



AIRTIGHT & NOISECHECK LIMITED

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NOISE IMPACT ASSESSMENT FOR

MR G HART
C/O LAND ADJACENT
1 WESTLANDS DRIVE
WATERLOOVILLE
HAMPSHIRE
PO7 5UG

SITE ADDRESS

LAND ADJACENT
1 WESTLANDS DRIVE
WATERLOOVILLE
HAMPSHIRE
PO7 5UG

REPORT DATE – 22ND DECEMBER 2022

Acoustic Engineer:



Michael Vine

Assessment Date: 1^{5th} – 16th June 2021

AIRTIGHT & NOISECHECK BUILDING ACOUSTIC TESTING

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Customer Name:

Date: 1^{5th} – 16th June 2021

Mr G Hart
C/O Land Adjacent to
1 Westlands Drive
Waterlooville
Hampshire
PO7 5UG

Site Address:

Land Adjacent to
1 Westlands Drive
Waterlooville
Hampshire
PO7 5UG

Acoustic Engineer:

Mr. Michael Vine

Equipment used:

Norsonic Environmental Analyser 121 – Serial No 29809, 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 & Nor 1225 – serial No 72933, - Calibration due July 2024

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

Measurement Procedure:

The external ambient noise levels were recorded for a 24hour period in two locations between Tuesday 15th & Wednesday 16th June 2021 to measure the apparent noise levels associated with the electrical substation located to the West of the proposed dwelling & the road traffic noise associated with the local road network to the North & East.

A planning application has been approved for the erection of 1 x dwelling to the East of 1 Westlands Drive, with the following condition attached to the approval:

Prior to occupation of the development hereby permitted a report shall be submitted to the Local Planning Authority in writing to confirm that the measurements employed with regard to the building envelope, including fenestration and ventilation, for this residential unit, will meet BS8223:2014 standards as recommended for indoor ambient noise levels for dwellings, especially in relation to living rooms and bedrooms i.e. during the day (07:00 to 23:00) 35 dB LAeq,16 hour and at night (23:00 to 07:00) 30 dB LAeq,8 hour for bedrooms. Similarly, for traditional external areas that are used for personal amenity space, such as gardens and patios the external noise level does not exceed 50 dB LAeq with an upper guideline value of 55 dB LAeq in noisier environments.

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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 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 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. from the WHO Guidance

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_{Amax} 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 Table 4 of 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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Executive Summary:

Airtight & Noisecheck Ltd were instructed by Chris Flint associates on behalf of Mr G Hart to undertake a Noise Impact Assessment (NIA) at Land adjacent to 1 Westland Drive, Waterloooville. A planning application has been approved to erect a single dwelling to the East of 1 Westland Drive. The local authority were originally concerned with the noise associated with the electrical substation located to the East of the existing dwelling and to the West of the proposed dwelling (at a distance of circa 5m).

In addition, the proposed scheme had a condition attached that is shown below:

Prior to occupation of the development hereby permitted a report shall be submitted to the Local Planning Authority in writing to confirm that the measurements employed with regard to the building envelope, including fenestration and ventilation, for this residential unit, will meet BS8223:2014 standards as recommended for indoor ambient noise levels for dwellings, especially in relation to living rooms and bedrooms i.e. during the day (07:00 to 23:00) 35 dB $L_{Aeq,16\text{ hour}}$ and at night (23:00 to 07:00) 30 dB $L_{Aeq,8\text{ hour}}$ for bedrooms. Similarly, for traditional external areas that are used for personal amenity space, such as gardens and patios the external noise level does not exceed 50 dB L_{Aeq} with an upper guideline value of 55 dB L_{Aeq} in noisier environments.

So the purpose of this report is to include suitable mitigation measures to the scheme to ensure the above acoustic criteria can be achieved.

Based on the measured values it is anticipated that the dwelling can be naturally ventilated for long periods do the day time and night time by open windows, and it is anticipated that the dwelling will not have any issues with overheating as they should be able to open their windows to avoid this, based on the $L_{Aeq,8\text{ hour}}$ values and the recommend levels listed within the ADO document.

For any other times the dwelling could be ventilated via standard ventilation and acoustic trickle vents to windows or by an acoustic wall vent.

The noise levels were measured at the electrical sub-station that was in operation throughout the measurement period and also at the proposed Eastern façade of the new dwelling in order to measure the noise associated with the road traffic. The road traffic was the dominant noise source in operation at the site, but it must be stressed that the site is located within a residential area and the levels are by no means excessive or intrusive.

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Acoustic Design Statement:

The site is situated in a quiet residential area with existing dwellings in all directions. The proposed dwelling will be located to the East of 1 Westland Drive, South of Westland Drive and to the West of Stakes Hill Road. The electrical substation is located to the West of the proposed dwelling, East of the existing dwelling and immediately to the South of Westland Drive. The substation is in use 24 hours a day and was only audible when directly at source, it was not audible above the road traffic noise or at the proposed façade.

Both the electrical sub-station and road traffic conditions were operating as normal throughout the assessment period.

The initial risk assessment has indicated that the day time noise levels in both locations fall into the negligible category & the night time falls into the low category, indicating that noise will not be a reason for refusal and that the site should be acceptable from a noise perspective. The dwelling is located circa 5m from the electrical substation and the source noise was measured at 2m so a further reduction of 9dB can be applied due to point source propagation ensuring that noise will not be an adverse impact on the proposed dwelling and that the internal noise levels can be achieved with windows open.

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.

The applicant 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. A robust glazing system offering minimum sound reduction in excess of 17dB sound reduction (ML 1) and 20dBA (ML 2) will be installed to the building to protect the residents from the external noise emissions
2. Natural ventilation can be achieved by open windows for periods of the day time and night time
3. Acoustic trickle vents or wall vents installed for periods when windows are closed (proposed that windows can be opened at owners discretion)
4. Orientation of rooms – some rooms located away from the road network

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, and that the required condition can be discharged using relatively straightforward mitigation measures.

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.

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1 Objective:

1.1 To determine the noise levels associated over a 24hour period at the proposed facades of the development. The noise levels associated with all facades were 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 garden within a residential area. A planning application has been approved to erect a single dwelling within the garden area.

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 East of No 1 Westland Drive and to the South of Westland Drive itself. The area is a residential area with Westland Drive being a cul-de-sac with a small number of houses. Stakes Hill Road is located to the East which is a busier road. The audible noise was the vehicular movements using the local road network.

3.2 The electrical substation fronts onto Westland Drive and is situated to the East of No 1 Westland Drive and will be located to the West of the proposed dwelling. It is surrounded by a 1.8m wire fence and will be circa 5m from the proposed residential façade. The Western elevation of the dwelling will face the substation with no noise sensitive windows on this elevation. The microphone was located:

- 1- Facing the electrical substation at a distance of 2m. It was in excess of 1.5m from ground level.
- 2- Eastern Façade of the dwelling – in excess of 1.5m from ground level and circa 3m from boundary line

3.3 There are residential dwellings located on all sides of the proposed scheme. Stakes Hill 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 predominantly dry & warm during the measurement procedures, the temperatures ranged between 12 - 22degrees on Friday, 12-21degrees on Saturday and 10-23 on Sunday. There was some cloud cover & sunshine apparent all weekend, with no wind or rain.

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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 – Front & Side of building:

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 – West Façade	50dBA	15dB	47dBA	17dB	62dBA	17dB
ML 2 – East Facade	54dBA	19dB	49dBA	19dB	65dBA	20dB

The above results include the -3dB acoustic feature correction for reflection from the façade.

6 Results Summary:

6.1 The levels of reduction apparent for the noise associated with the West and East facades is listed in the table above. The highest level of sound reduction shown above is 17dBA for the West façade and 20dBA for the East façade. It is clear to see that the site will be exposed to low level of noise and therefore, for the majority of the time be naturally ventilated with open windows to all facades. During the times whereby the windows are closed it is possible for the dwelling to be ventilated with acoustic trickle vents to noise sensitive rooms or a wall ventilation system, but based on the low noise levels and type of noise apparent the residents should be able to naturally ventilate the dwelling with open windows.

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 levels of reduction listed within this report are a fair indication of the noise levels apartment on site, providing suitable mitigation measures are implemented then there is no reason to suggest that the future residents will adversely affected by the noise emissions apparent.

7 Results Conclusion:

7.1 The tables listed above clearly indicate the required sound reduction values at the proposed site. It is clear to see that the measured levels are low for long periods and providing suitable mitigation measures are applied to the necessary facades the required internal criteria can be achieved.

7.2 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 at The NOEL value (No adverse effect level) and maybe towards 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.

7.3 Based on the measured levels and assuming a glazing specification offering a minimum sound reduction of 30dBA (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	50-54dBA	30dB	20-24dBA	Yes
Bedroom – L_{Aeq}	47-49dBA	30dB	17-19dBA	Yes
Bedroom - L_{Amax}	62-65dBA	30dB	32-35dBA	Yes

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7.4 Some facades will be screened from the road traffic and exposed to lower levels (as seen in the table below). The table shows the internal values with windows open on these facades, indicating a suitable level with windows open. In addition, Table 3.3 on the following page shows levels at which will not lead to a change in behaviour for certain periods of time. It is clear to see that these levels can be achieved with windows open on the front façade for periods of time.

7.5 The calculated internal levels for the Eastern façade are shown in the table below with open windows (worst case scenario and some facades will be exposed to even lower noise levels)

Room & period	External Value	Reduction offered by open window	Calculated Internal Value
Lounge - Day	54dBA	-13dB	41dBA
Bedroom - Night	49dBA	-13dB	36dBA

Room & period	External Value	Reduction offered by open window	Reduction offered by screening	Calculated Internal Value	Criteria Achieved
Lounge - Day	54dBA	-13dB	-10dB	31dBA	Yes
Bedroom - Night	49dBA	-13dB	-10dB	26dBA	Yes

7.6 The levels shown in the table above indicate that a good standard of living can be achieved with open windows on the all facades when measuring road traffic, with the levels of the East facade being 41dB for the day time and between 36dB for the night time which should ensure a reasonable standard of living. The residents can open and close their windows at their own discretion to achieve a suitable trade between overheating and noise ingress. In addition, all facades fall within the levels shown in the table below – change of behaviour in relation to transport services.

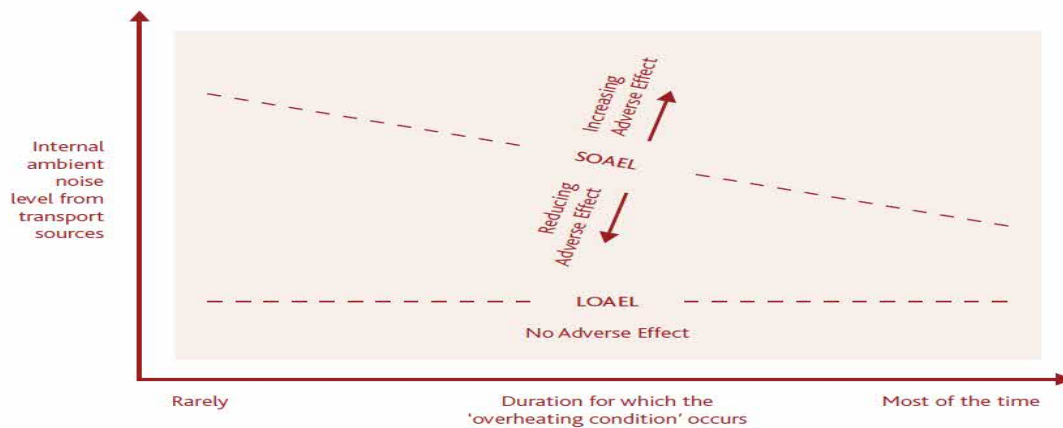
7.7 Table 3.3 – Guidance for level 2 assessment of noise from transport services in the ANC AVO guide states that ‘Noise causes a material change in behaviour e.g., having to keep windows closed most of the time’ if the following levels are exceeded for longer periods of time:

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}

7.8 Using the above guidance (sliding scale as shown in the diagram below) the calculated internal levels at all façades with the windows open are 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 and the rear elevations can be open as they wish.

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



7.9 Based on the measured levels and anticipated internal levels offered by natural ventilation, an alternative ventilation system may be required. It is anticipated that the windows can be opened for periods of the day & night time, and ventilated via acoustic trickle vents or a wall mounted ventilation unit during the periods when some windows are closed.

8 Building Specifications:

8.1 The highest level of sound insulation needed on the Eastern façade is 17dB with the Western facade being 20dBA. A standard double-glazed unit will offer the required 20dBA so this could be used on all windows for the dwelling, and the acoustic trickle vents or wall mounted vents could be implemented to the noise sensitive rooms. It is anticipated that for large periods of the day time and night time period the dwelling can be naturally ventilated via open windows.

Product	Sound Reduction - Open	Sound Reduction - Closed
Simon Acoustic Vent FV	32dB	40dB
Make	Model	Type
Titon Direct	Sonair F+	Wall mounted acoustic Ventilation

9 Façade Detail – The façade will comprise of 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'.

10 Roof Detail – The proposed roof detail will comprise of: Tiles on felt, pitched roof with 80mm PIR insulation between rafters & 37.5mm Insulated plasterboard to underside. This system should achieve a sound reduction of 43dB Rw 'BS8233: 2014, page 41 - Table 8 - The sound insulation of roofs'

11 Windows – The dwelling will have double-glazing installed, which must achieve a sound reduction of circa 20dBA required. Possible systems are shown in the table below.

Possible Units	Thickness	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	Overall reduction
SG Solaglass 4-12-4	20mm	24	18	25	36	39	31	29-3=26dB
SG Solaglass 4-10-4	18mm	23	20	24	35	41	36	30-3=27dB

11.1 The above are examples of possible systems that achieve the required levels of sound reduction. The client will have to decide upon the final specification used.

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11 Results Summary:

11.1 This report is concerned with the noise associated with the noise sources apparent at the site, the results indicate that the noise emissions produced at the site are predominantly low and should not lead to an adverse impact for the future residents.

11.2 The mitigation measures listed within this report should offer the sound reduction necessary to ensure the condition listed by the LPA can be achieved. They will be implemented throughout the site and the future residents should be able to enjoy a good standard of living. Based on the measured levels & the comprehensive glazing already installed, the internal criteria of BS8233: 2014 should be met within the noise sensitive dwelling at the proposed development.

11.3 The measures proposed at 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. The dwelling can be naturally ventilated with windows open, but provisions included to ensure that the dwelling is ventilated when the windows are closed. This will ensure a balance between noise and ventilation and ensure the dwellings can be ventilated and temperature controlled when the windows are closed.

11.4 It is anticipated that the future residents of the scheme can open their windows at their own discretion for periods of the day time and night time if they desire, to strike the balance stated above.

11.5 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)."

11.6 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 publically 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)

11.7 Some facades will be screened from the noise sources and thus offer a quiet façade.

11.8 The amenity space is located to the East of the building. The current $L_{Aeq\ 16\text{hour}}$ value measured in this location was 54dBA which is already below the upper level as recommended by section 7.7.3.2 Design criteria for external noise as listed in BS8233: 2014, which states a lower level of 50dB $L_{Aeq\ 16\text{hour}}$.

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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

R_w 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.

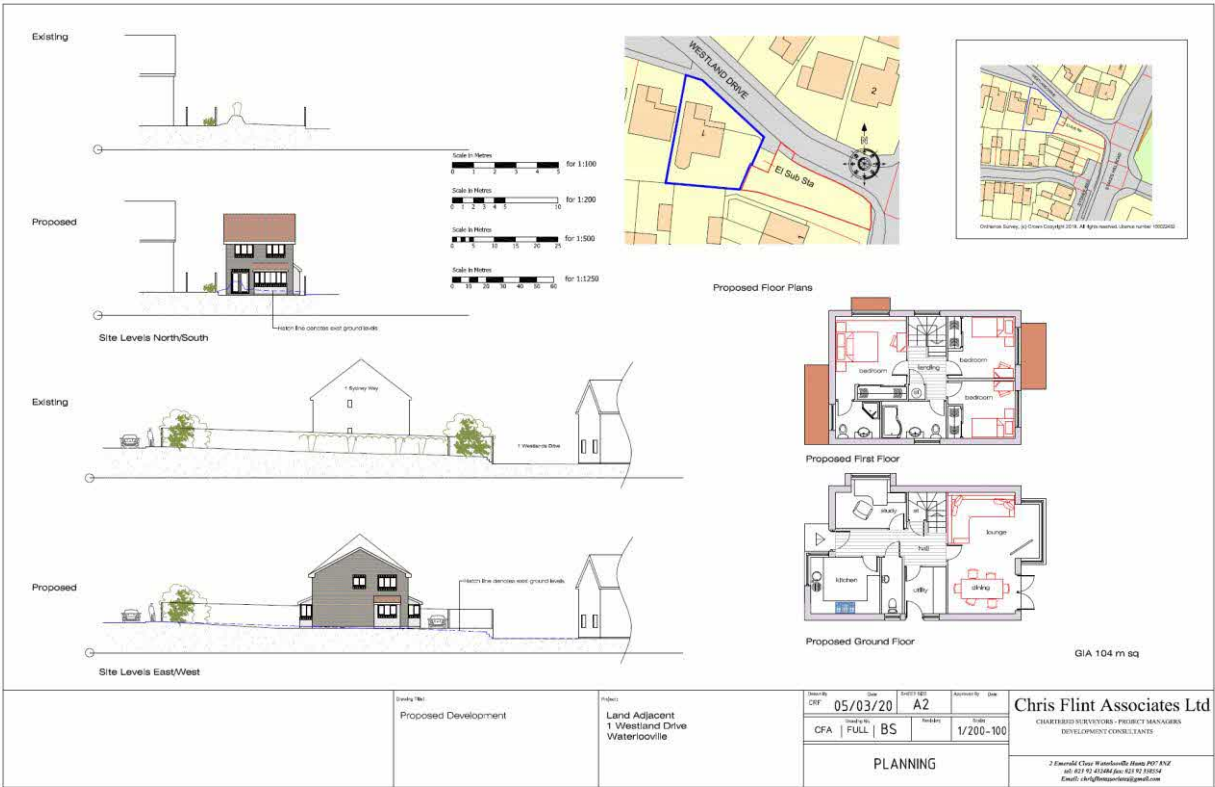
World Health Organization (WHO) - Guidelines for Community Noise.

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13 Google Earth:



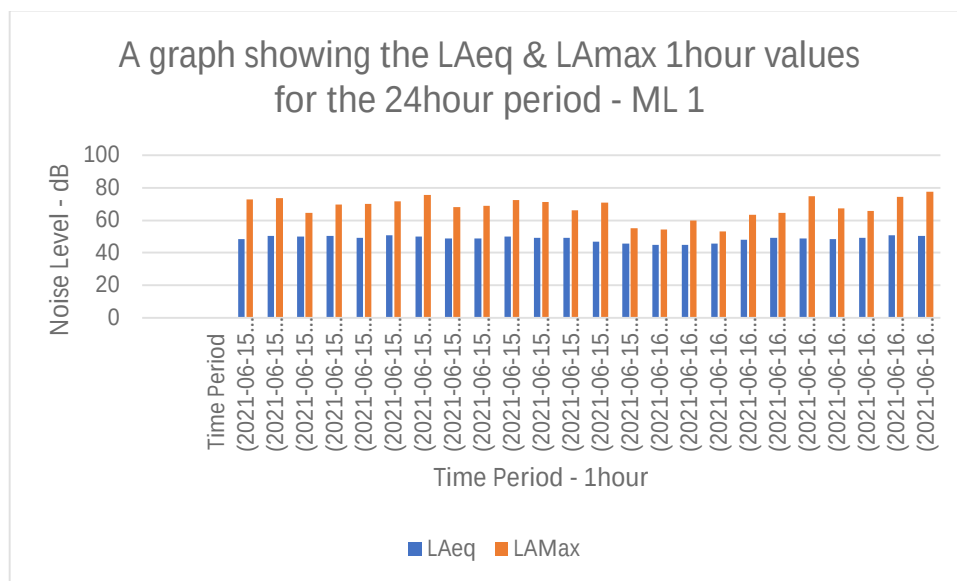
AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING



AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

1hour values – ML 1

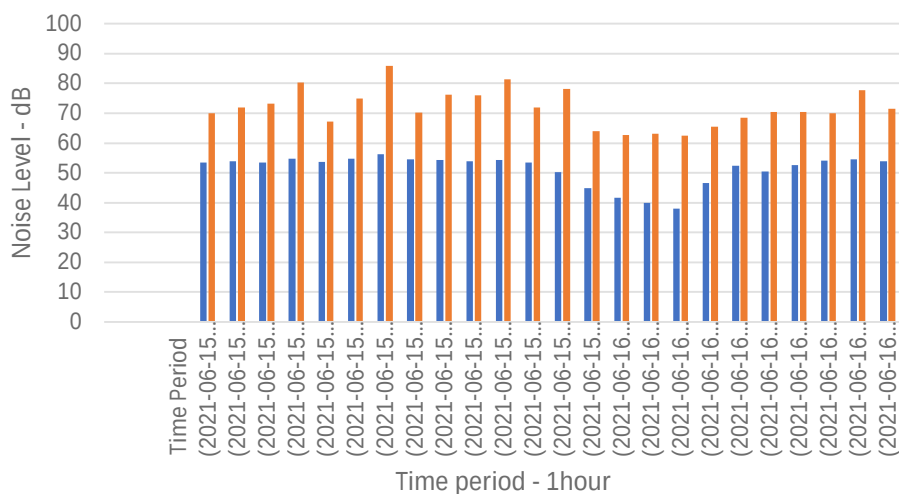
Time Period	LAeq	LAMax
(2021-06-15 10:00:00.240)	48.5	73.1
(2021-06-15 11:00:00.240)	50.3	73.9
(2021-06-15 12:00:00.240)	49.9	64.5
(2021-06-15 13:00:00.240)	50.3	69.8
(2021-06-15 14:00:00.240)	49.1	70.3
(2021-06-15 15:00:00.240)	50.7	71.6
(2021-06-15 16:00:00.240)	49.9	75.7
(2021-06-15 17:00:00.240)	48.8	68.3
(2021-06-15 18:00:00.240)	48.8	68.8
(2021-06-15 19:00:00.240)	49.9	72.4
(2021-06-15 20:00:00.240)	49.2	71.5
(2021-06-15 21:00:00.240)	49.1	66.3
(2021-06-15 22:00:00.240)	47	71
(2021-06-15 23:00:00.240)	45.7	55
(2021-06-16 00:00:00.240)	45.1	54.2
(2021-06-16 01:00:00.240)	45.1	60.1
(2021-06-16 02:00:00.240)	45.6	53.2
(2021-06-16 03:00:00.240)	47.9	63.6
(2021-06-16 04:00:00.240)	49.4	64.7
(2021-06-16 05:00:00.240)	48.8	75
(2021-06-16 06:00:00.240)	48.5	67.5
(2021-06-16 07:00:00.240)	49.3	65.8
(2021-06-16 08:00:00.240)	50.8	74.7
(2021-06-16 09:00:00.240)	50.5	77.6



1 Hour Values – ML 2

Time Period	LAeq	LAMax
(2021-06-15 10:00:00.240)	53.5	69.9
(2021-06-15 11:00:00.240)	53.9	71.9
(2021-06-15 12:00:00.240)	53.5	73.3
(2021-06-15 13:00:00.240)	54.8	80.3
(2021-06-15 14:00:00.240)	53.7	67.3
(2021-06-15 15:00:00.240)	54.7	74.9
(2021-06-15 16:00:00.240)	56.3	85.8
(2021-06-15 17:00:00.240)	54.6	70.3
(2021-06-15 18:00:00.240)	54.3	76.3
(2021-06-15 19:00:00.240)	53.8	76
(2021-06-15 20:00:00.240)	54.3	81.3
(2021-06-15 21:00:00.240)	53.4	71.9
(2021-06-15 22:00:00.240)	50.2	78.2
(2021-06-15 23:00:00.240)	44.8	64
(2021-06-16 00:00:00.240)	41.7	62.7
(2021-06-16 01:00:00.240)	39.9	63.2
(2021-06-16 02:00:00.240)	38.1	62.4
(2021-06-16 03:00:00.240)	46.7	65.5
(2021-06-16 04:00:00.240)	52.4	68.6
(2021-06-16 05:00:00.240)	50.4	70.5
(2021-06-16 06:00:00.240)	52.6	70.5
(2021-06-16 07:00:00.240)	54.2	69.9
(2021-06-16 08:00:00.240)	54.5	77.7
(2021-06-16 09:00:00.240)	53.9	71.4

A graph showing the LAeq & LAMax 1hour values
for the 24hour period - ML 2



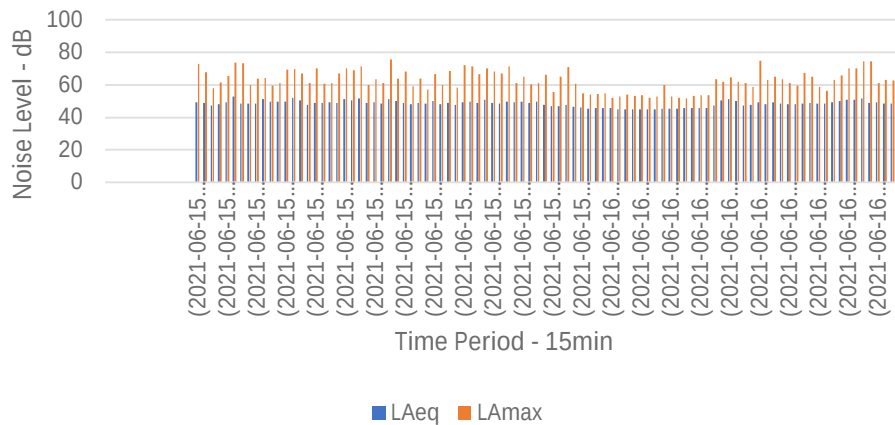
15min values – ML 1

Time Period	LAeq	LAmx
(2021-06-15 10:00:00.240)	49.3	73.1
(2021-06-15 10:15:00.240)	48.8	67.8
(2021-06-15 10:30:00.240)	47.5	57.9
(2021-06-15 10:45:00.240)	48	61.5
(2021-06-15 11:00:00.240)	49.5	65.7
(2021-06-15 11:15:00.240)	53	73.9
(2021-06-15 11:30:00.240)	48.6	73.3
(2021-06-15 11:45:00.240)	48.4	60.1
(2021-06-15 12:00:00.240)	48.5	64.1
(2021-06-15 12:15:00.240)	51.2	64.5
(2021-06-15 12:30:00.240)	49.9	59.7
(2021-06-15 12:45:00.240)	49.6	61.1
(2021-06-15 13:00:00.240)	49.7	69.6
(2021-06-15 13:15:00.240)	52.2	69.8
(2021-06-15 13:30:00.240)	50.4	67.1
(2021-06-15 13:45:00.240)	47.6	61.3
(2021-06-15 14:00:00.240)	49	70.3
(2021-06-15 14:15:00.240)	48.8	60.6
(2021-06-15 14:30:00.240)	49.4	61.3
(2021-06-15 14:45:00.240)	49	66.9
(2021-06-15 15:00:00.240)	51.4	70.4
(2021-06-15 15:15:00.240)	50.5	68.9
(2021-06-15 15:30:00.240)	51.6	71.6
(2021-06-15 15:45:00.240)	48.9	60.1
(2021-06-15 16:00:00.240)	49.3	63.4
(2021-06-15 16:15:00.240)	48.4	61
(2021-06-15 16:30:00.240)	51.2	75.7
(2021-06-15 16:45:00.240)	50.3	64
(2021-06-15 17:00:00.240)	49.1	68.3
(2021-06-15 17:15:00.240)	48.2	59
(2021-06-15 17:30:00.240)	49.1	63.8
(2021-06-15 17:45:00.240)	48.6	57.1
(2021-06-15 18:00:00.240)	50.1	66.8
(2021-06-15 18:15:00.240)	48	60.1
(2021-06-15 18:30:00.240)	48.9	68.8
(2021-06-15 18:45:00.240)	47.9	58.6
(2021-06-15 19:00:00.240)	49.3	72.4
(2021-06-15 19:15:00.240)	49.8	71.6
(2021-06-15 19:30:00.240)	49	66.8
(2021-06-15 19:45:00.240)	51.1	70.1
(2021-06-15 20:00:00.240)	49.1	68.3
(2021-06-15 20:15:00.240)	48.4	67.2
(2021-06-15 20:30:00.240)	49.8	71.5

(2021-06-15 20:45:00.240)	49.3	61
(2021-06-15 21:00:00.240)	49.7	65
(2021-06-15 21:15:00.240)	49	60.4
(2021-06-15 21:30:00.240)	49.6	61.3
(2021-06-15 21:45:00.240)	47.6	66.3
(2021-06-15 22:00:00.240)	47	55.7
(2021-06-15 22:15:00.240)	46.9	65.2
(2021-06-15 22:30:00.240)	47.6	71
(2021-06-15 22:45:00.240)	46.6	60.6
(2021-06-15 23:00:00.240)	46.1	55
(2021-06-15 23:15:00.240)	45.3	54
(2021-06-15 23:30:00.240)	45.6	54.5
(2021-06-15 23:45:00.240)	45.8	54.7
(2021-06-16 00:00:00.240)	45.6	51.9
(2021-06-16 00:15:00.240)	45.1	52.8
(2021-06-16 00:30:00.240)	44.8	54.2
(2021-06-16 00:45:00.240)	45	53.1
(2021-06-16 01:00:00.240)	45	53.8
(2021-06-16 01:15:00.240)	45.1	52.2
(2021-06-16 01:30:00.240)	45.1	52.9
(2021-06-16 01:45:00.240)	45.4	60.1
(2021-06-16 02:00:00.240)	45.5	52.8
(2021-06-16 02:15:00.240)	45.5	51.9
(2021-06-16 02:30:00.240)	45.7	51.8
(2021-06-16 02:45:00.240)	45.8	53.2
(2021-06-16 03:00:00.240)	45.7	53.8
(2021-06-16 03:15:00.240)	45.9	53.8
(2021-06-16 03:30:00.240)	47.5	63.6
(2021-06-16 03:45:00.240)	50.5	62
(2021-06-16 04:00:00.240)	51.3	64.7
(2021-06-16 04:15:00.240)	50.2	62
(2021-06-16 04:30:00.240)	47.4	61
(2021-06-16 04:45:00.240)	47.6	58.7
(2021-06-16 05:00:00.240)	49.3	75
(2021-06-16 05:15:00.240)	48.2	63.2
(2021-06-16 05:30:00.240)	49.2	65.1
(2021-06-16 05:45:00.240)	48.4	63.5
(2021-06-16 06:00:00.240)	48.1	61.2
(2021-06-16 06:15:00.240)	48	59.7
(2021-06-16 06:30:00.240)	48.7	67.5
(2021-06-16 06:45:00.240)	49	65.1
(2021-06-16 07:00:00.240)	48.7	58.9
(2021-06-16 07:15:00.240)	48.6	56.6
(2021-06-16 07:30:00.240)	49.4	63.1
(2021-06-16 07:45:00.240)	50.2	65.8
(2021-06-16 08:00:00.240)	51.1	70.2

(2021-06-16 08:15:00.240)	50.9	70.1
(2021-06-16 08:30:00.240)	51.8	74.7
(2021-06-16 08:45:00.240)	48.9	74.4
(2021-06-16 09:00:00.240)	49.2	61.2
(2021-06-16 09:15:00.240)	48.5	63
(2021-06-16 09:30:00.240)	48.5	62.6
(2021-06-16 09:45:00.240)	53.5	77.6

A graph showing the LAeq & LAmx 15min values over the 24hour period - ML 1



15min values – ML 2

Time:	LAeq	LAFmax
(2021-06-15 10:00:00.240)	54	68.9
(2021-06-15 10:15:00.240)	53.7	69.9
(2021-06-15 10:30:00.240)	53	66.8
(2021-06-15 10:45:00.240)	53.2	69.3
(2021-06-15 11:00:00.240)	54.7	71.9
(2021-06-15 11:15:00.240)	53.9	66.7
(2021-06-15 11:30:00.240)	53.3	65.1
(2021-06-15 11:45:00.240)	53.6	66.2
(2021-06-15 12:00:00.240)	53.1	66.9
(2021-06-15 12:15:00.240)	53.9	73.3
(2021-06-15 12:30:00.240)	53.6	62.7
(2021-06-15 12:45:00.240)	53.3	62.6
(2021-06-15 13:00:00.240)	54.2	68.5
(2021-06-15 13:15:00.240)	56	78.1
(2021-06-15 13:30:00.240)	55.2	80.3
(2021-06-15 13:45:00.240)	53.4	64.1
(2021-06-15 14:00:00.240)	53.8	66.2
(2021-06-15 14:15:00.240)	54.3	67.3
(2021-06-15 14:30:00.240)	53.6	66.4
(2021-06-15 14:45:00.240)	53.2	66.5

(2021-06-15 15:00:00.240)	54.4	67.8
(2021-06-15 15:15:00.240)	55.4	70.4
(2021-06-15 15:30:00.240)	54.6	74.9
(2021-06-15 15:45:00.240)	54.1	69.3
(2021-06-15 16:00:00.240)	54.3	71.8
(2021-06-15 16:15:00.240)	54.6	66.6
(2021-06-15 16:30:00.240)	58.9	85.8
(2021-06-15 16:45:00.240)	55.9	76.2
(2021-06-15 17:00:00.240)	54.8	70.3
(2021-06-15 17:15:00.240)	54	66.5
(2021-06-15 17:30:00.240)	55.3	68.8
(2021-06-15 17:45:00.240)	54.2	65.1
(2021-06-15 18:00:00.240)	55.3	76.3
(2021-06-15 18:15:00.240)	54.1	70.8
(2021-06-15 18:30:00.240)	54.5	73.8
(2021-06-15 18:45:00.240)	53.1	63.7
(2021-06-15 19:00:00.240)	53.4	68.8
(2021-06-15 19:15:00.240)	54.5	76
(2021-06-15 19:30:00.240)	53.7	67.1
(2021-06-15 19:45:00.240)	53.6	67.1
(2021-06-15 20:00:00.240)	53.2	74.4
(2021-06-15 20:15:00.240)	53.1	75.3
(2021-06-15 20:30:00.240)	55.6	81.3
(2021-06-15 20:45:00.240)	54.6	69.4
(2021-06-15 21:00:00.240)	55	71.9
(2021-06-15 21:15:00.240)	53.6	68.8
(2021-06-15 21:30:00.240)	53.7	65.3
(2021-06-15 21:45:00.240)	49.4	66.8
(2021-06-15 22:00:00.240)	50.2	64.8
(2021-06-15 22:15:00.240)	50.3	71.4
(2021-06-15 22:30:00.240)	51.4	78.2
(2021-06-15 22:45:00.240)	48.6	69.9
(2021-06-15 23:00:00.240)	46.2	63.7
(2021-06-15 23:15:00.240)	42.9	63.9
(2021-06-15 23:30:00.240)	44.5	63.1
(2021-06-15 23:45:00.240)	44.9	64
(2021-06-16 00:00:00.240)	41.8	61.3
(2021-06-16 00:15:00.240)	42.6	61.9
(2021-06-16 00:30:00.240)	40.2	62.7
(2021-06-16 00:45:00.240)	41.9	61.9
(2021-06-16 01:00:00.240)	40	61
(2021-06-16 01:15:00.240)	38.4	60
(2021-06-16 01:30:00.240)	40.3	60.7
(2021-06-16 01:45:00.240)	40.6	63.2
(2021-06-16 02:00:00.240)	40.1	62.4
(2021-06-16 02:15:00.240)	35.7	61

(2021-06-16 02:30:00.240)	38	61
(2021-06-16 02:45:00.240)	37.7	61.8
(2021-06-16 03:00:00.240)	38.1	63.2
(2021-06-16 03:15:00.240)	39.8	62.5
(2021-06-16 03:30:00.240)	45.6	65.5
(2021-06-16 03:45:00.240)	51.3	64.7
(2021-06-16 04:00:00.240)	55.3	68.6
(2021-06-16 04:15:00.240)	54.2	68.3
(2021-06-16 04:30:00.240)	46.4	63.4
(2021-06-16 04:45:00.240)	46.9	64.2
(2021-06-16 05:00:00.240)	47.4	63.9
(2021-06-16 05:15:00.240)	49.7	65.5
(2021-06-16 05:30:00.240)	51.9	70.5
(2021-06-16 05:45:00.240)	51.2	66
(2021-06-16 06:00:00.240)	51.5	65.6
(2021-06-16 06:15:00.240)	52	64.2
(2021-06-16 06:30:00.240)	52.7	67.3
(2021-06-16 06:45:00.240)	53.7	70.5
(2021-06-16 07:00:00.240)	54	68.6
(2021-06-16 07:15:00.240)	53.5	66
(2021-06-16 07:30:00.240)	54.6	69.9
(2021-06-16 07:45:00.240)	54.7	69.9
(2021-06-16 08:00:00.240)	56.9	77.7
(2021-06-16 08:15:00.240)	53.8	65.4
(2021-06-16 08:30:00.240)	53.1	70.4
(2021-06-16 08:45:00.240)	52.7	66.7
(2021-06-16 09:00:00.240)	54.1	65
(2021-06-16 09:15:00.240)	54	71.4
(2021-06-16 09:30:00.240)	53.3	65.4
(2021-06-16 09:45:00.240)	54.2	70.9

A graph showing the LAeq & LAmax 15min values
in ML 2

