



## AIRTIGHT & NOISECHECK LIMITED

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### NOISE IMPACT ASSESSMENT FOR

CLARENDON PROPERTIES LTD

MANOR FARM

EAST WORLDHAM

ALTON

GU34 3AY

### SITE ADDRESS

PROPOSED DWELLING

TO THE REAR OF 25 HIGH STREET

BOTLEY

HAMPSHIRE

SO30 2EA

REPORT DATE: 23<sup>RD</sup> MAY 2023

Acoustic Engineer:

Date: 16<sup>th</sup> – 17<sup>th</sup> May 2023

Michael Vine



## AIRTIGHT & NOISECHECK BUILDING ACOUSTIC TESTING

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Customer Name:

Testing Date: 16-17<sup>th</sup> May 2023

Clarendon Properties Ltd  
Manor Farm  
East Worldham  
Alton  
GU34 3AY

Site Address:

Proposed Dwelling  
To the Rear of 25 High Street  
Botley  
Hampshire  
SO30 2EA

Acoustic Engineer:

Mr. Michael Vine

Equipment used:

Norsonic Environmental Analyser 121 – Serial No 31375 Calibration due July 2024

Analyser complies with the following standards:

IEC 60651 type 1  
IEC 60804 type 1  
IEC 61260 class 1  
IEC 225  
ANSI S1.4-1985 type 1  
ANSI 1.43 -1997 type 1  
ANSI S1.11-1986 order 3 type 1D  
DIN 45 657  
Norsonic Production Standard set for the Nor121

Measurement Microphones (Gras 40AF) – Serial No 51465, - Calibration due July 2024

Acoustic Calibrator - (Type 1251) – Serial No 31652, Calibration due July 2023

Measurement Procedure:

The noise levels were measured for a 24hour period between Tuesday 17<sup>th</sup> to Wednesday 17<sup>th</sup> May 2023, in order to establish the current baseline noise levels apparent at the site location, and to assist a planning application for a purpose-built residential dwelling.

The measurement procedure took place during the working week when the road network was at typical use and the small industrial estate was in use.

Please note – No mitigation measures are required to be installed to the industrial units so this measurements recorded and used within this assessment will include the absolute level of mitigation required to the residential dwelling in order to mitigate against the noise sources apparent, with road noise being the dominant noise source.



## AIRTIGHT & NOISECHECK ACOUSTIC TESTING

### **Executive Summary:**

Airtight & Noisecheck Ltd were instructed by Clarendon Properties Ltd to undertake a detailed Noise Impact Assessment (NIA) at 25 High Street, Botley. A planning application is to be made to erect 1 x purpose-built dwelling over two floors, in the rear garden of the existing dwellings and in relatively close proximity to the small industrial estate. This assessment uses data measured at site during the 24hour measurement period.

The noise levels were measured for a 24hour period at the residential boundary of the site in relation to the road noise and industrial estate, in order to assess the vehicular traffic using the High Street to the North and the small industrial estate located to the East of the proposed scheme.

The noise levels & calculations indicate that if the mitigation measures are implemented then there is no reason to suggest that the future residents of the proposed dwelling will be adversely affected by the noise emissions created by the road traffic noise. The mitigation measures will have to be implemented to the glazing and ventilation of the proposed development and they show that the criteria for internal noise can be met. The noise levels have been measured at all noise sensitive facades.

There is no reason to suggest that the future residents of the proposed residential development will be adversely affected by the noise emissions providing the mitigation measures are implemented to the noise sensitive rooms. The detailed mitigation measures are listed within this report.

The final ventilation scheme has not been decided so a variety of options have been included within the report. However, it is clear that the dwelling will be able to be naturally ventilated with open windows for long periods of time.

The alternative ventilation system has been included to ensure suitable ventilation during periods when the windows are closed, but the average values indicate that natural ventilation will be a suitable approach.

### **Acoustic Design Statement:**

It is clear that whilst the site is situated near to a busy road network to the North of the building & a small industrial estate located to the East, it will be screened from the road noise by the existing dwellings and is located in a relatively quiet location. The client will take steps and implement robust mitigation measures to ensure the impact of the external & internal noise should not have an adverse impact on the future residential dwellings. These steps include:

1. Careful configuration and location of dwelling
2. An alternative ventilation system to ventilate the dwelling thus maintaining the integrity of the façade & glazing – acoustic trickle vents fitted to windows
3. Install a robust glazing system to the building to protect the residents from the external noise emissions
4. Thermal mass an option to the façade to reduce overheating

The above measures are a clear indication of the steps taken by the client to reduce the potential impact of the noise sources in operation. The initial risk assessment has indicated that both the day time & night time noise levels for the site fall into the negligible to low category as listed in the Pro PG document. This indicates that the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development. Based on the average  $L_{Aeq}$  values, noise should not be deemed a reason for refusal. It is clear to see that the noise levels increase from 0400hrs (likely to be road traffic) so suitable mitigation measures will still be required to the dwelling building fabric & elements.

The recommendation is to strike a balance between the internal acoustic environment and thermal comfort. There will be windows on facades facing the noise sources that can be opened. Based on the measured levels and the location of several windows it is unlikely that overheating will be an issue and the dwelling can be naturally ventilated.



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### **Assessment Criteria:**

The National Planning Policy Framework (NPPF) came into effect in March 2012 and was updated published in July 2021. It replaced other documents such as PPG24. The NPPF and provides a number of objectives and aims that are directed towards avoiding significant adverse impacts and reducing others on quality of life and health. This document states that:

Paragraph 174 states Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

Paragraph **185**. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- (a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life [65](#);
- (b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;

**187**. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

The Planning Practice Guidance has guidance on noise, date 22<sup>nd</sup> July 2019 and also has the noise hierarchy table as shown below. Paragraphs 009 & 011 are refenced later in this report.

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| Response                                         | Examples of outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Increasing effect level             | Action                           |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------|
| <b>No Observed Effect Level</b>                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |                                  |
| Not present                                      | No Effect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | No Observed Effect                  | No specific measures required    |
| <b>No Observed Adverse Effect Level</b>          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |                                  |
| Present and not intrusive                        | Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.                                                                                                                                                                                                                                                                   | No Observed Adverse Effect          | No specific measures required    |
| <b>Lowest Observed Adverse Effect Level</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |                                  |
| Present and intrusive                            | Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.                                          | Observed Adverse Effect             | Mitigate and reduce to a minimum |
| <b>Significant Observed Adverse Effect Level</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |                                  |
| Present and disruptive                           | The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area. | Significant Observed Adverse Effect | Avoid                            |
| Present and very disruptive                      | Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.                                                                                                                                                                                       | Unacceptable Adverse Effect         | Prevent                          |

**NOEL – No Observed Effect Level** This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to noise.

**LOAEL – Lowest Observed Adverse Effect Level** This is the level above which adverse effects on health and quality of life can be detected.

**SOAEL – Significant Observed Adverse Effect Level** This is the level above which significant adverse effects on health and quality of life occur.

The NPSE (Noise Policy Statement for England) states the following aims with respect to noise policy:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of the Government policy on sustainable development:

*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 improvement of health and quality of life.*

## AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

### **PROPG: PLANNING & NOISE (2017) NEW RESIDENTIAL DEVELOPMENT [PROPG 2017]**

The ProPG Planning & Noise document was published in 2017, its development supported by the Institute of Acoustics, the Association of Noise Consultants and the Chartered Institute of Environmental Health. The aim of the document is to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

ProPG advocates a systematic, proportionate risk-based, 2 stage approach which:

1. Encourages early consideration of noise issues;
2. Facilitates straightforward accelerated decision making for lower risk sites;
3. Assists proper consideration of noise issues where the acoustic environment is challenging.

A summary of the overall ProPG approach is included in Appendix B. The two sequential stages of the overall approach are:

1. Stage 1 – an initial noise risk assessment of the proposed development site; and
2. Stage 2 – a systematic consideration of four key elements.

The four key elements to be undertaken in parallel during Stage 2 are:

1. Element 1 – demonstrating a “Good Acoustic Design Process”;
2. Element 2 – observing internal “Noise Level Guidelines”;
3. Element 3 – undertaking an “External Amenity Area Noise Assessment”; and
4. Element 4 – consideration of “Other Relevant Issues”.

The approach is underpinned by the preparation and delivery of an “Acoustic Design Statement” [ADS]. The ADS is intended to conclude in the provision of one of the following four recommendations to the decision maker:

1. Planning consent may be granted without any need for noise conditions;
2. Planning consent may be granted subject to the inclusion of suitable noise conditions;
3. Planning consent should be refused on noise grounds in order to avoid significant adverse effects (“avoid”); or
4. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects (“prevent”).

The overall ProPG 2017 approach is intended for implementation with projects at an earlier stage than the subject of this report. This report provides a full noise mitigation strategy for the site, rather than an initial recommendation to the decision maker.

ProPG 2017 contains the most up to date guidance available on industry-wide adopted best-practise interpretation of relevant guidance regarding acceptable internal and external noise levels i.e. BS8233:2014 and WHO Guidelines.

### **WHO GUIDELINES FOR COMMUNITY NOISE (1999)**

The guidance in this document recommends design criteria for internal noise levels within residential and commercial buildings. A summary of the recommended guidance is shown in Table 2.1. **Table 2.1 – Excerpt from WHO [dB ref. 20µPa]**

| Criterion                                                                    | Environment  | Design range LAeq,T dB |
|------------------------------------------------------------------------------|--------------|------------------------|
| Maintain speech intelligibility, avoid moderate annoyance, daytime & evening | Living Rooms | 35                     |
| Prevent sleep disturbance, night time                                        | Bedrooms     | 30                     |

This guidance also states:

For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L<sub>Amax</sub> more than 10-15 times a night (Vallet & Vernet 1991)



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For outdoor living areas, it is stated that:

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB LAeq. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development

### **BS8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS**

The guidance in this document indicates acceptable noise levels for various activities within residential dwellings. A summary of the recommended guidance is shown in the following table as listed in BS8233: 2014

| Activity                   | Location    | 07:00 to 23:00      | 23:00 to 07:00     |
|----------------------------|-------------|---------------------|--------------------|
| Resting                    | Living Room | 35 dB LAeq, 16 hour | -                  |
| Dining                     | Dining Room | 40 dB LAeq, 16 hour | -                  |
| Sleeping (daytime resting) | Bedroom     | 35 dB LAeq, 16 hour | 30 dB LAeq, 8 hour |

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### **1 Objective:**

1.1 To use the measured noise levels from a 24hour noise impact assessment with the local roads at normal capacity and to ensure that the noise sources in operation will not lead to an adverse impact for the proposed residents of the dwelling. The site currently comprises of a residential garden located immediately to the South of an existing residential dwelling (25 High Street, Botley). A planning application has been submitted to erect 1 x purpose-built residential dwelling within the current garden area & located close to the existing dwellings and also located to a small industrial/business estate located to the East of the proposed dwelling. The industrial estate is used by a gar garage & an MOT centre.

1.2 The assessment was undertaken over a typical working week with the road traffic in operation. The report will be measured against the necessary criteria and list suitable mitigation measures for the dwelling.

### **2 Calibration:**

2.1 The measurement microphones were calibrated before and after testing in each measurement location and there were no drifts recorded during the assessments.

### **3 Site Layout & Microphone Position:**

3.1 The proposed dwelling will be located to the South of The High Street, to the rear of the existing dwellings. The High Street is a mixed use street, in a predominantly residential area. There is a small number of commercial units located to the East. There are residential dwellings located immediately to the North & residential gardens to the West & South

3.2 The proposed building is to be situated in the current garden area to the South of the residential dwelling. It will be located in the same vicinity as the existing dwellings and close to these buildings.

3.3 The proposed residential layout is shown later in the report. The microphones were located:

- 1- Proposed residential façade in relation to the road network & small industrial estate. The microphone approximately 2metres from ground floor level.

3.4 The noise from the industrial estate was audible during the attended visit to the site, with the noise sources comprising of vehicle movements & car garage treatments. The noise was not intrusive and was not continuous. The dominant noise source was the road traffic and not the noise associated with the business park. It is also closed during the night time period. The large garage is open 0800-1730hrs Monday to Friday and closed over the weekend.

### **4 Weather Conditions:**

4.1 The weather was dry & warm during the measurement procedures, the temperatures ranged between 15 – 24 degrees. There was no wind or rain during the measurement procedure.

### AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

#### 5 External Results:

5.1 The purpose of this measurement procedure was to calculate the noise levels apparent at the noise sensitive facades and ensure suitable mitigation measures are implemented so that the requirements of BS8233 & WHO can be met. The night time  $L_{Amax}$  values have also been derived so that they can be mitigated against.

**Table 1 -  $L_{Aeq}$  &  $L_{Amax}$  Values:**

| Mic Location              | $L_{Aeq}$ 16hour Value | Reduction needed for BS8233 compliance | $L_{Aeq}$ 8hour Value | Reduction for BS8233 compliance | $L_{Amax}$ value – night time | Reduction for WHO compliance |
|---------------------------|------------------------|----------------------------------------|-----------------------|---------------------------------|-------------------------------|------------------------------|
| ML 1 – Residential Facade | 47dBA                  | 12dB                                   | 44dBA                 | 14dB                            | 66dBA                         | 21dBA                        |

#### 6 Results Conclusion:

6.1 The levels of reduction apparent for the road traffic noise & other noise sources is listed in the table above. The required reduction for  $L_{Aeq}$  values is 14dBA and for the  $L_{Amax}$  noise levels it is 21dBA. It is clear to see that the road network is a lot quieter during the night time period. In addition, it is likely that some noise sensitive rooms will be exposed to lower noise levels due to the screening offered by the building once it is built, as will a large section of garden area.

6.2 The WHO guidelines for community noise - 2000 state that the internal  $L_{Amax}$  level (night time) should not exceed 45dB(A). If it exceeds this level on a regular basis then sleep disturbance may be caused. This is the internal level that should be achieved. The Pro PG document states that the internal level of 45dB should not be exceeded more than 10 times a night. This is the value listed above.

6.3 The client is willing to install suitable mitigation measures to the dwelling in order to reduce the possible impact. In addition to the measures to be applied to the building façade, there won't be any noise sensitive windows placed on the Eastern elevation facing the noise source, so the actual impact of the noise on some noise sensitive rooms may be reduced.

6.4 The proposed measures indicate that the development follows the approach recommended in the PPG Guidance (Paragraph 009) regarding the closure of windows which states: *"The agent of change will also need to define clearly the mitigation being proposed to address any potential significant adverse effects that are identified. Adopting this approach may not prevent all complaints from the new residents/users about noise or other effects, but can help to achieve a satisfactory living or working environment, and help to mitigate the risk of a statutory nuisance being found if the new development is used as designed (for example, keeping windows closed and using alternative ventilation systems when the noise or other effects are occurring)."*

6.5 Paragraph 011 of the same guidance states: Noise impacts may be partially offset if residents have access to one or more of:

- a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling;
- a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced if this area is exposed to noise levels that result in significant adverse effects;
- a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or
- a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minute walking distance)

6.6 The proposed dwelling is located in a quiet location with low average noise levels. The  $L_{Aeq}$  &  $L_{Amax}$  levels increase from 0430hrs and as the industrial estates are closed at this time, this increase will be due to the local traffic using the road network.

6.7 The amenity space will be located to the West of the building (front of the dwelling). The measured  $L_{Aeq}$  16hour value measured was 47dBA, so the recommended levels as stated in section 7.7.3.2 Design criteria for external noise as listed in BS8233: 2014, have already been achieved in this location.



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### **7 Building Specifications:**

7.1 Some building specifications are listed below, including, façade, glazing, roof & ventilation. Due to the status of the building the final ventilation scheme is unknown so various options have been included.

7.2 All of the rooms can be ventilated naturally for long periods of time, but a alternative ventilation system such as acoustic trickle vents could be implemented to the dwelling for periods when windows are closed.

7.3 The detailed calculations for each façade are listed later in this report and these calculations may show a slightly different sound reduction value is applicable due to the variety of specifications.

| Location    | Product                             | Sound Reduction - open | Sound reduction - closed |
|-------------|-------------------------------------|------------------------|--------------------------|
| All windows | RW Simon Acoustic EHA trickle vent  | 36dB                   | 38dB                     |
| All windows | RW Simon Acoustic EHAS trickle vent | 38dB                   | 41dB                     |

8 Façade Detail – The proposed façade is believed to be something similar to: - cavity brick wall construction. This system should achieve a sound reduction of between 50-52dB DnT,w + Ctr 'Code of Practice BS8233: 2014, Page 60 – Table E.1B – Airborne sound insulation of walls and partitions'.

9 Roof Detail – The proposed roof detail is believed to be similar to: Flat roof construction, with a minimum of 150mm insulation placed on top of rafters, an independent internal plasterboard ceiling. Such a systems should achieve a sound reduction in excess of 45dB 'Table 8 – The sound insulation of roofs, Page 41 – BS8233: 2014'. The roof appears to overhang a little which will offer some shading for the noise sensitive rooms, as will the building fabric.

10 Windows - The proposed windows to be used is unknown. The specifications listed below should ensure a suitable levels of sound reduction for this scheme.

| Possible Units       | Thickness | 125Hz | 250 Hz | 500 Hz | 1KHz | 2KHz | 4KHz | Overall reduction (DnT,w + Ctr) |
|----------------------|-----------|-------|--------|--------|------|------|------|---------------------------------|
| SG 6-12-10           | 28mm      | 27    | 26     | 33     | 39   | 39   | 47   | 36-3=33dB                       |
| SG solaglass 4-6-8.4 | 18.4mm    | 27    | 26     | 29     | 39   | 45   | 46   | 36-4=32dB                       |

10.1 This glazing specification could easily be installed throughout the site. There are many other suitable products and the client will have to show compliance for the windows before installation, the manufacturer will have the acoustic data for the windows.

### AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

#### 11 Results Summary - External:

11.1 This report has used measured data when the road traffic was operating in normal conditions & the industrial estate was in operation. It includes suitable mitigation measures that can be applied to the dwelling to ensure a suitable acoustic environment. In addition, it is essential to strike a balance between the thermal comfort of the dwelling and the acoustic criteria. The measures listed within the report offers a suitable way of doing that. It is apparent that the dwelling can be naturally ventilated via opening of windows, increasing the internal noise levels but only for a short period of time, some facades will also be screened from the noise sources once the dwelling is built leading to lower levels once again.

11.2 Based on the measured levels and assuming a glazing specification offering a sound reduction of 32dBA (easily meets the levels required above) is installed the following internal levels would be achieved:

| Room            | External Level | Sound Reduction of windows | Internal Level | Criteria Met |
|-----------------|----------------|----------------------------|----------------|--------------|
| Lounge          | 47dBA          | 32dB                       | 15dBA          | Yes          |
| Bedroom – LAeq  | 44dBA          | 32dB                       | 12dBA          | Yes          |
| Bedroom - LAmax | 66dBA          | 32dB                       | 34dBA          | Yes          |

11.3 The levels above indicate that the internal levels can be achieved with the windows closed thus showing that when the acoustic trickle vents will be used to ventilate the dwelling the noise criteria can be achieved. The table below shows the calculated single figure values of the habitable rooms with windows open. The below assumes a -13dB sound reduction for an open window. It further shows the levels at screened facades (screened by the building itself) to indicate noise levels at other facades of the site.

| Room & period   | External Value | Reduction offered by open window | Reduction offered by screening | Calculated Internal Value |
|-----------------|----------------|----------------------------------|--------------------------------|---------------------------|
| Lounge - Day    | 47dBA          | -13dB                            |                                | 34dBA                     |
| Bedroom - Night | 44dBA          | -13dB                            |                                | 31dBA                     |
| Lounge – Day    | 47dBA          | -13dB                            | -15dB                          | 19dBA                     |
| Bedroom - Night | 44dBA          | -13dB                            | -15dB                          | 16dBA                     |

11.4 The levels shown in the table above indicate that a good standard of living can be achieved with open windows on the entire dwelling, with the levels of the most exposed facades being 34dB for the day time (meets internal guidelines) and 31dB for the night time (just +1dB above recommended internal guidelines) which should ensure a reasonable standard of living. It is anticipated that a balance be struck between noise, overheating & ventilation, so mitigation measures will be required to the dwelling. The residents can open and close their windows at their own discretion to achieve a suitable trade between overheating and noise ingress. Some facades will be exposed to lower noise levels due to the screening offered by the building fabric, once the scheme has been built. The principle bedrooms will be located away from the industrial estate and also a long way away from the road.

11.5 Table 3.3 – Guidance for level 2 assessment of noise from transport services in the ANC AVO guide states that ‘Noise causes a material change in behaviour e.g., having to keep windows closed most of the time’ if the following levels are exceeded for longer periods of time:

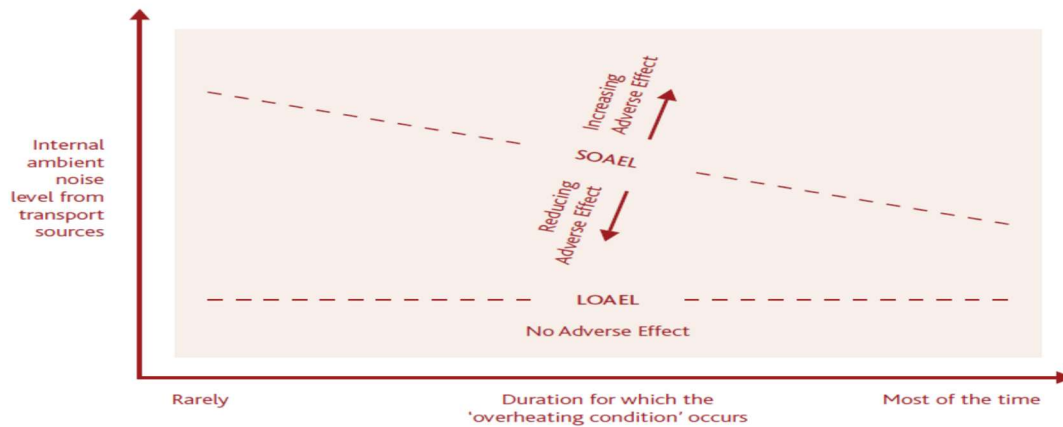
#### Internal ambient noise levels

| LAeq 16hour 0700-2300 | LAeq 8hour 2300-0700 | Individual noise events 2300-0700 |
|-----------------------|----------------------|-----------------------------------|
| >50dB                 | >42dB                | Normally exceeds 65dB LAmaxT      |

11.6 Using the above guidance (sliding scale as shown in the diagram below) the calculated internal levels at the dwelling with the windows open are also shown above. It is anticipated that the future occupants will accept an increase in the noise levels for periods of time to ensure a good thermal comfort for the dwelling. They will not be exposed to these levels for long period of time as they will be able to open and close the windows at their own discretion.

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Figure 3-2 Qualitative guidance on combined effect of internal ambient noise level and duration for the overheating situation



11.7 Based on the measured levels and anticipated internal levels offered by natural ventilation, it is recommended that the dwelling can be naturally ventilated with open windows, but as an additional mitigation measure, acoustic trickle vents should be fitted to all windows serving noise sensitive rooms to ensure ventilation during periods when the windows are closed. The kitchen and bathroom will be fitted with the necessary ventilation systems.

11.8 The mitigation measures listed within this report are very robust and comprehensive. If they are implemented throughout the site then the future residents should be able to enjoy a reasonable standard of living. Upon implementation of the comprehensive mitigation measures, the internal criteria of BS8233: 2014 should be met within the noise sensitive bedrooms at the proposed development.

11.9 It is clear that the noise emissions associated with the road traffic is the dominant noise source. However, if the necessary mitigation measures are implemented to the building fabric then there is no reason to suggest that the future residents will be adversely affected by the external noise emissions. It is also clear to see that the noise emissions may vary and be reduced at some aspects of the dwelling, however suitable acoustic feature corrections have been applied to the entire dwelling.

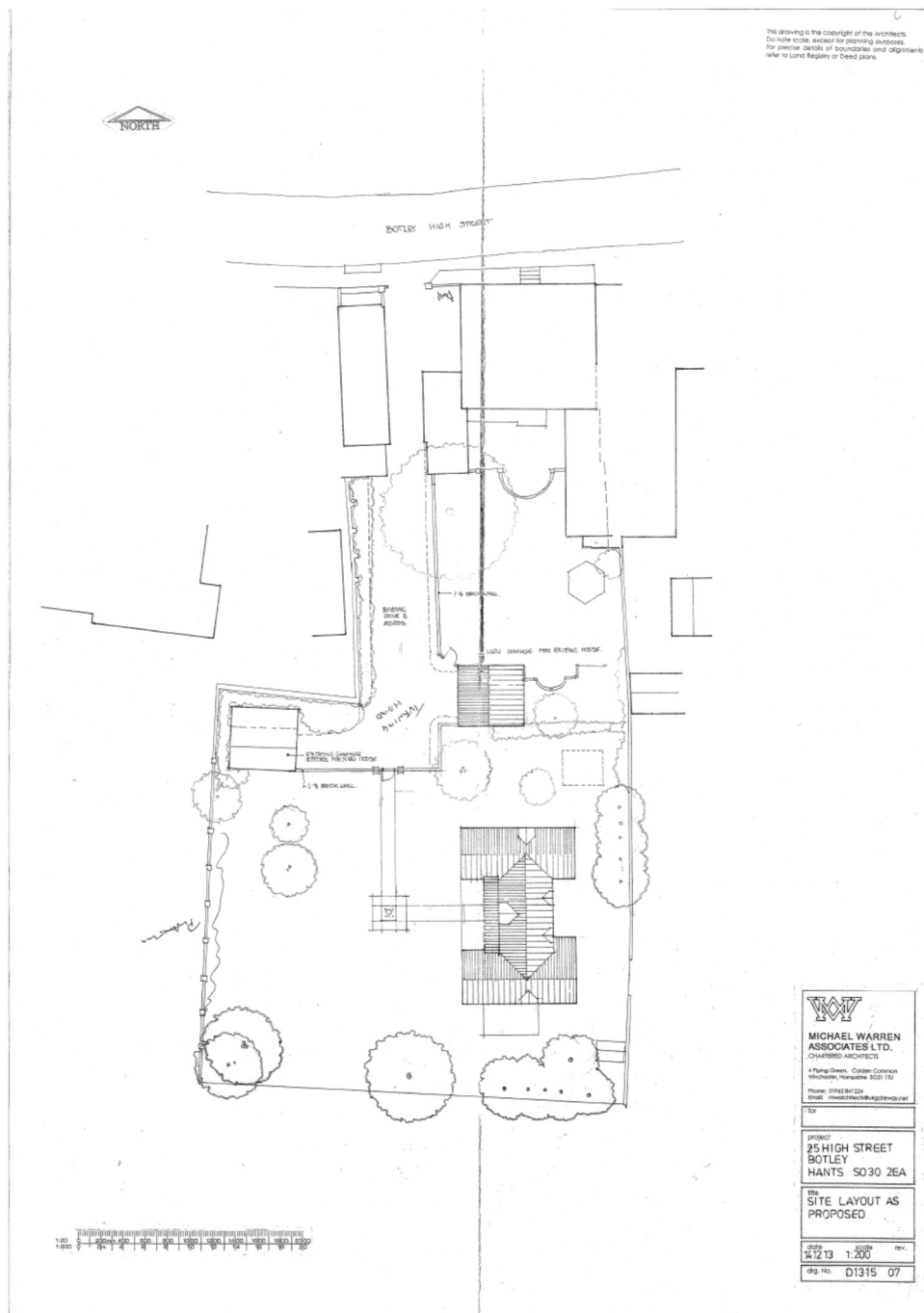
11.10 Planning Pro PG states that a good acoustic design process is a vital part of new developments. The client has taken great steps to ensure that the future occupants are protected from the dominant noise source, these steps include:

1. Careful configuration of dwelling – principle bedrooms away from industrial estate
2. A MVHR or alternative ventilation system to ventilate the dwellings thus maintaining the integrity of the façade & glazing – with air drawn in from the Western/Northern side of the dwelling
3. Install a robust glazing system to the building to protect the residents from the external noise emissions
4. Thermal mass an option to the façade to reduce overheating
5. No noise sensitive windows on Eastern elevation

11.11 The above-named document also states that the internal  $L_{Amax}$  value of 45dB should not be exceeded more than 10 times per night, and this criterion has been used for the site. Careful implementation of this scheme and control of the site should ensure that the future residents of the proposed scheme will be adequately protected from the external noise sources in operation at the site, with the road traffic noise being the dominant noise source, but also the noise associated with the small industrial estate located to the East of the proposed dwelling (beyond the boundary treatment already in place).

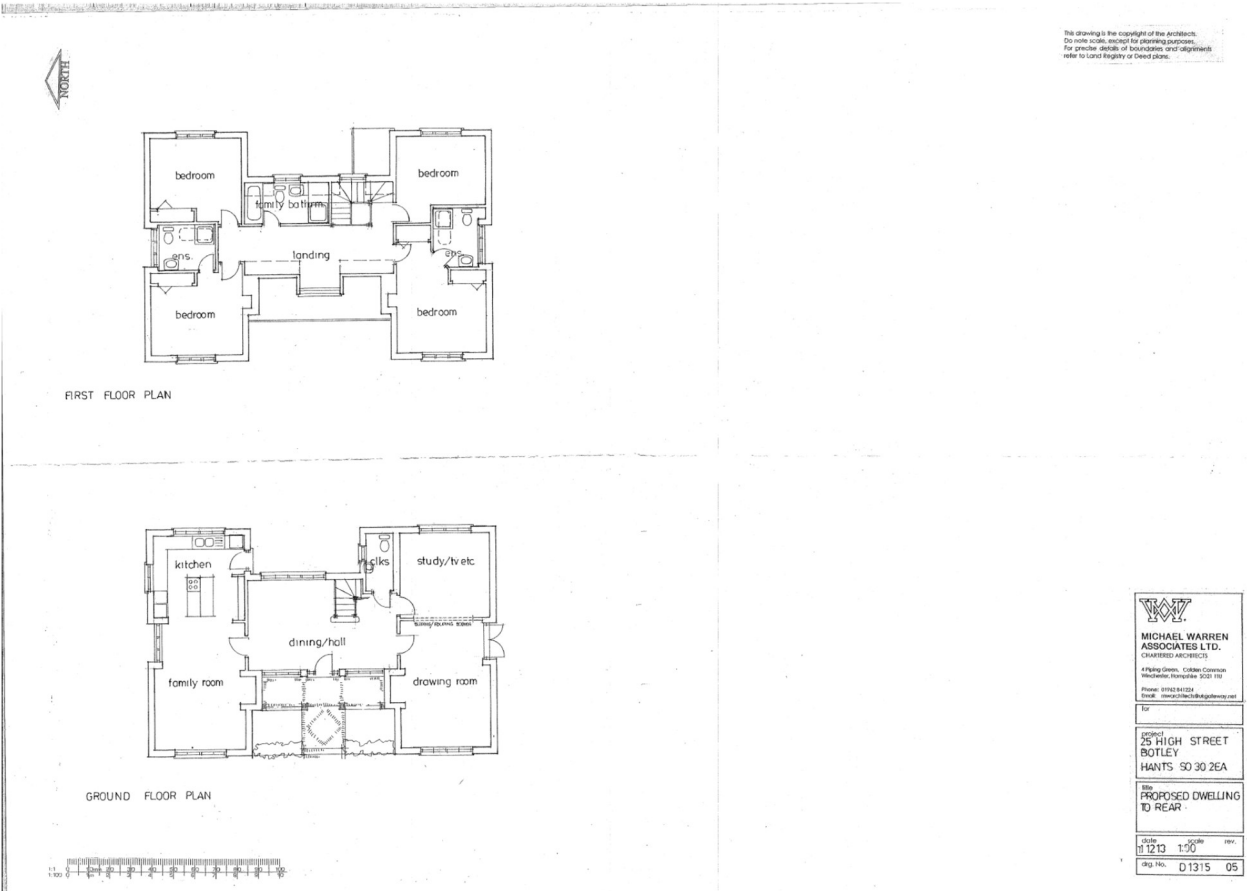
## AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

## 12 Site Plan:





AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING





AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

APPENDIX

Continuous equivalent noise level, LAeq — The steady noise level (usually in dBA) which, over the period of time under consideration, contains the same amount of sound energy as the time varying noise.

LAmx - The maximum value that the A-weighted sound pressure level reaches during a measurement period.

dB (A) — The A-weighted sound pressure level.

Decibel (dB) — A unit used for many acoustic qualities to indicate the level of sound with respect to a reference level.

A-weighting — A frequency weighting that relates to the response of the human ear.

Background noise level — Prevailing noise level in a specified environment measured in the absence of the noise being studied.

Habitable Room — A room used for sleeping or recreation/relaxation

Dew Weighted element normalised level difference — A single-number quantity which characterises the airborne sound insulation of a small building elements.

EPU — Environmental Protection Unit

Row Weighted sound reduction index — A single-number quantity which characterises the airborne sound insulation of a material or building element measured in the laboratory.

LA10 — The A-weighted noise level exceeded for 10% of the measurement duration.

LA90 - The A-weighted noise level exceeded for 90% of the measurement duration.

British Standards & associated documents:

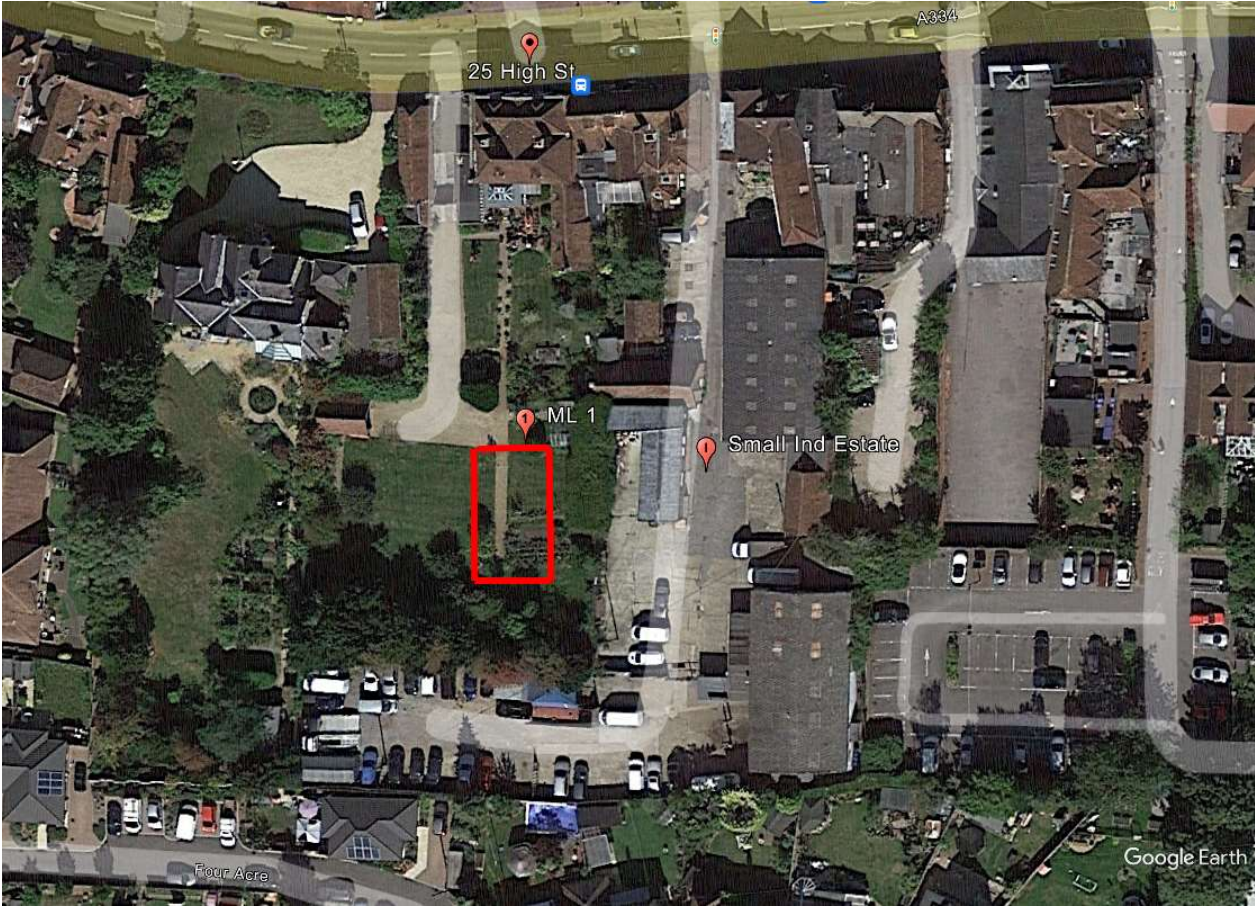
Code of Practice: BS8233: 2014 - Sound Insulation and noise reduction for buildings.

World Health Organization (WHO) - Guidelines for Community Noise.

ProPG: Planning & Noise - Professional Practice Guidance on Planning & Noise

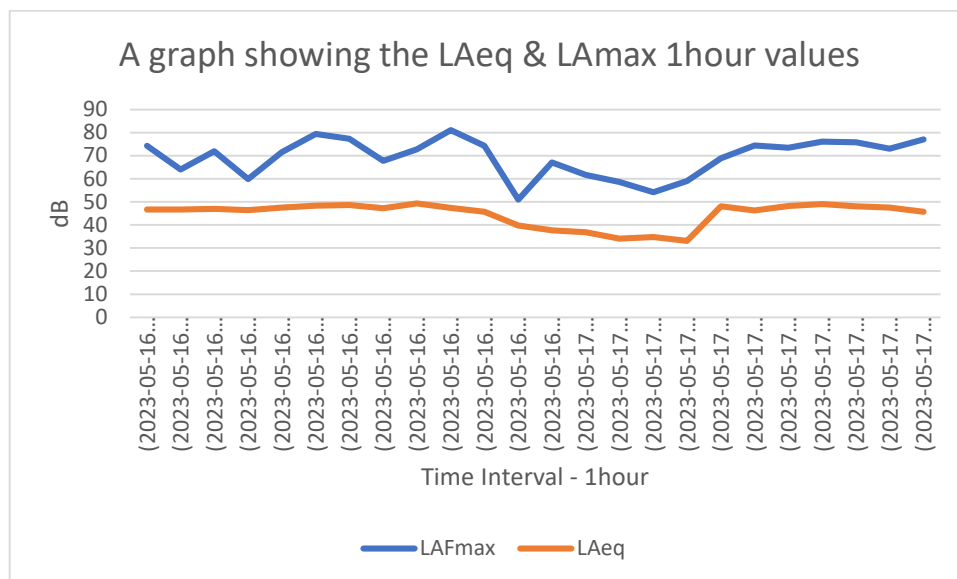
AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

**13 Google Earth:**



AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

| Time:                     | LAFmax | LAeq |
|---------------------------|--------|------|
| (2023-05-16 11:00:00.230) | 74.3   | 46.7 |
| (2023-05-16 12:00:00.230) | 64     | 46.7 |
| (2023-05-16 13:00:00.230) | 71.9   | 46.9 |
| (2023-05-16 14:00:00.230) | 59.9   | 46.4 |
| (2023-05-16 15:00:00.230) | 71.5   | 47.5 |
| (2023-05-16 16:00:00.230) | 79.4   | 48.3 |
| (2023-05-16 17:00:00.230) | 77.3   | 48.6 |
| (2023-05-16 18:00:00.230) | 67.8   | 47.3 |
| (2023-05-16 19:00:00.230) | 72.8   | 49.4 |
| (2023-05-16 20:00:00.230) | 81.1   | 47.4 |
| (2023-05-16 21:00:00.230) | 74.3   | 45.7 |
| (2023-05-16 22:00:00.230) | 51     | 39.8 |
| (2023-05-16 23:00:00.230) | 67     | 37.7 |
| (2023-05-17 00:00:00.230) | 61.7   | 36.8 |
| (2023-05-17 01:00:00.230) | 58.6   | 34.1 |
| (2023-05-17 02:00:00.230) | 54.2   | 34.8 |
| (2023-05-17 03:00:00.230) | 59     | 33.1 |
| (2023-05-17 04:00:00.230) | 68.9   | 48   |
| (2023-05-17 05:00:00.230) | 74.4   | 46.3 |
| (2023-05-17 06:00:00.230) | 73.5   | 48.2 |
| (2023-05-17 07:00:00.230) | 76     | 49   |
| (2023-05-17 08:00:00.230) | 75.8   | 48.1 |
| (2023-05-17 09:00:00.230) | 73     | 47.5 |
| (2023-05-17 10:00:00.230) | 77     | 45.7 |



AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

| Time:                     | LAFmax | LAeq |
|---------------------------|--------|------|
| (2023-05-16 11:00:00.230) | 57.2   | 47.7 |
| (2023-05-16 11:03:00.230) | 52.2   | 45.7 |
| (2023-05-16 11:06:00.230) | 64.7   | 48   |
| (2023-05-16 11:09:00.230) | 74.3   | 50.5 |
| (2023-05-16 11:12:00.230) | 56.2   | 46   |
| (2023-05-16 11:15:00.230) | 60.1   | 47.6 |
| (2023-05-16 11:18:00.230) | 61.6   | 48.8 |
| (2023-05-16 11:21:00.230) | 54.6   | 44.9 |
| (2023-05-16 11:24:00.230) | 59.6   | 46.4 |
| (2023-05-16 11:27:00.230) | 57.1   | 47.8 |
| (2023-05-16 11:30:00.230) | 56.6   | 47   |
| (2023-05-16 11:33:00.230) | 55.2   | 45.4 |
| (2023-05-16 11:36:00.230) | 57.7   | 45.8 |
| (2023-05-16 11:39:00.230) | 54.1   | 46.6 |
| (2023-05-16 11:42:00.230) | 54     | 44.4 |
| (2023-05-16 11:45:00.230) | 54.2   | 44.4 |
| (2023-05-16 11:48:00.230) | 59.2   | 44.5 |
| (2023-05-16 11:51:00.230) | 53.9   | 45.7 |
| (2023-05-16 11:54:00.230) | 58     | 44.5 |
| (2023-05-16 11:57:00.230) | 57.2   | 46.2 |
| (2023-05-16 12:00:00.230) | 61.6   | 46.2 |
| (2023-05-16 12:03:00.230) | 57.1   | 47.6 |
| (2023-05-16 12:06:00.230) | 58.9   | 46.5 |
| (2023-05-16 12:09:00.230) | 61.1   | 48.5 |
| (2023-05-16 12:12:00.230) | 57.9   | 46.5 |
| (2023-05-16 12:15:00.230) | 60.5   | 48.4 |
| (2023-05-16 12:18:00.230) | 56.3   | 48   |
| (2023-05-16 12:21:00.230) | 64     | 47.4 |
| (2023-05-16 12:24:00.230) | 60.1   | 44.7 |
| (2023-05-16 12:27:00.230) | 59.8   | 45.9 |
| (2023-05-16 12:30:00.230) | 61.1   | 47.5 |
| (2023-05-16 12:33:00.230) | 53.4   | 45.8 |
| (2023-05-16 12:36:00.230) | 59.3   | 45.4 |
| (2023-05-16 12:39:00.230) | 56.5   | 46.7 |
| (2023-05-16 12:42:00.230) | 56.9   | 47.6 |
| (2023-05-16 12:45:00.230) | 55.2   | 46.1 |
| (2023-05-16 12:48:00.230) | 58.7   | 46.9 |
| (2023-05-16 12:51:00.230) | 63.6   | 46.3 |
| (2023-05-16 12:54:00.230) | 57.9   | 43.6 |
| (2023-05-16 12:57:00.230) | 58.5   | 45.3 |
| (2023-05-16 13:00:00.230) | 59.9   | 48.4 |
| (2023-05-16 13:03:00.230) | 60.2   | 46.6 |
| (2023-05-16 13:06:00.230) | 59.2   | 46.5 |



|                           |      |      |
|---------------------------|------|------|
| (2023-05-16 13:09:00.230) | 54.7 | 46.3 |
| (2023-05-16 13:12:00.230) | 62.6 | 46.8 |
| (2023-05-16 13:15:00.230) | 53.3 | 45.7 |
| (2023-05-16 13:18:00.230) | 54.4 | 45.5 |
| (2023-05-16 13:21:00.230) | 64   | 46.8 |
| (2023-05-16 13:24:00.230) | 67.8 | 48.2 |
| (2023-05-16 13:27:00.230) | 56.7 | 45.2 |
| (2023-05-16 13:30:00.230) | 51.3 | 45   |
| (2023-05-16 13:33:00.230) | 56.7 | 45.6 |
| (2023-05-16 13:36:00.230) | 58.4 | 48.2 |
| (2023-05-16 13:39:00.230) | 61.1 | 48   |
| (2023-05-16 13:42:00.230) | 71.9 | 49.6 |
| (2023-05-16 13:45:00.230) | 59.7 | 47.7 |
| (2023-05-16 13:48:00.230) | 60.2 | 48.4 |
| (2023-05-16 13:51:00.230) | 52.9 | 45.3 |
| (2023-05-16 13:54:00.230) | 54.1 | 44.4 |
| (2023-05-16 13:57:00.230) | 56.2 | 46.1 |
| (2023-05-16 14:00:00.230) | 57.5 | 48   |
| (2023-05-16 14:03:00.230) | 57.4 | 46.6 |
| (2023-05-16 14:06:00.230) | 51.8 | 45.9 |
| (2023-05-16 14:09:00.230) | 54.8 | 46.4 |
| (2023-05-16 14:12:00.230) | 55.7 | 45.5 |
| (2023-05-16 14:15:00.230) | 54.5 | 45.5 |
| (2023-05-16 14:18:00.230) | 54.2 | 46.5 |
| (2023-05-16 14:21:00.230) | 57.9 | 45.7 |
| (2023-05-16 14:24:00.230) | 53.7 | 44.7 |
| (2023-05-16 14:27:00.230) | 59.9 | 46.8 |
| (2023-05-16 14:30:00.230) | 53.3 | 45.9 |
| (2023-05-16 14:33:00.230) | 57.1 | 47.4 |
| (2023-05-16 14:36:00.230) | 52.3 | 45.1 |
| (2023-05-16 14:39:00.230) | 54   | 45.8 |
| (2023-05-16 14:42:00.230) | 54   | 44.8 |
| (2023-05-16 14:45:00.230) | 53.7 | 45.6 |
| (2023-05-16 14:48:00.230) | 52.6 | 46.6 |
| (2023-05-16 14:51:00.230) | 56.8 | 46.7 |
| (2023-05-16 14:54:00.230) | 59.8 | 48   |
| (2023-05-16 14:57:00.230) | 56.8 | 47.4 |
| (2023-05-16 15:00:00.230) | 65.2 | 49.3 |
| (2023-05-16 15:03:00.230) | 61.7 | 48.8 |
| (2023-05-16 15:06:00.230) | 71.5 | 48.4 |
| (2023-05-16 15:09:00.230) | 64.1 | 47   |
| (2023-05-16 15:12:00.230) | 60.1 | 46.5 |
| (2023-05-16 15:15:00.230) | 63.1 | 46.4 |
| (2023-05-16 15:18:00.230) | 54.6 | 46.8 |
| (2023-05-16 15:21:00.230) | 61   | 46.1 |
| (2023-05-16 15:24:00.230) | 64.8 | 46.8 |



|                           |      |      |
|---------------------------|------|------|
| (2023-05-16 15:27:00.230) | 58.2 | 47.2 |
| (2023-05-16 15:30:00.230) | 56.6 | 47.5 |
| (2023-05-16 15:33:00.230) | 54.8 | 46.7 |
| (2023-05-16 15:36:00.230) | 60.8 | 49.3 |
| (2023-05-16 15:39:00.230) | 56   | 47.3 |
| (2023-05-16 15:42:00.230) | 59.8 | 49   |
| (2023-05-16 15:45:00.230) | 66.1 | 48.2 |
| (2023-05-16 15:48:00.230) | 54.5 | 46.7 |
| (2023-05-16 15:51:00.230) | 66.8 | 46.7 |
| (2023-05-16 15:54:00.230) | 62.2 | 45.4 |
| (2023-05-16 15:57:00.230) | 56.8 | 46.8 |
| (2023-05-16 16:00:00.230) | 61.5 | 48.2 |
| (2023-05-16 16:03:00.230) | 56   | 47.6 |
| (2023-05-16 16:06:00.230) | 58.6 | 46.4 |
| (2023-05-16 16:09:00.230) | 63   | 48.1 |
| (2023-05-16 16:12:00.230) | 70.8 | 48.1 |
| (2023-05-16 16:15:00.230) | 60.8 | 45.4 |
| (2023-05-16 16:18:00.230) | 57   | 46.3 |
| (2023-05-16 16:21:00.230) | 79.4 | 54.6 |
| (2023-05-16 16:24:00.230) | 69.9 | 50   |
| (2023-05-16 16:27:00.230) | 52.8 | 46.2 |
| (2023-05-16 16:30:00.230) | 58.4 | 45.8 |
| (2023-05-16 16:33:00.230) | 54.9 | 45.4 |
| (2023-05-16 16:36:00.230) | 66.8 | 48.9 |
| (2023-05-16 16:39:00.230) | 61.1 | 46.7 |
| (2023-05-16 16:42:00.230) | 57.4 | 46.6 |
| (2023-05-16 16:45:00.230) | 61   | 47.3 |
| (2023-05-16 16:48:00.230) | 60.1 | 47.7 |
| (2023-05-16 16:51:00.230) | 60.1 | 48.3 |
| (2023-05-16 16:54:00.230) | 58.1 | 47.7 |
| (2023-05-16 16:57:00.230) | 60.7 | 48.2 |
| (2023-05-16 17:00:00.230) | 58.1 | 47.1 |
| (2023-05-16 17:03:00.230) | 58.7 | 47.1 |
| (2023-05-16 17:06:00.230) | 63.6 | 49.3 |
| (2023-05-16 17:09:00.230) | 53   | 44.9 |
| (2023-05-16 17:12:00.230) | 71.8 | 50.1 |
| (2023-05-16 17:15:00.230) | 57.3 | 44.9 |
| (2023-05-16 17:18:00.230) | 57.9 | 47.8 |
| (2023-05-16 17:21:00.230) | 56.9 | 47   |
| (2023-05-16 17:24:00.230) | 52.1 | 45.2 |
| (2023-05-16 17:27:00.230) | 56.4 | 46.1 |
| (2023-05-16 17:30:00.230) | 61.4 | 47.3 |
| (2023-05-16 17:33:00.230) | 77.3 | 54.7 |
| (2023-05-16 17:36:00.230) | 64.9 | 49.9 |
| (2023-05-16 17:39:00.230) | 56.5 | 48.1 |
| (2023-05-16 17:42:00.230) | 55.4 | 46.2 |



|                           |      |      |
|---------------------------|------|------|
| (2023-05-16 17:45:00.230) | 69.7 | 48.9 |
| (2023-05-16 17:48:00.230) | 59.3 | 47.6 |
| (2023-05-16 17:51:00.230) | 57.3 | 48   |
| (2023-05-16 17:54:00.230) | 60.4 | 49.6 |
| (2023-05-16 17:57:00.230) | 60.5 | 49.2 |
| (2023-05-16 18:00:00.230) | 59.3 | 46.5 |
| (2023-05-16 18:03:00.230) | 62.4 | 47   |
| (2023-05-16 18:06:00.230) | 56.3 | 48.1 |
| (2023-05-16 18:09:00.230) | 54.5 | 46.4 |
| (2023-05-16 18:12:00.230) | 52.9 | 46.2 |
| (2023-05-16 18:15:00.230) | 54.3 | 46   |
| (2023-05-16 18:18:00.230) | 56   | 44.3 |
| (2023-05-16 18:21:00.230) | 57.6 | 46.6 |
| (2023-05-16 18:24:00.230) | 60   | 47.3 |
| (2023-05-16 18:27:00.230) | 62.2 | 46.3 |
| (2023-05-16 18:30:00.230) | 50.8 | 45.4 |
| (2023-05-16 18:33:00.230) | 62.3 | 46.9 |
| (2023-05-16 18:36:00.230) | 53.3 | 46.6 |
| (2023-05-16 18:39:00.230) | 57.4 | 47.7 |
| (2023-05-16 18:42:00.230) | 54.7 | 47.7 |
| (2023-05-16 18:45:00.230) | 59.1 | 48.2 |
| (2023-05-16 18:48:00.230) | 55.4 | 46.8 |
| (2023-05-16 18:51:00.230) | 61.9 | 48.7 |
| (2023-05-16 18:54:00.230) | 62.3 | 47.5 |
| (2023-05-16 18:57:00.230) | 67.8 | 51.3 |
| (2023-05-16 19:00:00.230) | 71.1 | 52.9 |
| (2023-05-16 19:03:00.230) | 70.1 | 52.4 |
| (2023-05-16 19:06:00.230) | 72.8 | 48.3 |
| (2023-05-16 19:09:00.230) | 60   | 49.3 |
| (2023-05-16 19:12:00.230) | 61.4 | 49.3 |
| (2023-05-16 19:15:00.230) | 61.7 | 49.6 |
| (2023-05-16 19:18:00.230) | 65.5 | 51.3 |
| (2023-05-16 19:21:00.230) | 64.5 | 50.6 |
| (2023-05-16 19:24:00.230) | 64.6 | 49.6 |
| (2023-05-16 19:27:00.230) | 60   | 47.1 |
| (2023-05-16 19:30:00.230) | 57.2 | 44.7 |
| (2023-05-16 19:33:00.230) | 57.4 | 44.2 |
| (2023-05-16 19:36:00.230) | 63.4 | 46.4 |
| (2023-05-16 19:39:00.230) | 55.9 | 45.3 |
| (2023-05-16 19:42:00.230) | 53.3 | 43.5 |
| (2023-05-16 19:45:00.230) | 57.9 | 45.9 |
| (2023-05-16 19:48:00.230) | 62.5 | 48.2 |
| (2023-05-16 19:51:00.230) | 63.3 | 48   |
| (2023-05-16 19:54:00.230) | 70.9 | 48.6 |
| (2023-05-16 19:57:00.230) | 71.7 | 53.8 |
| (2023-05-16 20:00:00.230) | 65.6 | 49   |



|                           |      |      |
|---------------------------|------|------|
| (2023-05-16 20:03:00.230) | 62.7 | 47   |
| (2023-05-16 20:06:00.230) | 60.3 | 47.3 |
| (2023-05-16 20:09:00.230) | 59.5 | 47.5 |
| (2023-05-16 20:12:00.230) | 57.8 | 46.6 |
| (2023-05-16 20:15:00.230) | 56.8 | 44.6 |
| (2023-05-16 20:18:00.230) | 57   | 45.7 |
| (2023-05-16 20:21:00.230) | 55.7 | 45.1 |
| (2023-05-16 20:24:00.230) | 61.7 | 45.7 |
| (2023-05-16 20:27:00.230) | 53.2 | 44.7 |
| (2023-05-16 20:30:00.230) | 58.2 | 43.9 |
| (2023-05-16 20:33:00.230) | 81.1 | 53.5 |
| (2023-05-16 20:36:00.230) | 56.9 | 47.2 |
| (2023-05-16 20:39:00.230) | 54.7 | 45.4 |
| (2023-05-16 20:42:00.230) | 53.4 | 44.2 |
| (2023-05-16 20:45:00.230) | 56.4 | 45.1 |
| (2023-05-16 20:48:00.230) | 56.7 | 46   |
| (2023-05-16 20:51:00.230) | 56.9 | 47   |
| (2023-05-16 20:54:00.230) | 62.2 | 48.5 |
| (2023-05-16 20:57:00.230) | 63.4 | 49.1 |
| (2023-05-16 21:00:00.230) | 61.4 | 48.4 |
| (2023-05-16 21:03:00.230) | 62.8 | 49.9 |
| (2023-05-16 21:06:00.230) | 67   | 48.2 |
| (2023-05-16 21:09:00.230) | 59.8 | 43.6 |
| (2023-05-16 21:12:00.230) | 60   | 43.1 |
| (2023-05-16 21:15:00.230) | 62.3 | 46.4 |
| (2023-05-16 21:18:00.230) | 64.3 | 48.9 |
| (2023-05-16 21:21:00.230) | 64   | 46.3 |
| (2023-05-16 21:24:00.230) | 74.3 | 50.4 |
| (2023-05-16 21:27:00.230) | 66.1 | 46.9 |
| (2023-05-16 21:30:00.230) | 60   | 44   |
| (2023-05-16 21:33:00.230) | 63.5 | 44.6 |
| (2023-05-16 21:36:00.230) | 49.1 | 40.2 |
| (2023-05-16 21:39:00.230) | 61.7 | 43.5 |
| (2023-05-16 21:42:00.230) | 46.3 | 40.8 |
| (2023-05-16 21:45:00.230) | 47.9 | 39.8 |
| (2023-05-16 21:48:00.230) | 50.5 | 40.2 |
| (2023-05-16 21:51:00.230) | 48.6 | 40.9 |
| (2023-05-16 21:54:00.230) | 53.6 | 40.2 |
| (2023-05-16 21:57:00.230) | 50.5 | 40.2 |
| (2023-05-16 22:00:00.230) | 46.1 | 39.9 |
| (2023-05-16 22:03:00.230) | 47.5 | 39.8 |
| (2023-05-16 22:06:00.230) | 50.1 | 39.8 |
| (2023-05-16 22:09:00.230) | 48.4 | 40.9 |
| (2023-05-16 22:12:00.230) | 46.2 | 38.9 |
| (2023-05-16 22:15:00.230) | 48.2 | 40.5 |
| (2023-05-16 22:18:00.230) | 47.4 | 40   |



|                           |      |      |
|---------------------------|------|------|
| (2023-05-16 22:21:00.230) | 48.3 | 41   |
| (2023-05-16 22:24:00.230) | 47.1 | 39.4 |
| (2023-05-16 22:27:00.230) | 49.9 | 38   |
| (2023-05-16 22:30:00.230) | 48.3 | 41.5 |
| (2023-05-16 22:33:00.230) | 47.2 | 38.8 |
| (2023-05-16 22:36:00.230) | 49   | 40.2 |
| (2023-05-16 22:39:00.230) | 47.5 | 39.2 |
| (2023-05-16 22:42:00.230) | 51   | 40.5 |
| (2023-05-16 22:45:00.230) | 47.7 | 39.6 |
| (2023-05-16 22:48:00.230) | 47.2 | 38.9 |
| (2023-05-16 22:51:00.230) | 46.8 | 38.8 |
| (2023-05-16 22:54:00.230) | 48.5 | 40.4 |
| (2023-05-16 22:57:00.230) | 50.5 | 39.2 |
| (2023-05-16 23:00:00.230) | 60   | 42.9 |
| (2023-05-16 23:03:00.230) | 45.2 | 36.2 |
| (2023-05-16 23:06:00.230) | 48.7 | 36.1 |
| (2023-05-16 23:09:00.230) | 49.6 | 36.2 |
| (2023-05-16 23:12:00.230) | 50.4 | 37.2 |
| (2023-05-16 23:15:00.230) | 67   | 38.9 |
| (2023-05-16 23:18:00.230) | 61.5 | 37.5 |
| (2023-05-16 23:21:00.230) | 50.5 | 39.2 |
| (2023-05-16 23:24:00.230) | 44.6 | 37   |
| (2023-05-16 23:27:00.230) | 44.6 | 36.8 |
| (2023-05-16 23:30:00.230) | 50.3 | 38.4 |
| (2023-05-16 23:33:00.230) | 56.7 | 39.4 |
| (2023-05-16 23:36:00.230) | 48   | 36.6 |
| (2023-05-16 23:39:00.230) | 45.1 | 36.4 |
| (2023-05-16 23:42:00.230) | 47.3 | 37.3 |
| (2023-05-16 23:45:00.230) | 51.3 | 37.7 |
| (2023-05-16 23:48:00.230) | 48.4 | 35.3 |
| (2023-05-16 23:51:00.230) | 47.2 | 35.1 |
| (2023-05-16 23:54:00.230) | 45.1 | 34.3 |
| (2023-05-16 23:57:00.230) | 45.1 | 34.5 |
| (2023-05-17 00:00:00.230) | 44.5 | 31.9 |
| (2023-05-17 00:03:00.230) | 48.4 | 34.1 |
| (2023-05-17 00:06:00.230) | 43.2 | 35.7 |
| (2023-05-17 00:09:00.230) | 43   | 34.6 |
| (2023-05-17 00:12:00.230) | 36.4 | 32.5 |
| (2023-05-17 00:15:00.230) | 47.4 | 35.7 |
| (2023-05-17 00:18:00.230) | 42.3 | 33.7 |
| (2023-05-17 00:21:00.230) | 61.7 | 46.5 |
| (2023-05-17 00:24:00.230) | 53.3 | 37   |
| (2023-05-17 00:27:00.230) | 43.9 | 34   |
| (2023-05-17 00:30:00.230) | 48   | 35.7 |
| (2023-05-17 00:33:00.230) | 45.2 | 34.5 |
| (2023-05-17 00:36:00.230) | 41.7 | 32.6 |



|                           |      |      |
|---------------------------|------|------|
| (2023-05-17 00:39:00.230) | 41.8 | 34.6 |
| (2023-05-17 00:42:00.230) | 43   | 33.4 |
| (2023-05-17 00:45:00.230) | 38.8 | 32.9 |
| (2023-05-17 00:48:00.230) | 47.4 | 34   |
| (2023-05-17 00:51:00.230) | 38.3 | 31.9 |
| (2023-05-17 00:54:00.230) | 47.8 | 34.4 |
| (2023-05-17 00:57:00.230) | 46.6 | 33.4 |
| (2023-05-17 01:00:00.230) | 49.7 | 37.6 |
| (2023-05-17 01:03:00.230) | 34.8 | 30.5 |
| (2023-05-17 01:06:00.230) | 34.2 | 31   |
| (2023-05-17 01:09:00.230) | 45.1 | 33.6 |
| (2023-05-17 01:12:00.230) | 50.9 | 37.9 |
| (2023-05-17 01:15:00.230) | 50.4 | 35.9 |
| (2023-05-17 01:18:00.230) | 51.3 | 39.7 |
| (2023-05-17 01:21:00.230) | 39   | 34.1 |
| (2023-05-17 01:24:00.230) | 36.8 | 30.7 |
| (2023-05-17 01:27:00.230) | 35.3 | 27.1 |
| (2023-05-17 01:30:00.230) | 47.9 | 32.3 |
| (2023-05-17 01:33:00.230) | 46.7 | 31.9 |
| (2023-05-17 01:36:00.230) | 42.1 | 30   |
| (2023-05-17 01:39:00.230) | 41   | 29.9 |
| (2023-05-17 01:42:00.230) | 32.7 | 27.8 |
| (2023-05-17 01:45:00.230) | 33   | 28   |
| (2023-05-17 01:48:00.230) | 32.8 | 28.3 |
| (2023-05-17 01:51:00.230) | 37.9 | 31.3 |
| (2023-05-17 01:54:00.230) | 58.6 | 38.7 |
| (2023-05-17 01:57:00.230) | 39.1 | 30   |
| (2023-05-17 02:00:00.230) | 54.2 | 39.5 |
| (2023-05-17 02:03:00.230) | 51.2 | 34.8 |
| (2023-05-17 02:06:00.230) | 48.2 | 36.2 |
| (2023-05-17 02:09:00.230) | 34.3 | 29   |
| (2023-05-17 02:12:00.230) | 34.5 | 29   |
| (2023-05-17 02:15:00.230) | 41.3 | 29.9 |
| (2023-05-17 02:18:00.230) | 44.3 | 33.4 |
| (2023-05-17 02:21:00.230) | 41   | 33.5 |
| (2023-05-17 02:24:00.230) | 47.1 | 34.5 |
| (2023-05-17 02:27:00.230) | 47.1 | 33.7 |
| (2023-05-17 02:30:00.230) | 46.9 | 36.2 |
| (2023-05-17 02:33:00.230) | 48.6 | 37   |
| (2023-05-17 02:36:00.230) | 37.9 | 30.5 |
| (2023-05-17 02:39:00.230) | 49   | 35.9 |
| (2023-05-17 02:42:00.230) | 41.8 | 35.1 |
| (2023-05-17 02:45:00.230) | 50   | 36.4 |
| (2023-05-17 02:48:00.230) | 43.9 | 33.5 |
| (2023-05-17 02:51:00.230) | 45   | 34.9 |
| (2023-05-17 02:54:00.230) | 44.1 | 32.8 |



|                           |      |      |
|---------------------------|------|------|
| (2023-05-17 02:57:00.230) | 48.4 | 34.6 |
| (2023-05-17 03:00:00.230) | 46.7 | 31.5 |
| (2023-05-17 03:03:00.230) | 43   | 30.6 |
| (2023-05-17 03:06:00.230) | 48.2 | 34.3 |
| (2023-05-17 03:09:00.230) | 35.1 | 28.8 |
| (2023-05-17 03:12:00.230) | 51.2 | 34.4 |
| (2023-05-17 03:15:00.230) | 29.2 | 25.8 |
| (2023-05-17 03:18:00.230) | 44.9 | 32   |
| (2023-05-17 03:21:00.230) | 52.1 | 34.7 |
| (2023-05-17 03:24:00.230) | 49.8 | 36.2 |
| (2023-05-17 03:27:00.230) | 35.4 | 28.6 |
| (2023-05-17 03:30:00.230) | 40.9 | 28   |
| (2023-05-17 03:33:00.230) | 35.3 | 28.5 |
| (2023-05-17 03:36:00.230) | 36.1 | 30.2 |
| (2023-05-17 03:39:00.230) | 59   | 37.6 |
| (2023-05-17 03:42:00.230) | 50.5 | 36   |
| (2023-05-17 03:45:00.230) | 45.7 | 32   |
| (2023-05-17 03:48:00.230) | 46.7 | 32.7 |
| (2023-05-17 03:51:00.230) | 47.1 | 36   |
| (2023-05-17 03:54:00.230) | 38.3 | 31.7 |
| (2023-05-17 03:57:00.230) | 38.1 | 31.1 |
| (2023-05-17 04:00:00.230) | 40.4 | 29.5 |
| (2023-05-17 04:03:00.230) | 36.2 | 29.4 |
| (2023-05-17 04:06:00.230) | 47.4 | 33   |
| (2023-05-17 04:09:00.230) | 54   | 37.1 |
| (2023-05-17 04:12:00.230) | 65.2 | 52.6 |
| (2023-05-17 04:15:00.230) | 65.4 | 51.2 |
| (2023-05-17 04:18:00.230) | 57.3 | 48.5 |
| (2023-05-17 04:21:00.230) | 59.6 | 47.8 |
| (2023-05-17 04:24:00.230) | 61.4 | 48.2 |
| (2023-05-17 04:27:00.230) | 62.6 | 48.8 |
| (2023-05-17 04:30:00.230) | 68.9 | 52.2 |
| (2023-05-17 04:33:00.230) | 64.4 | 52.4 |
| (2023-05-17 04:36:00.230) | 60.2 | 49.4 |
| (2023-05-17 04:39:00.230) | 59.8 | 47.5 |
| (2023-05-17 04:42:00.230) | 58.3 | 47.1 |
| (2023-05-17 04:45:00.230) | 56.2 | 44.7 |
| (2023-05-17 04:48:00.230) | 61.8 | 45.5 |
| (2023-05-17 04:51:00.230) | 59.5 | 45   |
| (2023-05-17 04:54:00.230) | 57.3 | 44.9 |
| (2023-05-17 04:57:00.230) | 56.8 | 42.6 |
| (2023-05-17 05:00:00.230) | 52.4 | 42.6 |
| (2023-05-17 05:03:00.230) | 58.4 | 43.7 |
| (2023-05-17 05:06:00.230) | 51.5 | 43.2 |
| (2023-05-17 05:09:00.230) | 64.9 | 43.8 |
| (2023-05-17 05:12:00.230) | 52.9 | 44.3 |



|                           |      |      |
|---------------------------|------|------|
| (2023-05-17 05:15:00.230) | 57.4 | 45.3 |
| (2023-05-17 05:18:00.230) | 60   | 47.4 |
| (2023-05-17 05:21:00.230) | 60.6 | 46   |
| (2023-05-17 05:24:00.230) | 66.2 | 45.6 |
| (2023-05-17 05:27:00.230) | 63.9 | 44.6 |
| (2023-05-17 05:30:00.230) | 52   | 45.1 |
| (2023-05-17 05:33:00.230) | 61.5 | 45.3 |
| (2023-05-17 05:36:00.230) | 60.2 | 45.6 |
| (2023-05-17 05:39:00.230) | 60.1 | 45.7 |
| (2023-05-17 05:42:00.230) | 55.2 | 44.8 |
| (2023-05-17 05:45:00.230) | 74.4 | 51.9 |
| (2023-05-17 05:48:00.230) | 57.1 | 45.7 |
| (2023-05-17 05:51:00.230) | 64.6 | 49.5 |
| (2023-05-17 05:54:00.230) | 60.9 | 47.5 |
| (2023-05-17 05:57:00.230) | 61   | 46.6 |
| (2023-05-17 06:00:00.230) | 57.3 | 47.5 |
| (2023-05-17 06:03:00.230) | 68   | 47.5 |
| (2023-05-17 06:06:00.230) | 56.1 | 46.2 |
| (2023-05-17 06:09:00.230) | 56   | 45.3 |
| (2023-05-17 06:12:00.230) | 56.9 | 45.6 |
| (2023-05-17 06:15:00.230) | 73.5 | 51.3 |
| (2023-05-17 06:18:00.230) | 55.6 | 46.6 |
| (2023-05-17 06:21:00.230) | 57.8 | 45.9 |
| (2023-05-17 06:24:00.230) | 59.3 | 46.4 |
| (2023-05-17 06:27:00.230) | 53.7 | 46   |
| (2023-05-17 06:30:00.230) | 69   | 49.2 |
| (2023-05-17 06:33:00.230) | 55.5 | 47.8 |
| (2023-05-17 06:36:00.230) | 55.2 | 47.2 |
| (2023-05-17 06:39:00.230) | 55.8 | 47.3 |
| (2023-05-17 06:42:00.230) | 54.2 | 45.6 |
| (2023-05-17 06:45:00.230) | 66   | 49.2 |
| (2023-05-17 06:48:00.230) | 56.2 | 47.2 |
| (2023-05-17 06:51:00.230) | 72.2 | 52.4 |
| (2023-05-17 06:54:00.230) | 61.9 | 48.8 |
| (2023-05-17 06:57:00.230) | 71.2 | 51   |
| (2023-05-17 07:00:00.230) | 72.8 | 50.6 |
| (2023-05-17 07:03:00.230) | 53.5 | 46.9 |
| (2023-05-17 07:06:00.230) | 59.6 | 46.9 |
| (2023-05-17 07:09:00.230) | 54.6 | 47.4 |
| (2023-05-17 07:12:00.230) | 76   | 53.7 |
| (2023-05-17 07:15:00.230) | 62.5 | 47.7 |
| (2023-05-17 07:18:00.230) | 66.6 | 48.3 |
| (2023-05-17 07:21:00.230) | 59.1 | 48.8 |
| (2023-05-17 07:24:00.230) | 72.7 | 50.1 |
| (2023-05-17 07:27:00.230) | 63.3 | 47.8 |
| (2023-05-17 07:30:00.230) | 62   | 46.7 |



|                           |      |      |
|---------------------------|------|------|
| (2023-05-17 07:33:00.230) | 59.2 | 46.5 |
| (2023-05-17 07:36:00.230) | 67.5 | 48   |
| (2023-05-17 07:39:00.230) | 71.2 | 49.4 |
| (2023-05-17 07:42:00.230) | 59.4 | 46.6 |
| (2023-05-17 07:45:00.230) | 58.6 | 47.3 |
| (2023-05-17 07:48:00.230) | 61.8 | 46.8 |
| (2023-05-17 07:51:00.230) | 59.8 | 47.4 |
| (2023-05-17 07:54:00.230) | 65.8 | 51.2 |
| (2023-05-17 07:57:00.230) | 71.5 | 51.7 |
| (2023-05-17 08:00:00.230) | 62.7 | 47   |
| (2023-05-17 08:03:00.230) | 63.4 | 48   |
| (2023-05-17 08:06:00.230) | 71.2 | 47.2 |
| (2023-05-17 08:09:00.230) | 61   | 47.2 |
| (2023-05-17 08:12:00.230) | 55.1 | 46.4 |
| (2023-05-17 08:15:00.230) | 55.7 | 46.1 |
| (2023-05-17 08:18:00.230) | 68.3 | 48.8 |
| (2023-05-17 08:21:00.230) | 73.3 | 51.5 |
| (2023-05-17 08:24:00.230) | 58.2 | 46.6 |
| (2023-05-17 08:27:00.230) | 63.4 | 46.4 |
| (2023-05-17 08:30:00.230) | 70.1 | 50.4 |
| (2023-05-17 08:33:00.230) | 56.5 | 46.7 |
| (2023-05-17 08:36:00.230) | 53.1 | 45.4 |
| (2023-05-17 08:39:00.230) | 75.8 | 52.9 |
| (2023-05-17 08:42:00.230) | 60.9 | 48.9 |
| (2023-05-17 08:45:00.230) | 62   | 48.9 |
| (2023-05-17 08:48:00.230) | 60.4 | 46.9 |
| (2023-05-17 08:51:00.230) | 55.5 | 44.6 |
| (2023-05-17 08:54:00.230) | 54.7 | 44.1 |
| (2023-05-17 08:57:00.230) | 54   | 44.1 |
| (2023-05-17 09:00:00.230) | 62.9 | 51.9 |
| (2023-05-17 09:03:00.230) | 71.1 | 47.2 |
| (2023-05-17 09:06:00.230) | 59.4 | 45.7 |
| (2023-05-17 09:09:00.230) | 73   | 50.9 |
| (2023-05-17 09:12:00.230) | 62.8 | 47   |
| (2023-05-17 09:15:00.230) | 66.7 | 48.2 |
| (2023-05-17 09:18:00.230) | 51.5 | 44.4 |
| (2023-05-17 09:21:00.230) | 53.8 | 44   |
| (2023-05-17 09:24:00.230) | 67.2 | 47.3 |
| (2023-05-17 09:27:00.230) | 57.6 | 46.9 |
| (2023-05-17 09:30:00.230) | 67.7 | 47   |
| (2023-05-17 09:33:00.230) | 59.9 | 47.3 |
| (2023-05-17 09:36:00.230) | 60.1 | 46.1 |
| (2023-05-17 09:39:00.230) | 52.4 | 45.1 |
| (2023-05-17 09:42:00.230) | 66.2 | 48   |
| (2023-05-17 09:45:00.230) | 55.9 | 45   |
| (2023-05-17 09:48:00.230) | 65.5 | 46.1 |

|                           |      |      |
|---------------------------|------|------|
| (2023-05-17 09:51:00.230) | 71.9 | 51.1 |
| (2023-05-17 09:54:00.230) | 56.5 | 44.6 |
| (2023-05-17 09:57:00.230) | 56.7 | 44.4 |
| (2023-05-17 10:00:00.230) | 57.4 | 45.6 |
| (2023-05-17 10:03:00.230) | 51.8 | 43.8 |
| (2023-05-17 10:06:00.230) | 53.6 | 42   |
| (2023-05-17 10:09:00.230) | 70.2 | 46.2 |
| (2023-05-17 10:12:00.230) | 55.1 | 46.6 |
| (2023-05-17 10:15:00.230) | 54.3 | 44.3 |
| (2023-05-17 10:18:00.230) | 54.4 | 45.3 |
| (2023-05-17 10:21:00.230) | 54.1 | 44.3 |
| (2023-05-17 10:24:00.230) | 56.8 | 44.6 |
| (2023-05-17 10:27:00.230) | 54.1 | 45.3 |
| (2023-05-17 10:30:00.230) | 62   | 46.9 |
| (2023-05-17 10:33:00.230) | 59   | 45.1 |
| (2023-05-17 10:36:00.230) | 55.7 | 45.3 |
| (2023-05-17 10:39:00.230) | 55.4 | 44.3 |
| (2023-05-17 10:42:00.230) | 55   | 43.5 |
| (2023-05-17 10:45:00.230) | 58.8 | 45.2 |
| (2023-05-17 10:48:00.230) | 50   | 43.8 |
| (2023-05-17 10:51:00.230) | 53.2 | 43.8 |
| (2023-05-17 10:54:00.230) | 58.9 | 46.4 |
| (2023-05-17 10:57:00.230) | 77   | 51.3 |

A graph showing the LAeq &amp; LAmax 3min values

