# PORTSMOUTH NHS TRUST

PROPOSED MULTI STOREY CAR PARK
QUEEN ALEXANDRA'S HOSPITAL
COSHAM, HAMPSHIRE, PO6 3LY

**Noise Impact Assessment**

January 2021

eas ltd
Environmental Assessment Services Ltd

# REPORT DATA SHEET

| Requirement | Data |
|---|---|
| Report Ref | CFP/QA/Noise |
| Date | January 2021 |
| Client | Portsmouth NHS Trust |
| Report type | Noise Impact Assessment |
| Revisions | |
| Prepared by | Eur Ing Malcolm McKemey BSc (Hons), CEng, CEnv, MICE, MIEAust, MCIWEM, MIEnvSc<br>[redacted]<br>Signed |
| Approved by | Emily Cooper BSc (Hons), PG Cert.<br>[redacted]<br>Signed |

# PORTSMOUTH NHS TRUST

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## Noise Impact Assessment

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**CONTENTS**

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## Noise Impact Assessment

January 2021

## 1. THE SITE AND BACKGROUND

1.1 The Noise Impact Assessment has been prepared to assist the determination of a planning application for the proposed installation of a 541 parking space multi-storey car park (MSCP) at the location of the existing 294 parking space ground level north car park at Queen Alexandra's Hospital in Cosham, Portsmouth. The Ordnance Survey reference for the site is SU 6550 0610 and the site elevation is approximately +36 m OD. See Figure 1 in Appendix A.

1.2 The site (as existing) comprises the north car park on the northwest corner of the hospital complex. See Figure 2 in Appendix A for the existing site layout. It is proposed to upgrade the existing car park to a multi-storey type to increase the parking capacity.

1.3 The site lies in a hospital complex and the significant noise sources comprised cars arriving at the existing car parking areas, manoeuvring to park and departing. There are noises emitted from the hospital air handling plant, although this mainly affects the eastern end of the car park. Contractors were on site, mainly in the northeast corner, carrying out civil and mechanical maintenance work, although their contribution to the overall noise level appeared to be minor. No other significant noise sources were apparent.

1.4 The nearest residential receptors are houses on Boston Road and Cavell Drive to the west of the site.

1.5 The site was initially visited on Tuesday 5 January 2021, when the Sound Level Meter (SLM) was installed on the site. Continuous noise monitoring was carried out at the site between 5 and 11 January 2021. Additional short-term monitoring was carried out around the site on 11 January 2021.

1.6 See Figure 3 in Appendix A for the proposed site layout.

## 2. DEFINITIONS

2.1 Noise assessment terms used in the report are as given in BS 4142:2014 or otherwise as defined and described below:

**$dB_{(A)}$** – the unit of noise measurement that expresses the loudness in terms of decibels (dB) weighted by frequency for humans' sensitivity to sound (A).

**$L_{(A)90,T}$** – A-weighted sound pressure level exceeded for 90 % of the measured time; defined as 'background noise level' over the time period T.

**$L_{(A)eq,T}$** – equivalent continuous A-weighted sound pressure level over a given period of time; defined as 'average noise level' for the time T.

**$L_{(A)max}$** – equivalent maximum continuous A-weighted sound pressure level over a given period of time; defined as 'maximum sound level'.

**$L_{(A)10}$** – A-weighted sound pressure level exceeded for 10% of the measured time; a measure commonly used in traffic noise assessment.

## 3. THE ASSESSMENT

3.1 The assessment has been carried out in accordance with ProPG: Planning & Noise (May 2017) and the recommendations given in the National Planning Policy Framework (NPPF) March 2012. Reference has been made to Noise Policy Statement for England (NPSE), BS 8233, BS 4142 and the World Health Organisation (WHO) Night Noise Guidelines for Europe 2009.

3.2 The assessment comprised:

i. The selection of a suitable noise monitoring station reasonably representative of the present noise exposure at the site and the exposure of the future receptors.

ii. The installation of the noise monitoring apparatus for a suitable monitoring period.

iii. General observations of factors affecting noise around the site.

iv. A review of the results of the monitoring.

v. Recommendations regarding measures to mitigate noise impacts and achieve good acoustic design, where indicated.

3.3 The activity at the site at the time of the monitoring comprised vehicles entering and leaving the existing north car park via Harvey Road, vehicles passing round the car park to visit the drive-through COVID19 testing and general operational noise from the hospital systems and activities.

3.4 The monitoring was carried out using a CEL (Casella) Type 490C Precision Sound Level Meter (SLM) and CEL-110/1 field calibrator (both calibrated to national standards on the 11 March 2020 – see certificates in Appendix C). The SLM was field calibrated before and after each monitoring session. There was no drift or variation from the calibration level exceeding 0.1 dB.

3.5 The SLM was mounted 2.5 m above ground level during the continuous noise measurements and 1.5 m above ground level during the short-term monitoring.

# 4. RESULTS OF THE MONITORING

4.1 The results of the noise monitoring are summarised in Tables 4.1, 4.2 and 4.3 below:

TABLE 4.1
AMBIENT DAYTIME NOISE LEVELS AT THE SITE

| Location | Date/Time (hrs) | $L_{(A)eq}$ ($dB_{(A)}$) | $L_{(A)90}$ ($dB_{(A)}$) | $L_{(A)10}$ ($dB_{(A)}$) | $L_{(A)max}$ ($dB_{(A)}$) |
|---|---|---|---|---|---|
| 1 | Tues 5 Jan 2021/10:50-23:00 | 53.8 | 50.2 | 55.8 | 79.9 |
| 1 | Wed 6 Jan 2021/07:00-23:00 | 56.1 | 50.4 | 58.6 | 90.5 |
| 1 | Thurs 7 Jan 2021/07:00-23:00 | 54.5 | 50.4 | 57.1 | 80.0 |
| 1 | Fri 8 Jan 2021/07:00-23:00 | 53.9 | 50.2 | 56.2 | 76.1 |
| 1 | Sat 9 Jan 2021/07:00-23:00 | 51.5 | 48.2 | 53.3 | 76.4 |
| 1 | Sun 10 Jan 2021/07:00-23:00 | 51.4 | 48.7 | 53.1 | 77.7 |
| 1 | Mon 11 Jan 2021/07:00-10:50 | 57.2 | 53.3 | 59.3 | 78.8 |

TABLE 4.2
AMBIENT NIGHT-TIME NOISE LEVELS AT THE SITE

| Location | Date/Time (hrs) | $L_{(A)eq}$ ($dB_{(A)}$) | $L_{(A)90}$ ($dB_{(A)}$) | $L_{(A)10}$ ($dB_{(A)}$) | $L_{(A)max}$ ($dB_{(A)}$) |
|---|---|---|---|---|---|
| 1 | 5/6 Jan 2021/23:00-07:00 | 48.3 | 46.4 | 49.6 | 68.9 |
| 1 | 6/7 Jan 2021/23:00-07:00 | 48.5 | 46.3 | 49.7 | 71.2 |
| 1 | 7/8 Jan 2021/23:00-07:00 | 49.7 | 48.2 | 50.7 | 69.9 |
| 1 | 8/9 Jan 2021/23:00-07:00 | 49.4 | 47.5 | 50.6 | 74.9 |
| 1 | 9/10 Jan 2021/23:00-07:00 | 49.1 | 47.4 | 50.1 | 68.7 |
| 1 | 10/11 Jan 2021/23:00-07:00 | 49.8 | 47.9 | 50.9 | 74.2 |

TABLE 4.3
SHORT-TERM NOISE LEVELS AROUND THE SITE

| Location | Date/Time (hrs) | $L_{(A)eq}$ ($dB_{(A)}$) | $L_{(A)90}$ ($dB_{(A)}$) | $L_{(A)10}$ ($dB_{(A)}$) | $L_{(A)max}$ ($dB_{(A)}$) |
|---|---|---|---|---|---|
| 1 | Average weekday 11:15 – 12:00 | 55.3 | 51.0 | 57.7 | 75.4 |
| 2 | 11 Jan 2021 11:14 – 11:29 | 59.7 | 58.5 | 60.5 | 69.0 |
| 3 | 11 Jan 2021 11:31 – 11:46 | 61.0 | 60.0 | 62.0 | 64.4 |
| 4 | 11 Jan 2021 11:48 – 12:03 | 59.6 | 54.5 | 62.0 | 72.8 |

4.2 The traces from the continuous monitoring, printouts from the short-term monitoring, plus frequency data, are given in Appendix C.

# 5. INTERPRETATION OF THE RESULTS

## 5.1 Meteorological Conditions

5.1.1 The wind direction during the monitoring period was generally northerly or northeasterly, apart from Monday 11 January when the wind was west-southwesterly. Wind speeds were low – moderate. Temperatures ranged between - 2 ºC on Friday 8 January and + 9 ºC on Monday 11 January. Atmospheric pressure was high throughout the monitoring, 1016 – 1027 mb. Rainfall was minimal.

5.1.2 The noise measurements do not appear to have been significantly affected by meteorological conditions and no adjustment for weather has been made to the readings shown in Tables 4.1 and 4.2.

## 5.2 Results of the Monitoring.

5.2.1 The results of the monitoring were very consistent, with the weekend daytimes being slightly quieter, as would probably be anticipated. The average daytime and night-time noise levels at the site, are summarised in Table 5.1 below:

TABLE 5.1
SUMMARY OF RESULTS

| Period | $L_{(A)eq}$ ($dB_{(A)}$) | $L_{(A)90}$ ($dB_{(A)}$) | $L_{(A)10}$ ($dB_{(A)}$) |
|---|---|---|---|
| Daytime | 54.1 | 50.2 | 56.2 |
| Night-time | 49.1 | 47.3 | 50.3 |

5.2.2 The Daytime $L_{(A)eq,16hr}$ and Night-time $L_{(A)eq,8hr}$ results suggest a Low Risk rating from the Stage 1 Noise Impact Assessment under ProPG: Planning and Noise.

5.2.3 The short-term noise monitoring around the site showed the significant influence on ambient noise levels from the mechanical and electrical systems running in the hospital, notably air handling/ventilation plant. The noise levels recorded at Location 3 were affected by the proximity of the drive-through COVID19 testing facility, which had a fairly continuous stream of cars passing through it during the short-term monitoring period. There was some external building contractor activity close to Location 2 during the monitoring, but this was brief and not particularly noisy.

5.2.4 No particularly dominant frequencies were noted from the monitoring results.

5.2.5 There was one anomaly in the results. As can be seen from the traces, there was a noise event at around 17:05 on Wednesday 6 January. This gave a $L_{(A)max}$ reading of 90.5 $dB_{(A)}$. The source of this noise event is uncertain, although it suggests a sudden loud noise in the vicinity of the noise monitoring equipment.

# 6. NOISE IMPACTS AT THE NEAREST RESIDENTIAL RECEPTORS

6.1 The nearest residential receptors are the back gardens and rear windows of the houses to the west of the existing car park site. The closest back garden is approximately 10 m from the monitoring location and the closest rear window is some 22 m from the monitoring location.

6.2 In this case, the daytime external $L_{(A)eq}$ results averaged 54 $dB_{(A)}$ and the night-time $L_{(A)eq}$ results averaged 49 $dB_{(A)}$. Allowing for distance and some screening from fences and hedges, the daytime $L_{(A)eq}$ in the back gardens is probably <50 $dB_{(A)}$ and the night-time $L_{(A)eq}$ at the rear façade of those dwellings is probably <45 $dB_{(A)}$.

6.3 The results may be compared with the internal and external noise level guidelines given in 6.5 and 6.6 below.

6.4 Traffic on Harvey Road and in the existing surface level car park is probably the main source of impact, however, the short-term noise monitoring results suggest general hospital activity contributes to background noise at the nearest residential receptors.

## 6.5 Internal Noise Level Guidelines (Stage 2, Element 2)

6.5.1 The World Health Organisation (WHO) recommends no more than 30 $dB_{(A)}$ $L_{(A)eq}$ inside a bedroom to permit restful sleep. The same night-time guideline is given in BS 8233:2014. Night-time is classed as 23:00 - 07:00 hours. The permitted maximum daytime internal $L_{(A)eq}$ is given as 35 $dB_{(A)}$ in BS 8233.

6.5.2 Allowing for the 12 - 15 $dB_{(A)}$ sound attenuation for an open window, it is apparent that the World Health Organisation (WHO) threshold of 30 dB $L_{(A)eq}$ for restful sleep should be achieved at the nearest residential receptors under existing conditions.

6.5.3 The WHO guidance states that the number of individual night-time noise events ($L_{(A)max}$) exceeding 45 $dB_{(A)}$ within a bedroom should be limited. This is generally taken as not more than eight exceedances during a single night, based on a 15 minute average monitoring period. From the continuous monitoring data, it is apparent that this threshold was not exceeded.

## 6.6 External Noise Level Guidelines and External Area Assessment (ProPG Stage 2, Element 3)

6.6.1 The WHO recommendations for external noise indicates 55 $dB_{(A)}$ $L_{(A)eq}$ as the threshold for annoyance and suggests <50 $dB_{(A)}$ as ideal. Allowing for attenuation with distance and the benefit of garden fences and hedges, the noise levels within the nearest residential gardens would be anticipated to be within the WHO recommendations under present conditions.

## 6.7 Probable changes in noise impacts from the proposed MSCP

6.7.1 The proposed MSCP will potentially increase noise impacts due to increased traffic flow and the elevation in height of the noise sources.

6.7.2 The traffic flow rates have not been assessed elsewhere, however, it may be assumed that during the peak periods (around 10 am and 2 pm) in the worst case, all the car park spaces could be used (vehicles entering and vehicles leaving) within, say, a two hour period. This would give traffic flows on Harvey Road of 294 vehicles per hour under present conditions and 541 vehicles per hour with the MSCP in operation.

6.7.3 There will be no significant change in the percentage of heavy goods vehicles as these vehicles are unlikely to access the car park under current or future circumstances. From Calculation of Road Traffic Noise (Chart 2), the increase in noise level due to the predicted increase in traffic flow would be 2.6 $dB_{(A)}$ as $L_{(A)10}$ or 2.5 $dB_{(A)}$ as $L_{(A)eq}$. This increase is likely to be perceptible at the nearest residential receptors but would only occur during peak hours and would not be anticipated to be a source of complaint.

6.7.4 Vehicles on the upper floors of the MSCP would have an unobstructed line of sight to the windows of the nearest houses and would be elevated above the existing garden fences and hedges. This would have the effect of reducing any existing attenuation provided by the garden fences and hedges when compared to the current surface level car park.

6.7.5 The impacts would be mainly confined to the daytime as the car parks are primarily used by outpatients, people ferrying outpatients and visitors to patients within the hospital. These car park users are fundamentally daytime users.

## 6.8 Requirements for Acoustic Design (ProPG Stage 2: Element 1)

6.8.1 There are limited options for the attenuation of any additional noise from increased traffic on Harvey Road. It would be feasible to construct an acoustic fence on the western site boundary. This could be an impermeable timber fence 1.8 m high. A higher fence could start to limit the morning sun reaching the residential gardens.

6.8.2 Increased noise impacts from the elevated floors of the MSCP should be attenuated by effective noise barriers on the outside of all storeys above ground level. These barriers would have to be impermeable to a height of not less than 1m above floor level. This would be a fairly normal arrangement for a multi-storey car park. The interior surfaces should also be designed to minimise noise reflection within the car park structure by the use of textured and sound absorbing materials on internal faces.

## 6.9 Noise during the construction of the MSCP

6.9.1 The construction of the proposed MSCP will generate significant noise.

6.9.2 Potentially noisy activities will include site clearance work, breaking up and removal of existing surfacing and car park apparatus, foundation work (including piling), placing and vibration of concrete, cranage for steelwork, various other mechanical plant operation, visiting lorries, etc. With most construction activities, it is possible to choose quieter methods and machinery.

6.9.3 Construction noise impacts at the nearest receptors are best mitigated by confining the work to normal business hours and enclosing the working area as much as is practicable. The principal mitigation will be the limited period in which the impacts from construction will occur.

6.9.4 The MSCP construction contractor should adopt a good neighbour policy to minimise noise impacts on the nearest residential receptors. This should include warning neighbours about noisy activities in advance, monitoring noise levels and providing a channel for complaints, with fast resolution where the complaints are justified.

## 7. CONCLUSIONS

7.1 The National Planning Policy Framework (and NPSE Supplementary Document 1) state that sustainable development should:

i. Avoid noise from giving rise to significant adverse impacts on health and quality of life.

ii. Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise, including through the use of conditions attached to planning consents.

iii. 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.

iv. Identify and protect areas of tranquillity, which have remained relatively undisturbed by noise and are prized for their recreational and amenity value.

7.2 From the results of this assessment, it is concluded that the present activities at the site do not expose the nearest residential receptors to adverse noise impacts on health and quality of life, and the proposed operation of the MSCP should not change this situation, subject to the attenuation recommendations given in this report.

7.3 The site monitoring revealed that the nearest residential receptors are not exposed to noise levels in excess of the WHO and British Standard:8233(2014) internal and external noise thresholds, as a result of activities at the hospital under present circumstances.

7.4 It is recommended that the MSCP should include effective noise barriers on the outsides of the parking levels above ground level. These barriers would have to be impermeable to a height of not less than 1m above floor level. The interior surfaces should be designed to minimise noise reflection within the car park floor by the use of textured and sound absorbing materials on internal faces.

7.5 Any additional impact from increased traffic flow on Harvey Road could be attenuated by installing an acoustic fence along the western boundary of the site.

7.6 Noise impacts during the construction of the MSCP could be mitigated by the choice of quiet plant and construction methods, limiting the work to normal business hours, enclosing the working area as much as is practicable and operating a good neighbours policy.

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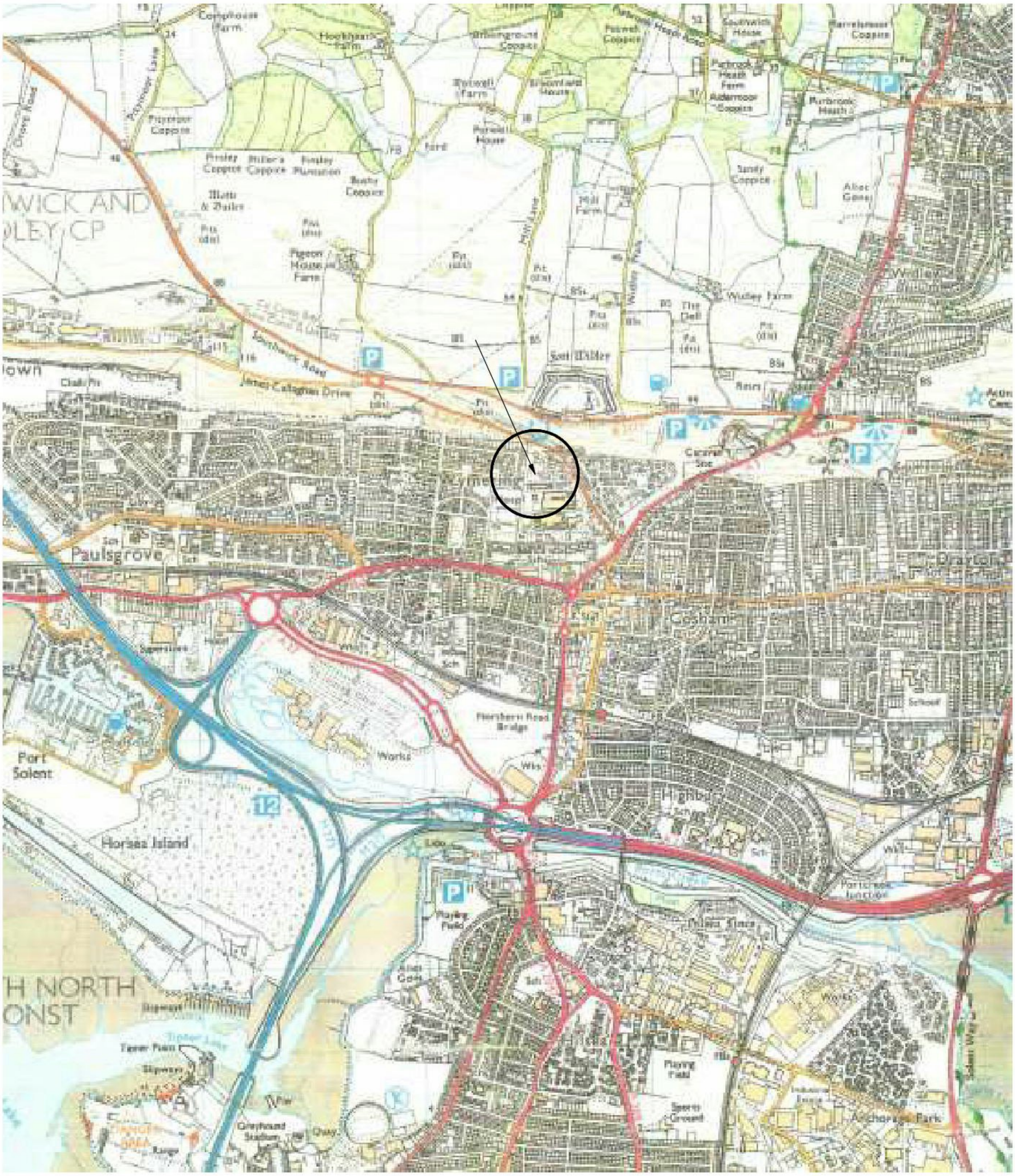
APPENDIX A

**Figure 1: Site Location**
**Figure 2: Existing Site Layout & Monitoring Locations**
**Figure 3: Proposed Redevelopment**




Reproduced from the Ordnance Survey 1:25000 scale Explorer Map No. 119 with permission. Licence No. 100005508

1:25000

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**Figure 1: Site Location**

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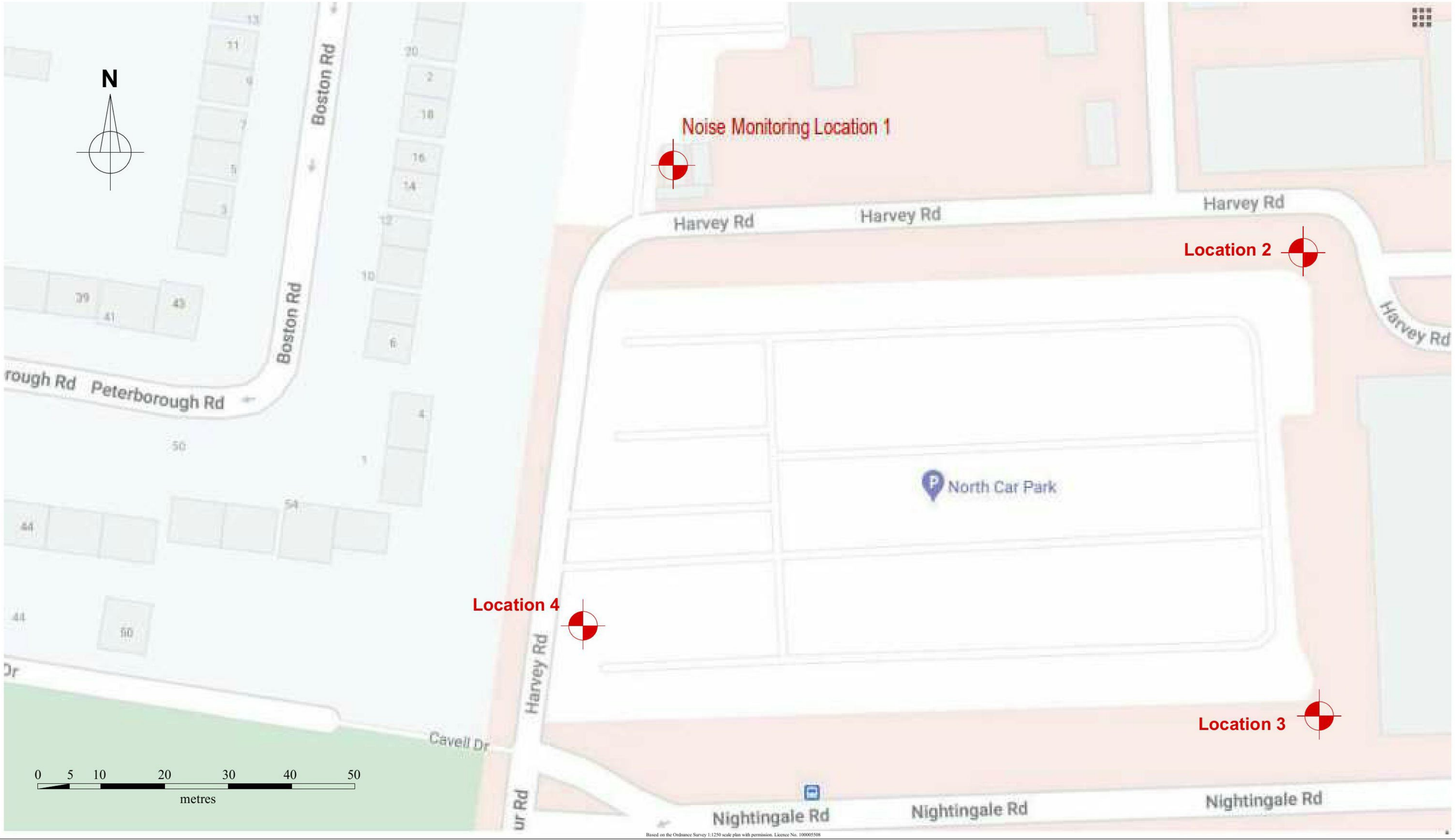


Scale as shown

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**Figure 2: Existing Site Layout & Monitoring Locations**

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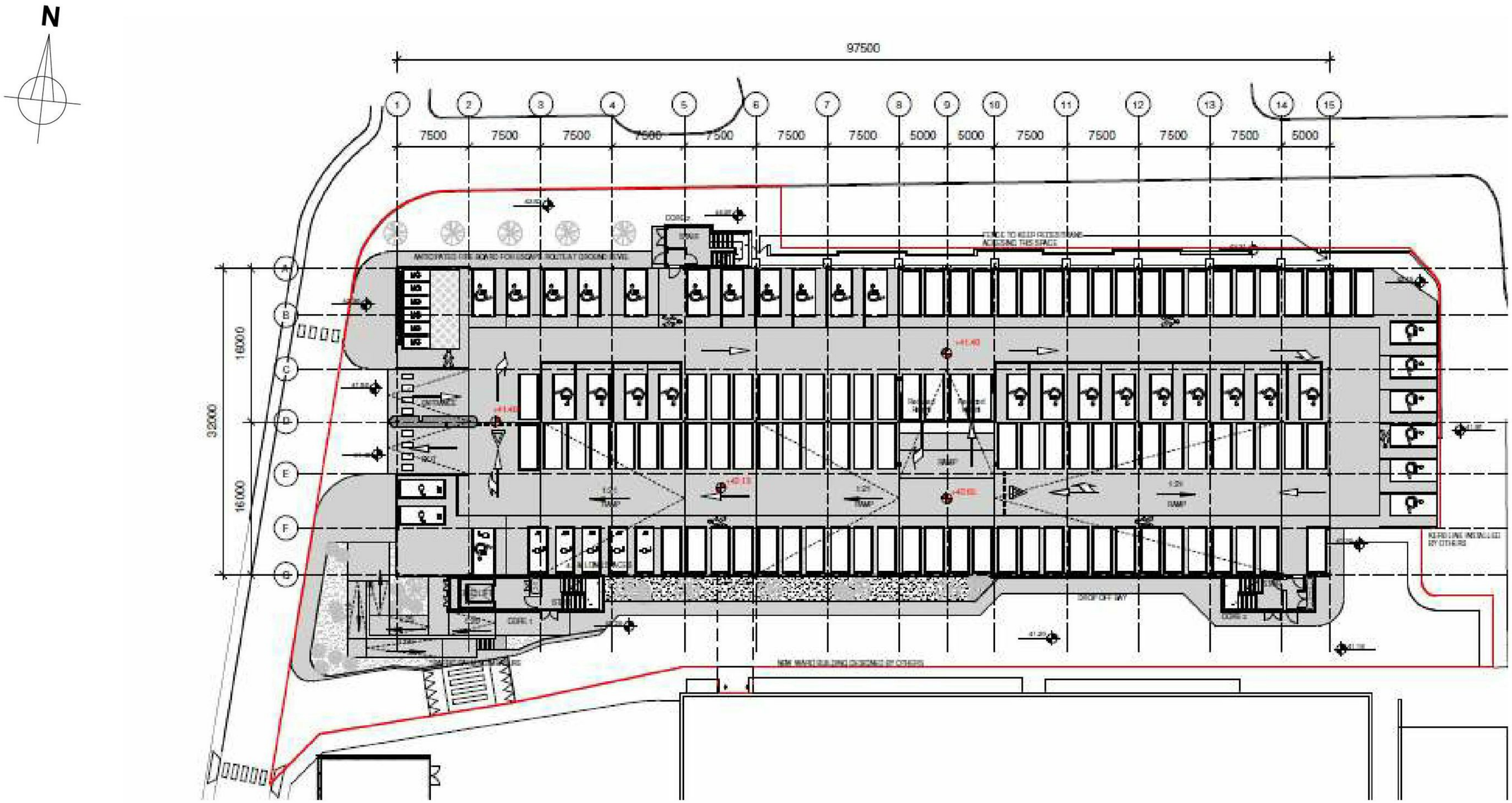


0 5 10 20 30 40 50

metres

Scale as shown

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PROPOSED MSCP, QUEEN ALEXANDRA'S HOSPITAL

COSHAM, HAMPSHIRE, PO6 3LY

**Figure 3: Proposed Redevelopment**

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February 2021

# APPENDIX B

## Noise Monitor Calibration Certificates

Acoustic Calibration Services Limited
Unit 6H Diamond Industrial Centre
Works Road Letchworth Garden City
Hertfordshire SG6 1LW
Tel: 01462-610085 Mobile: 0771 886 4944
Email: trevjohnlewis@aol.com
*or*
cal@acousticcalibration.co.uk
Web: www.acousticcalibration.co.uk

ACSL
Acoustic Calibration Services Limited

# CERTIFICATE OF CALIBRATION

**Model:** CEL-490.C1 **Serial Number:** 129580

**Organisation:** Environmental Assessment Services Limited, Enterprise House London Road, Hickstead, Haywards Heath, West Sussex RH17 5LZ

**Job Number:** 2807 **Customer Order Reference:** Carol Plummer

The Sound Level Meter was assessed for conformance with International Standards IEC 60651 and IEC 60804 using test procedures described in BS 7580 Part 1. The meter claims Type 1 accuracy conformance and it was against these requirements that all the results were evaluated.

The sound level meter was fitted with a GRAS 40AE measurement microphone Serial No. 100742 and a CEL-495 preamplifier Serial No. 001597. The microphone was replaced with a suitable input device in order to apply electrical signals to the preamplifier.

A CEL-110/1 Acoustic Calibrator Serial No: 119427 was supplied with the meter and was utilised in establishing the initial acoustic calibration setting.

The sound level meter passed all applied tests with no deviations from Type 1 specification, in accordance with IEC 60651 and IEC 60804. Accordingly, the meter meets the requirements of BS 7580 Part 1.

The sound level meter should be set to read **113.8dB** when used with the associated acoustic calibrator, microphone and preamplifier as detailed above at reference atmospheric pressure.

All ACSL's calibration instrumentation is fully traceable to National Standards. The acoustic references are calibrated by laboratories which are UKAS accredited for the purpose.

***Certificate No:*** **15768** ***Signature:*** [redacted]
***Date of Issue:*** **11th March 2020** ***Print Name***

Acoustic Calibration Services Limited
Unit 6H Diamond Industrial Centre
Works Road Letchworth Garden City
Hertfordshire SG6 1LW
Tel: 01462-610085 Mobile: 0771 886 4944
Email: trevjohnlewis@aol.com
*or*
cal@acousticcalibration.co.uk
web: www.acousticcalibration.co.uk

ACSL
Acoustic Calibration Services Limited

# CERTIFICATE OF CALIBRATION

**Model:** CEL-110/1 **Serial Number:** 119427

**Organisation:** Environmental Assessment Services Limited, Enterprise House London Road, Hickstead, Haywards Heath, West Sussex RH17 5LZ

**Job Number:** 2807 **Customer Order Reference:** Carol Plummer

The acoustic calibrator was run for a period of time until a stable level was measured. The output level was compared to the certified level of the laboratory measurement references. The measurements were repeated 5 times and the average value calculated.

The ambient temperature during calibration was **22.8** ± 1°C.
The barometric pressure was **100.4** to **100.5** kPa.
The relative humidity was **42** to **52** %

**The sound pressure level output from the Acoustic Calibrator was measured in its half inch configuration using a B&K 4134 microphone. The mean level output of the acoustic calibrator was 114.0 dB at the reference setting and 94.1 dB at the -20dB setting.**

**The output frequency signal of the acoustic calibrator is 1000Hz.**

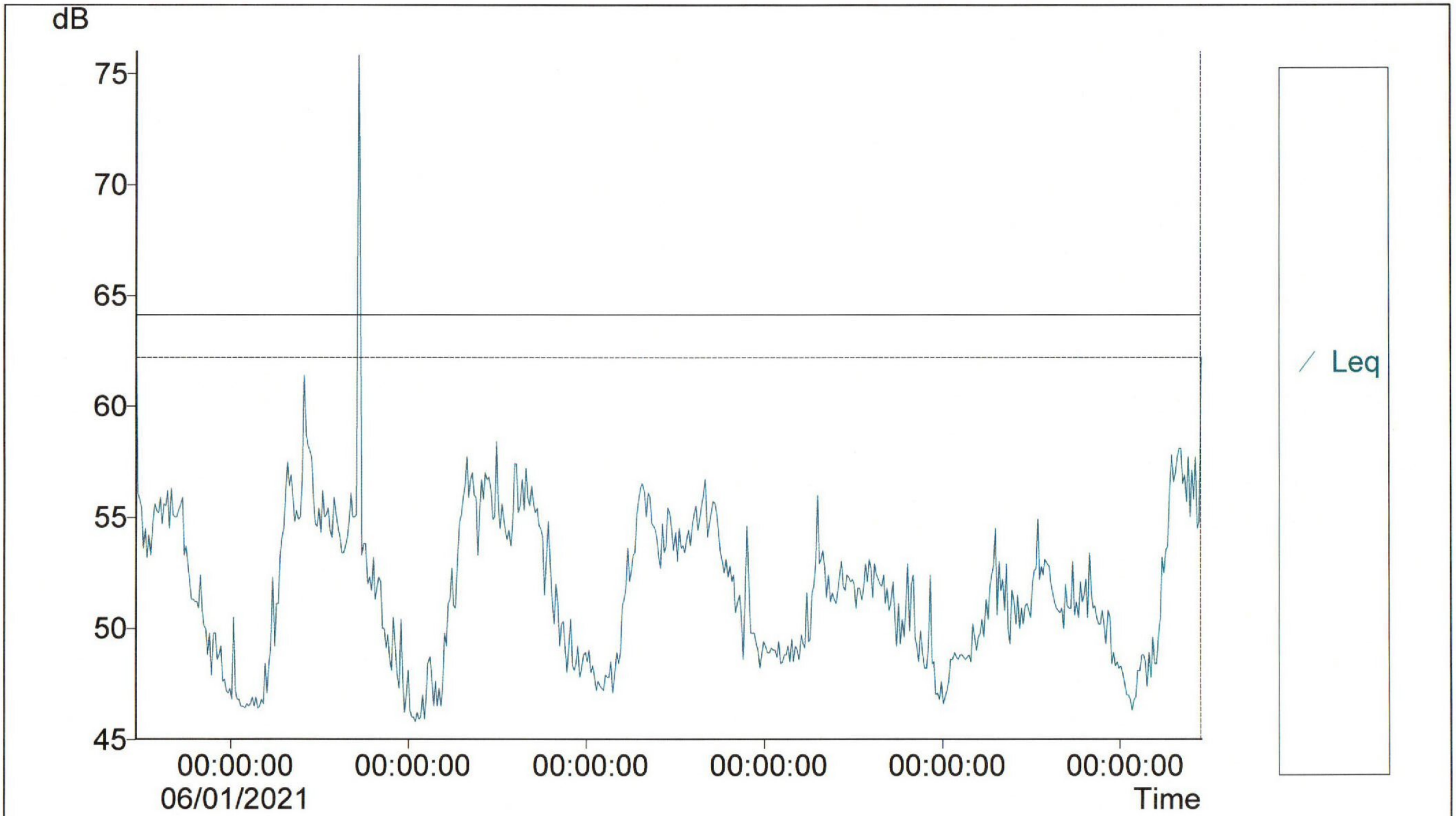
All ACSL's calibration instrumentation is fully traceable to National Standards. The acoustic references are calibrated by laboratories which are UKAS accredited for the purpose.

***Certificate No:*** **15767**
***Date of Issue:*** **11th March 2020**

***Signature:*** [redacted]
***Print Name:***

APPENDIX C

# SLM Traces

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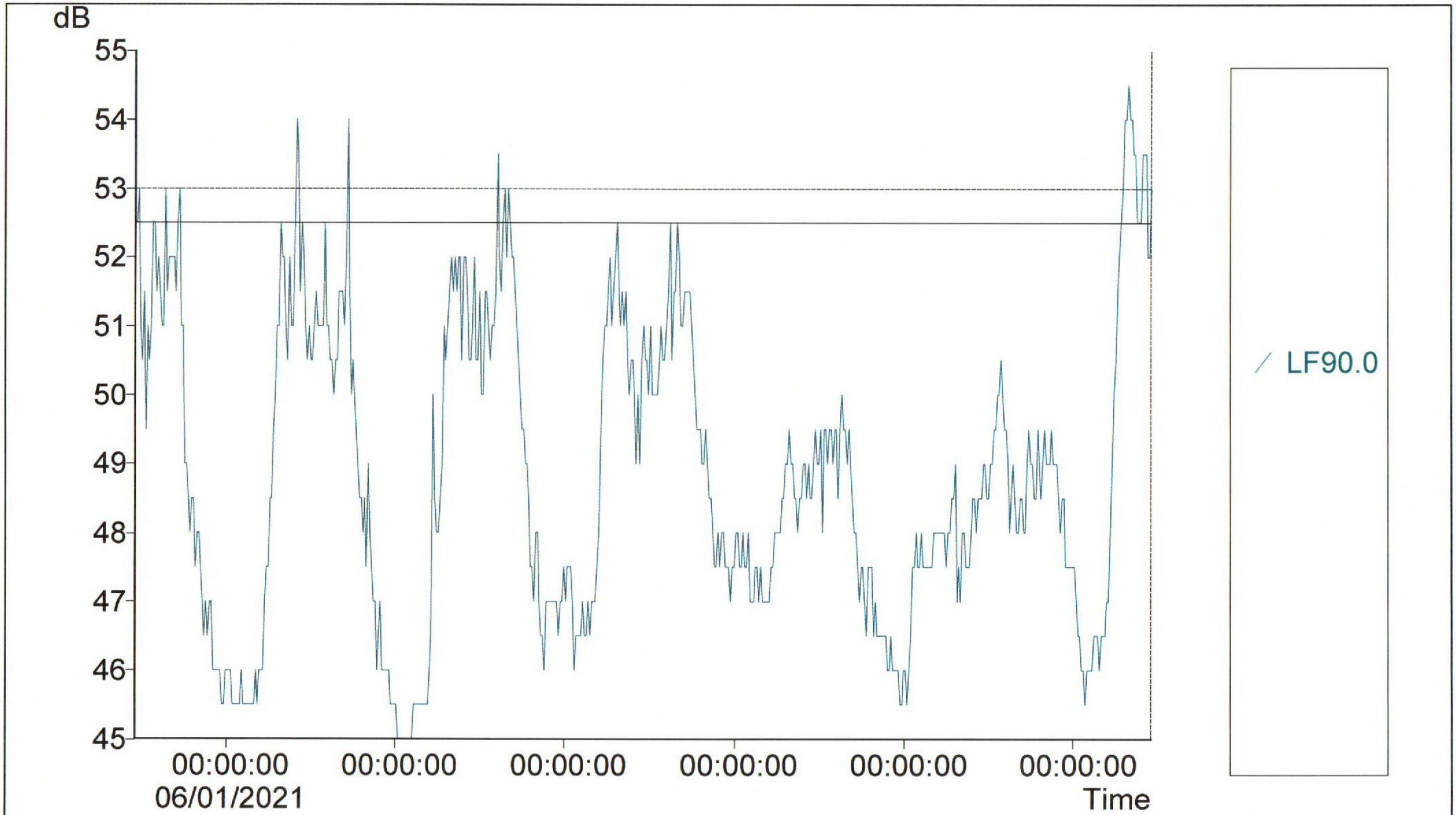


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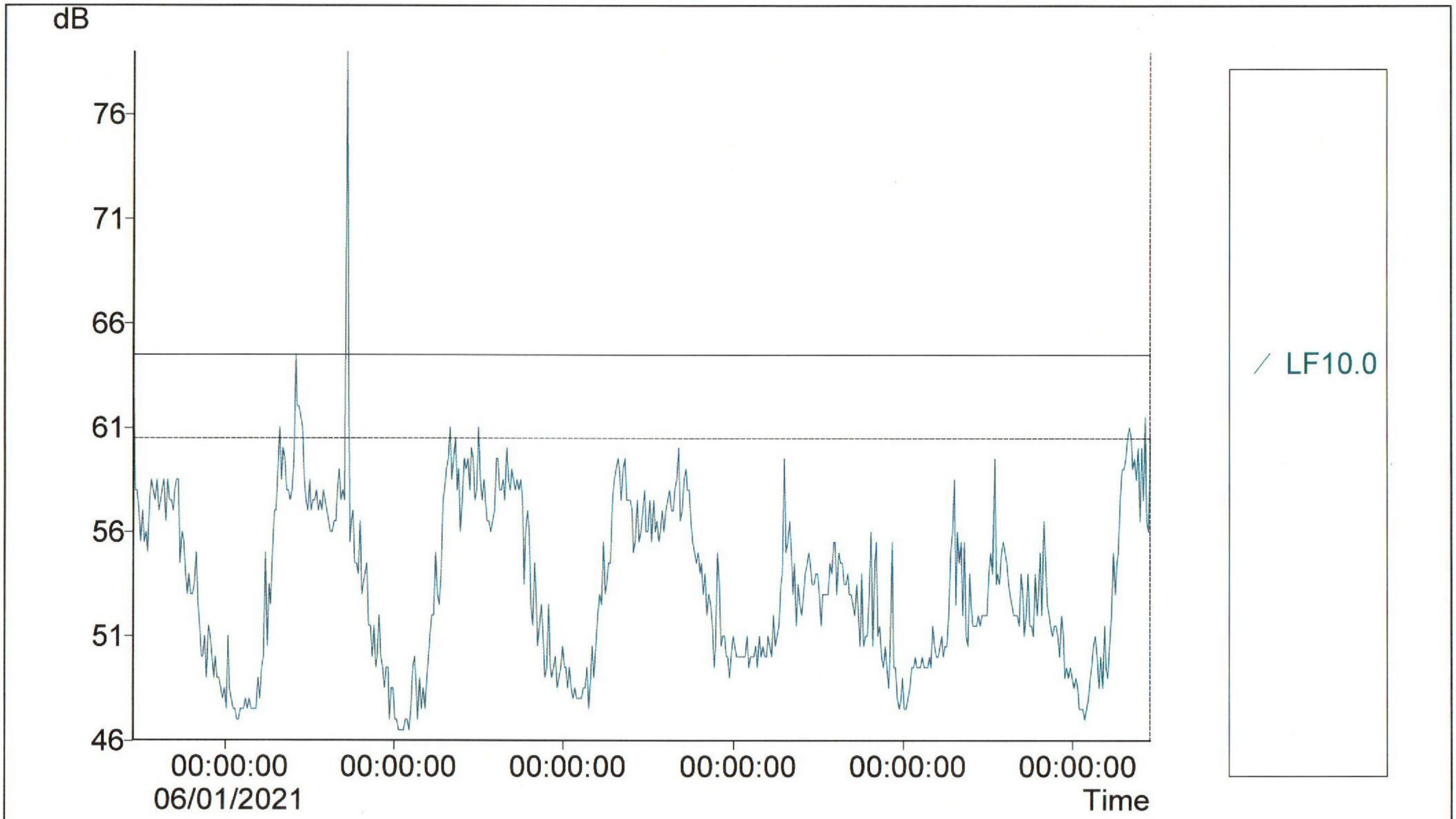


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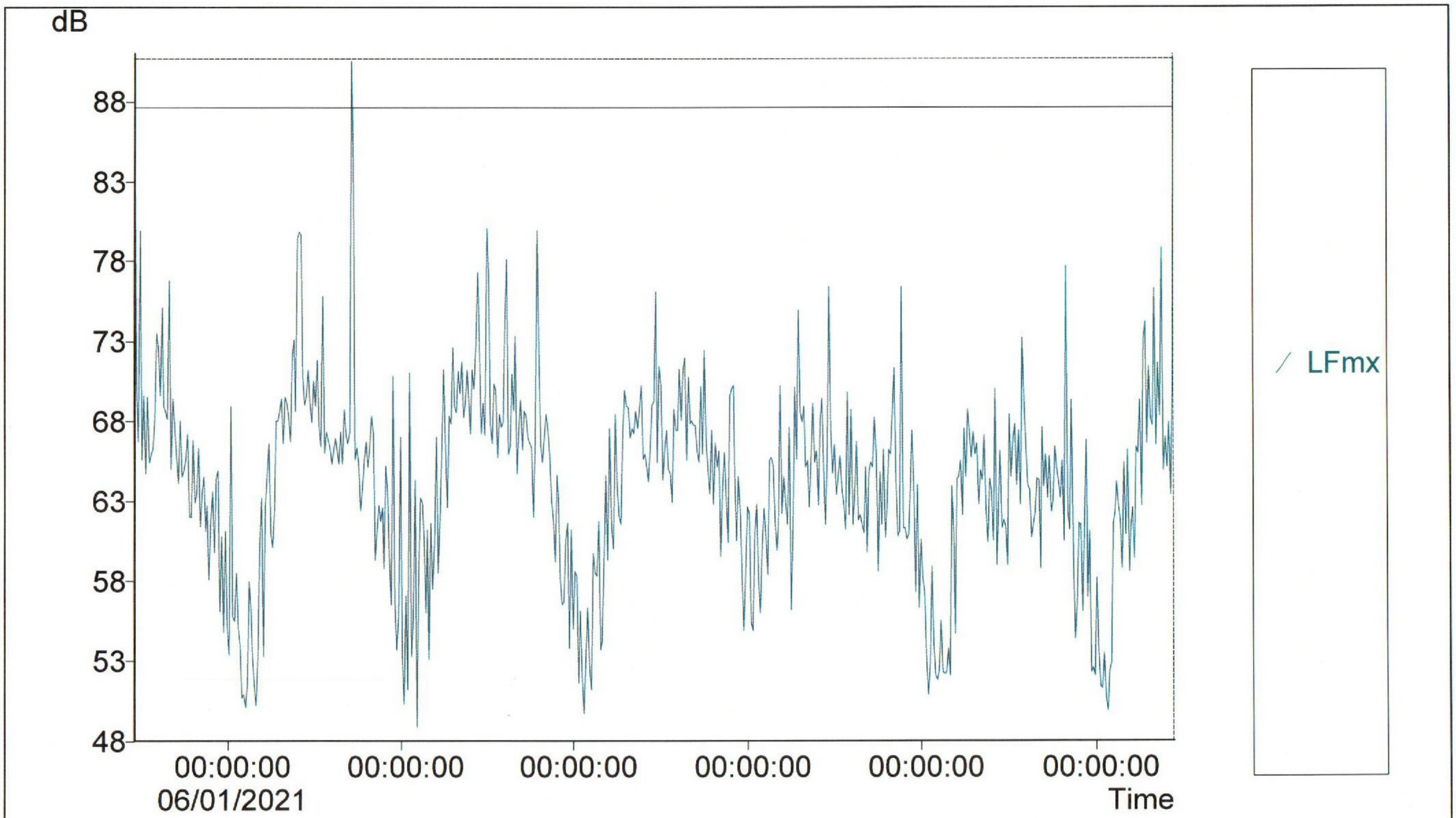


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APPENDIX D

# Photographs

Photo 1: The existing north car park with the hospital in the background.

Photo 2: The sound level meter installation for the continuous monitoring.

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