



**Agricultural Produce Store,
Mill House Farm, Roman Bank, Fleet Hargate**

Noise Assessment Report

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21/07/2022

On behalf of
Mill House Farm Ltd

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1.0 INTRODUCTION

- 1.1 Blue Tree Acoustics has been appointed by Mill House Farm Ltd to carry out a noise assessment for a proposed agricultural produce store at Mill House Farm, Roman Bank, Fleet Hargate.
- 1.2 The development site is situated to the north of Roman Bank in Fleet Hargate, near Spalding. Mill House Farm is an established development operated by Mill House Farm Ltd, harvesting and storing fruit, vegetables, roots, and tubers. The proposed development is to the northwestern side of the site, where a storage building will sit beyond another storage building that is currently under construction.
- 1.3 The proposed development gained planning permission from South Holland District Council on 17/01/2022 under ref. H05-0982-21.
- 1.4 Condition 6 of the decision notice relates to noise, and states:
- “6 Noise from fixed plant and machinery within or associated with the building shall not exceed a level of 5dB(A) above the background noise level when measured as a L(A)_{eq15min} at any residential boundary not within the applicant's ownership.*
- Reason: To ensure that there is no noise nuisance to nearby residents.*
- This Condition is imposed in accordance with Policies 2, 3 and 30 of the South East Lincolnshire Local Plan, 2019.”*
- 1.5 There is 1no residential boundary not within the applicant's ownership. This is to the south of the proposed development building, where 1no dwelling and associated outbuildings are sited. The boundary is entirely built up with outbuildings.
- 1.6 The noise impact assessment has included:
- a) Inspection of the site and surroundings.
 - b) Review of outline architectural plans of the proposed development provided by the Client.
 - c) Noise monitoring surveys undertaken at the site boundary.
 - d) Consideration of noise control measures required to meet planning Condition 6.
- 1.7 A glossary of technical terminology and parameters used in this report is provided in Appendix 1.

2.0 EXISTING NOISE SOURCES

- 2.1 The pre-existing Mill House Farm operation has various plant and processes that generate noise. There are vehicle movements in the area in addition to this, as well as aircraft overhead.
- 2.2 It is understood that some construction was undertaken during the noise survey, but it is unlikely that these activities will have affected the background noise levels. Background noise levels find the sound level exceeded for 90% of the measurement time, and therefore specific events are excluded from the measurement dataset used for assessment.

3.0 NEW NOISE SOURCES

3.1 Condition 6 relates to fixed plant and machinery within or associated with the new building. We understand that the fixed plant and machinery currently proposed are:

- a) Store 1 indoor evaporator unit and outdoor compressor unit
- b) Store 2 indoor evaporator unit and outdoor compressor unit
- c) Store 3 indoor evaporator unit and outdoor compressor unit

3.2 We have been given the following data for each plant item and the accompanying proposed indicative plant location plan below.

“RED Outside housed condensing unit “Standard”

Sound Pressure Data

HGX66e/1340-4S compressor 49db(A) @ 10m

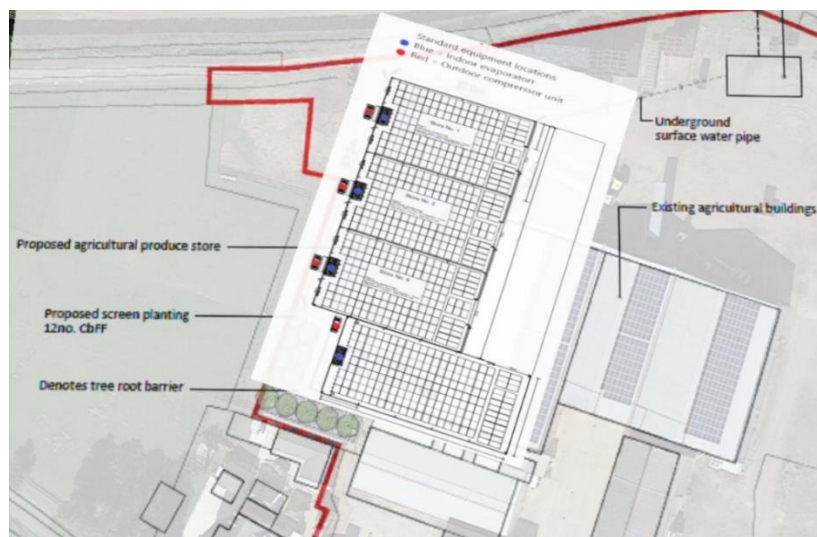
3 off AC style three-phase fans 63.7db(A) @ 10m

Estimated unit total 64.0db(A) @ 10m

Blue Inside evaporator “Standard”

Sound Pressure Data

3 x 800mm 4.8kw Aerofoil fan motors 75.5 dB (A) @ 10m ”



3.3 The northernmost (top) 3no pairs of red/blue items are subject to the planning permission this report relates to, and the southernmost (bottom) pair of red/blue items is not.

4.0 NOISE SURVEY

- 4.1 Noise monitoring was undertaken by Blue Tree Acoustics in order to determine the existing ambient noise climate at the site.
- 4.2 Unattended external noise measurements were taken between Thursday 05/05/2022 and Thursday 12/05/2022.
- 4.3 The measurements were taken at an accessible, free-field location on the development site adjacent to the residential boundary, as indicated in Figure 1. This location was close to the tree line, but the trees were not yet mature. The location was close to the residential boundary, but measurements were free-field and more than 3.5m from the residential outbuildings.
- 4.4 The instrumentation used during the unattended survey was 1no Rion NL-52 Type 1/Class 1 integrating sound level meter. The meter was within a valid period of laboratory calibration. Calibration checks were carried out both before and after the measurements, with no variance observed. A proprietary environmental windshield was fitted to the microphone. The measurements were made with the microphone mounted on a tripod at approximately 1.5m from local ground level.
- 4.5 Weather conditions throughout the survey periods were mainly dry and calm. There were a few periods of increased wind and light rainfall, and data from those periods is excluded. Archival weather data from a local station is presented in Appendix 3 below.
- 4.6 The measurement results are detailed in Appendix 2 and summarised in the table below, showing the average daytime and nighttime external noise levels recorded at the measurement location.

Table 1: Range of noise levels at development site

Time period (hours)	dB L _{Aeq}	dB L _{Amax}	dB L _{A10}	dB L _{A90}
Day (0700-2300)	50 - 78	52 - 98	51 - 82	48 - 64
Night (2300-0700)	50 - 56	52 - 72	50 - 58	48 - 54

- 4.7 Given the planning permission condition, the primary parameter of interest is the L_{A90} 'background sound level'. As can be seen in Appendix 2, the representative background sound level in the day and at night is 52dB L_{A90}.

5.0 NOISE ASSESSMENT

- 5.1 As the background sound level is 52dB L_{A90} at the residential boundary, and the Condition 6 permitted noise level is 57dB $L_{Aeq}(15 \text{ min})$.
- 5.2 Some plant items are located externally at varying distances, and other items are located within the new storage buildings.
- 5.3 We understand that the external building envelope of the proposed agricultural produce store buildings comprises a single skin of 100mm composite insulated cladding panel to roof and walls.
- 5.4 Considering the items listed in Section 3.0, the building envelopes, and the relevant sizes and distances of the units, we estimate that the likely noise level experienced at the boundary with no mitigation is typically 68dB L_{Aeq} , and therefore 11dB high. This includes all 4no pairs of plant items, including the plant that is not part of the permitted development this report relates to. Excluding the 4th pair of plant items, the noise levels are anticipated to be 63dB L_{Aeq} , and therefore 6dB high.
- 5.5 Consequently, we propose an acoustic barrier in the location marked with a green line on the image below. Our calculations indicate that a 5m high barrier would reduce total noise levels to 57dB L_{Aeq} . This meets the criterion. This includes all 4no pairs of plant items, including the plant that is not part of the permitted development this report relates to. Excluding the 4th pair of plant items, the total noise levels are found to be 51dB L_{Aeq} . Planning Condition 6 can therefore be satisfied. However, in addition, the barrier can also accommodate the 4th pair of plant items.

Markup 1 – Proposed barrier location (marked in green)



- 5.6 An acoustic barrier should be provided as shown above. The barrier itself can be constructed from any material as long as it creates an unbroken, airtight/impervious barrier meeting the above specification; for example, it could be brick, block or weather-treated timber (or ply) of at least 15mm minimum thickness. Timber joints should be tight-buttet with timber cover strips or tongue-and-groove boards used to ensure there are no airgaps. Gravel boards should be used to fully seal the gap between the fencing and the ground. The barrier should also be well-sealed to the building itself such that there is no gap between the structures. To improve performance, the barrier can be provided with a weatherproof acoustic absorption material, such as quilted fibreglass fitted to the inner face and also fitted to any faces with a view to the existing plant items.
- 5.7 It is advisable to ensure that the internal plant items are not directly attached to the wall or roof structures, so as remove the possibility for structure-borne noise to transmit from each unit. Each internal plant item should have a small partial enclosure adjacent to it to ensure that direct sound energy cannot strike any nearby building surfaces. This localised barrier could be made of plasterboard, or chipboard, or plywood, etc. It should extend 1m beyond the plant item both vertically and horizontally.
- 5.8 Some reduction in internal noise levels can be achieved by the introduction of sound absorbing materials into each store. Exposed mineral wool batts or similar would suffice. If hygiene requirements necessitate a proprietary solution, a product such as the Ecophon hygiene baffle could be used (<https://www.ecophon.com/en/products/modular-ceilings/hygiene/hygiene-performance-baffle>). Around 30m² of acoustic absorption would be desirable, exposed to the noise within each space.
- 5.9 It should be acknowledged that careful design and close attention to detail, along with high standards of site supervision and workmanship, are essential in achieving the required acoustic performance, particularly in relation to controlling flanking sound transmission paths, airgaps, and use of suitable materials. Therefore, effective work management plans will be needed to ensure all contractors and tradesmen are aware of the acoustic performance requirements and details to ensure works are implemented to the necessary standard.

6.0 SUMMARY AND CONCLUSIONS

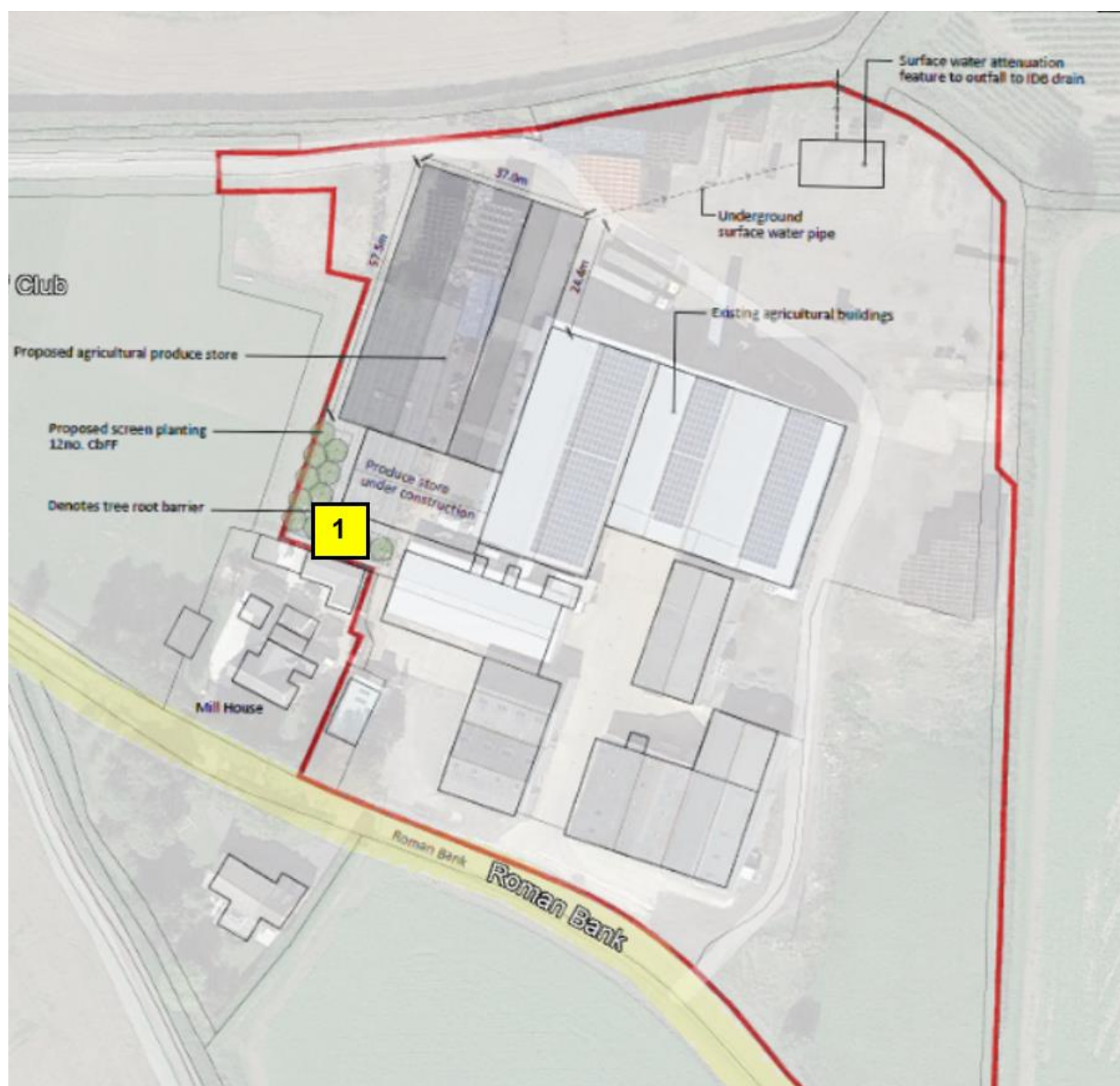
- 6.1 A noise assessment has been carried out on behalf of Mill House Farm Ltd for a proposed agricultural produce store at Mill House Farm, Roman Bank, Fleet Hargate.
- 6.2 The assessment has included measurements of the prevailing ambient and background sound levels at the site during representative daytime and nighttime periods.
- 6.3 Outline noise control measures have been recommended in order to meet the applicable planning condition.

7.0 DISCLAIMER

- 7.1 This document is limited to addressing the specific acoustic issues contained herein, and its content is based on drawings and information provided to date by our Client/their Design Team.
- 7.2 All findings, comments, recommendations, etc., in this document are for acoustic purposes only; any and all other considerations and requirements, e.g. structural, airflow, thermal, fire safety, CDM compliance, determination of whether materials are dangerous, hazardous, deleterious, etc. (non-exhaustively), are the responsibility of other such suitably qualified specialists to check and advise on.
- 7.3 BTA's work may occasionally involve provision of acoustic performance advice and acoustic design recommendations that others may choose to regard as a "specification" under CDM 2015 (and thus others may occasionally choose to regard BTA to be a "Designer" under CDM 2015). Notwithstanding this, it is always the responsibility of others (Principal Designer) to approve/incorporate into their final design – or not – their final specification selections; although these may be based on BTA's acoustic performance advice, as BTA neither has control over how or whether BTA's acoustic advice is incorporated into the final design by others, nor any power to enforce that any such final specification selections made by others based on BTA's advice are appropriate in any regard beyond their acoustic performance qualities, it also remains the responsibility of others under CDM 2015 to ensure that any ancillary (non-acoustic) considerations in the course of selection, installation, maintenance, etc. of final specifications are advised upon by such relevantly qualified specialists (non-acoustic, and therefore non-BTA), and that any safety precautions identified in the course of their consideration by others are taken by others (the Principal Designer, Designers, Contractors, Client, etc.).
- 7.4 Products and materials that perform well acoustically tend to be heavier than standard products. Use of these products and materials may increase the weight of the element, and the CDM Principal Designer, Client, etc. must take care to ensure that this risk is mitigated as far as possible with appropriate changes to their design, and the Client, Principal Contractor, Contractor, Installer, Fitter, etc. must ensure that appropriate and safe lifting and installation techniques, maintenance, etc. are used to reduce any remaining risk. Wherever BTA advises that works such as acoustic barriers are desirable to attenuate noise, care must be taken by the CDM Principal Designer, Client, etc. to ensure that the risks associated with constructing and maintaining bunds, walls, fences, etc. are mitigated as far as possible with appropriate changes to their design, and the Client, Principal Contractor, Contractor, Installer, Fitter, etc. must ensure that appropriate and safe construction and installation techniques, maintenance, etc. are used to reduce any remaining risk.

- 7.5 This document has been prepared for the sole use, benefit, and information of our direct Client for the purposes agreed at the time of their formal instruction. The liability of BTA in respect of the information contained herein will not extend to any third party.

FIGURE 1 – SITE PLAN OVERLAY AND APPROXIMATE MEASUREMENT LOCATION



APPENDIX 1 – TECHNICAL UNITS AND INDICES

a) Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of pressure in air. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. Due to the wide range of pressure variations detectable by the ear, a logarithmic scale is used to convert the values into manageable numbers. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

b) Frequency and Hertz (Hz)

Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or Hertz (Hz). Sometimes large frequencies are often written as kilohertz (kHz), where 1kHz = 1000Hz.

Young people with normal hearing can hear frequencies in the range 20Hz to 20kHz. However, the upper frequency limit gradually reduces as a person gets older.

As the ear hears some frequencies better than others, the A-weighting scale is used to mimic human hearing. A-weighting applies a correction to the sound level at a given frequency depending on how well the ear hears that frequency.

c) Glossary of Terms

In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The indices used in this report are described below.

L_{Aeq} This is the A-weighted equivalent continuous sound level which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period.

L_{Amax} This is the maximum A-weighted sound level that was recorded during the monitoring period.

L_{A90} This is the A-weighted sound level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

L_{A10} This is the A-weighted sound level exceeded for 10% of the time period and is often used in the assessment of road traffic noise.

- NR Measured noise levels in each octave band are compared to the NR curve reference values. The overall NR value is the lowest NR curve that has not been exceeded.
- $D_{nT,w}$ Weighted standardised level difference, a single figure generated by comparing the D_{nT} with a reference curve. The reference curve is shifted in 1dB steps until the sum of adverse deviation of the test curve, compared to the reference curve, is as large as possible, but no more than 32.0 dB. The value of the shifted reference curve at 500Hz is taken as the $D_{nT,w}$. N.B. As $D_{nT,w}$ for airborne transmission represents a level difference, an improvement generates a larger figure – used in airborne tests.
- R_w Similar to the $D_{nT,w}$ term, but a measure of the airborne sound insulation performance of a separating element, when tested in laboratory conditions. As such the build is essentially perfect, and has no flanking noise routes. $D_{nT,w}$ values measured on site will always be of a significantly lower value than the R_w value for a structure.

APPENDIX 2 – NOISE SURVEY DATA**Location 1: Thursday 05/05/2022 – Thursday 12/05/2022**

Rion NL-52 sound level meter (S/N 00620852). All values dB(A), 15-minute duration, free-field.

Chart 1: All data

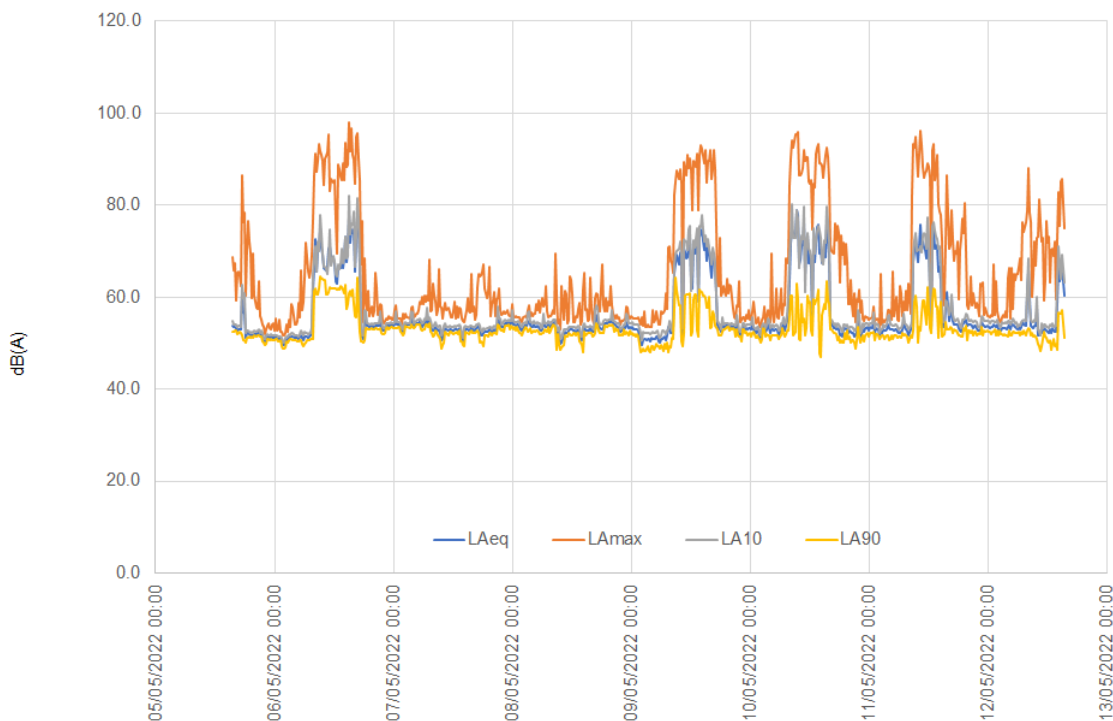


Chart 2: Dataset after excluding periods of wind >5m/s and/or rain

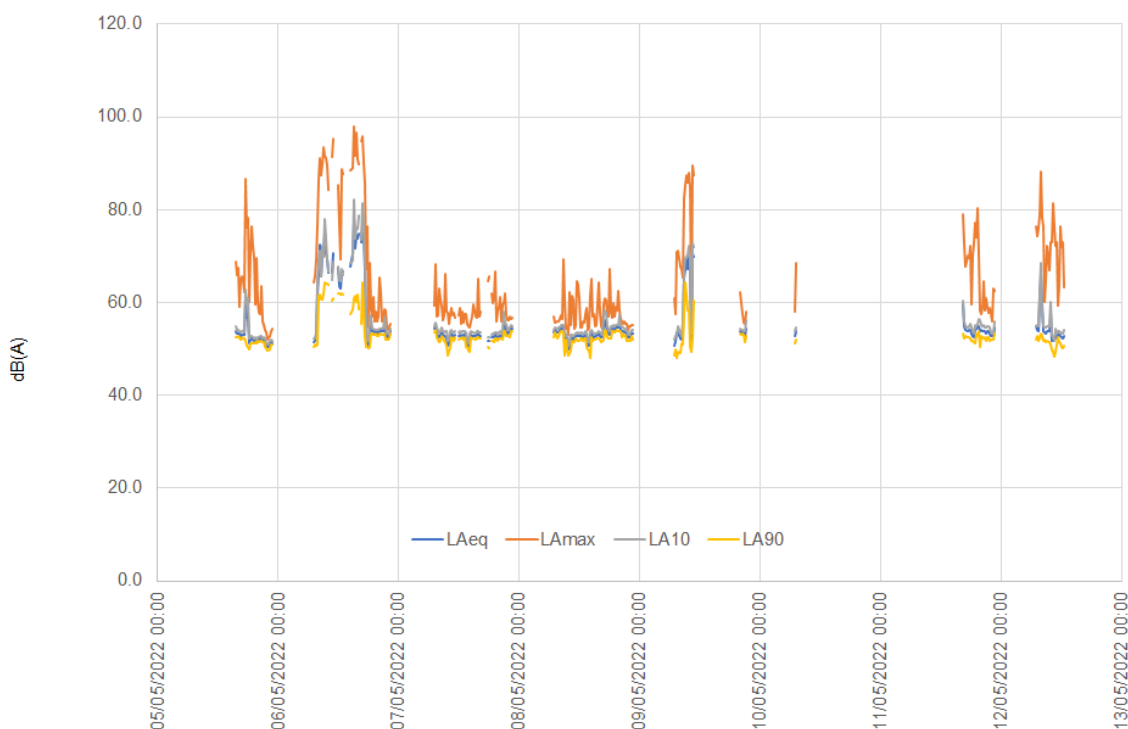


Chart 3: Daytime L_{A90}

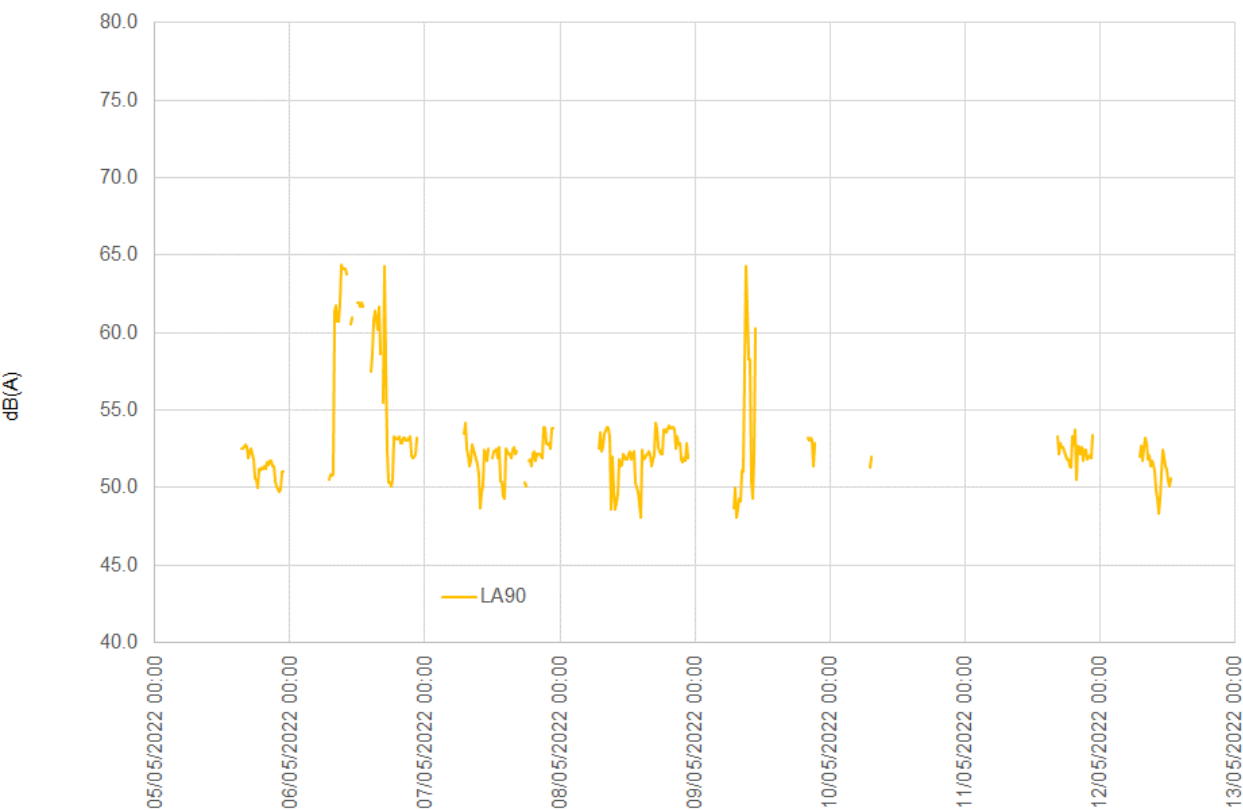
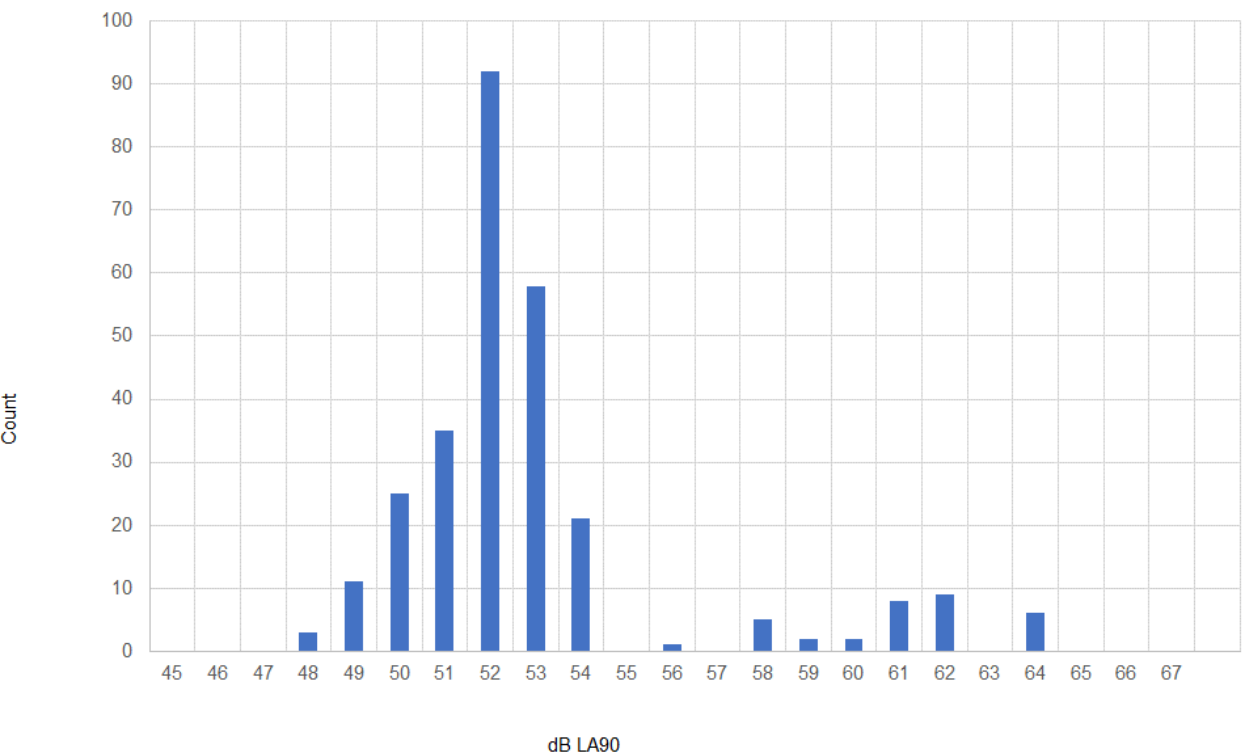


Chart 4: Daytime L_{A90} count



The typical background noise level value is taken as 52dB L_{A90} in the day.

Chart 5: Nighttime L_{A90}

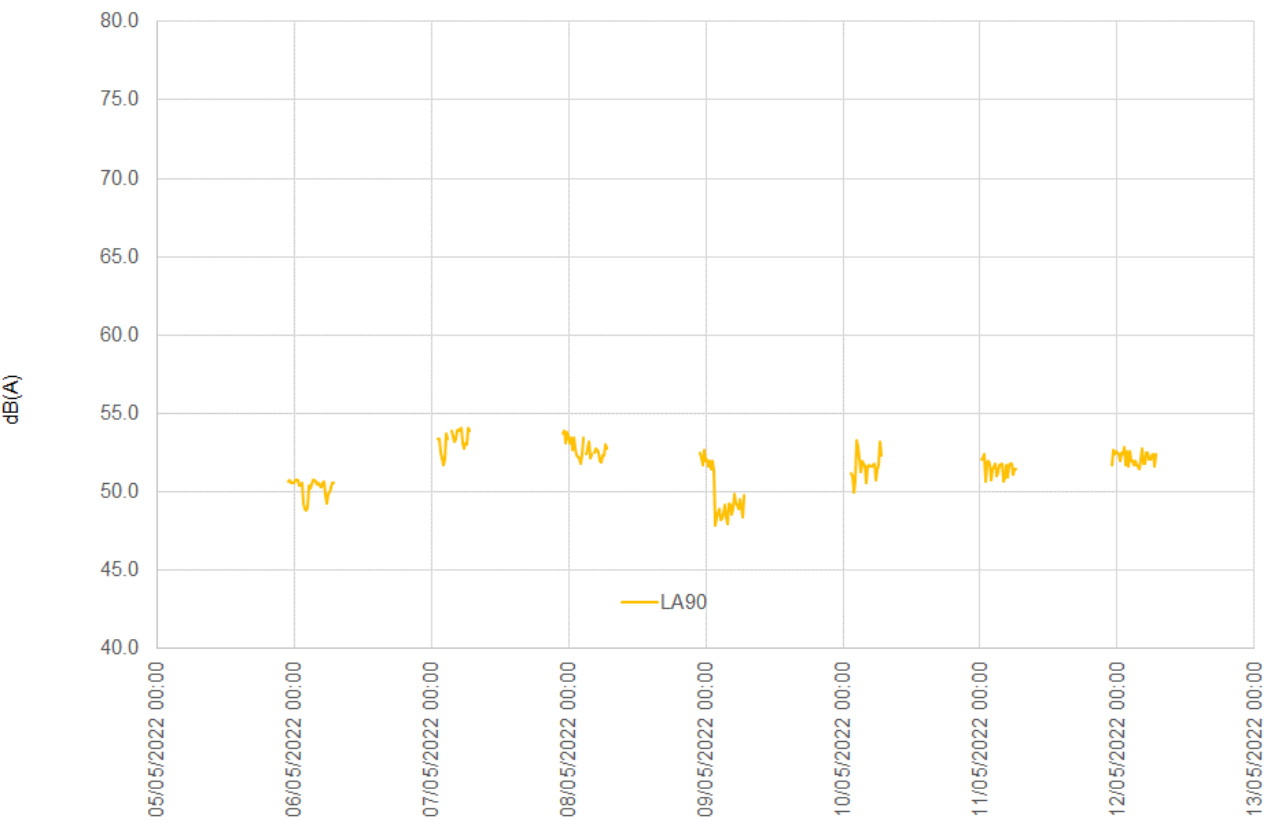
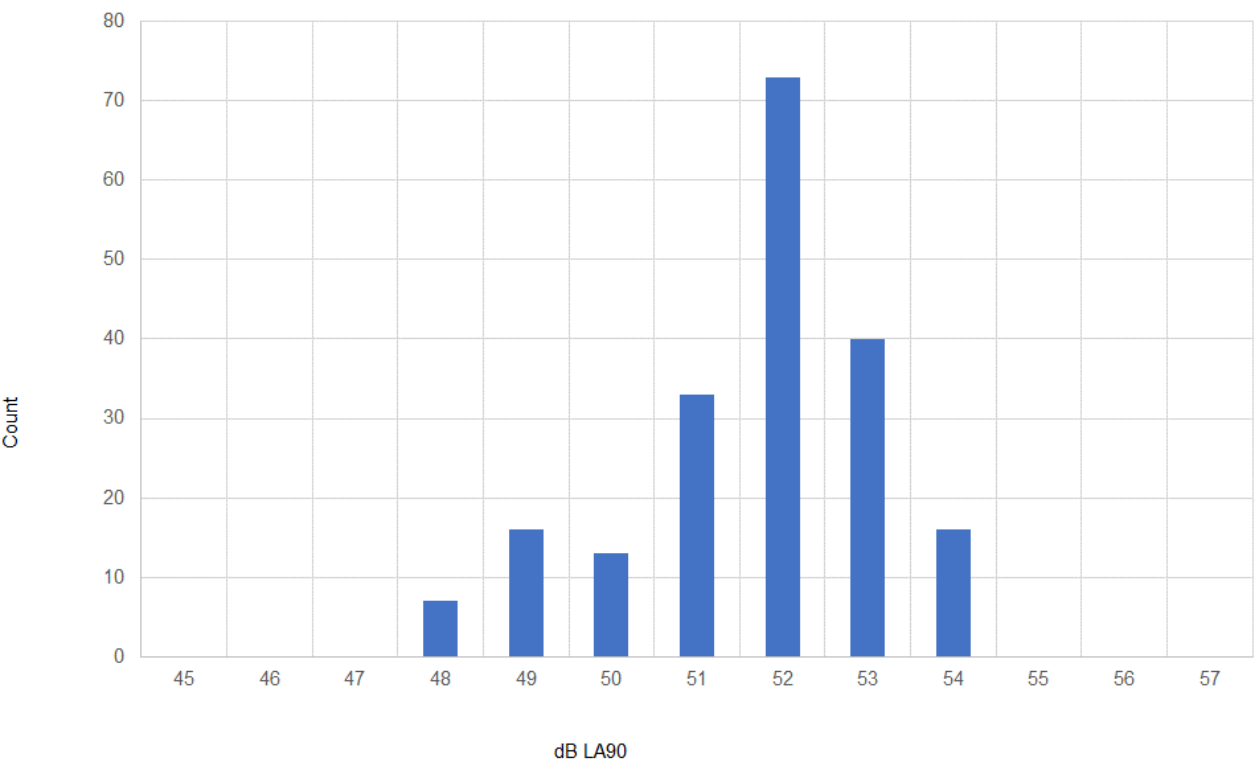


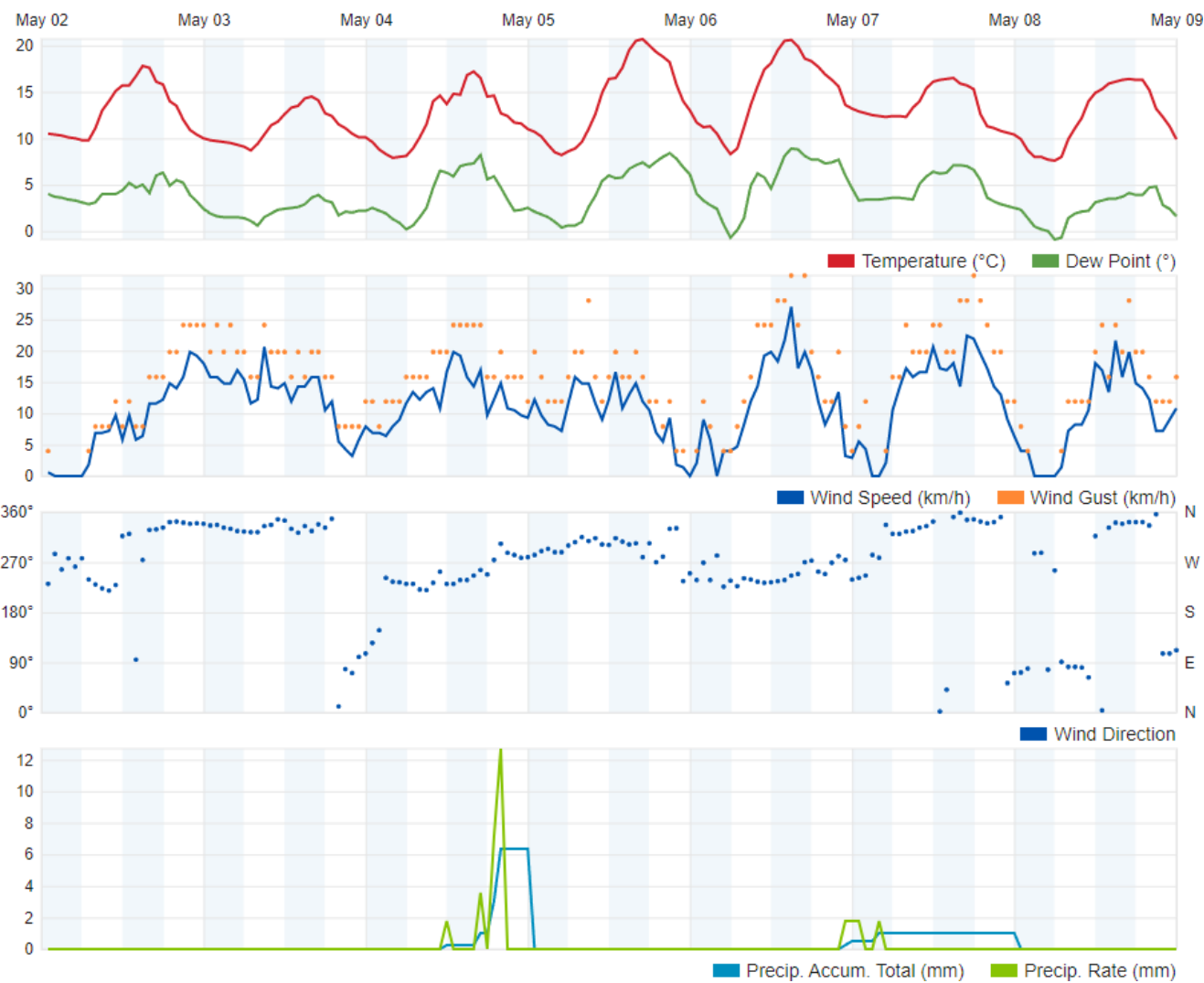
Chart 6: Nighttime L_{A90} count



The typical background noise level value is taken as 52dB L_{A90} at night.

APPENDIX 3 – WEATHER DATA

Monday 02/05/2022 – Sunday 08/05/2022



Monday 09/05/2022 – Sunday 15/05/2022

