



AIRTIGHT & NOISECHECK LIMITED

Gate 2 | Meadows Farm, Ervills Road, Worlds End, Hampshire, PO7 4QU

Phone: 034 5066 6966 Email: office@airtightnoisecheck.co.uk

NOISE IMPACT ASSESSMENT FOR

MRS B MATTU
69 HILLSIDE AVENUE
SOUTHAMPTON
HAMPSHIRE
SO18 1JY

SITE ADDRESS

HILL HAVEN
WINCHESTER ROAD
FAIR OAK
EASTLEIGH
HAMPSHIRE
SO50 7HB

REPORT DATE: 20TH MAY 2024

TESTING DATE: 15TH – 16TH MAY 2024

Acoustic Engineer:



Michael Vine

Date: 15th – 16th May 2024



AIRTIGHT & NOISECHECK BUILDING ACOUSTIC TESTING

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Customer Name:

Test Date: 15th – 16th May 2024

Mrs B Mattu
69 Hillside Avenue
Southampton
Hampshire
SO18 1JY

Site Address:

Hill Haven
Winchester Road
Fair Oak
Eastleigh
Hampshire
SO50 7HB

Acoustic Engineer:

Mr. Michael Vine

Equipment used:

Norsonic Environmental Analyser 140 BS EN IEC 61672-1 2013 Class 1 – Associated frequency analyser to BS EN IEC 61260: 1996 Class 1 – serial 1407126 – calibration due March 2026

Measurement Microphone (Nor 1225) – Serial Number 305215 – calibration due March 2026

Acoustic Calibrator - (Type 1251) – Serial No 31652, Calibration due November 2024

Measurement Procedure:

The external ambient noise levels were recorded for a 24hour period in one location between Wednesday 15th May to Thursday 16th May 2024 to measure the apparent noise levels at the front facade of the site to measure the impact of the noise sources in operation.

The dominant noise source in operation was road traffic using Winchester Road, which is located to the front of the site. The proposed scheme has been granted for Erection of 2no. detached dwellings (1 x 4-bedroom and 1 x 3-bedroom) with associated access and parking (Alternative Scheme to planning permission F/15/76485) (amended description), with the following condition apparent for noise:

No development shall start on site until a noise assessment has been submitted to and approved in writing by the Local Planning Authority. The report shall demonstrate that the impact of noise from road traffic has been considered and shall include a scheme of mitigation measures for protecting the development from noise and vibration. The development must thereafter be carried out in full accordance with the approved details.

This report will include suitable mitigation to ensure a reasonable standard of living for the residents, and the main aim is to ensure a good relationship between noise, ventilation & overheating and not being reliant on alternative systems, but they may be required for periods whereby the windows are closed.

*Please note that the site is surrounded by 2m high fencing so the microphone could not be placed at the building façade location, but rather it was placed above the hoarding which is 4m from the centre of Winchester Road, the building façade will be 12m from the centre of the road so a reduction of -5dB has been applied to the measured levels to account for propagation to the receptor location – using a sound propagation equation for a line source:

$$L_2 = L_1 - 10 \log r_2/r_1$$



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Executive Summary:

Airtight & Noisecheck Ltd were instructed by Mrs B Mattu to undertake a detailed Noise Impact Assessment (NIA) at Hill Haven, Winchester Road, Fair Oak. A planning application has been made & granted for Erection of 2no. detached dwellings (1 x 4-bedroom and 1 x 3-bedroom) with associated access and parking (Alternative Scheme to planning permission F/15/76485) (amended description) & the purpose of this assessment is to ensure that condition 5 on the previous page is discharged.

The noise levels were measured for a 24hour period at the front (East) boundary of the site. The noise apparent at the site was:

1. Road Traffic Noise from Winchester Road – Dominant Noise Source

The microphone was positioned 4m from the centre of Winchester Road. The distances to the dwellings from the road are shown in the table below.

Dwelling	Distance to Facade	Screened
Plots 1 & 2	12m	No

The rear facades should be screened from the road noise which will reduce the impact in this location. The calculated levels are shown later in the report.

The external noise levels were measured at the Eastern boundary of the site in-order-to assess the road traffic noise to the front of the proposed development.

The noise levels and calculations indicate that if the mitigation measures are implemented then there is no reason to suggest that the future residents of the proposed dwellings will be adversely affected by the noise emissions created by the external sources. The mitigation measures will have to be implemented to the glazing, ventilation & the site boundary of Plot 2 of the proposed development and they show that the criteria for internal noise can be met. The noise levels have been measured at the noise sensitive facade.

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 client will take measures to reduce the internal noise levels including, alternative ventilation (such as MVHR or similar) and new double-glazed windows, achieving a sound reduction as shown in the results table. The dwellings can be naturally ventilated with open windows on the rear elevations for periods of the day and night time periods, this will of course increase the noise levels, but a balance must be struck between noise & overheating. The necessary mitigation measures will be applied to the necessary facades.

The external noise levels are higher at the front of the site due to the vehicular traffic apparent at this location. The rear elevations are screened from the noise source and there are existing residential schemes in this location also. Suitable mitigation measures will be able to protect the future residents of the proposed scheme.



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Acoustic Design Statement (ADS):

It is clear, that the site is situated in a relatively busy area with high levels of vehicular traffic noise and other noise along Salisbury Road. This is the dominant noise apparent in the area. The client will take steps and implement mitigation measures to ensure the impact of the external and internal noise should not have an adverse impact on the future residential dwelling. These steps include:

1. Careful configuration of dwellings – noise sensitive windows located on rear façade & screened from noise source
2. Alternative ventilation system (MVHR with summer bypass or similar) to ventilate all dwellings thus maintaining the integrity of the façade & glazing.
3. Install new double glazing to the residential dwellings
4. Natural ventilation to be offered by opening windows to the dwellings – striking a balance with overheating
5. Acoustic barrier erected to amenity space of Plot 2 to reduce road noise impact
6. Dual Aspect rooms – screened windows

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 the daytime and night-time noise levels fall into the medium to high category, indicating that a good acoustic design process should be implemented to ensure adequate protection. The calculated daytime and night-time values for the rear elevation and the majority of the dwellings will fall into the low category which indicate that noise will not be a reason for refusal and that a good acoustic design process should ensure that the internal criteria can be achieved. The rear aspect offers a suitable area of reduced noise ingress, along with a suitable amenity space for Plot 1. This is a suitable approach as listed in the noise section of the PPG online guidance document.

If the mitigation measures are implemented, then there is no reason to suggest that the future occupants of the scheme cannot be adequately protected from the external noise emissions. In addition, there is only a small bedroom located on the front façade.

Negligible Sites:

These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

Low Noise Level Sites:

At low noise levels, 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 Acoustic Design Statement (ADS) which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.

Medium Noise Level Sites:

As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless 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, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.

The front façades of Plots 1 & 2 directly face the road and thus falls into the medium to high category for noise exposure, and the rear facades and dwellings will be exposed to lower levels due to increased distance from the noise source. In addition, this report/ADS clearly demonstrates suitable and robust measures that will be implemented to the building elements to ensure the noise sources will not have an adverse impact on the proposed scheme. Whilst it is accepted that the noise source may be audible it is highly unlikely that the noise will be intrusive.

The alternative ventilation system will ensure that the dwellings can be adequately ventilated during periods when the windows are closed. Please note that the scheme is not solely reliant on such ventilation systems as the majority of the rooms have dual aspects so they can be naturally ventilated with open windows at the rear, but the ventilation system will ensure ventilation when windows are closed and a balance between noise, ventilation & overheating.



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Assessment Criteria:

The National Planning Policy Framework (NPPF) came into effect in March 2012 and was updated in December 2023. It replaced other documents such as PPG24. The NPPF 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 180 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, considering relevant information such as river basin management plans;

Paragraph 191. Planning policies and decisions should also ensure that new development is appropriate for its location considering 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;

193. 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 22nd July 2019 and also has the noise hierarchy table as shown below. Paragraphs 009 & 011 are referenced later in this report.

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Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
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
Lowest Observed Adverse Effect Level			
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
Significant Observed Adverse Effect Level			
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.

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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 LAmax 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 determine the noise levels associated over a 24hour period at the front facade of the site. The noise levels associated with these facades was measured to ensure that the future residents of the proposed scheme will not be adversely affected by the noise emissions created in the immediate area. The site currently comprises of a vacant parcel of land with existing dwellings to the North & West, and newly built dwellings to the South. Winchester Road is located to the East. A planning application has been granted for the Erection of 2no. detached dwellings (1 x 4-bedroom and 1 x 3-bedroom) with associated access and parking (Alternative Scheme to planning permission F/15/76485) (amended description)

1.2 The objective of the testing is to ensure that the future residents of the proposed scheme will be protected from the external noise emissions produced at the site, the dominant noise source apparent on site is located to the East (front) of the proposed development, predominantly being road traffic noise, using Winchester Road.

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 site is a vacant piece of land located to the West of Winchester Road in Fair Oak, Eastleigh. Winchester Road is a busy road located to the North of Fair Oak and East of Eastleigh. It is predominantly a residential street, but with some missed use buildings apparent. The noise sources apparent at the site are:

- Road traffic using Winchester Road – 12m from the residential façade

3.2 A proposed site layout has been attached to this report and it clearly shows the dwellings will be 2 x detached dwellings with the front elevation facing the road and the rear facades screened form the noise sources. The microphone was located:

1- Eastern boundary of the site, microphone approximately 2metres from ground floor level and 4m from the centre of Winchester Road. The proposed façade will be 12m from the centre of the road so a reduction of -5dB has been applied to the values to account for sound propagation over distance using a line source equation. The propagation equation for the noise levels is a line source propagation:

$$L_2 = L_1 = 10\log(r_2/r_1) \text{ so this equates to a sound reduction of -5dB using a source distance of 4m and a receptor distance of 12m}$$

3.3 There are residential dwellings located on all sides of the proposed scheme. Winchester Road is a busy road linking the immediate area, but the area is predominantly residential with existing dwellings located on all sides.

4 Weather Conditions:

4.1 The weather was dry & warm during the measurement procedures, the temperatures ranged between 11-18degrees on Wednesday and 10-18degrees on Thursday. There was no wind during the measurement procedure, and a very short rain shower on Thursday morning.



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5 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 also.

LAeq 16hour & 8hour Values:

Mic Location	LAeq 16hour Value	Reduction needed for BS8233 compliance	LAeq 8hour Value	Reduction for BS8233 compliance	L _{Amax} value – night time	Reduction for WHO compliance
ML 1	66dBA	31dB	58dBA	28dB	80dBA	35dB

**The above values include the -5dB reduction for a line source equation. The L_{Amax} figure was the figure exceeded 10 times during the night time period (2300-0700hrs) using 3minute interval data – this was not the single highest figure*

6 Results Conclusion:

6.1 The levels of reduction apparent for the site is listed in the table above, with a single figure level shown. It is clear to see that the noise associated with the road network is the dominant noise source for the dwellings. The highest level of sound reduction required is 35dBA – this can be achieved with suitable double glazing, screened facades, and alternative ventilation system. If the L_{Amax} levels are reduced using a point source equation then these values would relate to a calculated level of 75dBA at the façade which equates to a sound reduction of 30dB, but it is recommended a minimum level of 35dB is applied to all windows on the elevations facing the road network. Standard double glazing can be installed to the rear elevations.

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 average noise levels measured require a lower reduction so if this level is achieved then the average internal noise criteria will also be met.

6.3 The noise levels measured within this report offer a fair reflection of the noise levels apparent at the site. The noise source apparent at the front of the site is vehicular traffic using the local road network. If the above levels of mitigation are met, then the requirements of BS8233: 2014 & World Health Organisation – guidelines for community noise should be met.

6.4 Based on the measured noise levels, the proposed mitigation measures, the location of the development and the type of noise apparent it is anticipated that the noise will fall between The NOEL value (No adverse effect level) and the LOAEL (Lowest observed adverse effect level) and as such the noise should not have a detrimental effect on the future residents providing adequate measures are implemented to the building fabric & elements. For noise sources at the LOAEL, it is anticipated that the noise will be noticeable but not be intrusive if suitable mitigation measures are implemented to the development. The levels at the rear fall into the low level and therefore noise should not be considered a factor for refusal, it is anticipated that the residents will be able to open their windows at their own discretion throughout the daytime and night- time on the rear elevation.

6.5 The dominant noise source was the road traffic, so it may be so that an alternative ventilation strategy is implemented as listed in the Table above, please note that these measures are not designed to allow the residents to keep the windows closed, but to offer levels of ventilation during periods when the windows are closed. It is anticipated that the residents will naturally ventilate the dwellings via open windows for periods of the day time and night time.

6.6 Noise above the LOAEL is noticeable and intrusive. It is accepted that the noise associated with the local road network will be noticeable but due to the measured levels and type of noise (vehicular traffic) it is anticipated that the noise will not be intrusive to such an extent whereby it will change behavior. It is accepted however that mitigation measures are required to the development to mitigate the noise emissions to the front of the development.

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

- 1 Careful configuration of dwellings – noise sensitive windows located on rear façade & screened from noise source
- 2 Alternative ventilation system (MVHR with summer bypass or similar) to ventilate all dwellings thus maintaining the integrity of the façade & glazing.
- 3 Install new double glazing to the residential dwellings
- 4 Natural ventilation to be offered by opening windows to the dwellings – striking a balance with overheating
- 5 Acoustic barrier erected to amenity space of Plot 2 to reduce road noise impact
- 6 Dual Aspect rooms – screened windows

6.8 The above-named document also states that the internal L_{Amax} value of 45dB should not be exceeded more than 10 times per night. This is the criteria that has been applied to the L_{Amax} values measured at the site. If this criterion is met, then sleep disturbance should not be caused.

6.9 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 front and rear of the site. All investigation leads to the area being predominantly residential with dwellings located on all facades of the proposed site, including directly behind the public house and adjacent to the car park.

6.10 The tables below show the predicted internal noise levels on the front and rear facades with windows open. It is critical to ensure a balance is struck between overheating and noise and therefore residents will accept slightly higher noise levels for shorter period of the day to alleviate the overheating. The acoustic trickle vents (or similar) and natural ventilation offered by the attenuated glazing to the side and rear elevations can ensure a suitable level of ventilation throughout the dwellings.

Front & Rear façades – windows open – calculated values at the facades:

Front Facades:

Mic Location	L_{Aeq} 16hour Value	Reduction for open window	Internal value	L_{Aeq} 8hour Value	Internal value	L_{Amax} value – night time	Internal value
Plots 1 & 2	66dBA	-13dB	53dB	58dBA	45dB	80dBA	67dB

Rear Facades:

Mic Location	L_{Aeq} 16hour Value	Reduction for screening	Reduction for open window	Internal Value	L_{Aeq} 8hour Value	Internal Value	L_{Amax} value – night time	Internal Value
Plots 1 & 2	66dBA	-15dB	-13dB	38dB	58dBA	30dB	80dBA	52dB

6.11 The calculated internal values can be seen in the tables above. It is clear to see the varying levels of noise for the site and the possible mitigation measures are included on page 11. These should ensure a suitable internal acoustic criterion for the site but also striking a balance between noise, ventilation and overheating. The client will upgrade the windows on all elevations to improve the sound reduction for the glazing strategy. The windows will achieve the minimum sound reduction values as listed in this report.

6.12 The calculated levels at the rear are a lot less than those at the front but they are still above the levels stated in BS8233: 2014 but below the guidelines shown below, so the alternative ventilation strategy will help on all facades, although it is anticipated that residents will accept slightly higher levels of noise for periods of time in order to naturally ventilate their dwellings.

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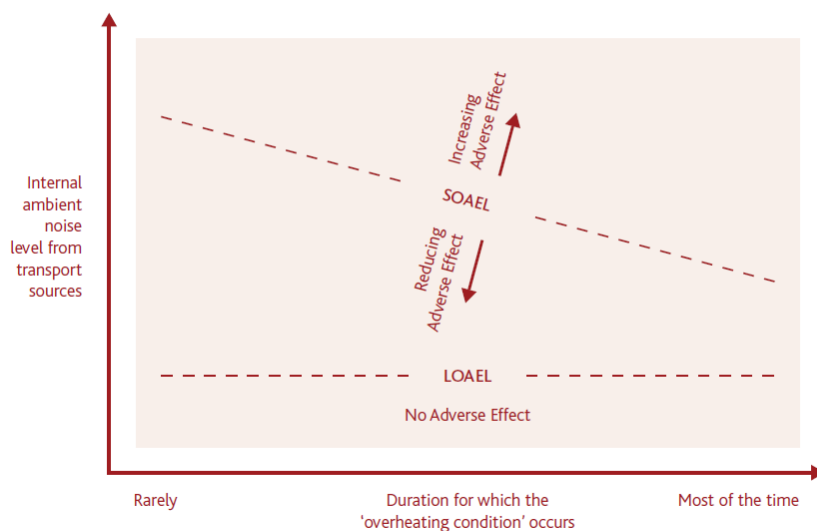
6.12 Table 3.3 – Guidance for level 2 assessment of noise from transport services in the ANC AVO guide states that ‘Noise causes a material change in behaviour e.g., having to keep windows closed most of the time’ if the following levels are exceeded for longer periods of time:

Internal ambient noise levels		
L _{Aeq} 16hour 0700-2300	L _{Aeq} 8hour 2300-0700	Individual noise events 2300-0700
>50dB	>42dB	Normally exceeds 65dB L _{AmaxT}

6.13 The front facades for plots 1 & 2 and the L_{Amax} values for the rear facades are calculated to be above the values shown in the table above so for some periods of time the rooms may need to be ventilated via an alternative solution for short periods of time when the windows are closed.

6.14 The rear facades for plot 6 fall outside of the guidance range shown above, all other rear facades fall below this criterion.

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





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6.15 The client will ensure all the windows on the development have suitable sound reduction values to meet the internal requirements with windows closed. In addition to this the client will also install an alternative ventilation system such as MVHR or similar to both plots, this will ensure ventilation is apparent when the windows are closed. The windows can be opened at the resident's desire, and this will subsequently offer natural ventilation to the entire dwellings by way of the rear windows being opened on the rear elevation. These measures implemented to the building fabric & glazing will ensure suitable sound reduction and natural ventilation for the entire dwelling. Furthermore, acoustic trickle vents can be installed to the windows facing the road network, some suitable products are shown on the following page.

6.16 The measures to be taken by the client, including orientation of dwelling, lower noise levels to the rear, upgrading windows, installing alternative ventilation to the dwellings should ensure a suitable internal acoustic criterion for the future residents of the scheme. The windows on the rear façade can be opened naturally throughout the day time and night time period.

6.17 The above 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)."*

6.18 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).

6.19 The proposed scheme will ensure that the first two bullet points shown above have been implemented as part of the application. There are both quiet facades and amenity space as part of the application that are screened from the noise sources. The calculated level at the rear facades is shown on the previous page and the calculated amenity space noise levels are shown later.

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7 Residential Amenity Space:

7.1 The table below indicates the calculated levels in both of the residential amenity spaces. Please note that for Plot 2 the amenity space is located to the North of the dwelling and actually runs from the front of the site to the rear, so whilst there will be segments of the amenity space closer to the road, there will also be large areas that will be further away. It is often best practice to use the centre of the area for the purpose of the sound propagation and therefore the same distances will be used as they were in the calculation of the noise levels (a source distance of 4m and a receptor distance of 12m) resulting in a -5dB correction for sound propagation.

Plot No	L _{Aeq} 16hour	Distance to Centre	Reduction – line source	Reduction - Screening	Reduction – boundary treatment	Calculated Level	Requirements met
Plot 1	71dBA	18m	-6dB	-15dB		50dBA	Yes
Plot 2	71dBA	12m	-5dB		-14.3dB	51.7dBA	Yes

7.2 The above level of reduction for Plot 2 boundary treatment reduction has been taken from the manufacturers data (see below) assuming a height of 2m. This treatment should be solid, with no gaps and run around the Eastern & Northern boundary of the amenity space for Plot 2.

Jakoustic Plus Barrier

Welcome to an acceptable level of noise and a better quality of life . . .

Jacksons fencing have launched a revolutionary acoustic barrier system that is designed to reduce noise to bring back the peace and quiet into your life.

All timber used is Jakure pressure treated and is covered by our 25-year guarantee. This gives it lasting protection above and below ground against all wood boring pests and all forms of wet and dry rot.

The Jakoustic system comprises of our unique timber 'tuning fork' design posts and 125mm boards featuring an interlocking "vee" coupled with a tongue and groove. This special profile has been carefully developed to locate the boards in such a way that eliminates gaps that sound will easily travel through, even when boards shrink and expand with changes in the weather. The fence is finished with a capping and counter rail.

An absorptive layer, which is covered with a protective membrane is incorporated on one side of the boards to further reduce noise by an average of 4dB.

Jakoustic Plus is ideal in applications where the screen is to be used to form a compound around a noise source or a noise source is surrounded with reflective surfaces such as high fencing and buildings.

Specification

The Jakoustic Plus barrier features timber construction, an unique tuning fork design posts or I beams, special fixings clamp the acoustic boards between posts, can accommodate changes in level or profile, comes complete with timber capping and counter rail and has an additional absorptive layer covered with a protective membrane.



Rear view showing protective plastic membrane

The Jakoustic Plus Barrier can reduce noise by up to 32dB (Jakoustic plus barrier certified laboratory results: Rating according to BS EN 1793-2:1998 Category=B3, BS EN 1793-1:1998 Category=A3, Laboratory sound reduction 32dB, Superficial Mass 33kg/m²)

Sound reduction achieved in tests on Jakoustic Barriers

Distance from noise source	Fence height 2m	Fence height 2.5m	Fence height 3m
5m	17.6dB	20.5dB	21.4dB
10m	14.3dB	17.5dB	18.1dB
15m	14.3dB	16.5dB	16.9dB
20m	13.2dB	15.9dB	16.4dB

The above data shows the results from measurements taken during a field trial, which simulated the latest British Standard test procedure for acoustic fencing in a practical location.



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8 Building Specifications:

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

8.2 A system such as natural ventilation should ensure a suitable acoustic environment for the rear facade, but it is recommended that a whole house MVHR system be installed to the dwelling to ensure suitable levels of ventilation during the times when the windows are closed. This will ensure a suitable balance between noise, overheating and ventilation. The MVHR system will ventilate the dwelling when the windows are closed, and the residents can open their windows at their own discretion during the day time and night time periods.

Make	Model	Type
Vent-Axia	Sentinel Kinetic Plus	Whole House Ventilation
Titon	HRV1.25 Q Plus with Trimbox NO2 Filter®	Whole House Ventilation

8.3 If an MVHR system is to be installed then it will have to be located in a location that will not impact on the noise sensitive bedrooms. It could be located in the common area or a cupboard for instance. It will need regular maintenance so an access panel will be required. It is recommended that the system is located away from the noise sensitive bedrooms and situated above or inside a purpose-built area within the communal area. Please note – this type of installation may be excessive for this development.

8.4 Acoustic trickle vents could also be placed on windows facing the road traffic, some suitable products are included in the table below.

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

9 Façade Detail – The proposed façade is believed to be something similar to: - Aggregate block cavity wall, minimum 100mm blocks (minimum density 1350kg/m³), minimum 75mm cavity between leaves, finished with 13mm plaster. 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'. Also, a cavity wall system comprising of 7N concrete blocks (two separate frames), have a sound reduction of approximately 53dB (predicted weighted sound reduction index values of Celcon Blockwork – from H&H Celcon).

10 Roof Detail – The proposed roof detail is believed to be similar to: Tiles on felt, pitched roof with 100mm mineral wool on plasterboard ceiling. This system should achieve a sound reduction of 43dB Rw 'BS8233: 2014, page 41 - Table 8 - The sound insulation of roofs'.

11 Windows – The actual proposed window specification to be used is unknown, so the following are options that achieve good levels of attenuation.

Elevation	Possible Units	Thickness	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	Overall reduction
Front & Side	SG Solaglass 6-20-10	36mm	26	30	35	39	35	44	37-2=35dB Rw + Ctr
Front & Side	SG Solaglass 6-24-10	40mm	25	31	37	40	36	45	38-3=35dB Rw + Ctr
Rear	SG Solaglass 4-12-6	22mm	23	21	30	40	38	35	33-3=30dB Rw + Ctr

11.1 The above systems are possible options for both the front & side elevations and the rear elevations. It is clear that the levels of reduction at the front are higher than those at the rear and the systems above offer the measured levels of reduction as listed within this report.



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12 Results Summary:

12.1 The results indicate that whilst the noise emissions produced at the front of the site are the dominant source, mitigation measures can be applied to all facades of the building (windows & ventilation) to protect the future residents from noise break in.

12.2 Based on the noise levels recorded there is no reason why future residents can't be adequately protected from the external noise emissions. This is provided the correct materials are used to the external aspects of the site. The level of mitigation is far less at the rear of the building due to the screening offered by the building.

12.3 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 rooms at the proposed scheme. The mitigation measures consider all of the apparent noise sources on site and cover the concerns of the local authority & meet the relevant British Standards. The L_{Aeq} values have been listed and the necessary mitigation measures required to ensure these are met, in addition to this, detailed calculations have been performed for the dwelling to ensure that the acoustic criteria set out not only in BS8233: 2014 are met but also the requirements for night-time noise events listed in World Health Organisation – Guidelines for community Noise are met in relation to L_{Amax} values caused from the noise sources.

12.4 The necessary acoustic feature corrections have been applied to the figures and as such the robust measures should ensure a suitable internal criterion for the future residents of the proposed scheme.

12.5 Both the measured levels and the calculated levels show similar levels of mitigation are required for the site. Providing the highest levels of sound reduction is achieved then there is no reason to suggest that the variety of noise sources will have an adverse impact on the proposed development.

12.6 Based on the attended visit, the measured & calculated noise levels it is anticipated that the proposed scheme can be adequately protected from the noise sources apparent in the vicinity of the site. A good acoustic design will be pivotal in ensuring the internal criterion as stated in BS8233: 2014 and the client has indicated that they are prepared to ensure suitable mitigation for the proposed dwelling in relation to the external noise sources apparent in the vicinity of the site. The immediate area is residential which also indicates a suitable environment for existing housing stock.

12.7 The variety of measures listed for the various building façades should ensure a suitable balance between overheating and internal noise levels. There will be times when the residents wish to open their windows to naturally ventilates these rooms and accept a slightly higher noise levels for a short period of time. The windows to the rear can be opened and offer natural ventilation to the entire dwelling and still meet the requirements for the average noise levels during the day time and night time period.

12.8 The majority of the noise sensitive rooms are actually dual aspect so they should be able to be naturally ventilated for long periods via open windows on the rear facades. The front facades can also be treated with acoustic trickle vents to allow for passive ventilation, this report includes suitable methods of ventilation during periods when windows are closed, and the aim of this report is to ensure a balance between noise, ventilation & overheating and it recommends that natural ventilation is offered by open windows at the residents discretion, in particular to the rear facades that offer lower levels of noise. This coupled with the robust and comprehensive mitigation measures and the largely dual aspect habitable rooms should ensure a suitable balance as listed above.

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13 Site Plans:





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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.

LAm_{ax} - 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

D_{ne,w} Weighted element normalised level difference – A single-number quantity which characterises the airborne sound insulation of a small building elements.

EPU – Environmental Protection Unit



Rw 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.

ProPG: Planning & Noise - Professional Practice Guidance on Planning & Noise - May 2017

ACOUSTICS VENTILATION AND OVERHEATING - Residential Design Guide – Jan 2020

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14 Google Earth:

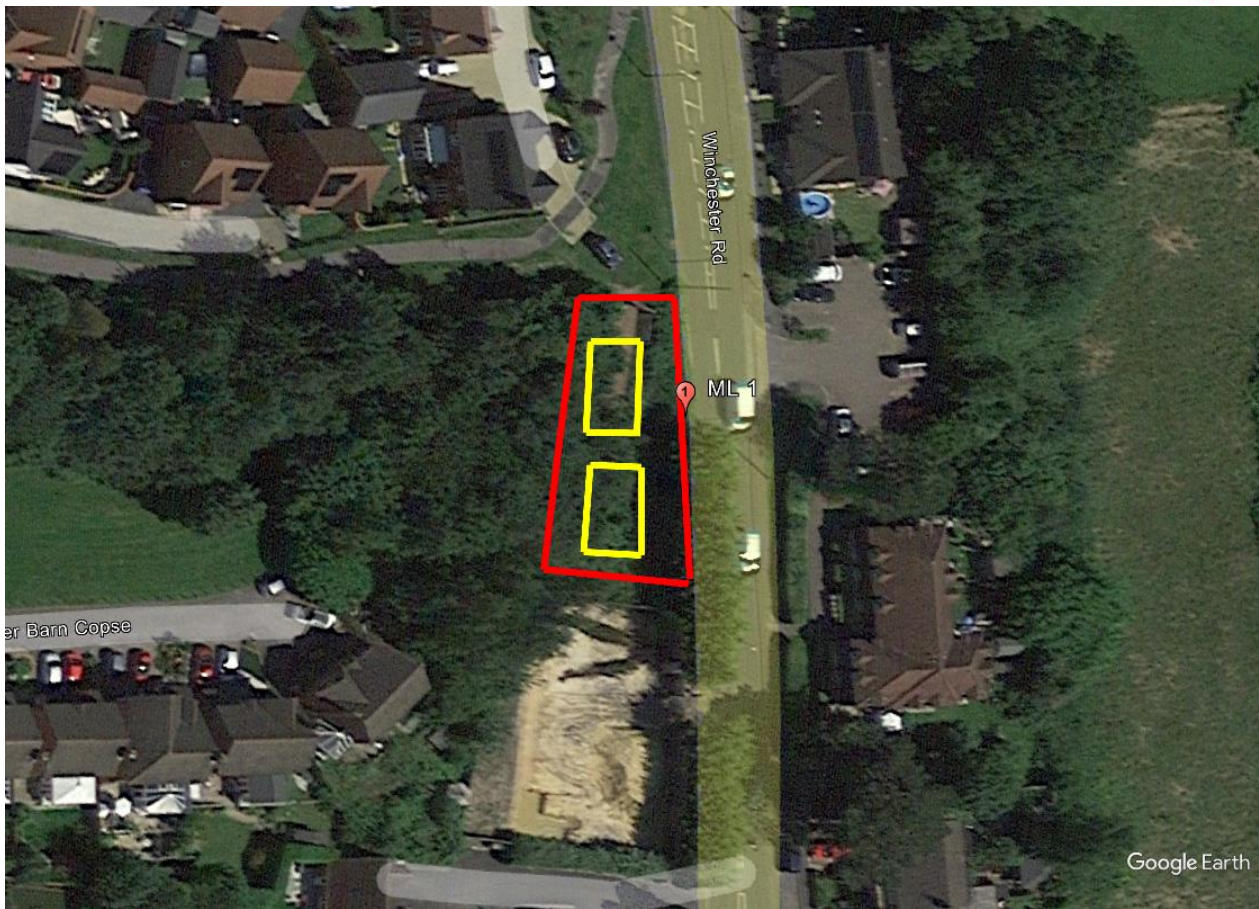


Table 3-3 Guidance for Level 2 assessment of noise from transport noise sources^[Note 1] relating to overheating condition

Internal ambient noise level ^[Note 2]			Examples of Outcomes ^[Note 5]	
$L_{Aeq,T}$ ^[Note 3] during 07:00 – 23:00 ^[Note 4]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 ^[Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{A,F,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. 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.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life.
			Noise can be heard, but does not cause any change in behaviour	At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. ^[Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{A,F,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response ^[Note 9] . Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Note 1 The noise levels suggested in Tables 3-2 and 3-3 assume a steady road traffic noise source but may be adapted for other types of transport.

Table B-5 Examples of passive ventilation solutions providing enhanced sound insulation

Design option	Description and references	Approximate Level Difference (external free field level – internal reverberant level)	Improvement relative to a window providing a similar amount of ventilation
Standard opening windows	Window(s) open sufficiently to provide a ventilation free-area equivalent to 2% of the floor area. ^[42]	13 dB	0 dB
Open windows with sound attenuating balconies	Window(s) as above. Balconies may have a solid balustrade or be enclosed to a further degree (maintaining an open area for ventilation). Absorption may be provided to the balcony soffit or potentially to other surfaces. ^[49, 50, 51]	17 – 23 dB	4 – 10 dB
Attenuated or plenum windows	Dual windows (spaced by around 200mm) with staggered openings and absorptive linings to the cavity reveals. Various other configurations also possible in principle. ^[52, 53]	17 – 24 dB	4 – 11 dB
Attenuated vents/louvres	Ventilation openings with integral means of attenuating sound. Typically this may be acoustic louvres or acoustically lined ducts/plena. ^[54, 55]	17 – 29 dB	4 – 16 dB
Attenuated windows or vents/louvres with sound attenuating balconies	Combined use of balconies to provide screening and acoustically attenuated windows or vents. Refer to above for description of each element.	21 – 39 dB	8 – 26 dB



Time Period	LAeq	LAmx
(2024/05/16 07:00:02.00)	72.1	81.2
(2024/05/16 07:03:02.00)	71.9	83.5
(2024/05/16 07:06:02.00)	72.7	80.5
(2024/05/16 07:09:02.00)	72.8	82
(2024/05/16 07:12:02.00)	71.6	80.9
(2024/05/16 07:15:02.00)	70.8	82.2
(2024/05/16 07:18:02.00)	72.8	85.2
(2024/05/16 07:21:02.00)	71.2	81.5
(2024/05/16 07:24:02.00)	73.1	84.2
(2024/05/16 07:27:02.00)	72.9	85.3
(2024/05/16 07:30:02.00)	73	84.1
(2024/05/16 07:33:02.00)	72.7	84.6
(2024/05/16 07:36:02.00)	72.5	82.6
(2024/05/16 07:39:02.00)	70.6	80.4
(2024/05/16 07:42:02.00)	71.3	81.6
(2024/05/16 07:45:02.00)	73.1	88.4
(2024/05/16 07:48:02.00)	72	82.6
(2024/05/16 07:51:02.00)	72.4	82.7
(2024/05/16 07:54:02.00)	72.3	84.6
(2024/05/16 07:57:02.00)	71.4	81.6
(2024/05/16 08:00:02.00)	73.9	92.8
(2024/05/16 08:03:02.00)	72.4	81.1
(2024/05/16 08:06:02.00)	72.1	80
(2024/05/16 08:09:02.00)	72.6	81.3
(2024/05/16 08:12:02.00)	73.1	84.8
(2024/05/16 08:15:02.00)	72.4	80.2
(2024/05/16 08:18:02.00)	71.3	82.6
(2024/05/16 08:21:02.00)	70.9	80.9
(2024/05/16 08:24:02.00)	72.3	83.9
(2024/05/16 08:27:02.00)	72.1	83.9
(2024/05/16 08:30:02.00)	71.3	82
(2024/05/16 08:33:02.00)	72.2	81.4
(2024/05/16 08:36:02.00)	70.2	83.7
(2024/05/16 08:39:02.00)	71.4	82.4
(2024/05/16 08:42:02.00)	72.4	84.2
(2024/05/16 08:45:02.00)	72.9	84.1
(2024/05/16 08:48:02.00)	70.5	81
(2024/05/16 08:51:02.00)	70.6	85.6
(2024/05/16 08:54:02.00)	71	79.7
(2024/05/16 08:57:02.00)	71.5	84.3
(2024/05/16 09:00:02.00)	72.1	85
(2024/05/16 09:03:02.00)	70.9	82.8
(2024/05/16 09:06:02.00)	71.1	80.8
(2024/05/16 09:09:02.00)	71.8	87.3
(2024/05/16 09:12:02.00)	72	82.6



(2024/05/16 09:15:02.00)	70.9	82.5
(2024/05/16 09:18:02.00)	71.5	81.6
(2024/05/16 09:21:02.00)	73	90.1
(2024/05/16 09:24:02.00)	71.6	81.3
(2024/05/16 09:27:02.00)	72.4	82.2
(2024/05/16 09:30:02.00)	72.1	84.3
(2024/05/16 09:33:02.00)	70.8	82.3
(2024/05/16 09:36:02.00)	71.4	82.5
(2024/05/16 09:39:02.00)	71.9	83.3
(2024/05/16 09:42:02.00)	70.5	81.1
(2024/05/16 09:45:02.00)	71.5	82.2
(2024/05/16 09:48:02.00)	70.9	83.5
(2024/05/16 09:51:02.00)	70.8	80.8
(2024/05/16 09:54:02.00)	70.4	80.8
(2024/05/16 09:57:02.00)	71.1	83.9
(2024/05/16 10:00:02.00)	70.6	81.9
(2024/05/16 10:03:02.00)	71.6	86.9
(2024/05/16 10:06:02.00)	72	81.3
(2024/05/16 10:09:02.00)	70.9	80.6
(2024/05/16 10:12:02.00)	70.1	82.7
(2024/05/16 10:15:02.00)	70.5	80
(2024/05/16 10:18:02.00)	69	79.1
(2024/05/16 10:21:02.00)	69.7	81.2
(2024/05/16 10:24:02.00)	71.5	86
(2024/05/16 10:27:02.00)	69.9	85.4
(2024/05/16 10:30:02.00)	71.4	83.4
(2024/05/16 10:33:02.00)	70.8	84
(2024/05/16 10:36:02.00)	69.9	79.9
(2024/05/16 10:39:02.00)	70	80.9
(2024/05/15 10:42:04.00)	69.7	81.2
(2024/05/15 10:45:02.00)	70.5	80.1
(2024/05/15 10:48:02.00)	68.2	80.5
(2024/05/15 10:51:02.00)	69.5	79.7
(2024/05/15 10:54:02.00)	71.7	85.3
(2024/05/15 10:57:02.00)	69.6	82.4
(2024/05/15 11:00:02.00)	71.1	84.6
(2024/05/15 11:03:02.00)	70.6	81.3
(2024/05/15 11:06:02.00)	69.6	84.2
(2024/05/15 11:09:02.00)	70.2	80.1
(2024/05/15 11:12:02.00)	69.9	83.2
(2024/05/15 11:15:02.00)	70.8	83.8
(2024/05/15 11:18:02.00)	70.7	84.9
(2024/05/15 11:21:02.00)	70.1	83
(2024/05/15 11:24:02.00)	69.3	86.7
(2024/05/15 11:27:02.00)	67.3	78.7
(2024/05/15 11:30:02.00)	69.7	81.3



(2024/05/15 11:33:02.00)	70.5	80.5
(2024/05/15 11:36:02.00)	70.4	81.4
(2024/05/15 11:39:02.00)	71	85.1
(2024/05/15 11:42:02.00)	69.3	80.2
(2024/05/15 11:45:02.00)	69.7	78.6
(2024/05/15 11:48:02.00)	70.8	82.3
(2024/05/15 11:51:02.00)	71.1	82.3
(2024/05/15 11:54:02.00)	70	82.9
(2024/05/15 11:57:02.00)	68.9	80.2
(2024/05/15 12:00:02.00)	70.2	84.7
(2024/05/15 12:03:02.00)	70.3	80.4
(2024/05/15 12:06:02.00)	70.2	80.5
(2024/05/15 12:09:02.00)	71.6	87.7
(2024/05/15 12:12:02.00)	70.1	80
(2024/05/15 12:15:02.00)	69.8	80.8
(2024/05/15 12:18:02.00)	70.1	80.1
(2024/05/15 12:21:02.00)	70.8	81.9
(2024/05/15 12:24:02.00)	69.9	81.8
(2024/05/15 12:27:02.00)	69	80
(2024/05/15 12:30:02.00)	71.1	82.7
(2024/05/15 12:33:02.00)	70.5	82.6
(2024/05/15 12:36:02.00)	70.1	79.7
(2024/05/15 12:39:02.00)	70.3	82.4
(2024/05/15 12:42:02.00)	68.4	82.3
(2024/05/15 12:45:02.00)	70.2	84.3
(2024/05/15 12:48:02.00)	72.4	86.1
(2024/05/15 12:51:02.00)	70	80.5
(2024/05/15 12:54:02.00)	69.9	79.2
(2024/05/15 12:57:02.00)	70.2	78.9
(2024/05/15 13:00:02.00)	69.4	80.3
(2024/05/15 13:03:02.00)	71	82.3
(2024/05/15 13:06:02.00)	70.8	79.6
(2024/05/15 13:09:02.00)	69.7	79
(2024/05/15 13:12:02.00)	70.1	80.4
(2024/05/15 13:15:02.00)	71.3	83.1
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(2024/05/15 13:21:02.00)	71.4	82.8
(2024/05/15 13:24:02.00)	70.4	81.1
(2024/05/15 13:27:02.00)	70.7	82.1
(2024/05/15 13:30:02.00)	70.3	82.9
(2024/05/15 13:33:02.00)	70.7	80.4
(2024/05/15 13:36:02.00)	69.7	82.9
(2024/05/15 13:39:02.00)	71.5	84.7
(2024/05/15 13:42:02.00)	71.5	80.8
(2024/05/15 13:45:02.00)	71.1	80.7
(2024/05/15 13:48:02.00)	71.7	85.1



(2024/05/15 13:51:02.00)	70.1	80
(2024/05/15 13:54:02.00)	70.6	85.5
(2024/05/15 13:57:02.00)	70.9	83.1
(2024/05/15 14:00:02.00)	70.4	85.6
(2024/05/15 14:03:02.00)	69.9	83.2
(2024/05/15 14:06:02.00)	71	81.8
(2024/05/15 14:09:02.00)	70.5	82
(2024/05/15 14:12:02.00)	69.7	80.6
(2024/05/15 14:15:02.00)	69.7	82.1
(2024/05/15 14:18:02.00)	69.8	79.5
(2024/05/15 14:21:02.00)	71.7	80.5
(2024/05/15 14:24:02.00)	69.6	81.9
(2024/05/15 14:27:02.00)	71.2	80.3
(2024/05/15 14:30:02.00)	70.6	80.3
(2024/05/15 14:33:02.00)	71	82.9
(2024/05/15 14:36:02.00)	71.2	81.3
(2024/05/15 14:39:02.00)	70.5	79.8
(2024/05/15 14:42:02.00)	69.4	79.2
(2024/05/15 14:45:02.00)	70.9	80.6
(2024/05/15 14:48:02.00)	70.7	83.5
(2024/05/15 14:51:02.00)	71.2	81.7
(2024/05/15 14:54:02.00)	71.7	87.9
(2024/05/15 14:57:02.00)	71.8	83
(2024/05/15 15:00:02.00)	69.2	78.4
(2024/05/15 15:03:02.00)	71.5	81.9
(2024/05/15 15:06:02.00)	71.7	85.5
(2024/05/15 15:09:02.00)	71.8	84.1
(2024/05/15 15:12:02.00)	70.1	78.1
(2024/05/15 15:15:02.00)	71	82.4
(2024/05/15 15:18:02.00)	71.1	85.4
(2024/05/15 15:21:02.00)	71.1	80.3
(2024/05/15 15:24:02.00)	70.6	82.2
(2024/05/15 15:27:02.00)	71.7	83.1
(2024/05/15 15:30:02.00)	70.4	81
(2024/05/15 15:33:02.00)	71	81.5
(2024/05/15 15:36:02.00)	71.9	85.2
(2024/05/15 15:39:02.00)	70.4	79.1
(2024/05/15 15:42:02.00)	71	89.1
(2024/05/15 15:45:02.00)	71.8	82.2
(2024/05/15 15:48:02.00)	72.1	85.4
(2024/05/15 15:51:02.00)	71.5	82.5
(2024/05/15 15:54:02.00)	70.6	85
(2024/05/15 15:57:02.00)	71.6	82
(2024/05/15 16:00:02.00)	71.5	80.1
(2024/05/15 16:03:02.00)	70.6	82
(2024/05/15 16:06:02.00)	70.2	80.5



(2024/05/15 16:09:02.00)	69.9	78.7
(2024/05/15 16:12:02.00)	71.3	81.3
(2024/05/15 16:15:02.00)	71.4	79.6
(2024/05/15 16:18:02.00)	70.4	80.6
(2024/05/15 16:21:02.00)	71.4	80.6
(2024/05/15 16:24:02.00)	70.9	82
(2024/05/15 16:27:02.00)	71.3	79.4
(2024/05/15 16:30:02.00)	70.3	86.7
(2024/05/15 16:33:02.00)	71.5	82
(2024/05/15 16:36:02.00)	72	82.2
(2024/05/15 16:39:02.00)	71.6	82
(2024/05/15 16:42:02.00)	70.9	79.7
(2024/05/15 16:45:02.00)	72.6	84.5
(2024/05/15 16:48:02.00)	70	82.3
(2024/05/15 16:51:02.00)	71.5	81.5
(2024/05/15 16:54:02.00)	71.9	82.6
(2024/05/15 16:57:02.00)	71.7	83.4
(2024/05/15 17:00:02.00)	72.1	79.2
(2024/05/15 17:03:02.00)	72	80.3
(2024/05/15 17:06:02.00)	71.2	81
(2024/05/15 17:09:02.00)	71.4	81.6
(2024/05/15 17:12:02.00)	71.5	80.2
(2024/05/15 17:15:02.00)	71.3	81
(2024/05/15 17:18:02.00)	71.2	82.1
(2024/05/15 17:21:02.00)	71.5	85.6
(2024/05/15 17:24:02.00)	72	80.9
(2024/05/15 17:27:02.00)	70.7	80
(2024/05/15 17:30:02.00)	70.9	80.7
(2024/05/15 17:33:02.00)	71	84.8
(2024/05/15 17:36:02.00)	71.5	81
(2024/05/15 17:39:02.00)	72	81.1
(2024/05/15 17:42:02.00)	72.6	90.7
(2024/05/15 17:45:02.00)	71.8	80.3
(2024/05/15 17:48:02.00)	70.7	80.1
(2024/05/15 17:51:02.00)	71.7	82.3
(2024/05/15 17:54:02.00)	71.3	80.2
(2024/05/15 17:57:02.00)	71.7	82.1
(2024/05/15 18:00:02.00)	71.7	80.9
(2024/05/15 18:03:02.00)	72	88.9
(2024/05/15 18:06:02.00)	72.2	79.7
(2024/05/15 18:09:02.00)	70.9	81.5
(2024/05/15 18:12:02.00)	71.9	81.7
(2024/05/15 18:15:02.00)	70.4	80
(2024/05/15 18:18:02.00)	71.5	84.3
(2024/05/15 18:21:02.00)	71.2	79.9
(2024/05/15 18:24:02.00)	69.8	81.7



(2024/05/15 18:27:02.00)	70.7	80.5
(2024/05/15 18:30:02.00)	72	90.5
(2024/05/15 18:33:02.00)	70.9	81.4
(2024/05/15 18:36:02.00)	73.1	90.9
(2024/05/15 18:39:02.00)	71.1	81.4
(2024/05/15 18:42:02.00)	73.2	89.9
(2024/05/15 18:45:02.00)	70	80.5
(2024/05/15 18:48:02.00)	71.6	81.2
(2024/05/15 18:51:02.00)	71.3	82.7
(2024/05/15 18:54:02.00)	71.2	82.3
(2024/05/15 18:57:02.00)	70.7	80.6
(2024/05/15 19:00:02.00)	72	86.2
(2024/05/15 19:03:02.00)	71.7	85.6
(2024/05/15 19:06:02.00)	71.5	82.6
(2024/05/15 19:09:02.00)	69.1	79.5
(2024/05/15 19:12:02.00)	70.1	85.2
(2024/05/15 19:15:02.00)	70.1	81.4
(2024/05/15 19:18:02.00)	70.8	80.9
(2024/05/15 19:21:02.00)	70.8	83.6
(2024/05/15 19:24:02.00)	70.6	81
(2024/05/15 19:27:02.00)	71.1	86.1
(2024/05/15 19:30:02.00)	69.3	79.6
(2024/05/15 19:33:02.00)	68	78.4
(2024/05/15 19:36:02.00)	69.5	80.9
(2024/05/15 19:39:02.00)	71.7	89.9
(2024/05/15 19:42:02.00)	70.2	81.8
(2024/05/15 19:45:02.00)	70.4	84
(2024/05/15 19:48:02.00)	70.7	83
(2024/05/15 19:51:02.00)	69.6	81.9
(2024/05/15 19:54:02.00)	70.3	81.3
(2024/05/15 19:57:02.00)	71.6	85
(2024/05/15 20:00:02.00)	70	81
(2024/05/15 20:03:02.00)	68.6	78.4
(2024/05/15 20:06:02.00)	67.6	79.1
(2024/05/15 20:09:02.00)	70.4	87.2
(2024/05/15 20:12:02.00)	70.8	83.5
(2024/05/15 20:15:02.00)	69.9	79.5
(2024/05/15 20:18:02.00)	66.6	79.6
(2024/05/15 20:21:02.00)	68.8	79.5
(2024/05/15 20:24:02.00)	70.9	84.1
(2024/05/15 20:27:02.00)	68.6	82.1
(2024/05/15 20:30:02.00)	70.6	80.8
(2024/05/15 20:33:02.00)	67.1	82.2
(2024/05/15 20:36:02.00)	68.1	78.9
(2024/05/15 20:39:02.00)	69.2	82.4
(2024/05/15 20:42:02.00)	67.6	84.7



(2024/05/15 20:45:02.00)	66	78.8
(2024/05/15 20:48:02.00)	68.2	80.6
(2024/05/15 20:51:02.00)	67.4	82
(2024/05/15 20:54:02.00)	67	82.2
(2024/05/15 20:57:02.00)	68.4	79.6
(2024/05/15 21:00:02.00)	67.6	80.7
(2024/05/15 21:03:02.00)	66.8	78.4
(2024/05/15 21:06:02.00)	66.2	78.9
(2024/05/15 21:09:02.00)	67	79.2
(2024/05/15 21:12:02.00)	67.1	79.8
(2024/05/15 21:15:02.00)	66.2	78.1
(2024/05/15 21:18:02.00)	67.9	83.2
(2024/05/15 21:21:02.00)	67.3	79.8
(2024/05/15 21:24:02.00)	67.2	82.2
(2024/05/15 21:27:02.00)	66.2	81.7
(2024/05/15 21:30:02.00)	66.8	79.5
(2024/05/15 21:33:02.00)	67.6	80.3
(2024/05/15 21:36:02.00)	68.3	83.2
(2024/05/15 21:39:02.00)	67.2	79.8
(2024/05/15 21:42:02.00)	67.6	84.4
(2024/05/15 21:45:02.00)	64.7	79
(2024/05/15 21:48:02.00)	66.3	79.5
(2024/05/15 21:51:02.00)	67.2	78.2
(2024/05/15 21:54:02.00)	66.4	79.5
(2024/05/15 21:57:02.00)	64.2	79.9
(2024/05/15 22:00:02.00)	67	84.9
(2024/05/15 22:03:02.00)	66.6	78.9
(2024/05/15 22:06:02.00)	68.5	88.9
(2024/05/15 22:09:02.00)	66.4	79
(2024/05/15 22:12:02.00)	64.5	80.6
(2024/05/15 22:15:02.00)	65.4	78.6
(2024/05/15 22:18:02.00)	61.2	78.1
(2024/05/15 22:21:02.00)	63.7	77.5
(2024/05/15 22:24:02.00)	65	80
(2024/05/15 22:27:02.00)	67.9	81.9
(2024/05/15 22:30:02.00)	70.6	94
(2024/05/15 22:33:02.00)	63.7	77.5
(2024/05/15 22:36:02.00)	64.8	79.4
(2024/05/15 22:39:02.00)	56.8	75.4
(2024/05/15 22:42:02.00)	62.3	75.8
(2024/05/15 22:45:02.00)	61.3	77.1
(2024/05/15 22:48:02.00)	63.3	81.3
(2024/05/15 22:51:02.00)	63.6	80.5
(2024/05/15 22:54:02.00)	64.1	79.9
(2024/05/15 22:57:02.00)	64.2	82.2
(2024/05/15 23:00:02.00)	61.1	77

(2024/05/15 23:03:02.00)	62.7	79.4
(2024/05/15 23:06:02.00)	61.1	78.4
(2024/05/15 23:09:02.00)	63.1	82.9
(2024/05/15 23:12:02.00)	61.2	79.6
(2024/05/15 23:15:02.00)	60.1	75.8
(2024/05/15 23:18:02.00)	55.9	73
(2024/05/15 23:21:02.00)	55.1	72.1
(2024/05/15 23:24:02.00)	62.3	76.8
(2024/05/15 23:27:02.00)	59	76.8
(2024/05/15 23:30:02.00)	52.1	73.3
(2024/05/15 23:33:02.00)	64.5	79.2
(2024/05/15 23:36:02.00)	59.3	76.7
(2024/05/15 23:39:02.00)	64.6	87.3
(2024/05/15 23:42:02.00)	64.4	80.5
(2024/05/15 23:45:02.00)	52.4	71.1
(2024/05/15 23:48:02.00)	62.9	79.2
(2024/05/15 23:51:02.00)	52.5	73.3
(2024/05/15 23:54:02.00)	58.8	79
(2024/05/15 23:57:02.00)	29.2	37.8
(2024/05/16 00:00:03.00)	35.5	47.8
(2024/05/16 00:03:02.00)	60.5	80.6
(2024/05/16 00:06:02.00)	35	45.8
(2024/05/16 00:09:02.00)	54.9	75.9
(2024/05/16 00:12:02.00)	57.9	73.7
(2024/05/16 00:15:02.00)	62.7	77.1
(2024/05/16 00:18:02.00)	30.5	43.3
(2024/05/16 00:21:02.00)	60	78
(2024/05/16 00:24:02.00)	29.1	42.4
(2024/05/16 00:27:02.00)	60.4	77.4
(2024/05/16 00:30:02.00)	60.6	79.4
(2024/05/16 00:33:02.00)	64.3	85.6
(2024/05/16 00:36:02.00)	32.7	41.8
(2024/05/16 00:39:02.00)	26.5	34.1
(2024/05/16 00:42:02.00)	56.8	77.1
(2024/05/16 00:45:02.00)	53.4	72.5
(2024/05/16 00:48:02.00)	61.2	82.5
(2024/05/16 00:51:02.00)	61.9	80.2
(2024/05/16 00:54:02.00)	56.4	73.2
(2024/05/16 00:57:02.00)	58.8	77.9
(2024/05/16 01:00:02.00)	59.2	77.2
(2024/05/16 01:03:02.00)	31	44.1
(2024/05/16 01:06:02.00)	58.1	77.3
(2024/05/16 01:09:02.00)	53.5	72.9
(2024/05/16 01:12:02.00)	28.8	41.8
(2024/05/16 01:15:02.00)	58.9	74
(2024/05/16 01:18:02.00)	57.4	77.6



(2024/05/16 01:21:02.00)	52.7	73.5
(2024/05/16 01:24:02.00)	58.8	80.2
(2024/05/16 01:27:02.00)	59	77.5
(2024/05/16 01:30:02.00)	37.7	56.3
(2024/05/16 01:33:02.00)	25.6	38.3
(2024/05/16 01:36:02.00)	58.8	79.4
(2024/05/16 01:39:02.00)	55.3	77.8
(2024/05/16 01:42:02.00)	27.9	38
(2024/05/16 01:45:02.00)	44.5	66.1
(2024/05/16 01:48:02.00)	41.3	64
(2024/05/16 01:51:02.00)	26.3	34
(2024/05/16 01:54:02.00)	56.2	78.8
(2024/05/16 01:57:02.00)	35	52
(2024/05/16 02:00:02.00)	61.2	78.9
(2024/05/16 02:03:02.00)	28.8	34.6
(2024/05/16 02:06:02.00)	59.1	81.6
(2024/05/16 02:09:02.00)	33.1	42.8
(2024/05/16 02:12:02.00)	58.2	79.2
(2024/05/16 02:15:02.00)	53	73.3
(2024/05/16 02:18:02.00)	52.2	73.1
(2024/05/16 02:21:02.00)	56.5	76
(2024/05/16 02:24:02.00)	63.9	88.5
(2024/05/16 02:27:02.00)	53.6	74.2
(2024/05/16 02:30:02.00)	55.5	77.7
(2024/05/16 02:33:02.00)	30	38.5
(2024/05/16 02:36:02.00)	55.6	74.9
(2024/05/16 02:39:02.00)	28.5	44
(2024/05/16 02:42:02.00)	27.4	35.7
(2024/05/16 02:45:02.00)	32	45.8
(2024/05/16 02:48:02.00)	57	78.7
(2024/05/16 02:51:02.00)	22	35.5
(2024/05/16 02:54:02.00)	22.7	25.4
(2024/05/16 02:57:02.00)	26.3	32.9
(2024/05/16 03:00:02.00)	26.9	43.5
(2024/05/16 03:03:02.00)	23	29.5
(2024/05/16 03:06:02.00)	28.1	45.4
(2024/05/16 03:09:02.00)	59.7	78.1
(2024/05/16 03:12:02.00)	32.5	44.4
(2024/05/16 03:15:02.00)	59.1	78.3
(2024/05/16 03:18:02.00)	27.6	34.2
(2024/05/16 03:21:02.00)	58.8	77.7
(2024/05/16 03:24:02.00)	57.5	80
(2024/05/16 03:27:02.00)	29.1	40.2
(2024/05/16 03:30:02.00)	57.3	76.5
(2024/05/16 03:33:02.00)	27	33.7
(2024/05/16 03:36:02.00)	56	75.7



(2024/05/16 03:39:02.00)	28	36.8
(2024/05/16 03:42:02.00)	58.9	81.9
(2024/05/16 03:45:02.00)	36.9	53.3
(2024/05/16 03:48:02.00)	58.2	78.4
(2024/05/16 03:51:02.00)	28.9	40.6
(2024/05/16 03:54:02.00)	54.7	74.5
(2024/05/16 03:57:02.00)	51.8	73.2
(2024/05/16 04:00:02.00)	66	86.2
(2024/05/16 04:03:02.00)	53.2	75
(2024/05/16 04:06:02.00)	58.4	80.8
(2024/05/16 04:09:02.00)	62	81.3
(2024/05/16 04:12:02.00)	60.9	82.3
(2024/05/16 04:15:02.00)	56.8	78.5
(2024/05/16 04:18:02.00)	56.4	75.1
(2024/05/16 04:21:02.00)	61.2	80.6
(2024/05/16 04:24:02.00)	47.9	59.1
(2024/05/16 04:27:02.00)	58.6	77.8
(2024/05/16 04:30:02.00)	56.8	77.5
(2024/05/16 04:33:02.00)	59.6	77.1
(2024/05/16 04:36:02.00)	61.4	78.5
(2024/05/16 04:39:02.00)	52.6	64.1
(2024/05/16 04:42:02.00)	59.4	78.3
(2024/05/16 04:45:02.00)	54.8	73.2
(2024/05/16 04:48:02.00)	60.5	82.9
(2024/05/16 04:51:02.00)	63.4	81.5
(2024/05/16 04:54:02.00)	62.2	80.1
(2024/05/16 04:57:02.00)	61.8	79.6
(2024/05/16 05:00:02.00)	62.5	80.2
(2024/05/16 05:03:02.00)	61.7	77.8
(2024/05/16 05:06:02.00)	57.3	76.2
(2024/05/16 05:09:02.00)	63.4	81.9
(2024/05/16 05:12:02.00)	60.2	80.1
(2024/05/16 05:15:02.00)	65	82.2
(2024/05/16 05:18:02.00)	63.8	82.9
(2024/05/16 05:21:02.00)	62.9	80.8
(2024/05/16 05:24:02.00)	65.8	83.5
(2024/05/16 05:27:02.00)	64.7	81.4
(2024/05/16 05:30:02.00)	64.2	82.1
(2024/05/16 05:33:02.00)	65.6	84.6
(2024/05/16 05:36:02.00)	65.1	81.4
(2024/05/16 05:39:02.00)	65.3	80.1
(2024/05/16 05:42:02.00)	67.6	86
(2024/05/16 05:45:02.00)	67.1	81.3
(2024/05/16 05:48:02.00)	65.1	80.2
(2024/05/16 05:51:02.00)	67.5	84.3
(2024/05/16 05:54:02.00)	66.3	81.9

A graph showing the LAeq & LMax 3min values

The Y-axis is labeled 'dB' and ranges from 0 to 1. The X-axis is labeled 'Time Interval - 3min' and shows a long sequence of zeros. The LMax value is represented by a solid orange line at 0 dB. The LAeq value is represented by a solid blue line at 0 dB.

Legend: LAeq (blue line), LMax (orange line)



