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WCD B40 Noise Impact Assessment 10032022

Date:

10th March 2022

For:

ROYAL BOROUGH OF GREENWICH (RBG)

Report Title:

WOOLWICH CREATIVE DISTRICT

NOISE IMPACT ASSESSMENT - B40

Condition 16 Ref – 18/22892/F

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1.0 INTRODUCTION

The former Woolwich Arsenal military buildings are to be restored as a cultural hub, close to the new Berkeley Homes (BH) development. The new quarter will provide performance spaces, rehearsal rooms, dance studios, offices and workspaces for a number of cultural organisations to inhabit.

The proposed site lies in the Royal Borough of Greenwich (RBG) close to residential dwellings, between the River Thames and the A206.

It is approximately 1-2km from London City Airport (LCA). Levels from takeoffs/landings at the City airport are high (around 70-80dB(A) L_{max}) at worst case residential facades. L_{Aeq} levels are normally <60dB(A), with occasional excursions above this level.

LCA Operational Times:

06.30 and 22.30 hours on weekdays

06.30 and 13.00 hours on Saturdays

12.30 and 22.30 on Sundays

09.00 and 22.30 hours on Public or Bank Holidays

Full closure on 25 December

Over 200 flights per day in summer, one every few minutes.

The Woolwich Crossrail station is set to open in 2022.

Long term background noise levels have been measured in three locations facing the WCD site representative of the local noise environment from Thursday 11th January 2018 and Monday 15th January 2018.

This data has been used to construct a CadnaA noise mapping model for L_{A90} background noise and $L_{Aeq, 15min}$ noise levels. The model has been used to determine noise limits for plant and entertainment noise at the closest noise sensitive receptors and to satisfy Client, BREEAM and RBG requirements.

It is understood that conditions relating to plant noise have now been discharged.

2.0 POLICY, GUIDANCE AND DESIGN CRITERIA

2.1 National Planning Policy Framework

The National Planning Policy Framework was introduced by the Department of Communities and Local Government in March 2012. The document sets out the Government's planning policies for England and how these are expected to be applied.

The Framework provides for the production of distinctive local and neighbourhood plans by Councils, in consultation with local people, which should be developed to reflect the needs and priorities of their communities.

It states that the planning system is required to contribute to and enhance the natural and local environment. Consequently, the aim is to prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

Therefore, planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.2 National Policy Statement for England

The Noise Policy Statement for England (NPSE) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

The statement sets out the long term vision of the government's noise policy, which is to "promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development".

The guidance promotes the effective management and control of noise, within the context of Government policy on sustainable development and thereby aims to:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvements of health and quality of life.

The statement adopts established concepts from toxicology that are currently being applied to noise impacts. The concept details noise levels, at which the effects of an exposure may be classified into a specific category. The classification categories as detailed within NPSE are as follows:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected;
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations and therefore the SOAEL is likely to be different for different sources, receptors and at different times of the day.

The first aim of the Statement is to avoid significant adverse effects on health and quality of life taking into account the guiding principles of sustainable development.

The second aim considers situations where impacts are established between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur. The third aim seeks to improve health and quality of life, where possible, through the pro-active management of noise, whilst also taking account of the guiding principles of sustainable development.

In the absence of quantified noise limits, further relevant guidance must also be considered.

It is the standard noise policy of RBG that noise from all new items of fixed plant are assessed in accordance with BS 4142, and designed to minimise the likeliness of causing an adverse impact at the nearest noise sensitive residential windows during the proposed period of operation.

2.3 RBG Council Policy – Condition 16

“16. Noise breakout from the development $L_{Aeq, 15min}$ (continuous sound pressure level) during the daytime and night-time at the facades of surrounding noise sensitive properties should not exceed the $L_{Aeq, 15min}$ (continuous sound pressure level) without entertainment noise present.

Prior to the occupation of the development, a noise impact assessment demonstrating that the above standard can be met shall be submitted to and approved in writing by the Local Planning Authority.

Mitigation within the design of building envelopes in the development will be designed to meet the above standard.

The approved mitigation scheme will be implemented prior to the occupation of the development.”

This is set out in the RBG Local Plan: Core Strategy Policies D5 & DH1 & The London Plan Policy 7.15.

The same approach to Phase 1a of the development has been taken with respect to noise, therefore the following correspondence with Ibraheem Alade Elias, the noise and air quality specialist EHO at

RBG, demonstrates $L_{Aeq, 15min} +3dB$, 0700 – 2300hrs is suitable. Although the below refers to Condition 5, it would also apply to Condition 16.

“I confirm that Your Statement to understand Condition 5 is correct. Combined level maximum of +3dB (minimum difference needed to perceive a change) is acceptable.

*Kind Regards
Ibraheem Alade Elias
Environmental Protection Officer – Noise and Air Quality Specialist
Royal Borough of Greenwich “*

In response to GSAD email:

“Dear Mr Elias,

*thank you for your time last Tuesday and for clarifying RBG Condition 5.
As we understand it, the total level of activity sound from WCD can rise to a limit equal to the $L_{Aeq,15min}$ noise level at any residential facade without activity noise, at any time.
This will result in a combined level maximum of +3dB.*

Could you confirm this?”

2.3.1 Entertainment Noise

The building envelope and associated cladding / glazing will be designed to meet RBG planning conditions.

The planning policy is indicated below which GSAD have used for the current design.

Table 1 Entertainment Noise Planning Policy

| 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 | $L_{Aeq,15m}$ shall not increase by more than 3 dB* |
| Noise at 1 metre external to a sensitive façade | Night | 2300-0700 | $L_{Aeq,15m}$ shall not increase.* |

* As compared to the same measure, from the same position, and over a comparable period, with no entertainment taking place

2.4 Operational Hours

It is intended that the new building will operate between 0700 and 2300hrs. Hence the following sections of this report have been based on sound levels measured during these periods.

3.0 NOISE SURVEY DETAILS

3.1 Noise Survey Positions

Long term background noise levels have been measured in locations representative of the local noise environment by GSAD in Positions 1, 2 and 3 from Thursday 11th January 2018 and Monday 15th January 2018. Locations are shown on Figures 1 and 3.

Details of the measurement equipment and procedure are shown in Appendix D.

3.2 Noise Indices

The equipment was set to record octave band sound pressure levels at 15 minute intervals. The following noise indices used in this assessment are as follows:

$L_{Aeq,T}$: The A-weighted equivalent continuous sound pressure level over a period of time, T.

$L_{Amax,T}$: The A-weighted maximum sound pressure level that occurred during a given period. Measured using the fast (L_{AFmax}) or slow (L_{ASmax}) time weightings.

$L_{A90,T}$: The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background noise level.

$L_{A1,T}$: The A-weighted sound pressure level exceeded for 1% of the measurement period. Indicative of the maximum noise level.

The L_{A90} is considered most representative of the background noise level for the purposes of complying with any Local Authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', e.g. L_{A90}) to approximate the frequency response of the human ear.

3.3 Site Survey Weather Conditions

Due to the position of noise measurements, it was not feasible to deploy a weather station at all locations. Therefore, the weather data measured at London City Airport across the River Thames has been used to consider the suitability of weather for representative measurements.

During the unattended noise measurements between Thursday 11th January 2018 and Monday 15th January 2018, temperatures varied between 3 °C and 11 °C during the measurement period.

Measurements taken during times of heavy rainfall and/or wind speeds greater than 5m/s have been excluded from the assessments such that the remaining data is deemed suitable for representative noise measurements.

4.0 SURVEY RESULTS

The results of the background noise surveys show that noise levels on the site are typical for an urban location in proximity to an airport and main roads.

Typical noise levels between 0700 and 2300hrs have been calculated and used in all further calculations.

There are several noise sensitive residential buildings nearby;

- Imperial Building
- Pavilion Square
- Warehouse Court
- Building 22
- Building 45
- The Armouries

Time histories of the noise surveys are given in Appendices A, B and C.

Table 2: Summary of results - noise surveys

| Position | | Worst case (lowest) $L_{Aeq, 15min}$ at 11PM | Daytime Representative $L_{A90, 15min}$ | Daytime $L_{Aeq-16hr}$ | Night-time Representative $L_{A90, 15min}$ | Night-time $L_{Aeq-8hr}$ |
|------------|---|---|--|---------------------------|---|-----------------------------|
| Position 1 | Imperial Building roof - west of B40/B41) | 49 | 49 | 56 | 41 | 52 |
| Position 2 | Warehouse Court (Central roof) – south of B17 | 45 | 49 | 55 | 40 | 47 |
| Position 3 | Building 22 roof – east of B19 | 48 | 47 | 56 | 46 | 53 |

The above survey results have been used to develop a noise map of the site which will help predict the prevailing noise levels at all façades of the building.

5.0 ASSESSMENT OF NOISE SURVEY RESULTS

5.1 Control of Noise to Interior and Exterior

A CadnaA noise map of the site has been constructed to determine the levels of airborne, traffic and aircraft noise incident on each applicable building facade. Plan views from the model can be found in Figures 4 and 5.

The sound insulation of the WCD building envelopes will be designed to reduce external noise break out from entertainment noise and noise break in from external noise to satisfy the limits detailed in section 2.

The table below defines worst-case $L_{Aeq,15min}$ noise levels at the nearest noise sensitive facades at 11PM.

Table 3: Summary of $L_{Aeq, 15min}$ noise levels at nearby facades (see figure 6 for building location)

| Location | | $L_{Aeq, 15min}$ at façade (dB) (lowest) | Proposed $L_{Aeq, 15min}$ limit with entertainment noise 07:00- 23:00 |
|----------|-------------------|---|---|
| A | Imperial Building | 47 | 50 |
| B | Pavilion Square | 49 | 52 |
| C | Warehouse Court | 49 | 52 |
| D | The Armouries | 44 | 47 |
| E | Building 22 | 45 | 48 |
| F | Building 45 | 41 | 44 |

See figures 4 and 5 for CadnaA model plans showing predicted representative $L_{A90,15min}$ noise levels at nearby facades.

Natural ventilation, if used, will be designed so as to not compromise the required façade sound insulation.

6.0 ASSESSMENT OF PROPOSED ENTERTAINMENT NOISE

Condition 16 of the planning permission (reference 18/2892/F) sets out limits for the cumulative entertainment noise of the operational building. The ground floor is to be used by a dance company and the rest of the building for educational purposes.

The two ground floor studios facing the Artillery Square are to be used for dance rehearsals in which music playback will take place. When required for ventilation and summer cooling, 3 sash windows in each studio may be opened. Photos of the studios and windows are attached in figure 9.

A CadnaA noise mapping model has been calculated based on three windows (1.2m² each) open in each studio during rehearsals with the following internal noise level in the plane of the windows from sound systems. A site plan of B40 and the nearest receptors is shown in figure 7.

Table 4: Proposed operational limits in the B40 studios facing artillery square

| | Unit | Frequency Hz | | | | | | | dBA |
|-------------------|------|--------------|-----|-----|-----|----|----|----|-----------|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | |
| B40 Dance Studios | SPL | 100 | 95 | 95 | 90 | 85 | 85 | 85 | 93 |

The worst-case receptors for noise from B40 are Pavilion square to the south of B40. The closest window is approximately 24m from the pavilion square building at it's closest. As per the background noise surveys shown in table 3, the proposed L_{Aeq, 15min} limit for entertainment noise at the façade of the pavilion square building is 52dB.

The CadnaA noise mapping model predicts a worst case sound pressure level of 44dB L_{Aeq} at the closest point of the pavilion square façade which is 8dB below the proposed limit and therefore indicates dance rehearsals can take place safely within the local authority limits, using the proposed sound system limits set out in table 4.

CadnaA model results are shown in figure 8.

FIGURES

FIGURE 1: SITE PLAN SHOWING NOISE MEASUREMENT LOCATIONS

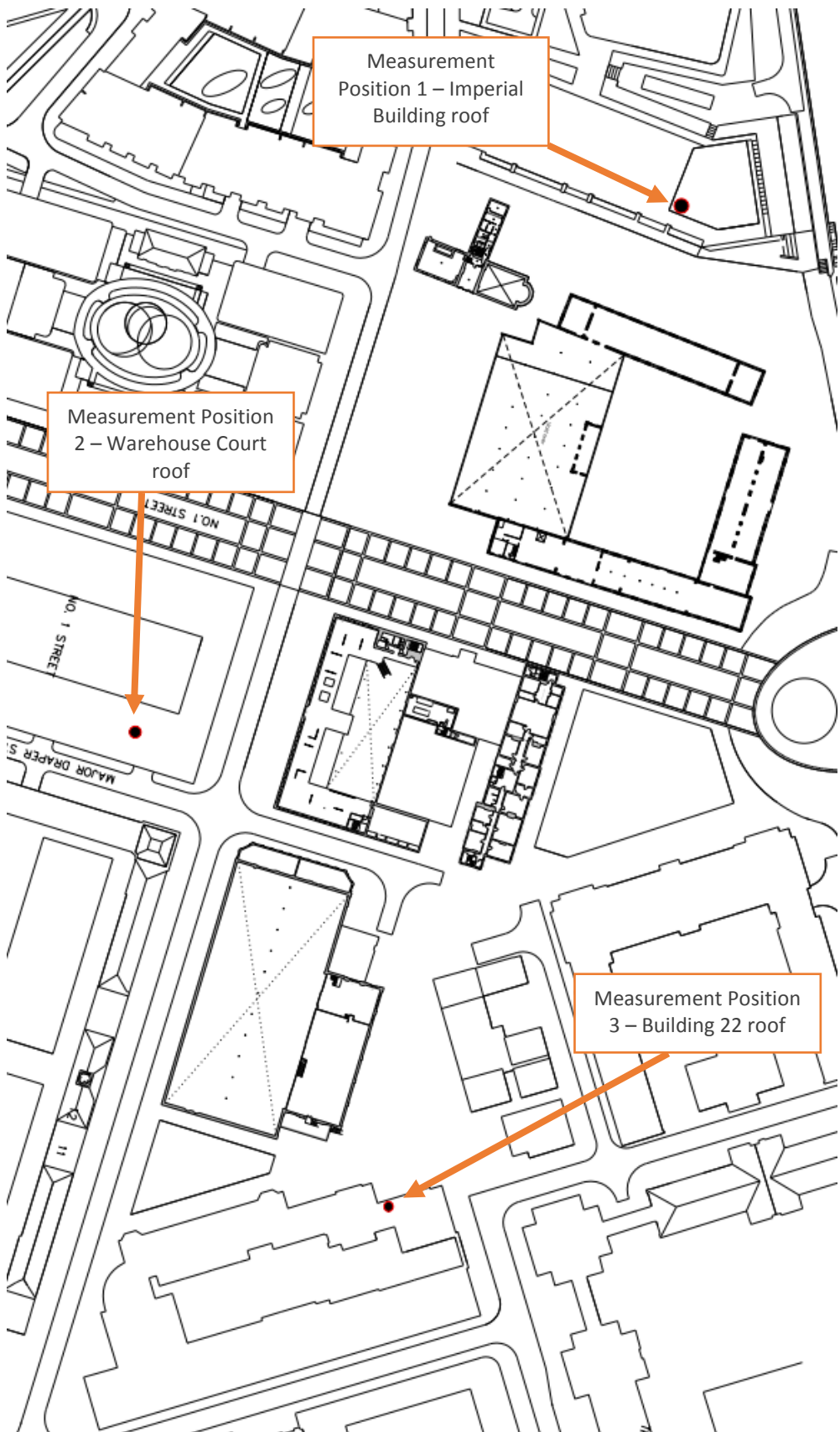


FIGURE 3: SITE PHOTO OF MEASUREMENT LOCATIONS



Measurement Position 1 –
Imperial Building roof



Measurement Position 2 –
Warehouse court roof. Note
microphone not shown



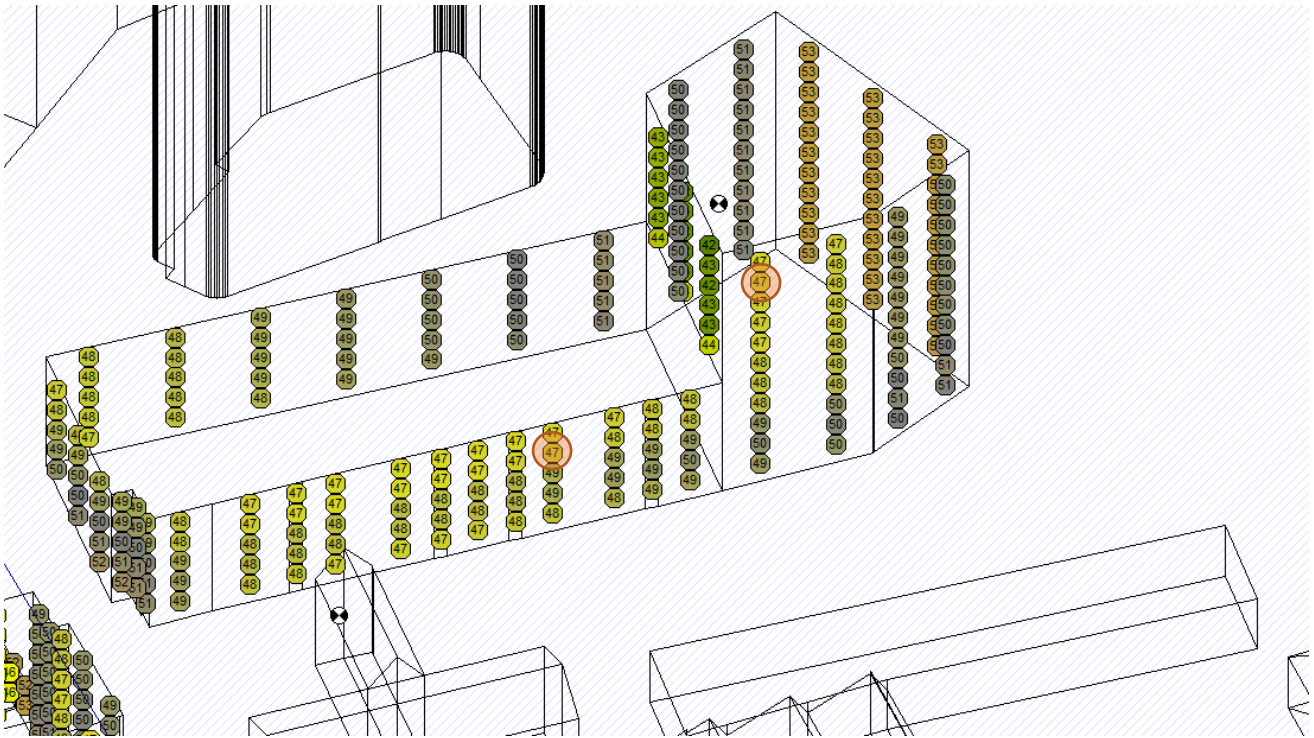
Measurement Position 3
– Building 22. Note
microphone not shown

FIGURE 4: CADNA-A MODEL – 11PM LAeq, 15min

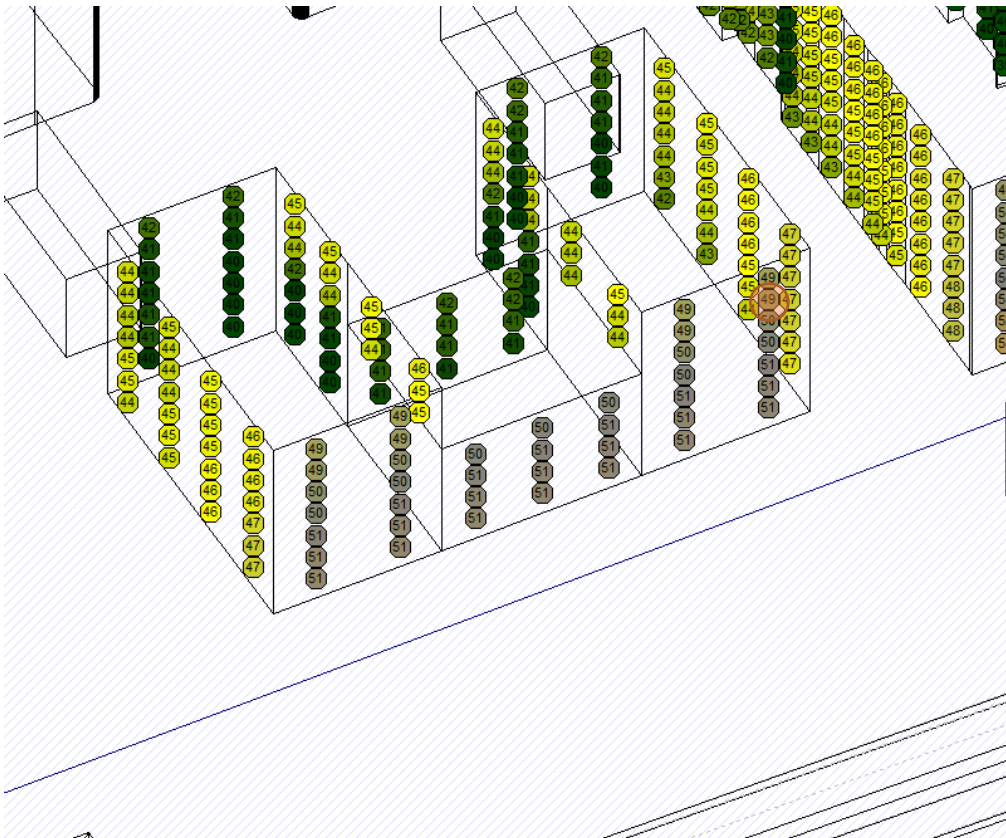
Plan view



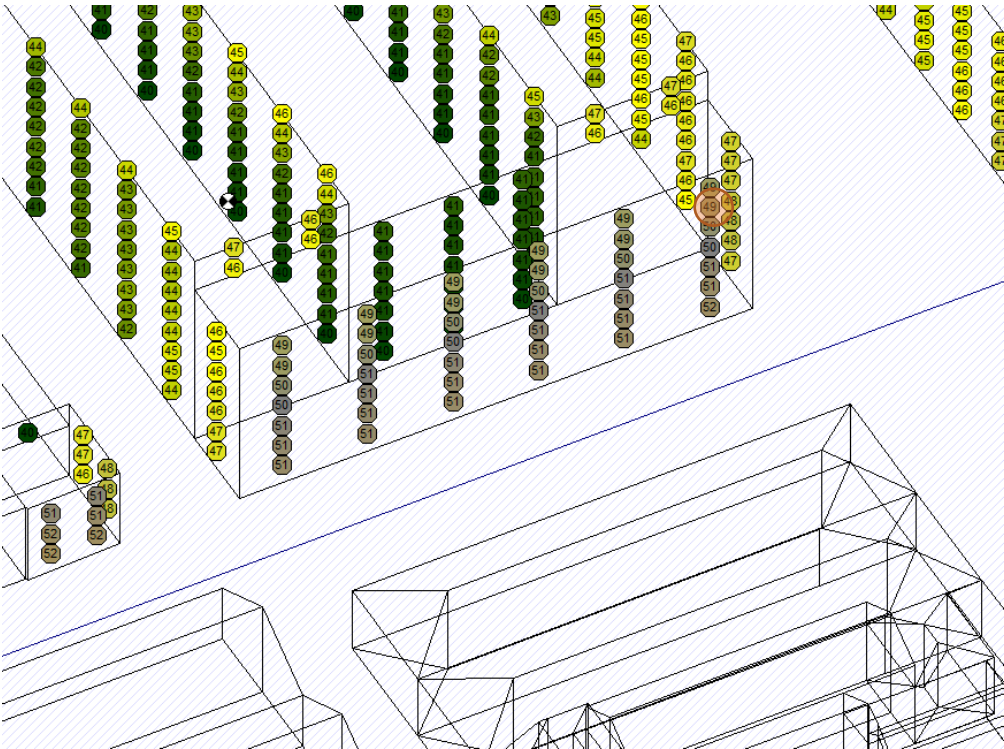
3D View – A. Imperial Building from B41



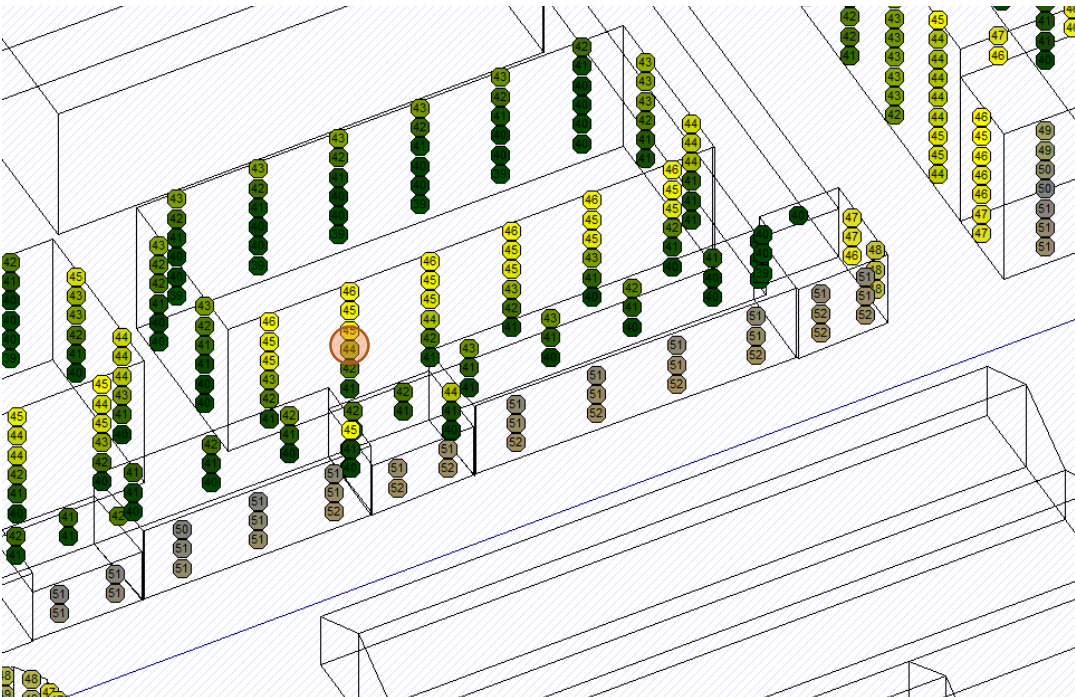
3D View – B. Pavilion Square from B41



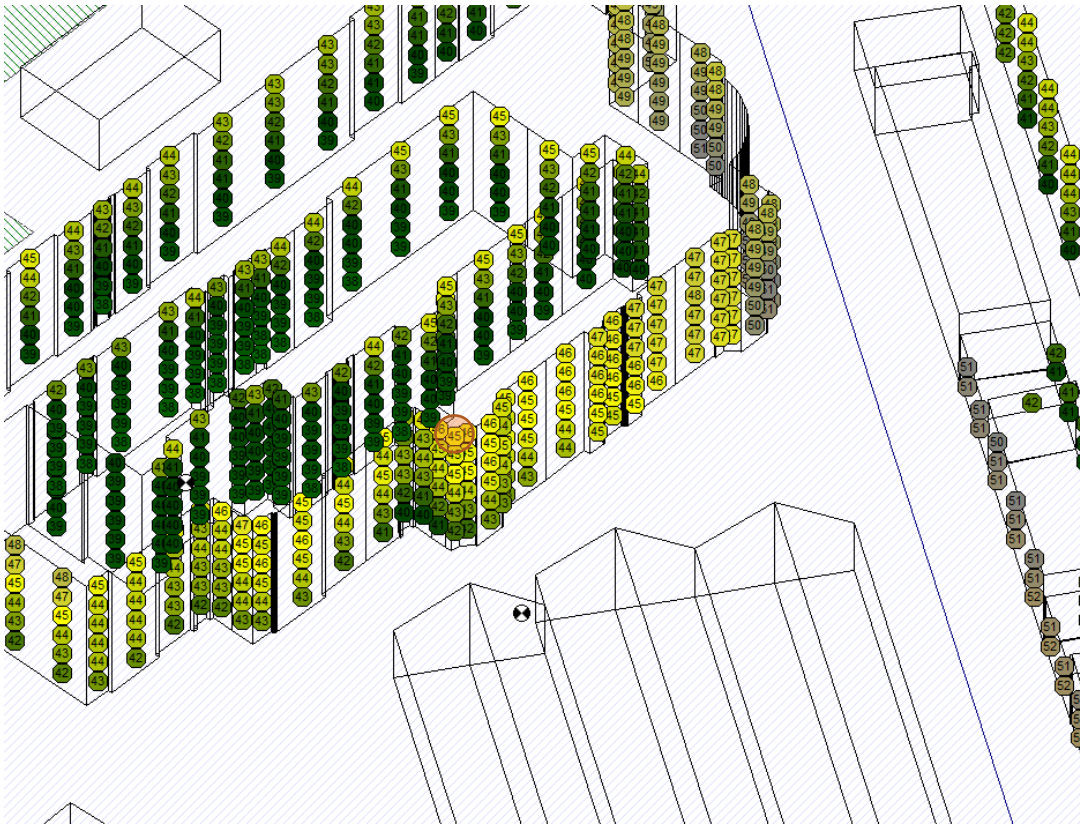
3D View – C. Warehouse Court from B17



3D View – D. The Armouries from B17



3D View – E. Building 22 from B19



3D View – F. Building 45 from B19

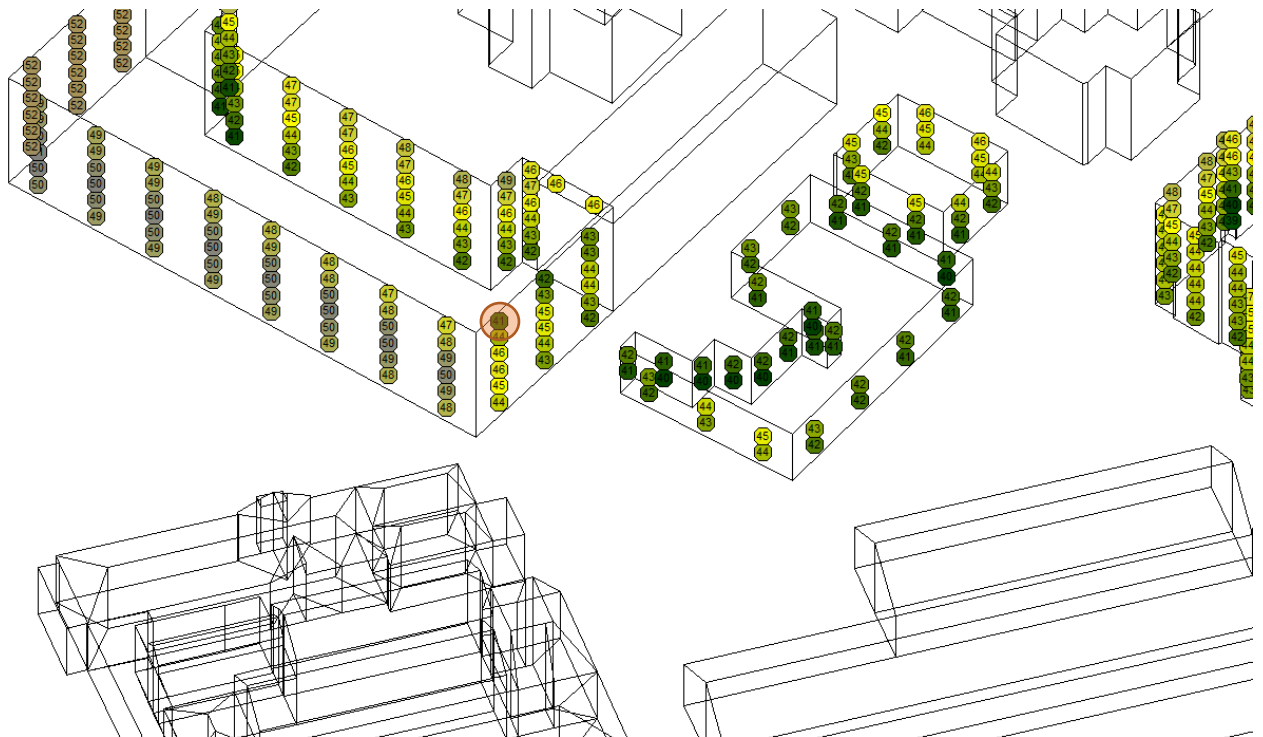
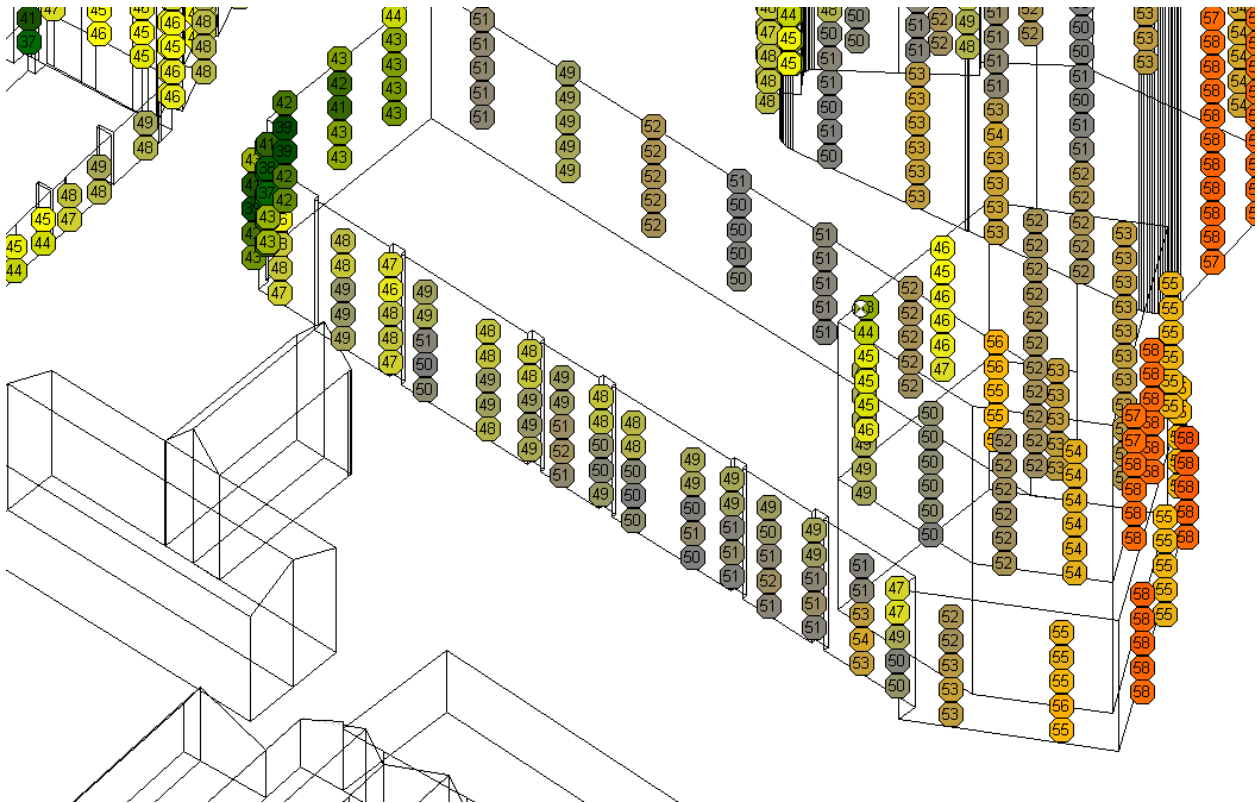


FIGURE 5: CADNA-A MODEL – PREDICTED DAYTIME REPRESENTATIVE LA90

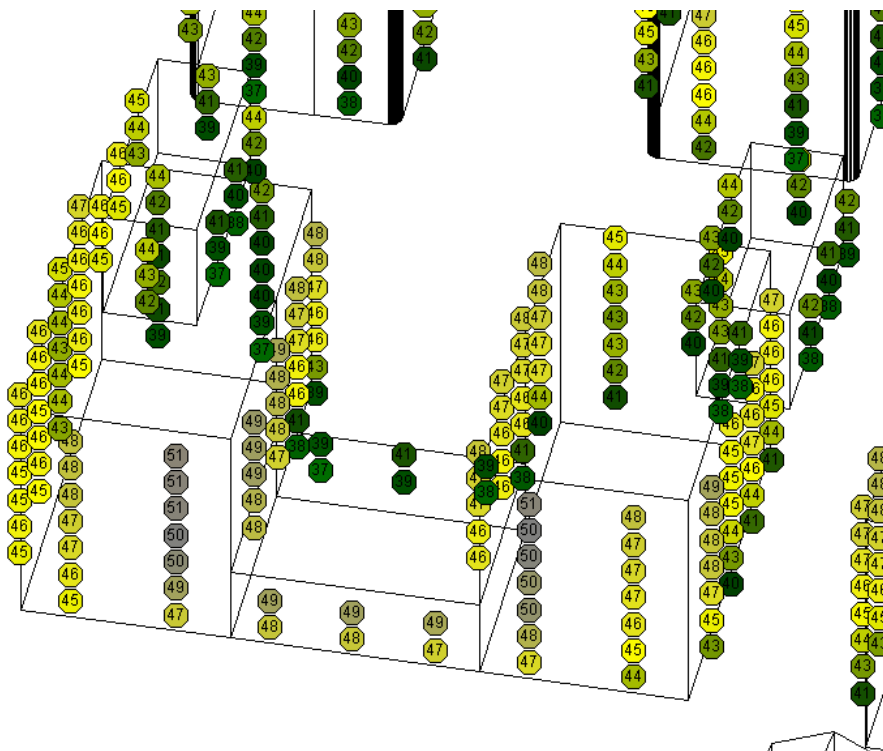
Plan View



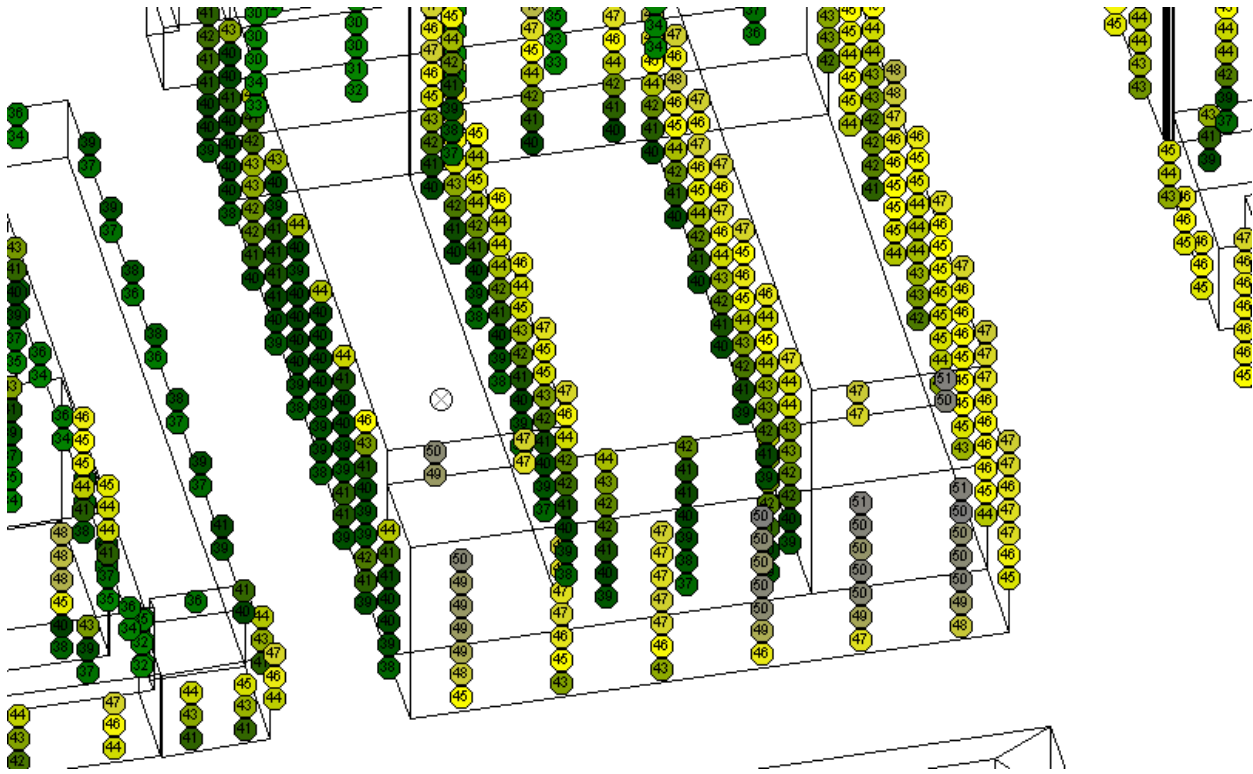
3D View – A. Imperial Building



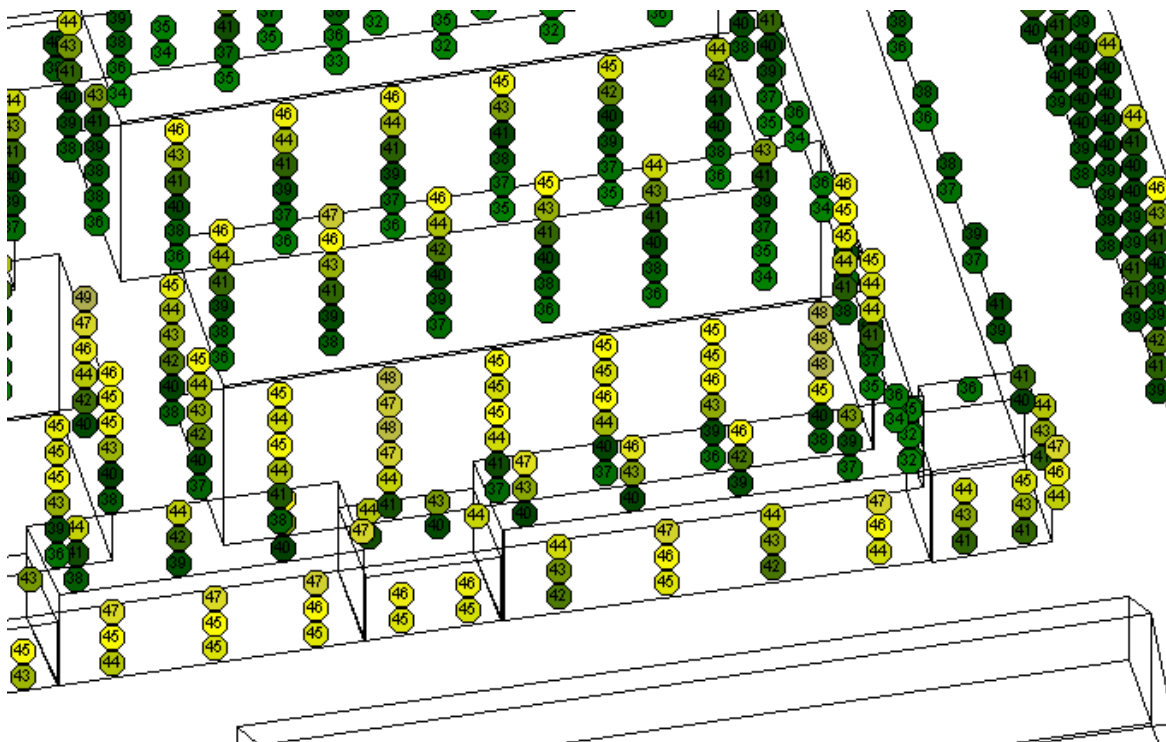
3D View – B. Pavilion Square



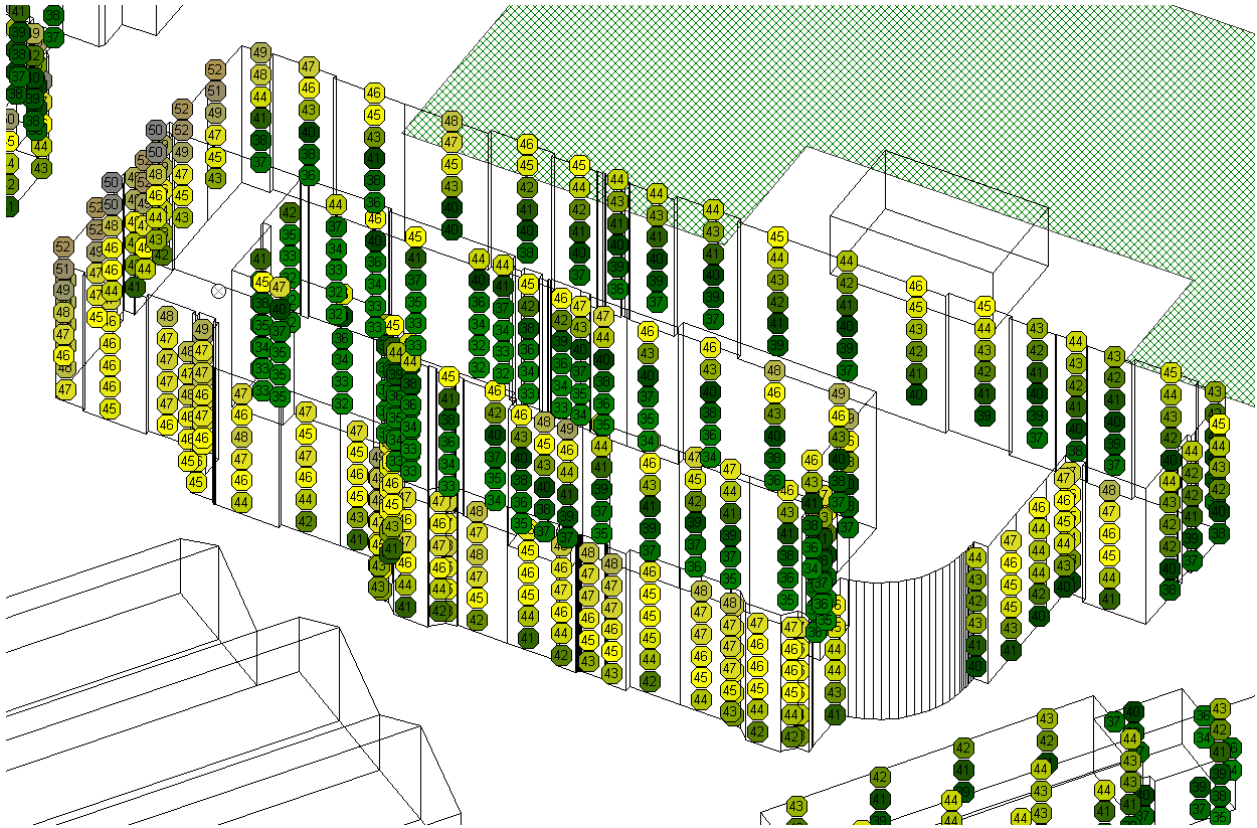
3D View – C. Warehouse Court



3D View – D. The Armouries



3D View – E. Building 22



3D View – F. Building 45

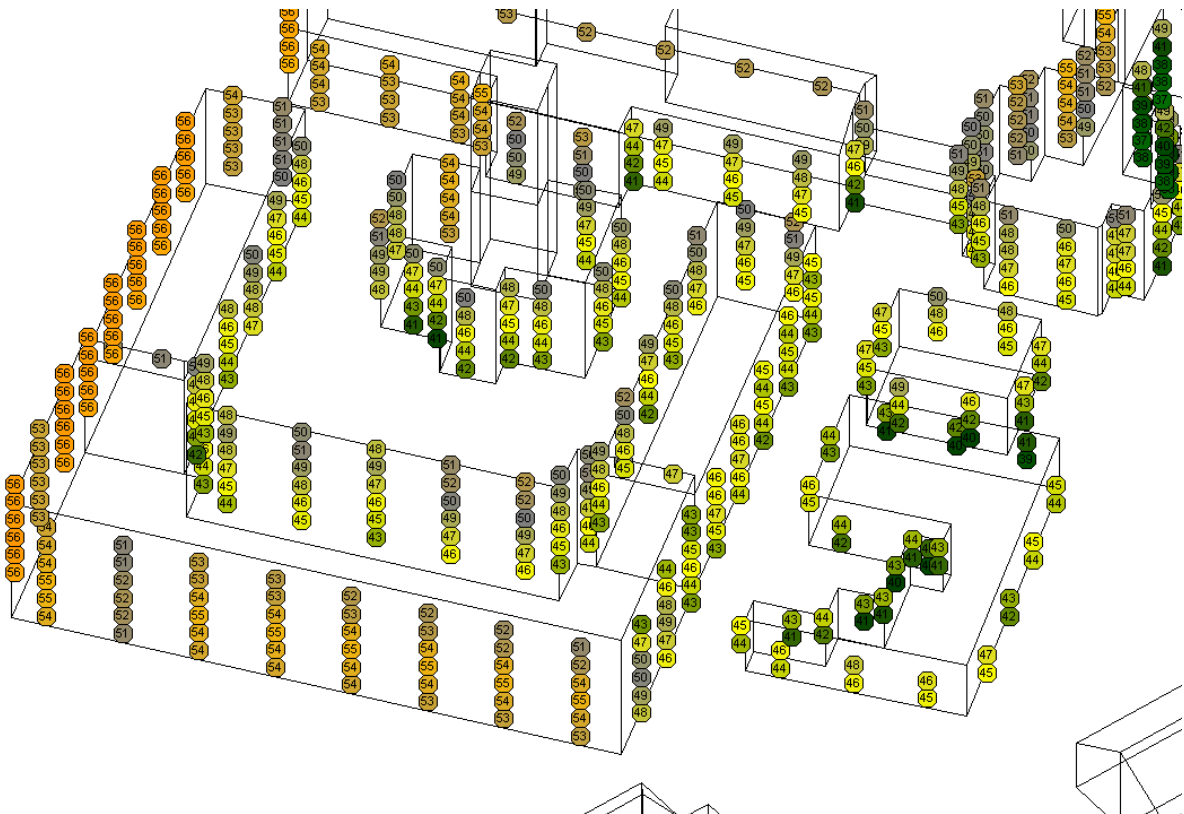


FIGURE 6: BUILDING LEGEND

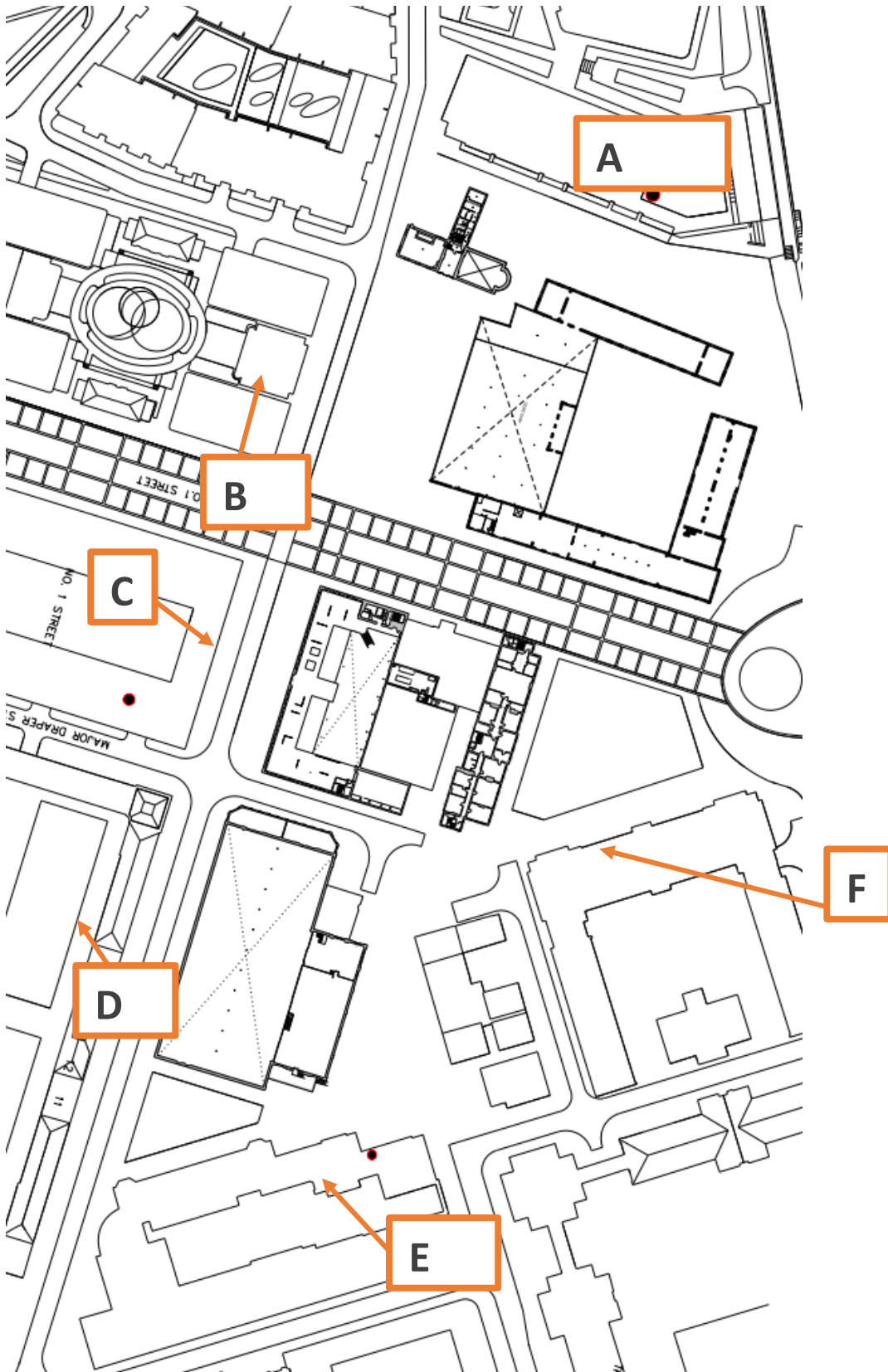
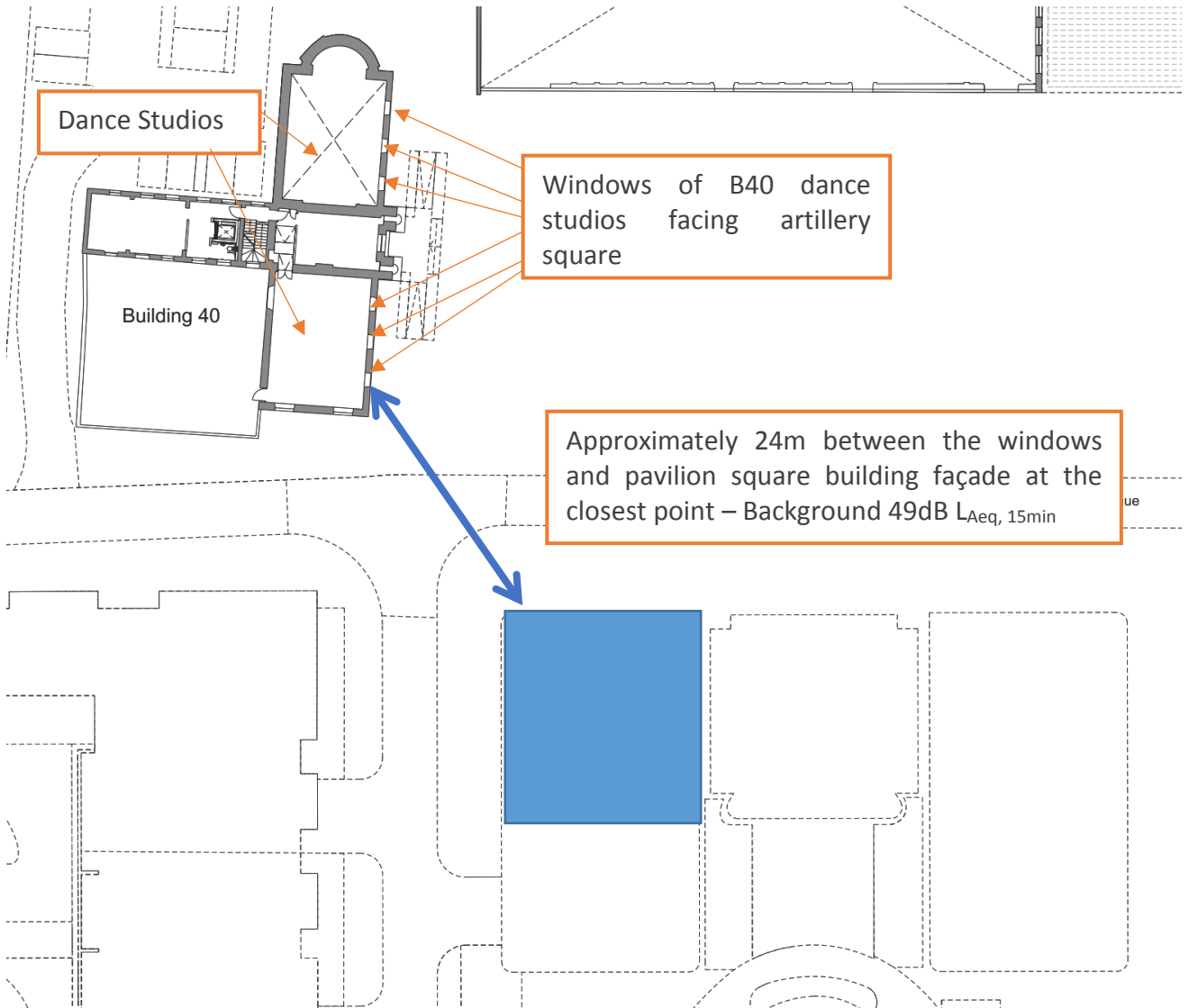


FIGURE 7: SITE PLAN SHOWING CLOSEST RECEPTORS

B40



Background noise levels

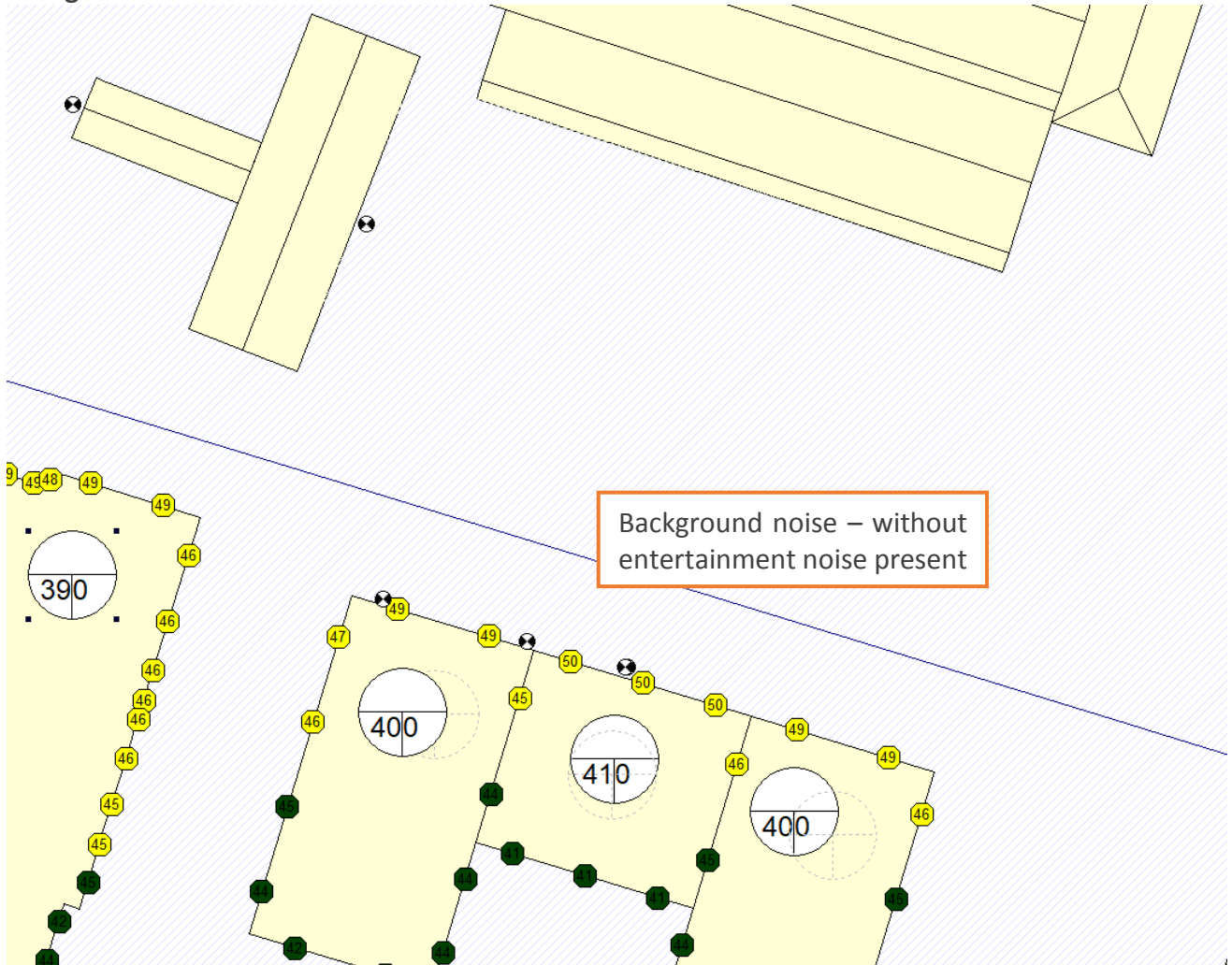


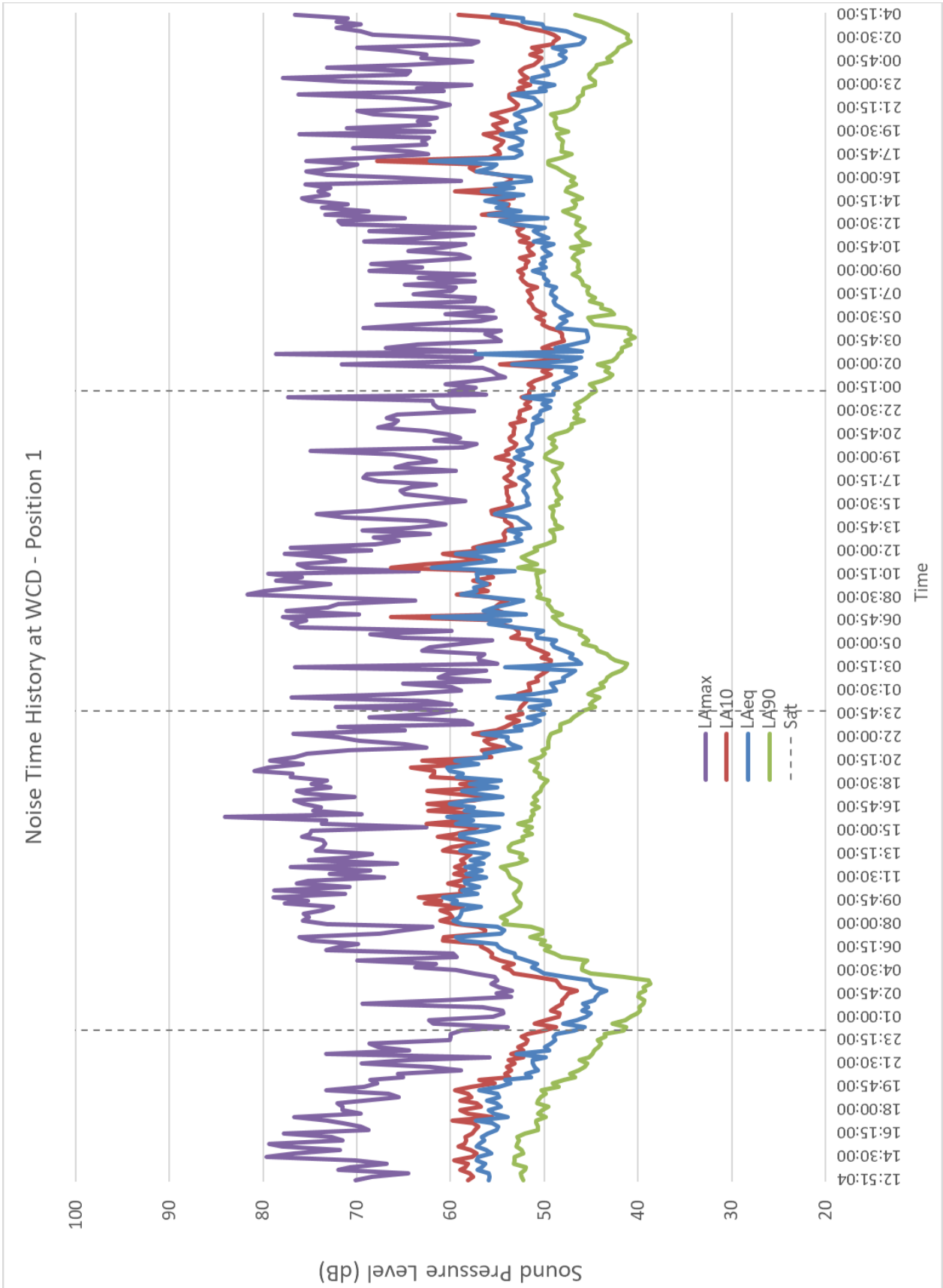
FIGURE 9: SITE PHOTOS OF DANCE STUDIOS AND OPENABLE WINDOWS



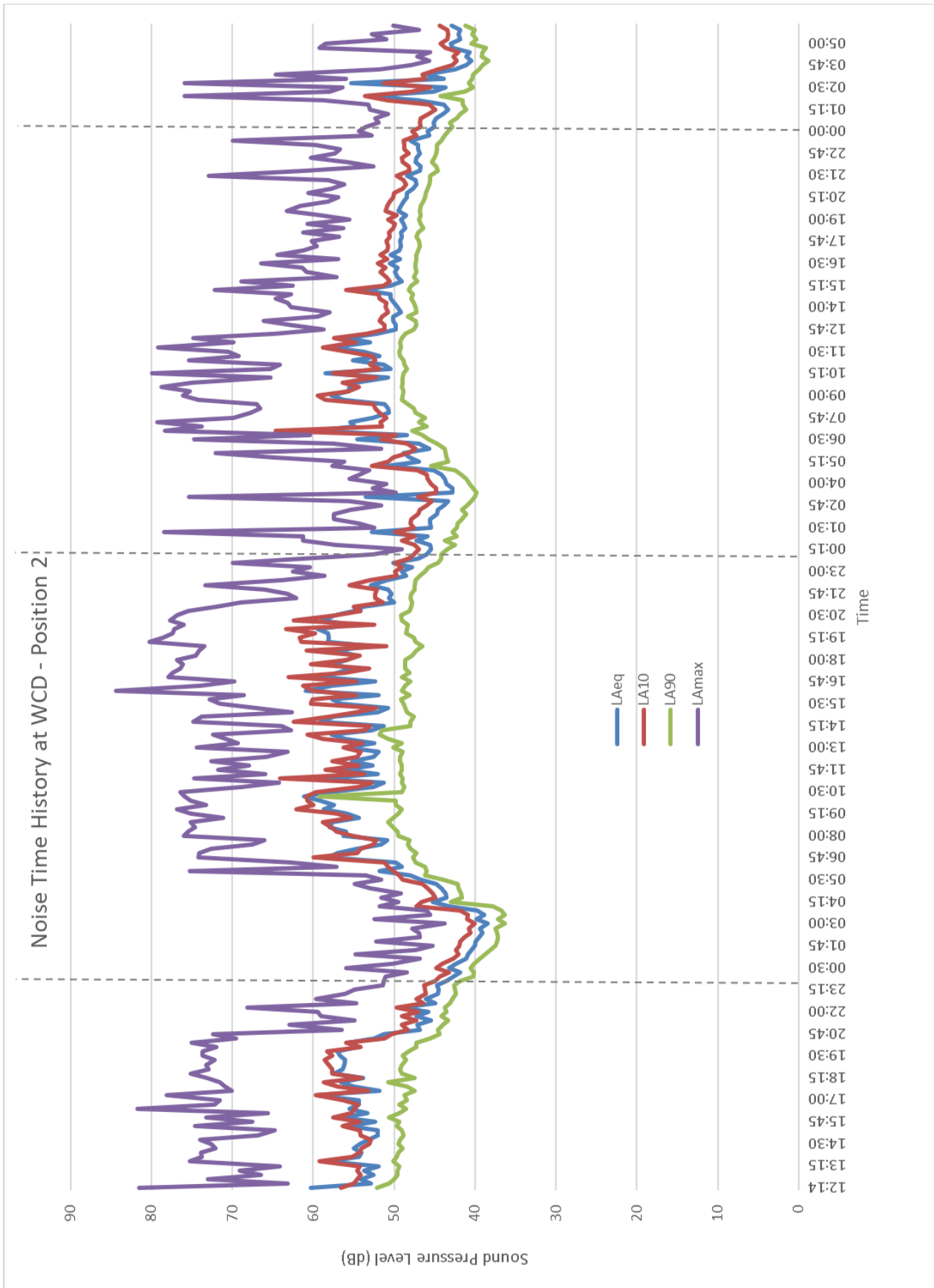


APPENDICES

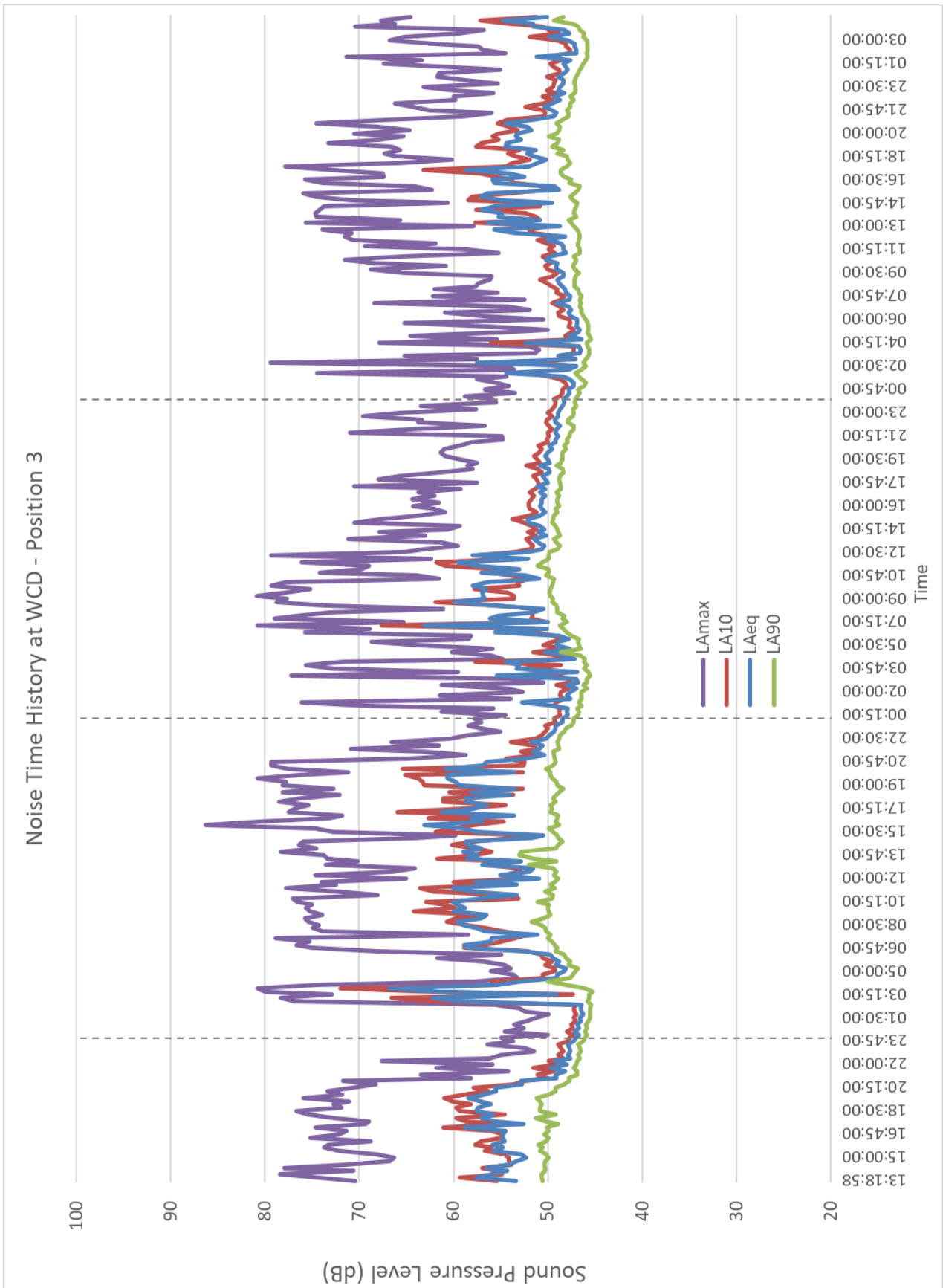
APPENDIX A: TIME SERIES RESULTS AT POSITION 1 (IMPERIAL BUILDING)



APPENDIX B: TIME SERIES RESULTS AT POSITION 2 (WAREHOUSE COURT)



APPENDIX C: TIME SERIES RESULTS AT POSITION 3 (BUILDING 22)



APPENDIX D: MEASUREMENT EQUIPMENT AND PROCEDURE

Airborne Noise

Background noise levels have been measured over a minimum period of several days at three positions around the surrounding site, the measurement positions are shown in Figure 1 and 3.

The levels were recorded as A-weighted and octave band L_{eq} , L_{max} and L_{90} using the following equipment.

- 1 x Norsonic 118 Real Time Analyser
- Norsonic 1251 Calibrator
- GRAS Environmental Microphone
- 2x NTi XL2 Sound level meter

The equipment was calibrated before and after the survey and no drift from calibration was found.

Where weather conditions were not conducive to representative noise measurements, data was excluded.

APPENDIX E: GLOSSARY OF ACOUSTIC TERMS

DECIBEL (dB) - A unit of sound pressure measurement

Sound Pressure Level in dB (L_p) = $20 \log$ (Measured sound pressure/Reference sound pressure = $20 \mu\text{Pa}$)

dB(A) - The A-weighted sound pressure level, the weighting network reduces low frequency sound in a similar way to the human ear.

REVERBERATION TIME (RT or T) – decay of sound in rooms

The time taken for a sound, once terminated, to fall through 60dB i.e. to one millionth of its original sound intensity. T_{30} – RT for first 30dB of decay. RT_{500} - Mid frequency RT.

HERTZ (Hz) - a unit of frequency measurement. The normal range of hearing is from 20Hz to about 15kHz.

ABSORPTION COEFFICIENT – degree to which a material absorbs sound.

The ratio of absorbed to incident sound energy (perfect absorber = 1)

SOUND REDUCTION INDEX R – quantity which describes a material's ability to reduce the sound pressure level across it (e.g. a wall or floor)

$$R = L_1 - L_2 + 10 \log (S/A)$$

L_1 - Average sound pressure level in source room (averaged from 100 Hz – 3150 Hz)

L_2 - Average sound pressure level in receiving room (averaged from 100 Hz – 3150 Hz)

S – Wall Area (m^2)

A – Total absorption in receiving room (m^2 units)

R_w – weighted sound reduction index

AVERAGE ROOM TO ROOM LEVEL DIFFERENCE – D , dB = $L_1 - L_2$, averaged 1/3 octave bands from 100Hz – 3150kHz.

D_w – weighted value of D (usually 2 - 3dB higher)

$D_{nT, w}$ – D_w corrected for reverberation time of receiving room

NOISE RATING CURVES (NR CURVES) – set of curves used to describe optimum background noise levels for different tasks.

$L_{10/90}$ LEVEL (dB) - The level in dB of a time varying sound pressured level (e.g. traffic) exceeded for 10%/90% of the time of measurement.

L_{90} is usually called the BACKGROUND NOISE LEVEL.

L_{eq} AVERAGE SOUND PRESSURE LEVEL – level dB of a time varying sound pressure level with equal amounts of energy above and below it, for the time of measurement.

TONAL NOISE – noise of a single frequency (or a narrow band of frequencies that can be perceived as a tone), audible above the broad band noise background. Noise which is at least 5dB above the average of the 1/3 octave band sound pressure levels immediately on either side of it.