meter and microphone was checked before and after use, to confirm that there was no significant drift in meter response at the calibrator frequency and level. This verification indicated that there was less than

0.5dB variation between checks. The meter is annually calibrated and this calibration is traceable to international standards.

During the measurements the weather dry with wind speeds of less than 5m/s. Measurements at location 1 were taken at 1 metre from the façade of the Holiday inn. Measurements at Location 2 were undertaken under acoustically free-field conditions. Measurements at Location 3 were undertaken under façade conditions.

# B3 Results

Table B2 Table B3 present the noise survey results at Locations 1 and 2 respectively.

| Date | Noise Level, dB (A) | | | | | Notes |
|---|---|---|---|---|---|---|
| | Start | $L_{90}$ | $L_{10}$ | $L_{max}$ | $L_{eq}$ | |
| 06.06.16 | 11:36 | 57 | 65 | 75 | 63 | |
| 06.06.16 | 11:41 | 57 | 65 | 77 | 62 | |
| 06.06.16 | 11:46 | 57 | 64 | 74 | 62 | |
| 06.06.16 | 12:17 | 58 | 65 | 80 | 63 | |
| 06.06.16 | 12:22 | 58 | 68 | 82 | 65 | |
| 06.06.16 | 12:27 | 59 | 65 | 74 | 62 | |
| 06.06.16 | 13:04 | 57 | 64 | 73 | 61 | |
| 06.06.16 | 13:09 | 57 | 63 | 70 | 61 | |
| 06.06.16 | 13:14 | 57 | 68 | 73 | 64 | |
| 07.06.16 | 01:14 | 46 | 63 | 73 | 61 | Measurement disregarded due to the presence of a rubbish lorry |
| 07.06.16 | 01:19 | 46 | 62 | 73 | 59 | |
| 07.06.16 | 01:24 | 46 | 53 | 76 | 59 | |
| 07.06.16 | 02:02 | 47 | 61 | 70 | 57 | |
| 07.06.16 | 02:07 | 47 | 63 | 79 | 64 | Measurement disregarded due to the presence of a motorcycle |
| 07.06.16 | 02:13 | 46 | 55 | 78 | 59 | Measurement disregarded due to the presence of a motorcycle |
| 07.06.16 | 02:18 | 45 | 57 | 70 | 55 | |

Table B2: Measured noise levels at Location 1

| Date | Noise Level, dB (A) | | | | | Notes |
|---|---|---|---|---|---|---|
| | Start | $L_{90}$ | $L_{10}$ | $L_{max}$ | $L_{eq}$ | |
| 06.06.16 | 11:58 | 61 | 70 | 78 | 67 | |
| 06.06.16 | 12:03 | 61 | 68 | 88 | 67 | |
| 06.06.16 | 12:09 | 62 | 71 | 109 | 81 | Measurement disregarded as someone shouted into the microphone |
| 06.06.16 | 12:36 | 61 | 69 | 105 | 76 | Measurement disregarded as someone shouted into the microphone |
| 06.06.16 | 12:41 | 61 | 73 | 97 | 75 | Ambulance noise during the measurement |
| 06.06.16 | 12:46 | 61 | 71 | 92 | 71 | Ambulance noise during the measurement |
| 06.06.16 | 13:22 | 63 | 71 | 93 | 71 | |
| 06.06.16 | 13:27 | 61 | 69 | 85 | 66 | |
| 06.06.16 | 13:32 | 61 | 69 | 88 | 67 | |
| 07.06.16 | 01:34 | 54 | 68 | 79 | 64 | |
| 07.06.16 | 01:39 | 60 | 71 | 84 | 70 | Measurement disregarded due to presence of moving trollies noise |
| 07.06.16 | 01:44 | 59 | 70 | 76 | 66 | |
| 07.06.16 | 01:49 | 59 | 75 | 87 | 74 | Measurement disregarded due to presence of moving trollies noise |
| 07.06.16 | 01:54 | 61 | 73 | 89 | 73 | Measurement disregarded due to presence of moving trollies noise |
| 07.06.16 | 02:28 | 53 | 67 | 76 | 63 | |
| 07.06.16 | 02:33 | 53 | 64 | 76 | 61 | |
| 07.06.16 | 02:38 | 52 | 66 | 78 | 62 | |

Table B3: Measured noise levels at Location 2

Figure 5 present the noise survey results at Location 3.

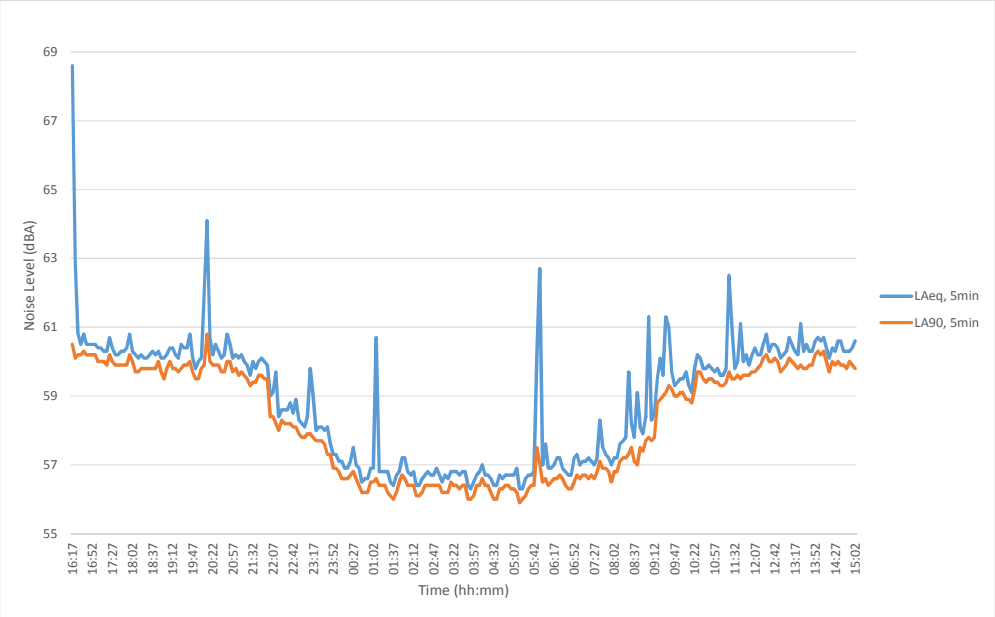


Figure 5: Measured noise levels at location 3