Noise Monitoring Assessment Report

771 Cudgen Road, Cudgen NSW

Prepared for: Lendlease Building Pty Ltd

Job Number: A101021.0286.00 ENM41.Rev0 **| Date:** 07/02/2022

ADE CONSULTING GROUP

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For and on behalf of

ADE Consulting Group Pty Ltd

Prepared by:	Reviewed by:	Issued by:
		
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Contents

Executive Summary

ADE Consulting Group Pty Ltd (ADE) was commissioned by Lendlease Group (Lendlease) to assess the levels of construction related vibration during the construction of the Tweed Valley Hospital Project, located at 771 Cudgen Road, Cudgen NSW.

This report summarises ambient noise data collected at three (3) locations during the monitoring period of December 2022, for each device positioned along the south and southwest of Cudgen Road.

The road works underway are in close proximity to the SVANTEK Noise and Vibration loggers. This includes compacting works during the operation using generators, vibratory/multi-tyre roller, road graders, excavators, and asphalt plant equipment.

Noise impacts have been correlated with vibration levels at each of locations; measurable due to the close proximity of works to the sensors and microphones of the data loggers positioned near or on residential premises. Noise (and vibration) impacts at these locations have increased due to the planned and approved road works on Cudgen Road, a part of the Tweed Valley Hospital Development Project.

ADE prepared a Construction Noise and Vibration Impact Statement (CNVIS) for CD Civil which presents mitigation measures for impacted receivers (where feasible and reasonable). These management practices are to be adhered to at all times, together with the noise management practices outlined and approved in the Noise and Vibration Management Sub-Plan, prepared by Lendlease.

Where all feasible and reasonable management practices are implemented, compliance with the management plan and the Interim Construction Noise Guideline is anticipated. In the event that any one (1) noise complaint is received, additional mitigation measures may be necessary, as outlined in the CNVIS prepared by ADE.

1 Introduction

1.1 Introduction

ADE Consulting Group Pty Ltd (ADE) was commissioned by Lendlease Group (Lendlease) to assess the levels of construction related vibration during the construction of the Tweed Valley Hospital Project, located at 771 Cudgen Road, Cudgen NSW (hereinafter referred to as 'the Site').

No one section or part of a section of this report should be taken as giving an overall idea of this report. Each section must be read in conjunction with the entire report, including its appendices and attachments.

At the time of noise monitoring, Lendlease is continuing superstructure works on Site which includes the construction of columns and suspended slabs. CD Civil has begun works on Cudgen Road in closer proximity to receivers which includes construction of permanent footpaths, road construction and widening which includes the use of large 10T vibratory rollers, excavators, multi-tyred rollers, graders and asphalt machines.

The purpose of environmental monitoring is to:

- assess construction related airborne noise levels against regulatory requirements, development consent conditions, Australian guidelines, and international standards for construction noise management and control on construction sites
- mitigate potentially excessive noise generation through site planning and the adoption of appropriate work methods and practices where feasible and reasonable
- monitor and assess construction impacts likely to cause annoyance to the amenity on surrounding sensitive receivers, and provide feasible and reasonable recommendations to manage the impacts
- establish and maintain positive relationships with project stakeholders.

The purpose of the Environmental Noise Monitoring Assessment (ENM) report is to assess the impacts that construction activities from the Tweed Valley Hospital Project have on ambient noise levels on Site and comply with the Tweed Valley Hospital Management Plan – Noise and Vibration, and conditions **C4** – **C7, C12** – **C17** and **B16** from the Development Consent described below as well as the relevant criteria in **Section 2**.

This report uses specific terminology. A general acoustic glossary is provided in **Appendix I – Glossary**.

1.2 Project background

On 13 June 2017, the NSW Government announced an allocation of approximately $534M for the development of a new hospital on a greenfield site in the Tweed. The new Tweed Valley Hospital (the Project) is located on a portion of 771 Cudgen Road.

An Environmental Impact Statement (EIS) was prepared to accompany a State Significant Development Application for the Project which was assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

An overview of the project specific information is provided in **Table 1** below.

Table 1 Project Specific Information

Site Details	
Client Name:	Lendlease
ADE Project Number:	A101021.0286.00
Site Address:	771 Cudgen Road, Cudgen NSW (Lot 11 DP 1246853)
Date of Report:	07/02/2022
Development Consent	SSD-10353, Health Administration Corporation. Authorised by the Minister for Planning and Public Spaces on 9 March 2020. Consent approved on 12 June 2020.
Objectives:	• comply with relevant guidelines and conditions **C4** – **C7**, **C12** – **C14** and **B16** of the SSD-10353 consent • manage potential airborne construction noise impacts from construction activities which have the potential to affect the nearby noise sensitive receivers (Kingscliff TAFE and residential properties) • establish and maintain good relationships with the neighbours and wider community.
Key Legislation:	Protection of the Environment Operations Act 1997 (NSW) (POEO Act). The POEO Act is a key piece of environmental protection legislation and regulates activities via: • environmental protection licensing, as per schedule 1 • regulation of scheduled and non-scheduled activities • environmental protection offences and penalties • establishment of a general duty of care to notify environment harm.

1.2.1 Development consent SSD-10353

The consent of approval conditions regarding vibration are summarised below in **Table 2**.

Table 2 Development consent conditions

Conditions of Approval Number		Condition requirements
Construction Hours	**C4**	Construction, including the delivery of materials to and from the site, may only be carried out between the following hours: (a) Between 7 am and 6 pm, Mondays to Fridays inclusive; and (b) Between 8 am and 1 pm, Saturdays No work may be carried out on Sundays or public holidays.
	C5	Construction activities may be undertaken outside of the hours in condition **C4** if required: (a) By the Police or a public authority for the delivery of vehicles, plant or materials; or (b) In an emergency to avoid the loss of life, damage to property or to prevent environmental harm; or (c) Where the works are inaudible at the nearest sensitive receivers; (d) Where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works; or (e) For the delivery, set-up and removal of construction cranes, where notice of the crane related works is provided to the Planning Secretary and affected residents at least seven days prior to the works.
	C6	Notification of such construction activities as referenced in condition **C5** must be given to affected residents before undertaking the activities or as soon as is practical afterwards.
	C7	The construction hours must include respite periods and specific times for activities during the day (outside the sensitive times), as required by condition **B16** of this consent, for the high noise generating construction activities (such as activities that would reach or exceed the Highly Affected Noise Level as defined in the ICNG).

Conditions of Approval Number		Condition requirements
Construction Noise Limits	**C12**	The development (including roadworks) must be constructed to achieve the project specific construction NMLs detailed in the Noise and Vibration Impact Assessment for SSDA Tweed Valley Hospital Stage 2' by JHA dated 19/09/2019. Additional mitigation measures must be implemented and any activities that are likely to exceed the NMLs or the high affected noise level of 75dB(A) in accordance with the management and mitigation measures in Appendix 3 and the approved CNVMSP required by condition **B16**.
	C13	Any noise generated during construction of the development must not be offensive noise within the meaning of the Protection of the Environment Operations Act 1997 or exceed approved noise limits for the site.
	C14	Unattended long-term construction noise monitoring must be undertaken during the duration of the Stage 2 works, consistent with the Stage 1 works in SSD-9575. The location of the loggers and the details of the monitoring methods including the reporting methods should be consistent with the CNVMSP in condition **B16** and the Stage 1 works in SSD-9575.
	C15	The intra-day respite periods required to be provided in the CNVMSP in condition **B16** of this development consent must be reviewed on a monthly basis, after the commencement of Stage 2 construction works, in consultation with Kingscliff TAFE and Kingscliff High School. The respite periods are to be maintained / or amended, as agreed with the identified noise receivers. The details of any amendments to the intra-day respite periods due to agreement with the Kingscliff TAFE and Kingscliff High School, must be provided to the Department for information.
	C16	The Applicant must ensure construction vehicles (including concrete agitator trucks) do not arrive at the site or surrounding streets outside of the construction hours of work outlined under condition **C4**.
	C17	The Applicant must implement, where practicable and without compromising the safety of construction staff or members of the public, the use of 'quackers' to ensure noise impacts on surrounding noise sensitive receivers are minimised.

Note: CoA **B16** refers to the Lendlease's Construction Noise and Vibration Management Sub-Plan (CNVMSP)

1.2.2 Monitoring Locations

Existing monitors had been relocated on 17 November 2022 due to scheduled road upgrade works being undertaken by CD Civil along Cudgen Road. The monitoring locations were established at the boundary of the nearest sensitive receivers to ensure the roadworks are compliant with the Tweed Valley Hospital Management Plan – Noise and Vibration.

Aerial imaging and monitoring location overview is presented in **Appendix II – Aerial Photograph**.

2 Noise criteria

2.1 NSW Interim Construction Noise Guideline

The standard construction hours are defined in the *Interim Construction Noise Guideline* (ICNG, DECC 2009) as:

- Monday to Friday 07:00 hrs to 18:00 hrs
- Saturday 08:00 hrs to 13:00 hrs
- no work on Sundays or Public Holidays.

Table 3 below provides guidance noise management levels (NML) for residential premises for airborne construction noise, reproduced from the ICNG.

Table 3 Guideline noise levels for residential premises, airborne construction noise (ICNG)

Time of Day	Noise Management Level dBA $L_{eq,15min}$	How to apply
Standard hours Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or Public Holidays	Noise Affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise • where the predicted (or measured $L_{Aeq(15\ minute)}$ is greater than the noise affect level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level • the proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details
	Highly Noise Affected >75 dBA	The highly noise affected level represents the point above which there may be a strong community reaction to noise • where noise is above the level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: ▪ times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences ▪ If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times
Outside recommended standard hours	Noise affected RBL + 5 dB	• a strong justification would typically be required for works outside the recommended standard hours • the proponent should apply all feasible and reasonable work practices to meet the noise affected level • where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community

Note: RBL refers to Rating Background Level, as defined in the Noise Policy for Industry (EPA, 2017) and outlined in the Management Plan

2.2 Other sensitive land uses and commercial receivers

The location where the construction works are currently undertaken is surrounded by a number of non-residential land uses.

These include:

- Mate and Matt's Farm Fresh Fruit and Vegetable approximately 10 m south/south-east
- Hardy Electrical and Solar approximately 10 m south/south-east
- Kingscliff TAFE, an educational facility approximately 10 m south/south-east
- Kingscliff Library, approximately 380 m north-east
- Tweed Regional Aquatic Centre, approximately 130 m east
- Kingscliff High School, approximately 500 m south/south-east
- Jack Julius Park - passive recreational area, approximately 650 m south-east.

Table 4 below outlines the noise management levels for non-residential land use.

Table 4 Noise at sensitive land uses (other than residences)

Land use	Management Level $L_{Aeq,15\ minute}$ (applicable when properties are in use)
Industrial premises	External noise level 75 dBA
Office, retail outlets and other commercial properties	External noise level 70 dBA
Classrooms at school and other educational institutions	Internal noise level 45 dBA
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dBA
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dBA
Community centres	Refer to the recommended 'maximum' internal levels outlined in AS2107 for specific uses

Note: The internal noise level criteria shown above is adjusted by +10 dB to conservatively assume internal to external noise level differences. This is representative of windows being opened to provide ventilation

Note: Office, retail and other commercial properties external noise level applies to all local business premises along Cudgen Road including Mate and Matts, and Hardy Electrical and Solar.

Other sensitive receptors not defined in the ICNG require noise level criteria derived from AS2107.

The AS2107 noise level criteria are generally provided as internal levels, and an internal-to-external correction of +10 dB has been applied to assume a conservative noise level with an open window for ventilation.

The public library to the north-east would have an external noise management level of 55 dBA, this is provided in **Table 5** below.

Table 5 NMLs for 'Other Sensitive Receivers' based on AS2107

Land use	Noise Management Level $L_{Aeq,15min}$	
	Internal	External
Public Library	45 dBA	55 dBA

Note: The Noise and Vibration Impact Statement was prepared under AS2107:2000. This standard has been superseded by AS2107:2018

2.3 Residential noise criteria summary

The measured background noise levels are used to determine the noise management level (NML) for the Project.

These NMLs are summarised below in **Table 6**.

Table 6 Noise Management Level (dB $L_{Aeq,15min}$) for residential receivers

NCA	Logger ID[1]	Standard hours (RBL +10)	Out of hours (RBL +5)			Sleep Disturbance (RBL +15) dB L_{AMax}
		Day	Day	Evening	Night	
NCA-A/1	n/a	55	50	48	43	53
NCA-B/2	005, 006, 007	57	52	44	41	52
NCA-C/3	n/a	59	54	48	39	52

Note: Cudgen Road Upgrade Works currently operate within OOH periods
Note: All loggers are currently positioned within NCA-B/2
Note 1: Logger ID based on Acoustic Studio Report. ADE CNVIS naming convention reverts to numerical, NCA corresponds to NCA definitions outlined in both the Management Plan and the ADE CNVIS

3 Results overview

3.1 Survey instrumentation and methodology

This report covers the monitoring period of the whole calendar month of December 2022. Unattended noise monitoring was conducted at three (3) locations using Class 1 four-channel Svantek SVAN 958A Sound & Vibration Analysers.

The monitors are enclosed in a weather resistant environmental case which is placed on the ground and covered with a tarp to aid in keeping temperatures below 60°C to prevent and avoid temperature related failures, and moisture intrusion. Images relating to the installation of the loggers is provided in **Appendix II – Aerial Photograph** and **Appendix IV – Site Photographs**.

A summary of the noise and vibration monitoring equipment is provided in **Table 7** below.

Table 7 Noise and Vibration equipment deployed

Make	Model	Location	Serial Number	Calibrated on	Calibration Due
Svantek	SVAN958A	005	92832	01/02/2022	1/02/2024
Svantek	SVAN958A	006	92835	18/02/2022	18/02/2024
Svantek	SVAN958A	007	92834	09/03/2022	9/03/2024
Svantek	SV-33B	Calibrator	104340	01/02/2022	01/02/2023

Note: Monthly field calibrations per AS1055:2018 are carried out, no calibration drift exceeding ± 1 dB has been recorded at 114 dB at 1 kHz

The noise monitoring equipment continuously measures the noise environment in 15-minute periods during the daytime, evening, and night-time periods throughout the monitoring period. All equipment carries current National Association of Testing Authorities (NATA) calibration certificates, and the calibration is checked once per month to ensure calibration drift does not exceed ± 1 dB.

The height of the microphone is no less than 1.2 m, and no greater than 1.5 m above the ground level. A wind shield was placed on each microphone to reduce any wind interference during the measurements.

Lendlease has established a daily checklist on site to ensure all monitors are operating in the field correctly, have adequate sunlight to power the units and that they are reporting consistently. Lendlease will report any issues immediately to ADE.

Furthermore, ADE conduct regular checks throughout the week via telemetry to ensure the monitors are operating and recording correctly. ADE are to advise Lendlease of any issues immediately. Monitors will not be removed unless consultation with Lendlease, TSA and HI have occurred and alternative locations are agreed upon.

3.1.1 Analysis methodology

The three environmental noise and vibration loggers are located in relatively close proximity to each other. Legitimate construction noise impacts (such as loud bangs, dropping of heavy machinery, jack hammering/rock breaking, alarms etc) would see impact at all three loggers with varying noise levels, correlated through graphical analysis.

When an event occurs, it is discarded if it cannot be demonstrated that the event occurred on Site; that is, could be observed within the data at all three locations. An event which is detected at each of the three locations can be reasonably assumed to have occurred on Site (or externally such as an emergency vehicle), and is then investigated further.

Vibration impacts can be correlated with noise impacts where large/heavy plant equipment are in use in close proximity to the logging devices. Higher than anticipated noise levels, and increased vibration energy provides correlative data where plant such as rollers, heavy loaded trucks, graders, piling, excavating, or otherwise vibration intensive plant equipment are within perceptible distances from the devices or sensitive receivers.

These impacts are less likely to occur at greater distances where vibration energy dissipates through the earth, whereas noise would dissipate at approximately 6 dB per doubling of distance in nominal conditions.

The correlation strengthens the confidence in works impacting the devices and nearby receivers, decreasing erroneous reporting of traffic noise/extraneous noise as site impact.

Weather data is collected at Coolangatta AWS (ID 040717); noise data is correlated with weather conditions and processed in accordance with the NPfI.

3.2 Results

Noise monitoring data, processed, demonstrates that the ambient noise environment is dominated by road traffic noise, with CD Civil impacts to loggers, as construction works have moved closer to the logger locations.

Table 8 Unattended noise monitoring results (overall)

Logger ID	Measured noise levels, dBA												
	Average noise level (Leq)			$L_{10,ave}$ noise level			Background noise levels (RBL)			RNP defined noise level (L_{eq}) [1]			
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day		Night	
										15 hr	1 hr	9 hr	1 hr
L.005	60	56	52	62	59	54	44	42	42	59	58	52	53
L.006	60	58	53	63	62	56	46	40	37	59	61	53	55
L.007	63	62	56	67	66	59	47	41	38	63	64	56	59

Note: All three SVANTEK devices received up-to-date firmware on 1 December. Field calibrations were undertaken and no drift exceeding ± 1 dB was detected

Note: December 25, 26 and 27 are excluded from analysis as these days are public holidays

Note: The EPA document Road Noise Policy (RNP, 2011) is used to provide road traffic noise levels for the 15-hour day and 9 hour night-time period, and the busiest daytime/night-time 1-hour. These levels are for historical correlation purposes

The results of the monitoring show an increase in noise impacts at the loggers' locations which are in close proximity to the boundaries of residential premises. The increase in noise is due, in large, to the CD Civil works along Cudgen Road.

December saw correlated noise and vibration impacts, sumarised below:

- CD Civil open trench works to lay new watermain. Plant include 8T excavator, 9T Roller and Bobcat. Proximity to monitors is approximately 10 m
- Gosling Electrical drilling piles and erecting light poles. Proximity to monitors is approximately 10 – 50 m
- CD Civil excavating to full depth pavement on Cudgen Road. Plant include 8t excavator, Grader, 9T Roller and Bobcat. Proximity to monitors is approximately 15 m
- ADCO excavating/pouring concrete to Health Hub foundation, installing steel (this is not part of LLB scope, however, is within proximity to dust/noise monitors. Plant includes 14T excavator, 9T roller and Concrete boom pumps. Proximity to monitors is approximately 15 m)
- ABS installing facade on Main Hospital Building. Plant includes tower crane. Proximity to monitors is approximately 200 m
- Portable generators live throughout the day. Proximity to monitors is approximately 60 m

- Constant entrance/exit of trucks to site compound for spoil removal and material delivery through main entrance. Trucks involved are semi-trailers, 6-wheelers etc. Proximity to monitors is approximately 30 m
- Installing stormwater drainage on Northern side of Cudgen Road. Plant includes 8T excavator and plate compactors. Proximity to monitors is approximately 50 m
- Saw cutting of concrete footpath on Eastern End of Cudgen Road. Proximity to monitors is approximately 12 m.

The following graphs display measured L_{eq} noise levels exceeding 60 dBA, and are inclusive of all road traffic noise along Cudgen Road and weather affected data. Only the correlation between noise and vibration is used for conservative assessment purpsoes to establish the potential impact from road works near the loggers' position.

Figure 1 shows correlation with work activities where vibration levels are increased at Location L.005. Correlative impacts are noted on 12, 15, and 21 December.

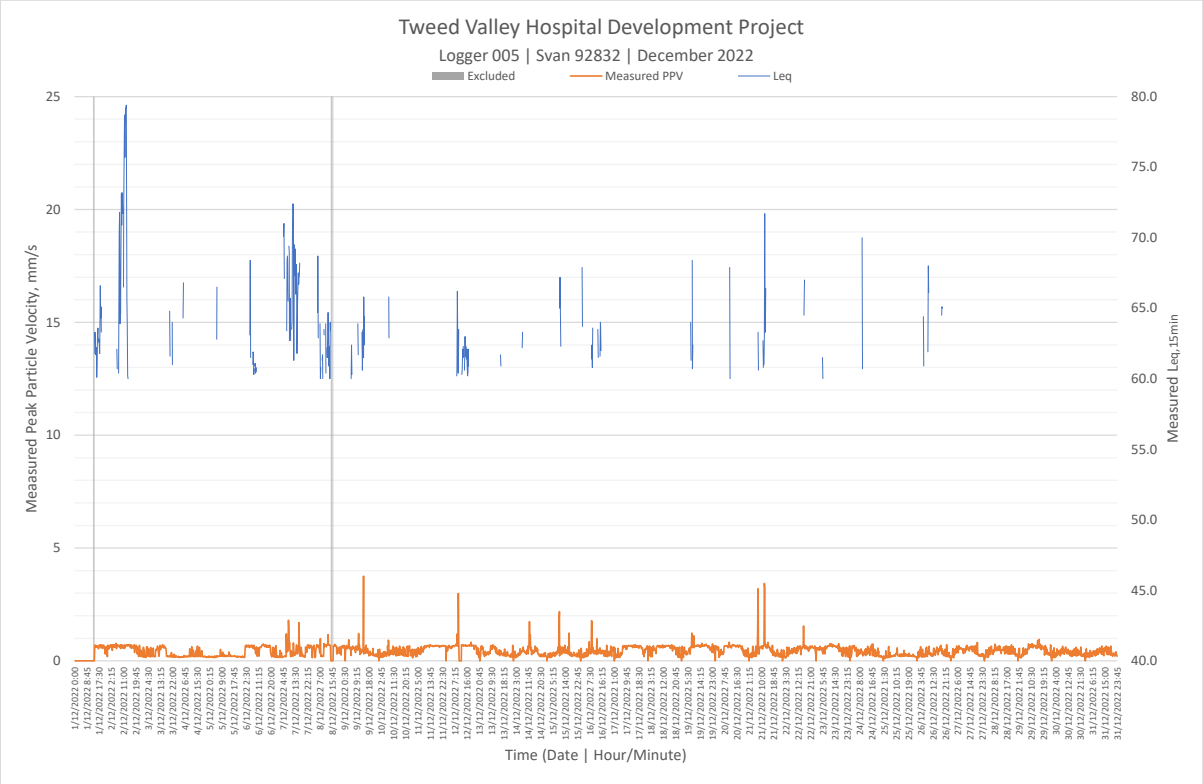


Figure 1 Measured PPV Vibration and L_{eq} noise levels – Location 005

Figure 2 presents correlation data at Location L.006. This location has high levels of extraneous vibration, likely weather induced or other, as measurements were inconsistent with works on site. ADE note that the devices ground sensor and microphone is near by a farm where irrigation and farm equipment may influence readings.

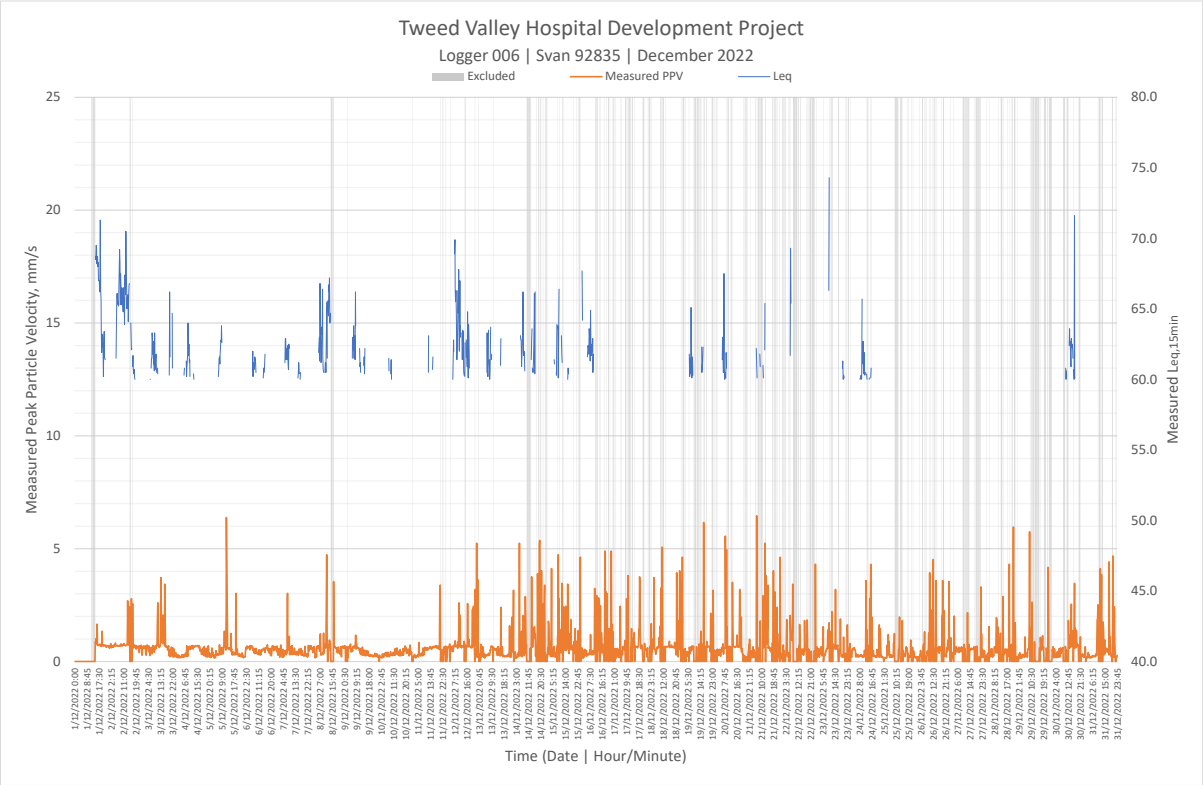


Figure 2 Measured PPV Vibration and Leq noise levels – Location 006

Figure 3 below presents correlation data at the southwestern Residential premesis. Correlative data is noted on 7, 14, and 15 December.

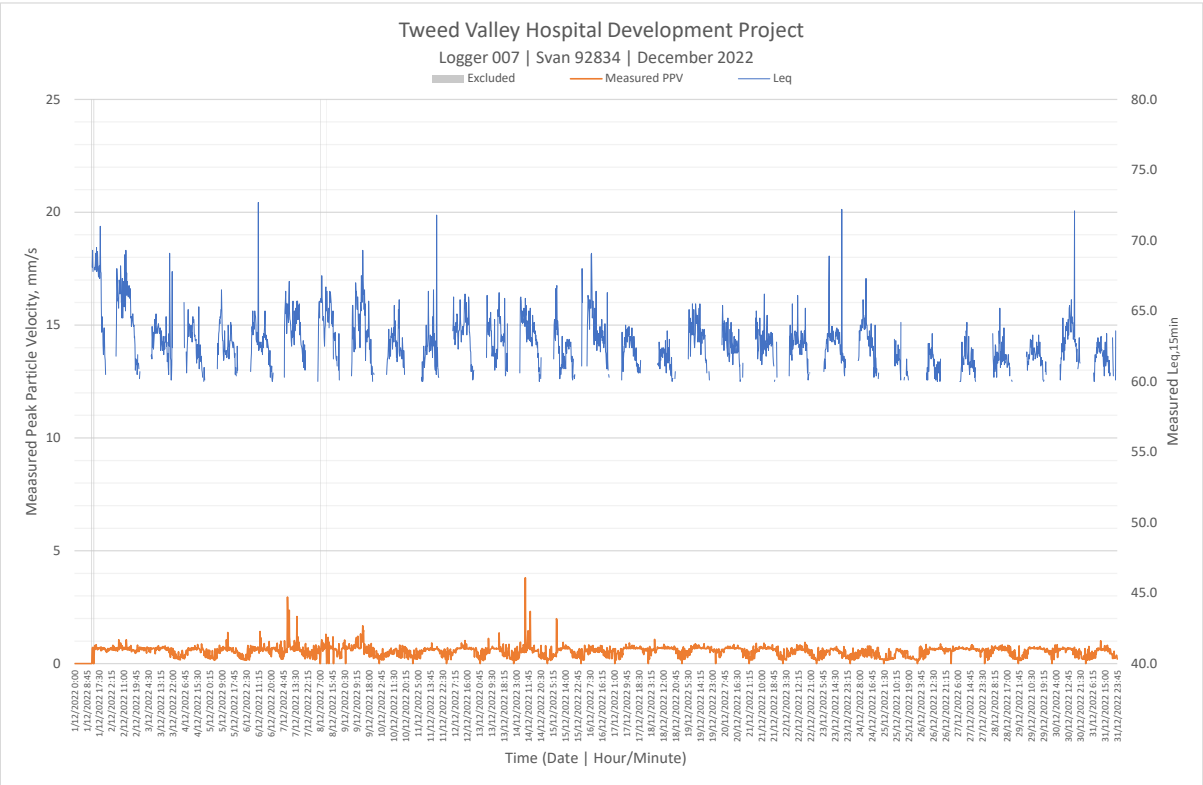


Figure 3 Measured PPV Vibration and Leq noise levels – Location 007

3.3 Discussion

During the calendar month of December 2022, the meteorological conditions exhibited above average wind conditions and increased precipitation resulting in 14 days (whole or part) of measurements excluded from analysis due to exclusion requirements of the NPfI. An additional three days of public holidays were excluded from analysis.

Increases in noise levels due to the CD Civil works are anticipated; the measured noise levels are comparative to the predicted noise levels outlined in the ADE CNVIS of the works as the loggers are positioned closer to the works than the facade of the impacted receivers. Noise graphs for each of the locations are presented in **Appendix V – Noise Graphs**.

Noise levels were lower than the previous monitoring period (November 2022), and vibration intensive and noise intensive (such as rolling works) were undertaken with less frequency. Traffic levels from construction is judged to not have increased by any significant level as the measurement analysis covered in this report is less than the predicted level (57 dBA $L_{eq,9hr}$) outlined in the CNVIS.

The noise management practices outlined in both the Management Plan, and the CNVIS prepared for CD Civil are to be employed at all times, and where any one (1) valid complaint is received, additional noise mitigations may be necessary such as respite periods and/or offers where feasible and reasonable mitigations have not made a significant reduction in noise experienced by the residence along Cudgen Road.

3.3.1 NML exceedances

Works occurring in close proximity to the noise logging devices measure noise levels exceeding the noise management levels at the devices location. The extent of the NML exceedances and measured noise levels are within the predicted noise results of the CNVIS (**Section 5.2.4**), or lower.

Events measured during December which are judged as being from the Site are as follows:

- Friday 9 December, Location L.007
  - Noise levels up to 69 dBA
- Tuesday 13 December, Location L.007
  - Noise levels up to 66 dBA, background noise level increase significantly likely due to works nearby (often generators may influence this)
- Thursday 15 December and Thursday 22 December, Location L.005
  - Noise levels up to 66 – 67 dBA
  - Location L.006 shows increase in noise levels on 15 December, up to 66 dBA
  - Location L.007 shows increase in noise levels (15 Dec) up to 66 – 67 dBA
  - 15 December - Vibration increase during these events correlates with noise level increase at all three locations (likely an excavator or roller)
- Wednesday 12 December, Location L.006
  - Noise levels up to 70 dBA
- Friday 16 December, Location L.005
  - Noise levels up to 64 dBA
- Tuesday / Wednesday 20/21, Location L.005
  - Noise levels up to 70 / 71 dBA
    - On 21 December, vibration levels increase with noise level increase, indicating influence from works nearby
      - This period of time is excluded from noise analysis due to excessive wind conditions, however high confidence of impact from CD Civil Site
  - Location L.006 correlates increase noise levels (66 dBA both days).

The intermittent use of generators, excavators, graders, and bobcats in close proximity to the noise monitoring devices has shown noise levels increases up to 70 dBA in comes cases, some vibration intensive plant has been corelated with high confidence (such as vibratory rollers) on 15 and 21 December.

The works undertaken by CD Civil have impacts which are in line with the predictions undertaken by ADE and prepared for CD Civil in the CNVIS pertaining to Cudgen Road Upgrade works. The measured results are lower than expected (note that the CNVIS does not take into account any mitigating measures) likely due to implementation of all reasonable and feasible mitigation measures and standard management practices.

Nevertheless, the mitigation measures and management practices outlined in the CNVIS are recommended to be adhered to at all times where feasible and reasonable, including additional measures where applicable in the event of any one (1) valid community complaint or concern.

4 Conclusion

ADE Consulting Group Pty Ltd (ADE) was commissioned by Lendlease Group (Lendlease) to assess the levels of airborne construction noise during the construction of the Tweed Valley Hospital Project, located at 771 Cudgen Road, Cudgen NSW.

This report summarises the analysed ambient noise data collected at three locations, positioned along the south and southwest of Cudgen Road. At the time of preparing this report and the monitoring period in which it covers (December 2022), CD Civil are at Site undertaking approved road work activities on Cudgen Road. These works include road grading, asphalt works and vibratory compaction.

Noise Management Level exceedances (exclusive of existing traffic noise) are due to works undertaken along the Cudgen Road Upgrade alignment and the plant equipment in use at the time. Some noise impacts up to 70 dBA $L_{eq,15min}$ are recorded (however infrequent) and are believed to be during the road works as they progress.

The degree of the exceedances is not of any immediate consequence or concern, as the predicted noise levels presented in the ADE CNVIS for the road upgrade project are higher than those measured and presented in this report. While the weather conditions were less than ideal, five (5) days of noise levels have vibration correlations (December 7, 12, 14, 15, 21) and are still within the worst-case predicted noise levels (Refer to the CNVIS for a detailed overview).

An additional four days (December 9, 13, 16, 20) have noise levels increased above the immediate ambient noise environment with sufficient confidence of site origin (ie road works), however remain lower than the predicted noise levels outlined in the aforementioned CNVIS.

The CNVIS presents mitigations and management practices which when implemented (where feasible and reasonable) are anticipated to lower the impact of the works; the noise levels (and vibration where correlation exists) presented in this report (NMA41) demonstrate effective noise management practice by CD Civil.

Where all feasible and reasonable mitigation measures are implemented, compliance with the relevant guidelines and the site-specific noise and vibration management plan is anticipated.

Appendix I – Glossary

1 Sound Pressure Level

Defined as:

$$L_p = 10log_{10}\left(\frac{p^2}{p_{ref}^2}\right)dB$$

In the above equation, p is the sound pressure fluctuation relative to atmospheric pressure, and *pref* is 20 microPascals (2 x 10-5 Pa), the approximate threshold of hearing.

Sound or noise is the sensation produced at the ear by small fluctuations in atmospheric pressure. Human ears are sensitive to changes to sound pressure over a wide range, from 20 microPascals to 60 Pascals, in lieu of using a linear scale to represent this range, a logarithmic scale is adopted to better handle

2 Sound Power Level

Sound power level cannot be directly measured using a microphone, it does not change with distance and is not influenced by atmospheric conditions. The sound power level refers to the total energy of the sound, and is reference to 1 Pico Watt.

3 Weighting and Loudness

The overall level of a sound is usually expressed as dB(A) and not dB. Weighting refers to the human ear's frequency response to sound. Typically, sound is measured with an A-weighted filter which reduces the significance of lower frequencies and very high frequencies, increasing the importance of mid-frequencies (500 Hz to 4 kHz), and being a good measure of the "loudness" of a sound.

A change of 1 to 2 dB(A) is difficult to detect, whilst a change of 3 to 5 dB(A) corresponds to a small but noticeable change. A 10 dB(A) change corresponds to a doubling or halving in apparent loudness.

4 Noise Metrics and Statistical Noise Levels

i) L_{Aeq} - The time averaged A-weighted sound pressure level for the interval, as defined in AS1055.1. It is generally described as the equivalent continuous A-weighted sound pressure level that has the same mean square pressure level as a sound that varies over time. It can be considered as the average sound pressure level over the measurement period.

ii) L_{Amin}/L_{Amax} - Minimum or Maximum A-weighted noise level detected during the measuring period. It refers to the minimum background noise detected or the maximum L*p* measured.

iii) L_{A90} - A-weighted noise level which is exceeded for 90% of the measuring period. It is usually used as the descriptor for background noise level during the measurement period.

iv) L_{A1} - Noise level which is exceeded for 1% of the measurement period.

v) L_{A10} - Noise level which is exceeded for 10% of the measurement period. The L_{A10} is often referred to as the average *maximum* noise level.

5 Background Noise

The underlying level of noise present in the ambient noise, excluding the noise source which is under investigation, when extraneous noise is removed.

6 Ambient Noise

Ambient noise of an environment: the all-encompassing sound associated with that environment, being a composite of sounds from many sources.

7 Vibration

The mechanical oscillations occurring about an equilibrium point. The oscillations may be periodic such as the motion of a pendulum or random. Vibration is most commonly expressed in terms of displacement, velocity, acceleration and frequency, all of which are related

8 Displacement

The change in position of an object, is a vector quantity. (Stress indicator).

9 Velocity

The rate of change of displacement, is a vector quantity. (Fatigue indicator).

10 Acceleration

The rate of change of velocity, is a vector quantity. (Indicator of force).

11 Frequency

The number of times a periodic function or vibration occurs or repeats itself in a specified time, often 1 second – cycles per second. Frequency is measured in Hertz.

12 Hertz

The unit of frequency or pitch of a sound. One hertz equals one cycle per second.

13 Peak Particle Velocity (PPV)

The greatest instantaneous particle velocity during a given time interval if measurements are made in 3-axis. The resultant Peak Particle Velocity (PPV) is the vector sum i.e. the square root of the summed squares of the maximum velocities, regardless of when in the time history those occur.

14 Root Mean Square rms

The rms value of a set of numbers is the square root of the average of their squares. Best used when assessing building damage.

15 Vibration Dose Value VDV

The Vibration Dose Value (VDV) is used for assessing intermittent vibration. A cumulative measurement of the vibration level received over an 8-hour or 16-hour period. Best used when the structure is occupied.

16 Peak

The peak is the maximum amplitude during a measurement period.

17 Peak to Peak P-P

The peak-to-peak (P-P) is the difference between the maximum positive and maximum negative amplitudes of a waveform.

18 Logarithmic Scale

Comparing frequency with large amplitude differences be accomplished using a logarithmic scale. Critical vibration components usually occur at low amplitudes compared to the rotational frequency vibration. These components are not revealed on a linear amplitude scale because low amplitudes are compressed at the bottom of the scale, however a logarithmic scale shows prominent vibration components equally well at any amplitude.

19 Zero Crossing Frequency

Determining the apparent dominate frequency of a given sample can be achieved by using the Zero Crossing Frequency.

20 Primary Waves P Waves

Alternating compressions ('pushes') and dilations ('pulls') in the same direction as the wave is propagating. P waves are the first arriving energy, smaller and higher frequency than S waves.

21 Secondary Waves S Waves

Alternating transverse motions perpendicular to the direction of propagation. Slower than P waves.

22 Rayleigh Waves R Waves

Motion is both in the direction of propagation and perpendicular (in a vertical plane). R waves are also dispersive, and amplitudes decrease with depth.

23 Accelerometer

A vibration sensor whose electrical output is directly proportional to the acceleration component of the vibration. The two most common accelerometer types are the traditional charge type and the IEPE, integrated electronic piezoelectric type with a built-in line-drive amplifier to enable the output signal to be transmitted over 'longer cable runs'.

24 Geophone

Geophones measure velocity by means of a magnetic core surrounded by an electrical coil. When the surface vibrates, the geophone housing moves however the coil stays stationary, thus the movement of the magnet in the coil causes an electrical current which is calibrated to velocity of vibration.

25 Filter

A device for separating components of a signal on the basis of their frequency. It allows components in one or more frequency bands to pass relatively unattenuated, and it attenuates components in other frequency bands. Modifies the frequency spectrum of a signal usually while it is in electrical form.

26 Short-term vibration

Vibration which does not occur often enough to cause structural fatigue, and which does not produce resonance in the structure being evaluated.

27 Long-term vibration

All types of vibration not covered by the definition of 'short-term vibration

28 Impulsive vibration

Rapid build-up to a peak followed by a damped decay that may or may not involve several cycles of vibration. It can also consist of a sudden application of several cycles at approximately the same amplitude, providing that the duration is short (typically <2 seconds). Impulsive vibration (no more than 3 occurrences) in an assessment period is assessed on the basis of weighted rms acceleration, and peak particle velocity.

29 Continuous vibration

Continuous vibration continues uninterrupted for a defined period (usually throughout daytime and/or night-time). This type of vibration is assessed on the basis of weighted rms acceleration.

30 Intermittent vibration

Defined as interrupted periods of continuous (e.g., a drill) or repeated periods of impulsive vibration (e.g., a pile driver), or continuous vibration that varies significantly in magnitude. It may originate from impulse sources (e.g., pile drivers and forging presses) or repetitive sources (e.g. pavement breakers), or sources which operate intermittently, but which would produce Continuous vibration if operated continuously (for example, intermittent machinery, railway trains and traffic passing by). This type of vibration is assessed on the basis of vibration dose value.

Appendix II – Aerial Photograph

ADE Monitoring locations, site location (including CD Civil's Cudgen Road Upgrade works) are presented below.


555200
555600
556000
N
Tweed Valley Hospital Development Project
Northern Location
005 - SVAN 92832 | DustTrack 8533 181 801
Stockpile Locations
006 - SVAN 92835 | DustTrack 8533 184 203
Southern Works
007 - SVAN 92834 | DustTrack 8533 184 203
0
100
200 m
Tweed Valley Hospital Development Project
Environmental Noise, Vibration, and Dust Monitoring
Location Overview
Image: Nearmaps | Scale 1:4500 | GDA 1994 Zone 56
Legend
Roads
Cudgen Road Uprade Works Locations
Loggers
Tweed Valley Hospital Development Project
ADE GROUP
SOLUTIONS THROUGH INNOVATION

Appendix III – References

Standards, policies, and guidelines used for the assessment of vibration are as follows:

- ADE Group Consulting Pty Ltd – Cudgen Road Upgrade Construction Noise and Vibration Impact Statement, Prepared for CD Civil, Version 1.0, 6 September 2022 (ADE Reference A103022.1044.00)
- AS 1055:2018 Acoustics – Description and measurement of environmental noise
- AS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors
- AS 2659.1-1998 Guide to the use of sound measuring equipment – Portable sound level meters
- Development Consent SSD-10353, Department of Planning, Industry and Environment – Tweed Valley Hospital Stage 2 – 12 July 2020 (approval)
- Interim Construction Noise Guideline (ICNG, NSW Department of Environment and Climate Change DECC, 2009)
- Noise Policy for Industry (NPfI, EPA 2017)
- Transport for New South Wales Construction Noise and Vibration Strategy (TfNSW, 2019)
- Tweed Valley Hospital Management Plan – Noise and Vibration, Revision 7.0, Lendlease Building Pty Ltd
    - Tweed Valley Hospital – Noise and Vibration Impact Assessment for State Significant Development (SSD), SVM-2370, Revision: Issue 2, 17 October 2018 – Acoustic Studio

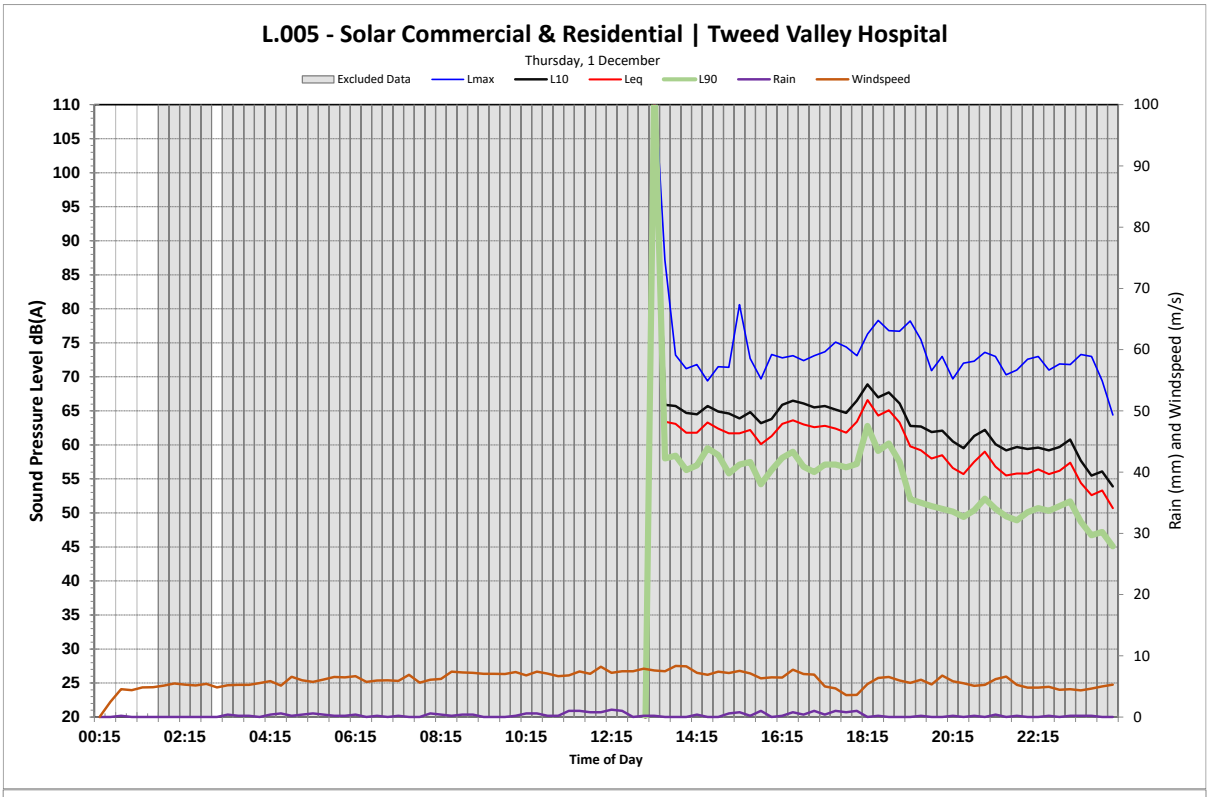
Appendix IV – Site Photographs

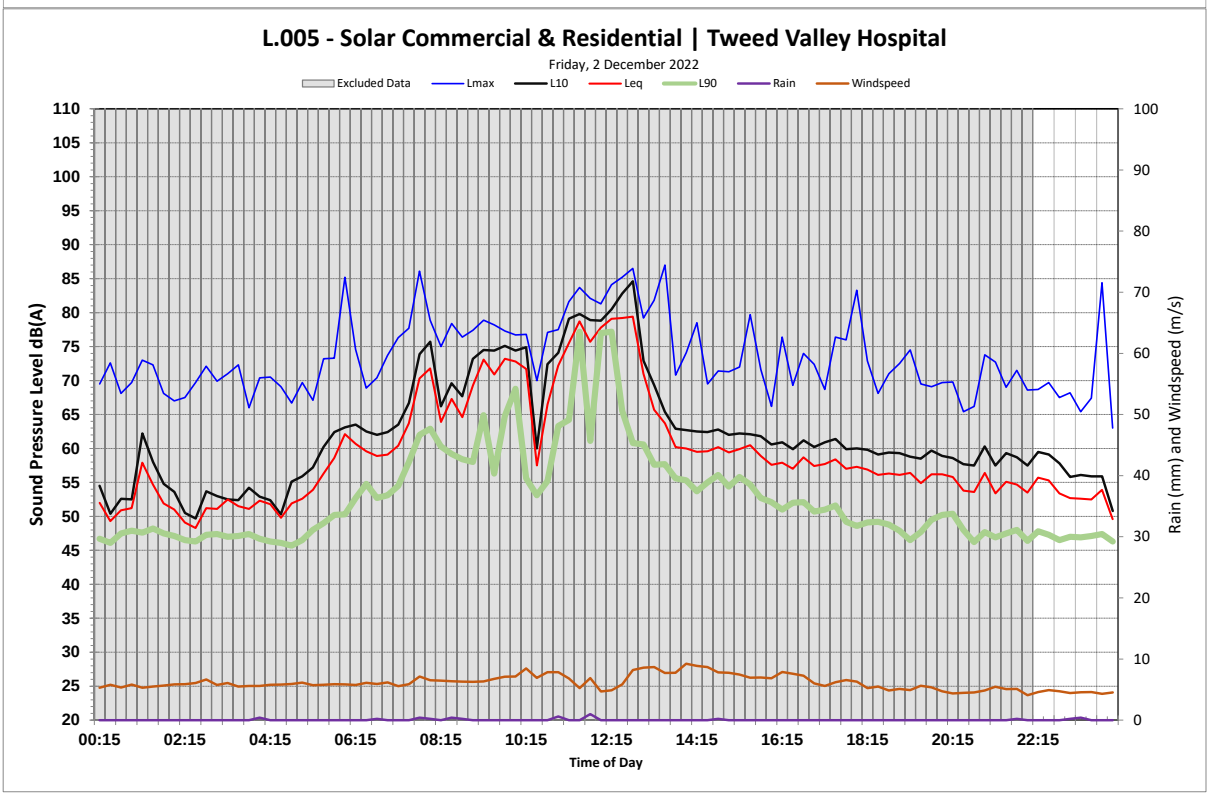
Photograph 1 Representative photograph of monitoring location 007 – Residential, as observed 08/12/2022

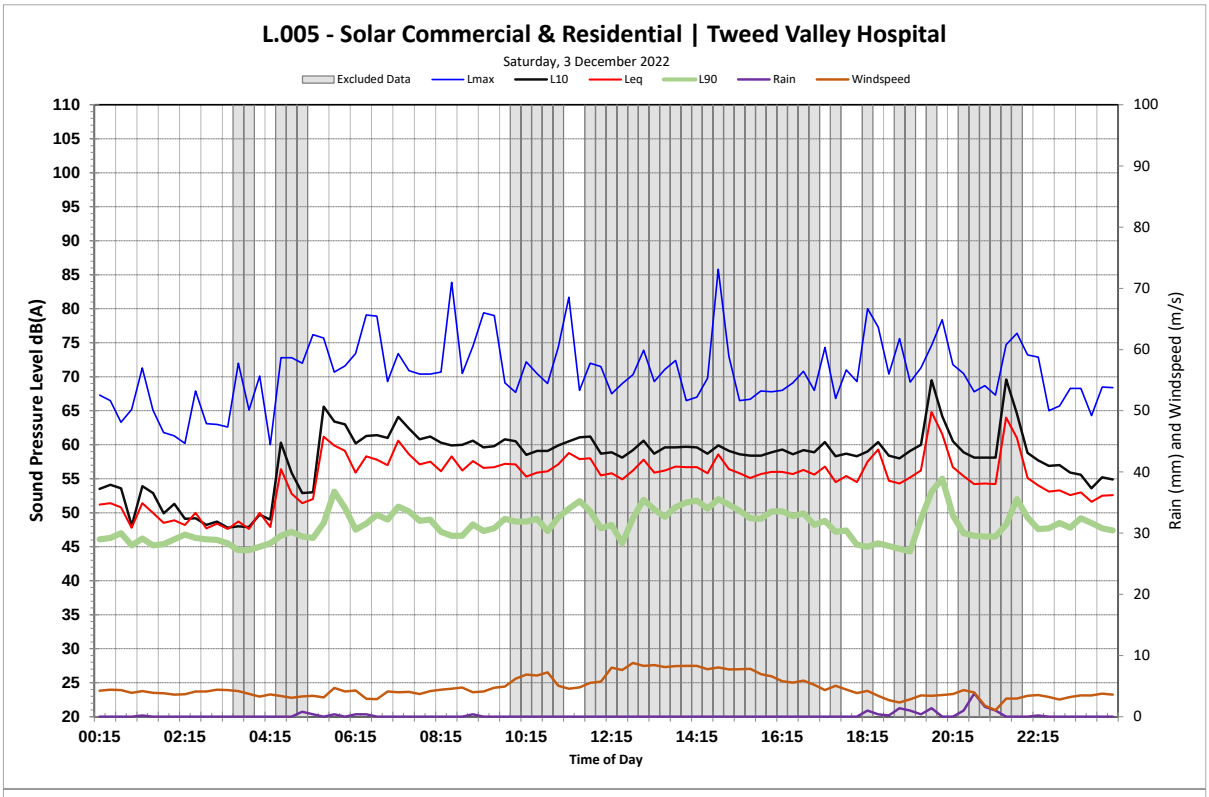
Photograph 2 Representative photograph of monitoring location 005 – Solar Industry, as observed 08/12/2022

Photograph 3 Representative photograph of monitoring location 006 – Mate and Matts, as observed 08/12/2022

Appendix V – Noise Graphs



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Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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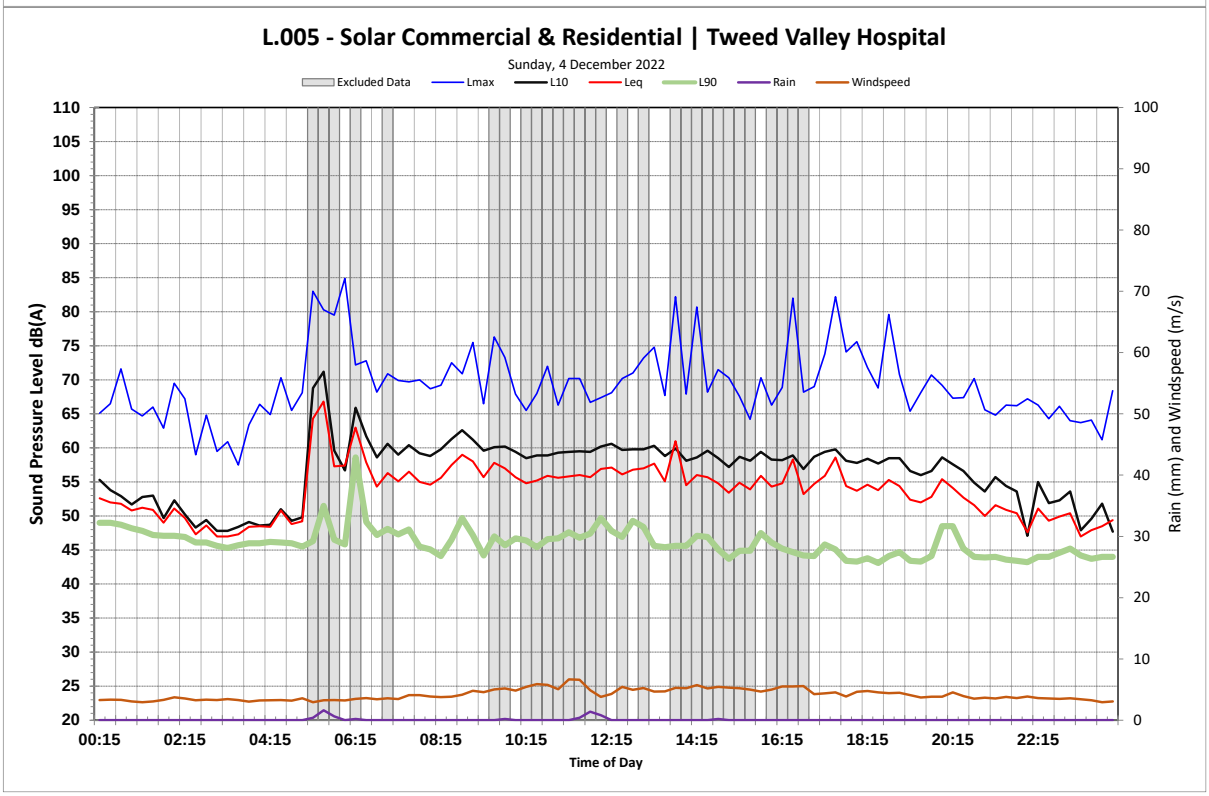
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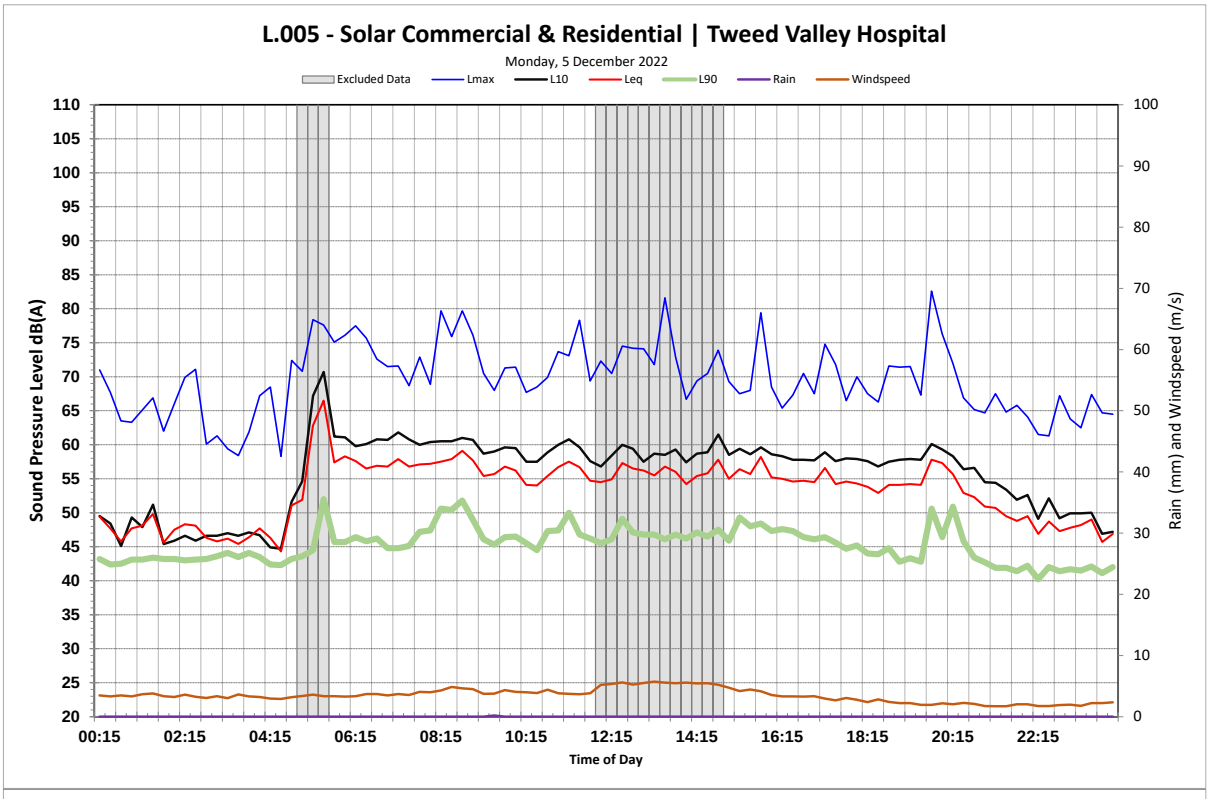
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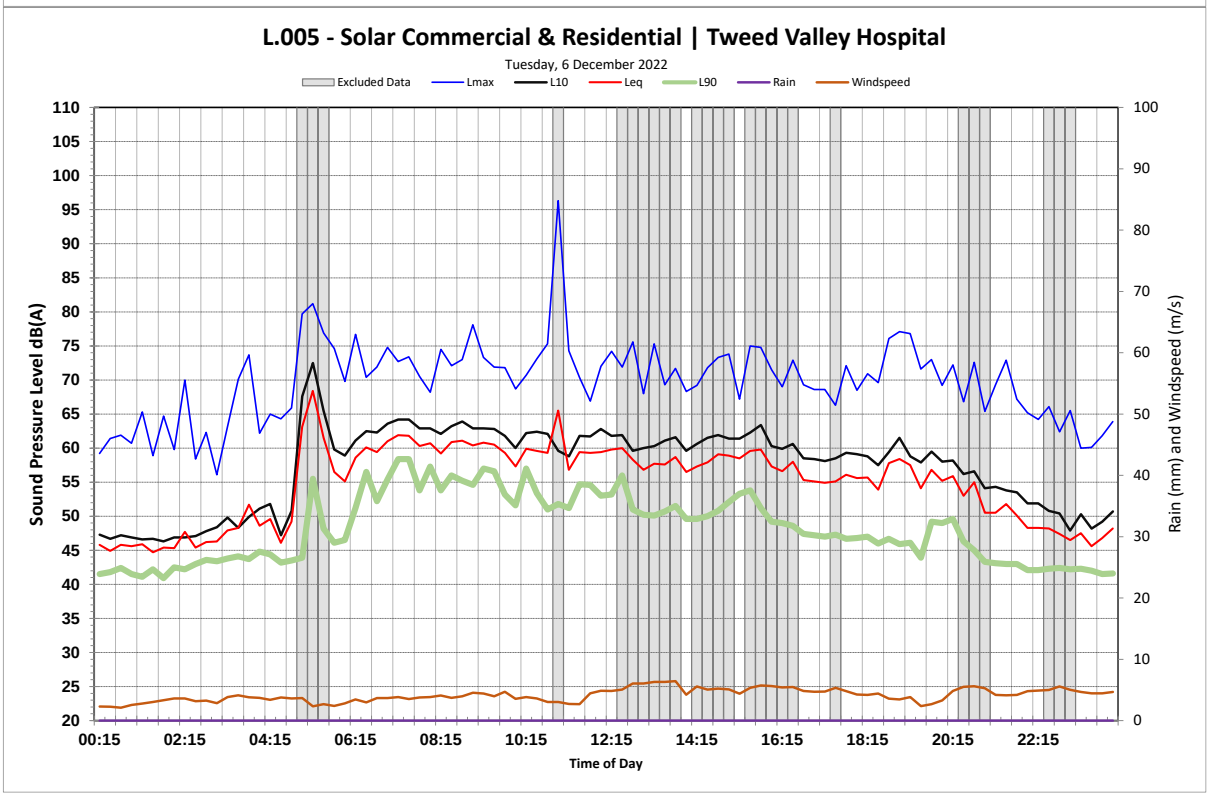
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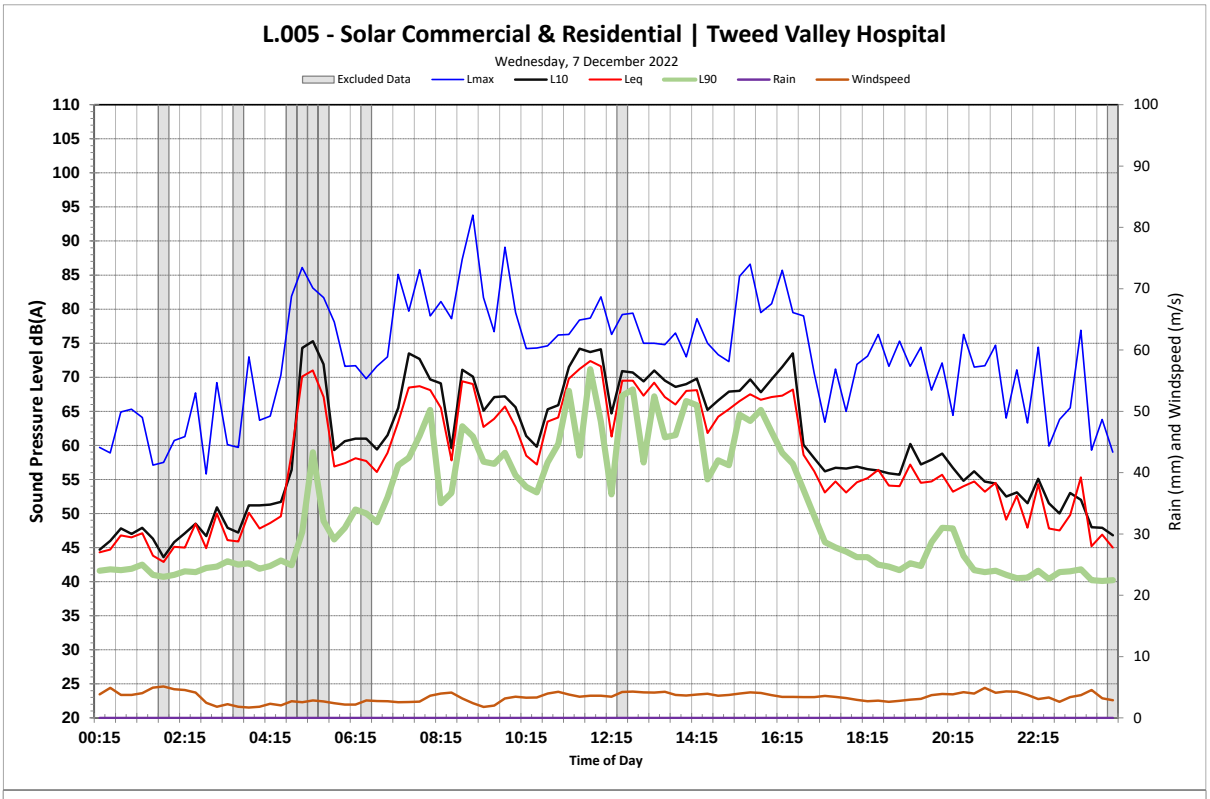
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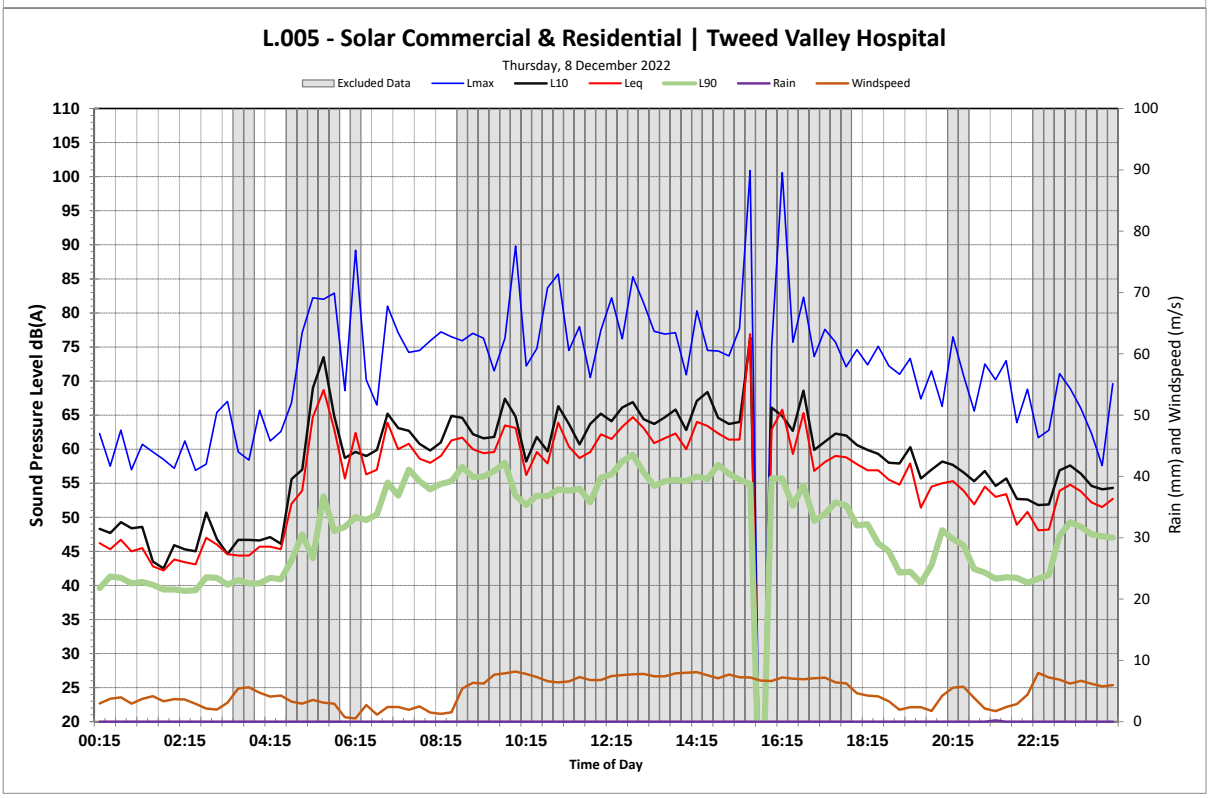
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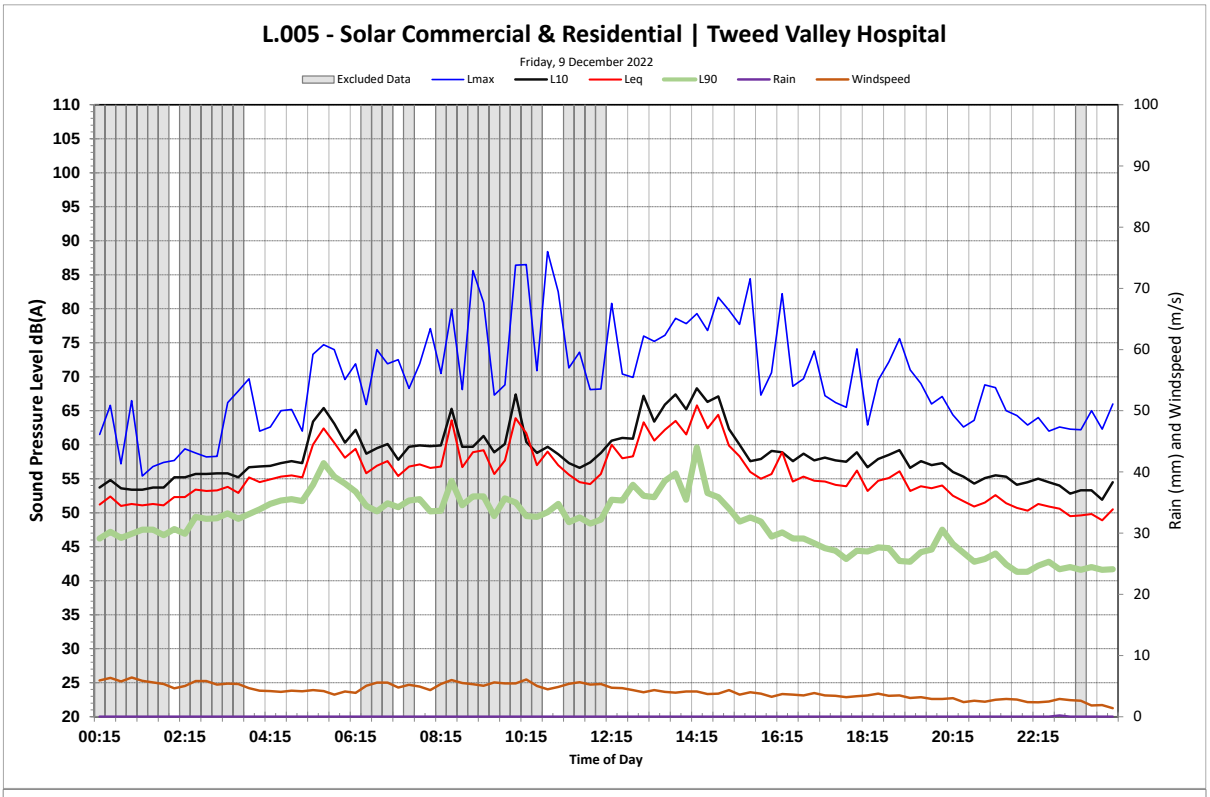
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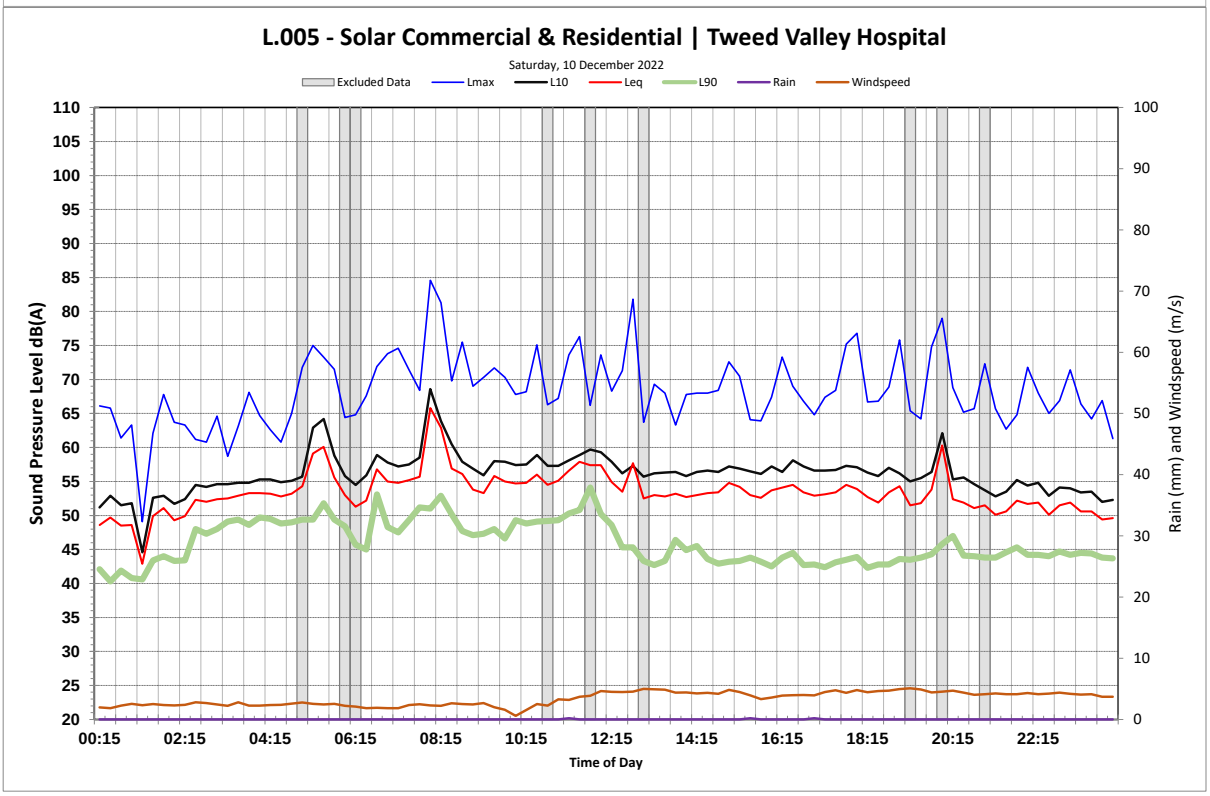
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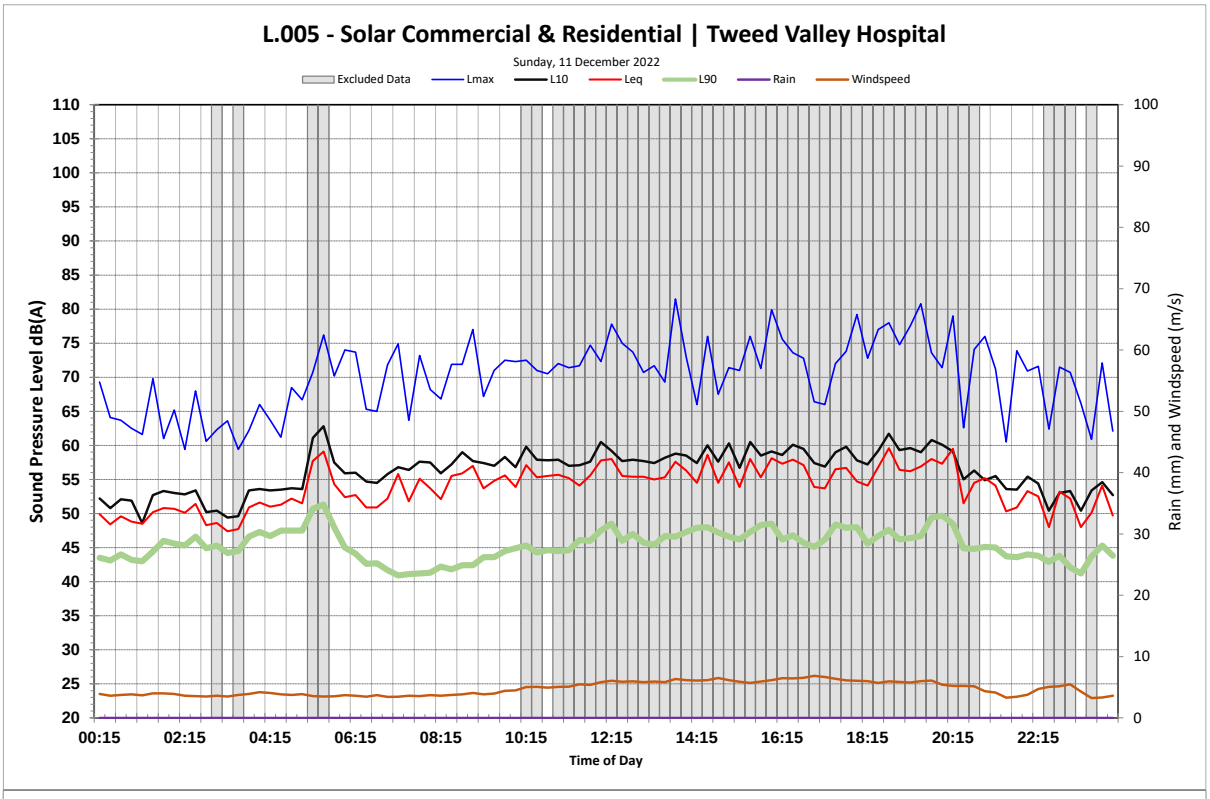
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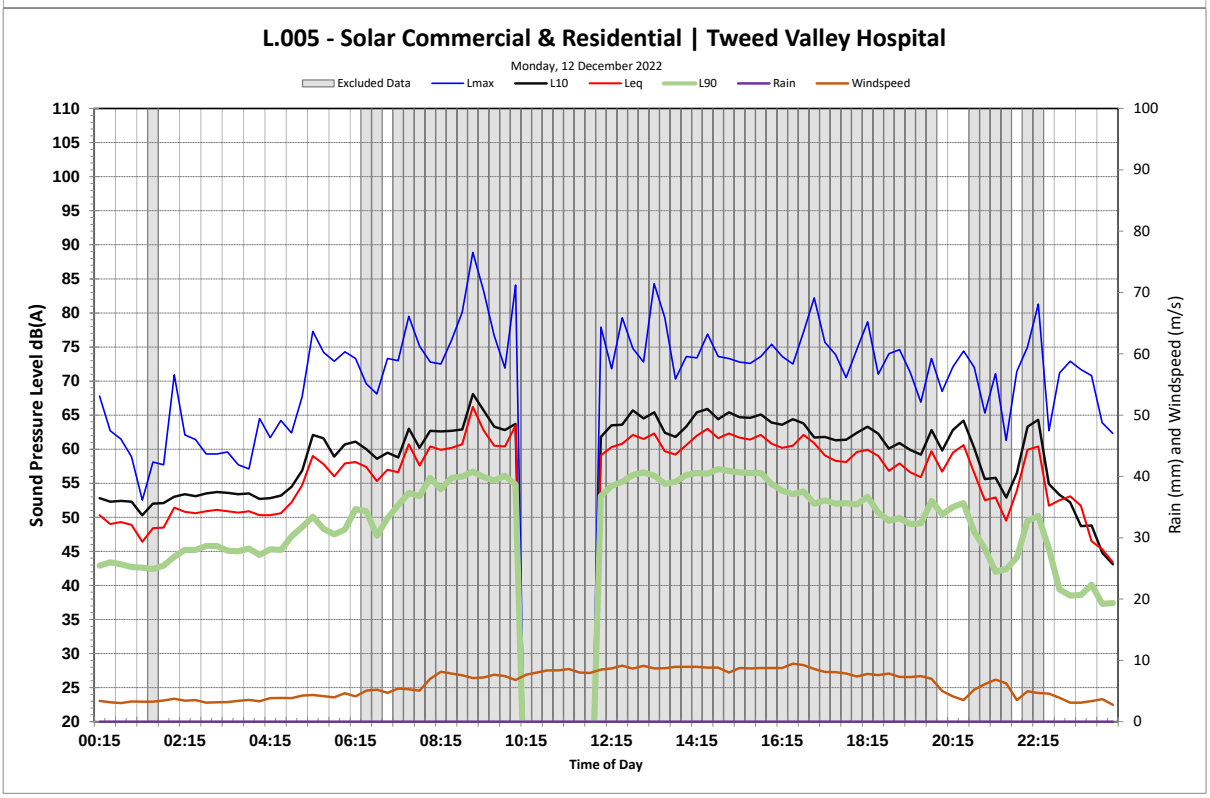
L.005 - Solar Commercial & Residential | Tweed Valley Hospital
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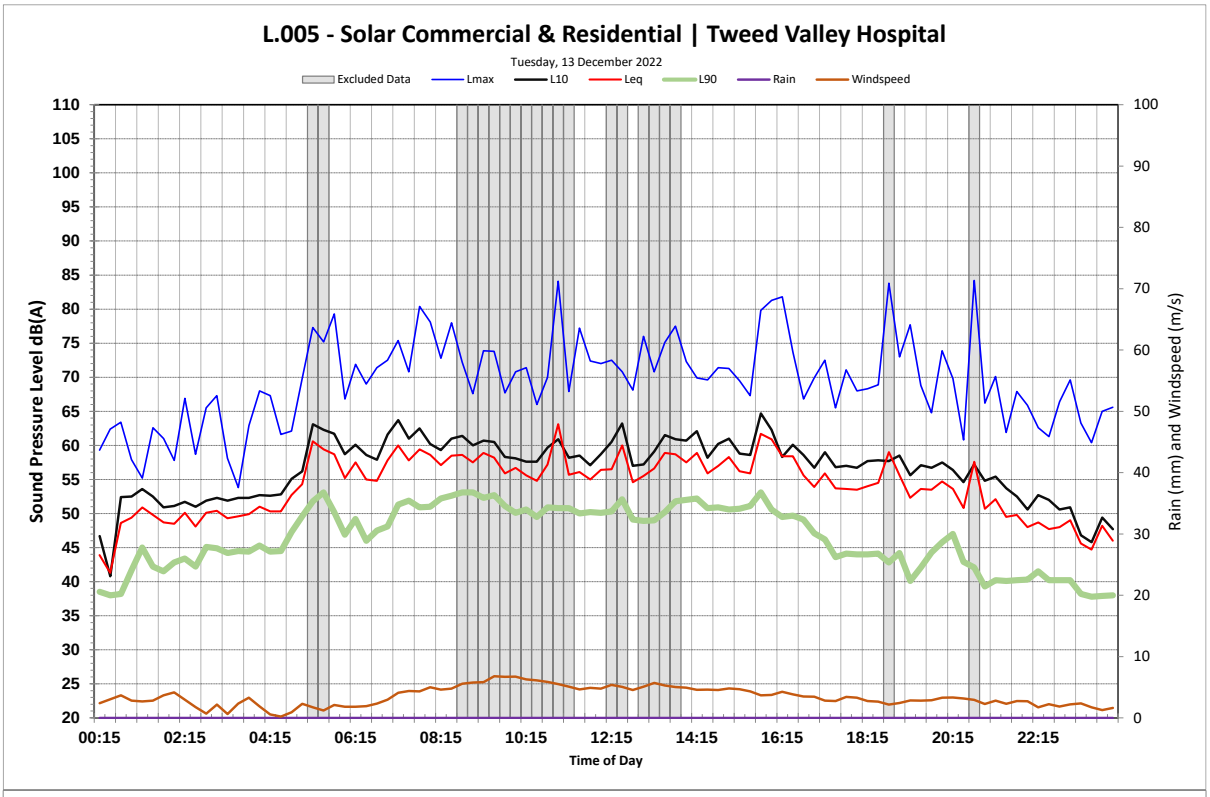
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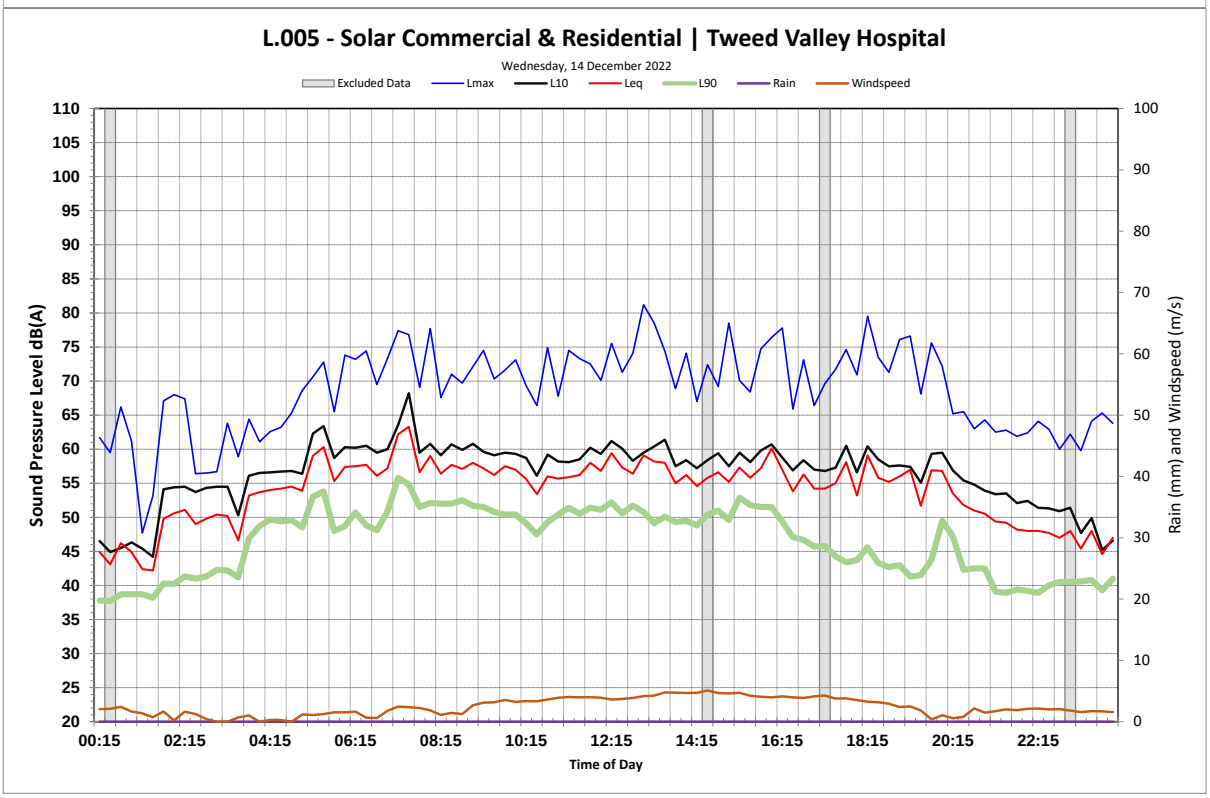
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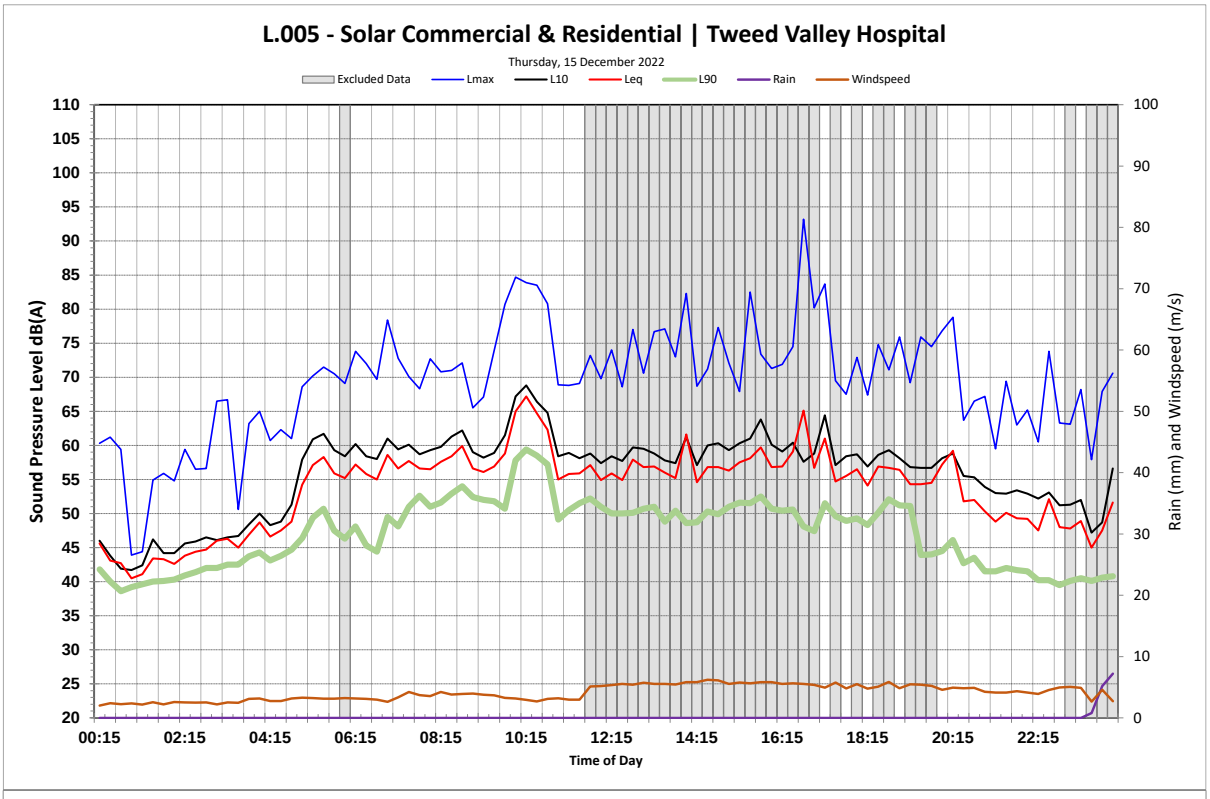
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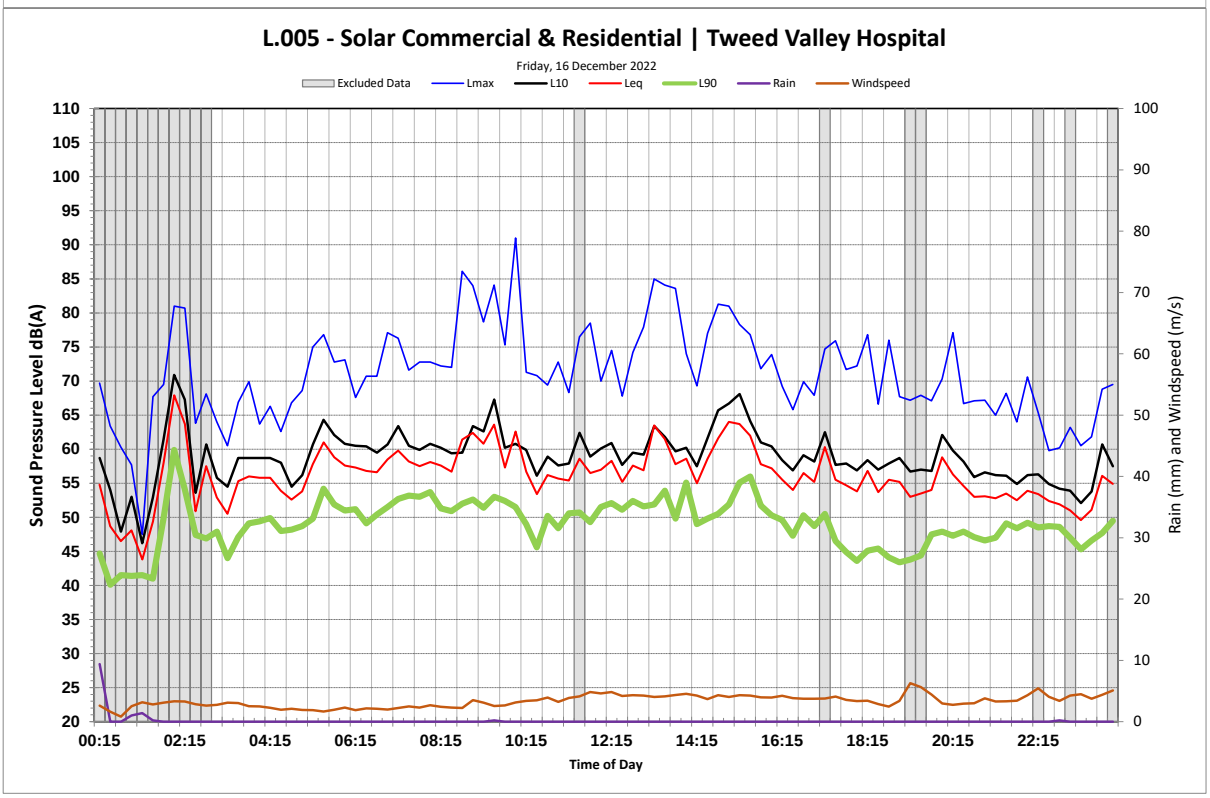
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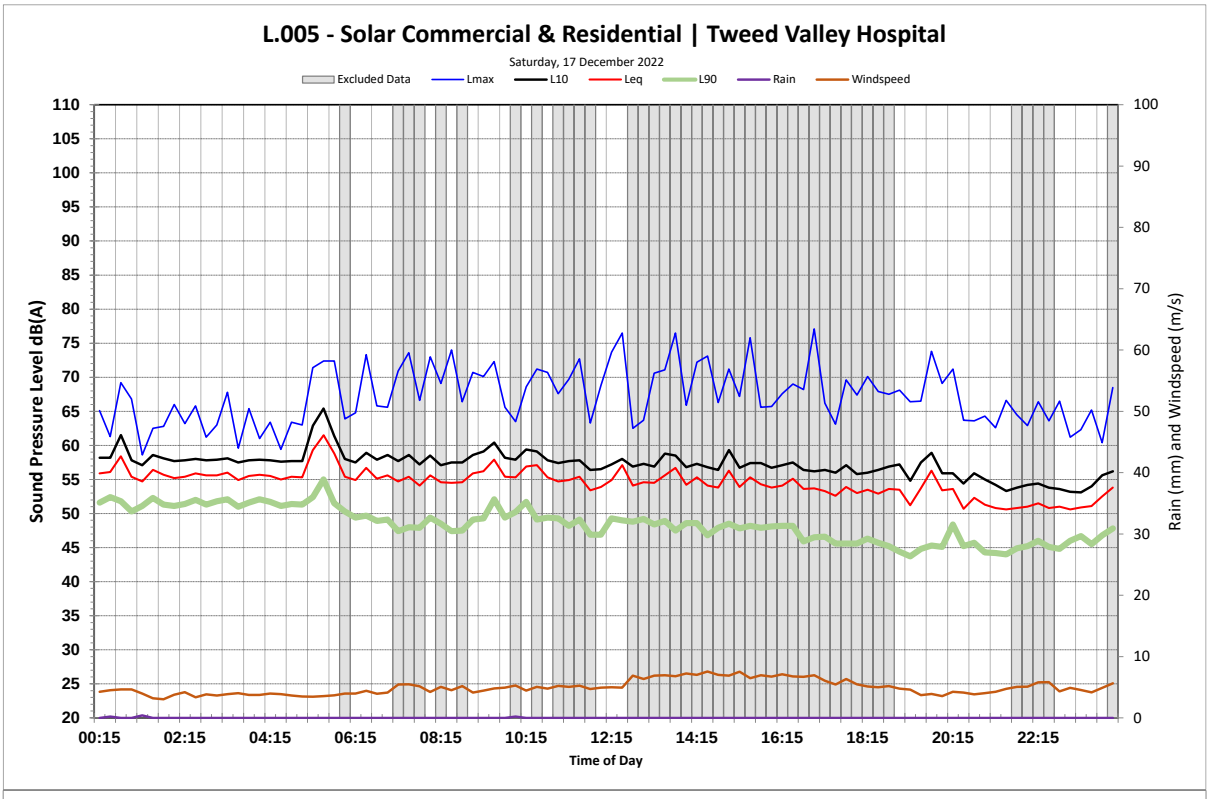
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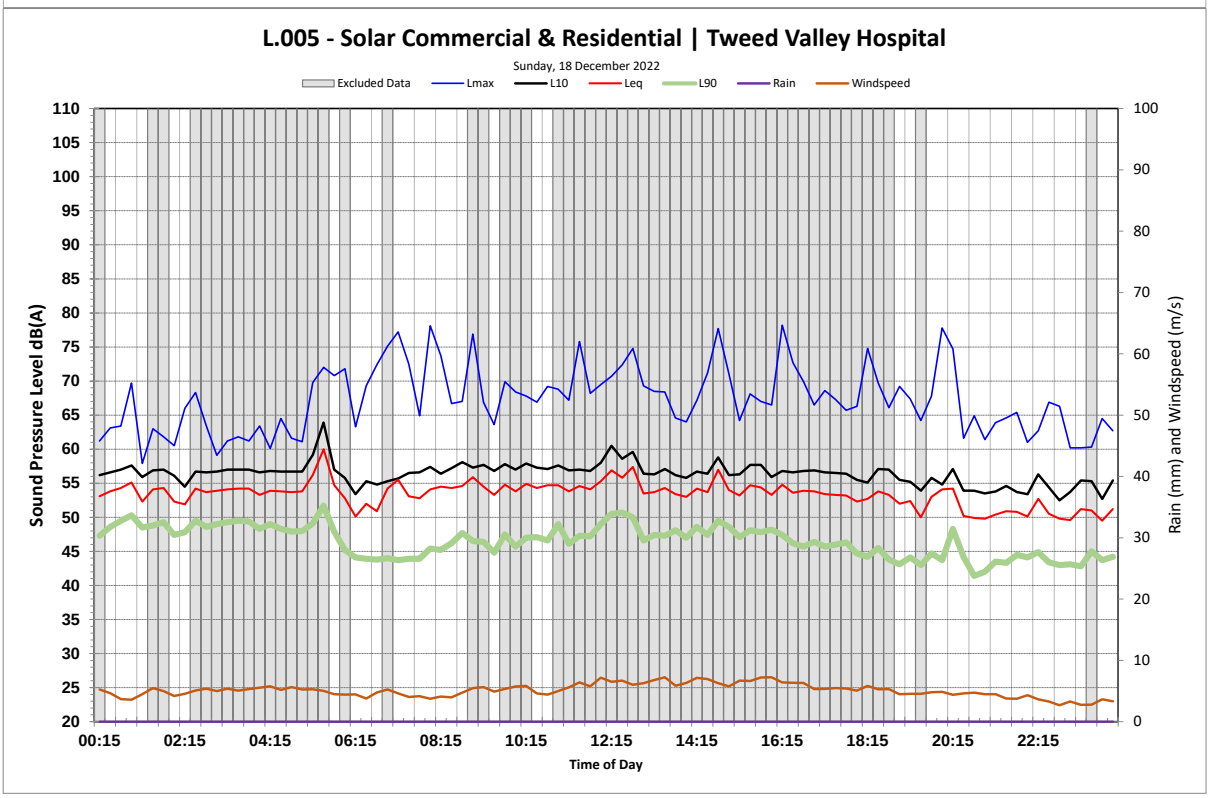
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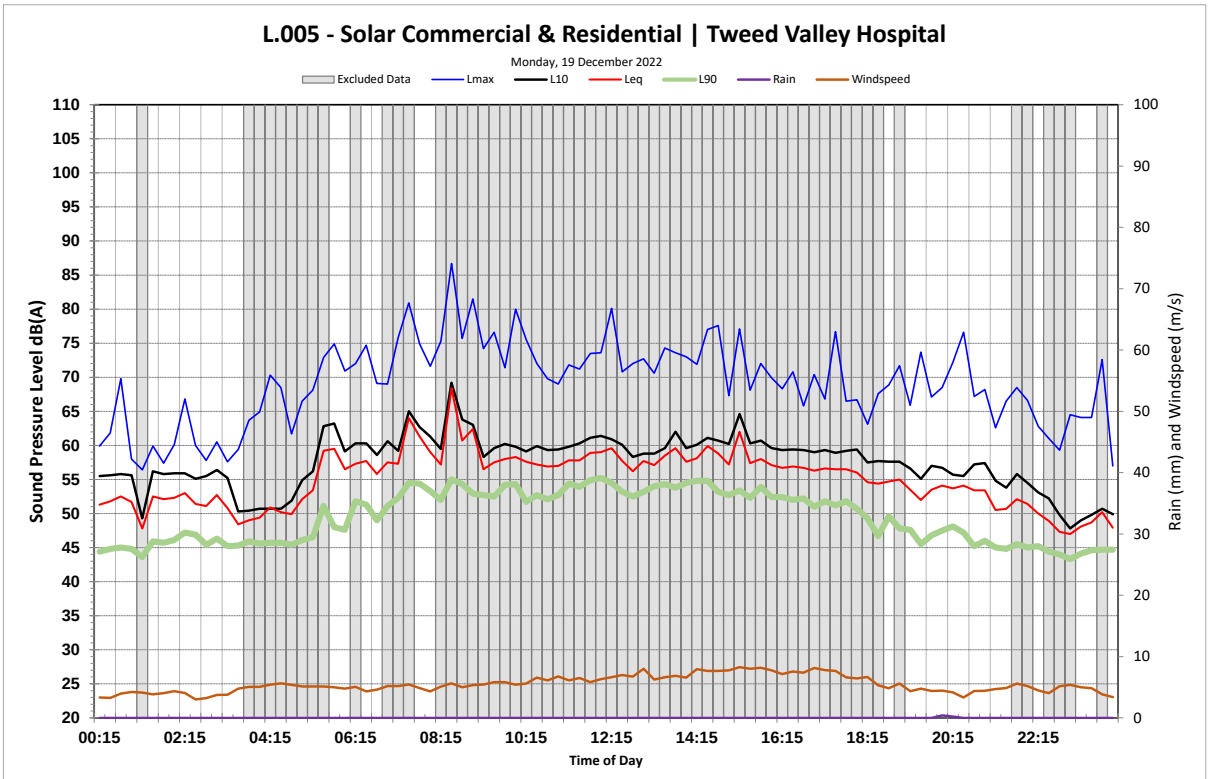
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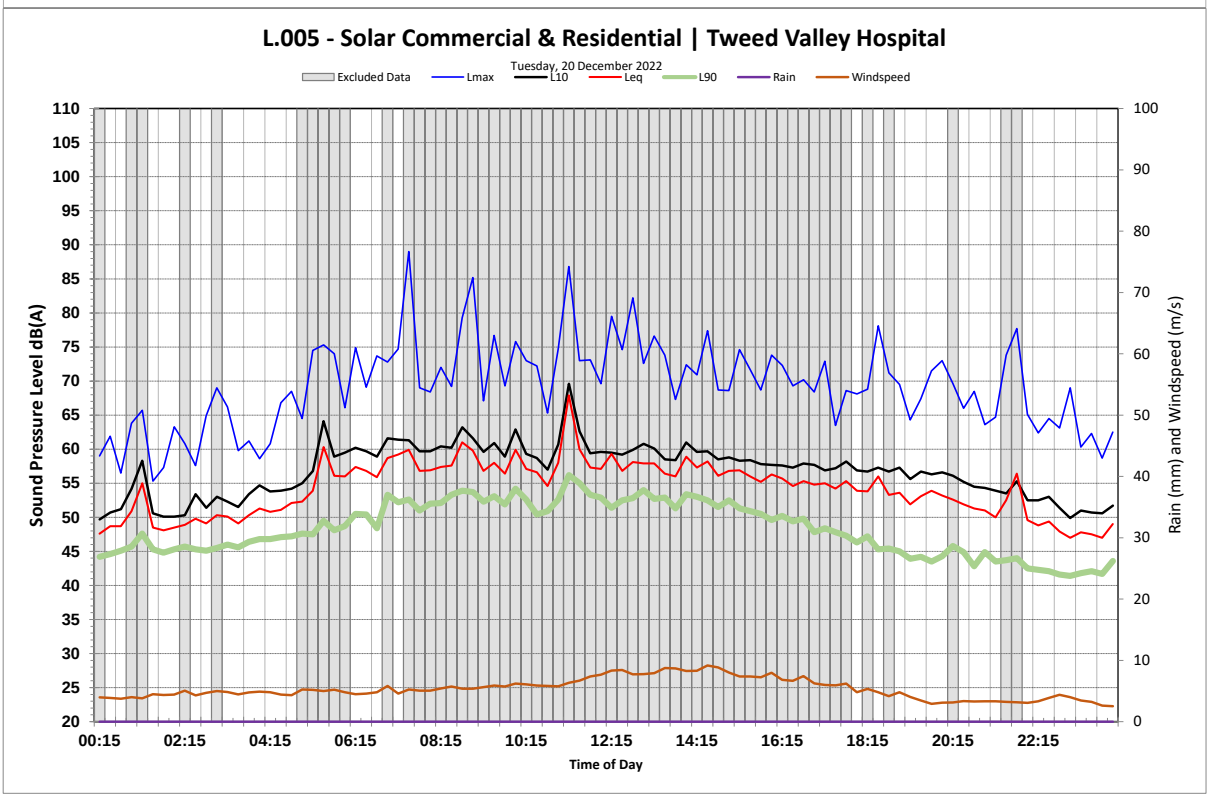
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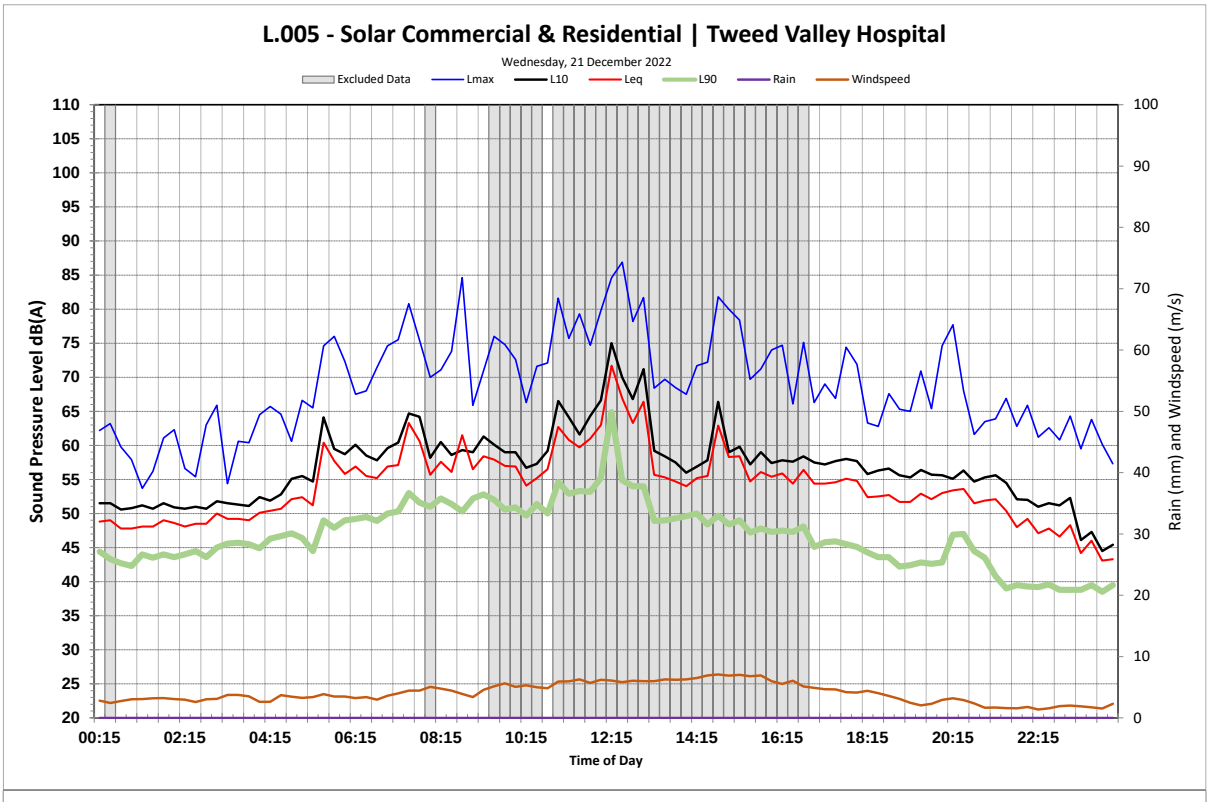
L.005 - Solar Commercial & Residential | Tweed Valley Hospital
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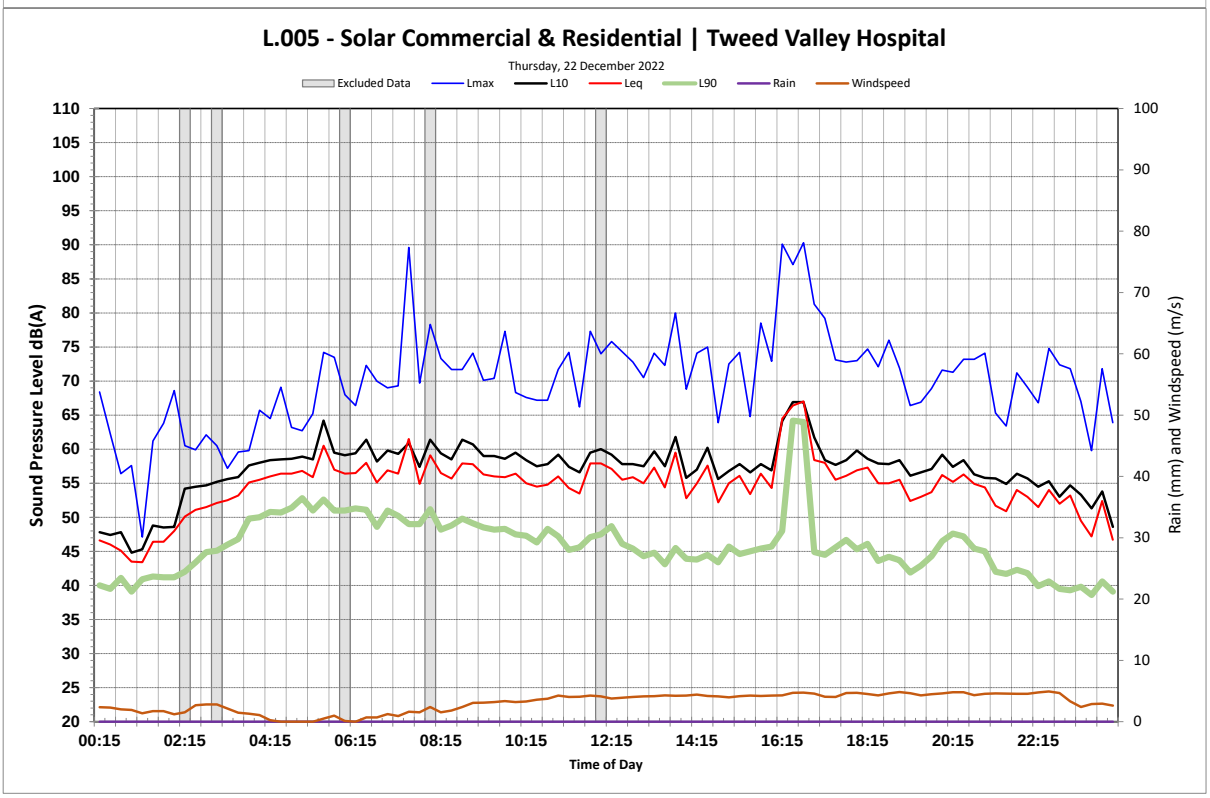
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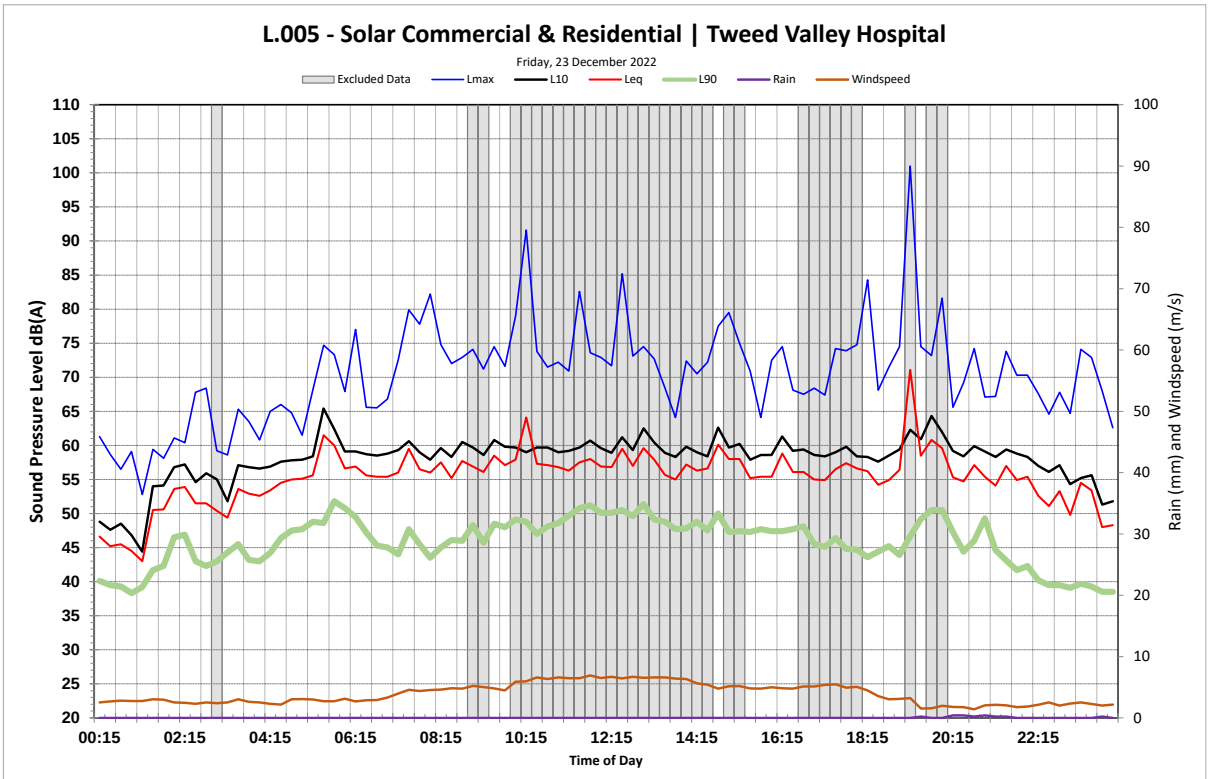
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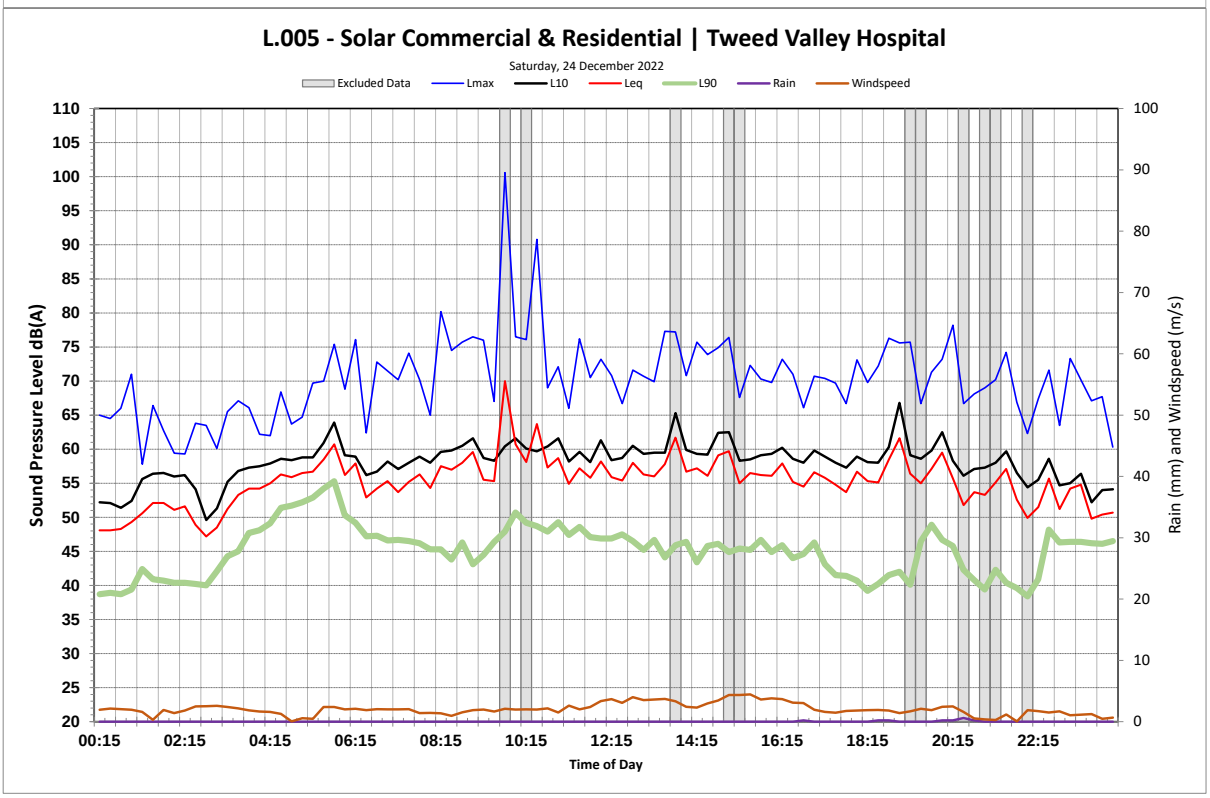
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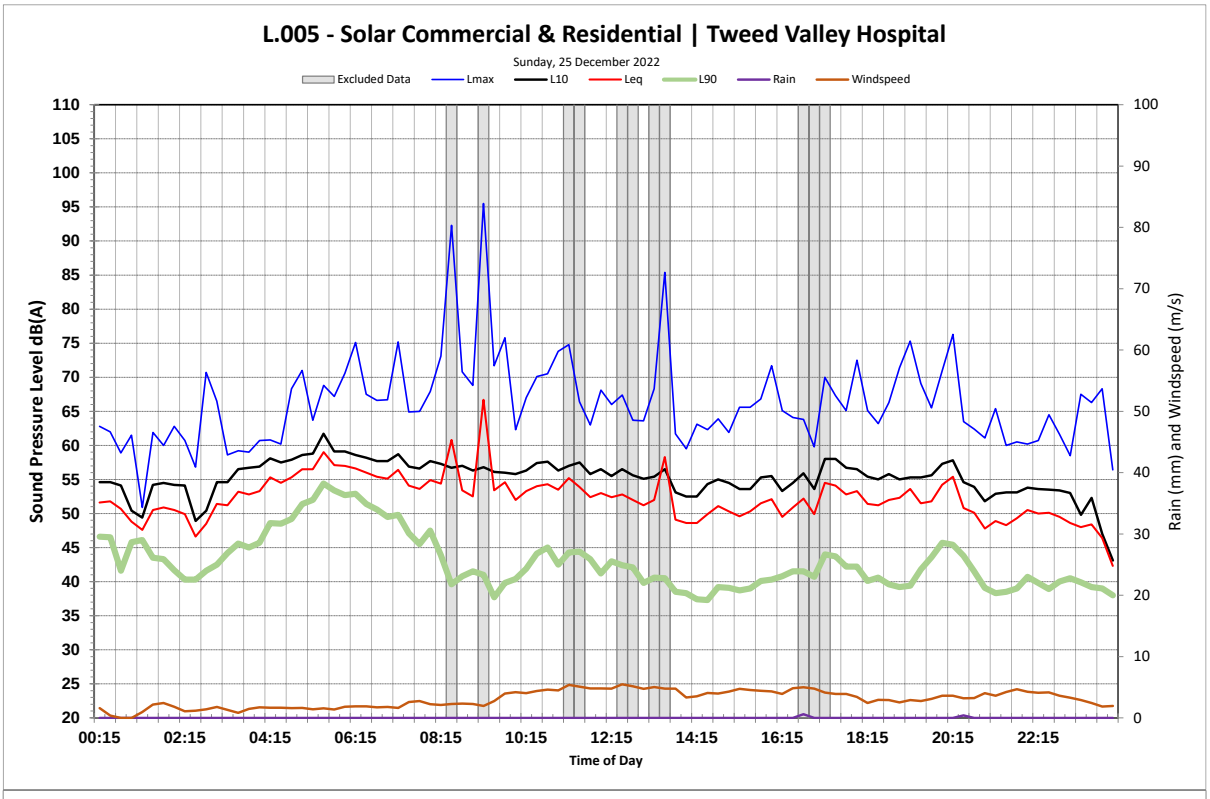
L.005 - Solar Commercial & Residential | Tweed Valley Hospital
Sunday, 25 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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16:15
18:15
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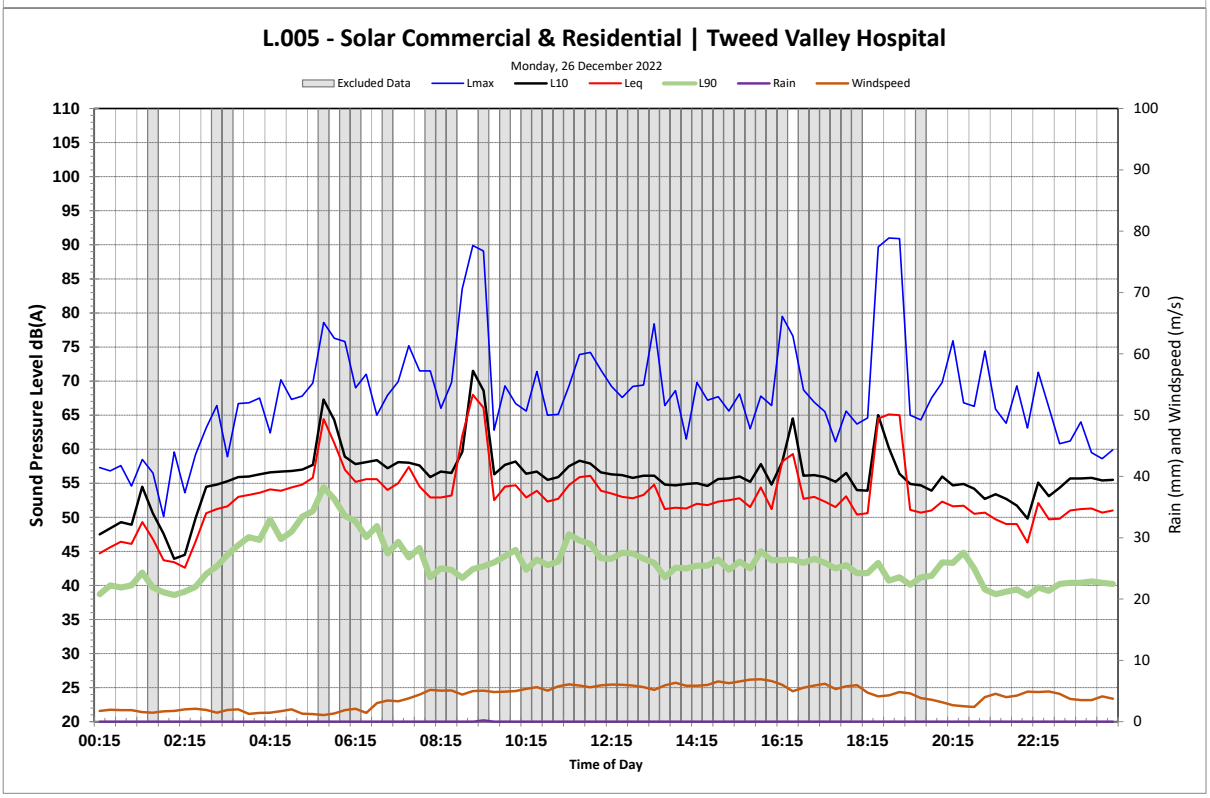
L.005 - Solar Commercial & Residential | Tweed Valley Hospital
Monday, 26 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
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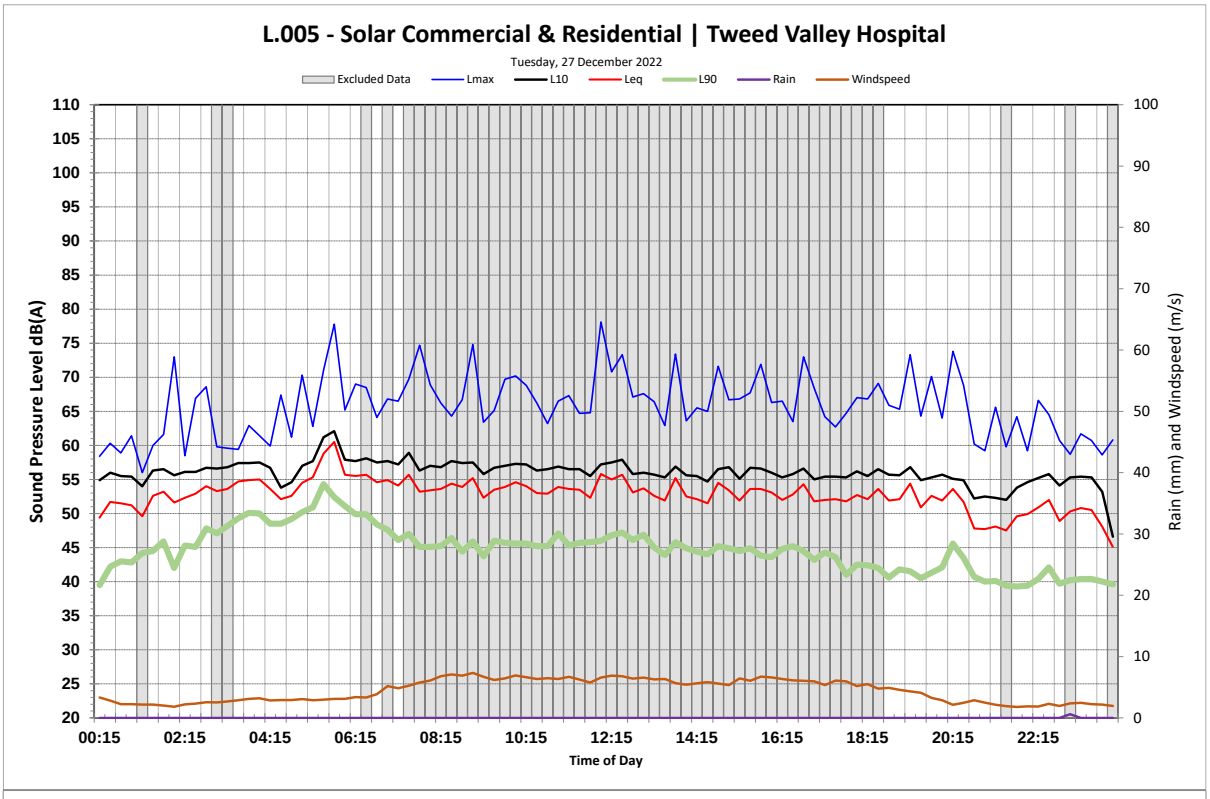
22:15


L.005 - Solar Commercial & Residential | Tweed Valley Hospital
Tuesday, 27 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
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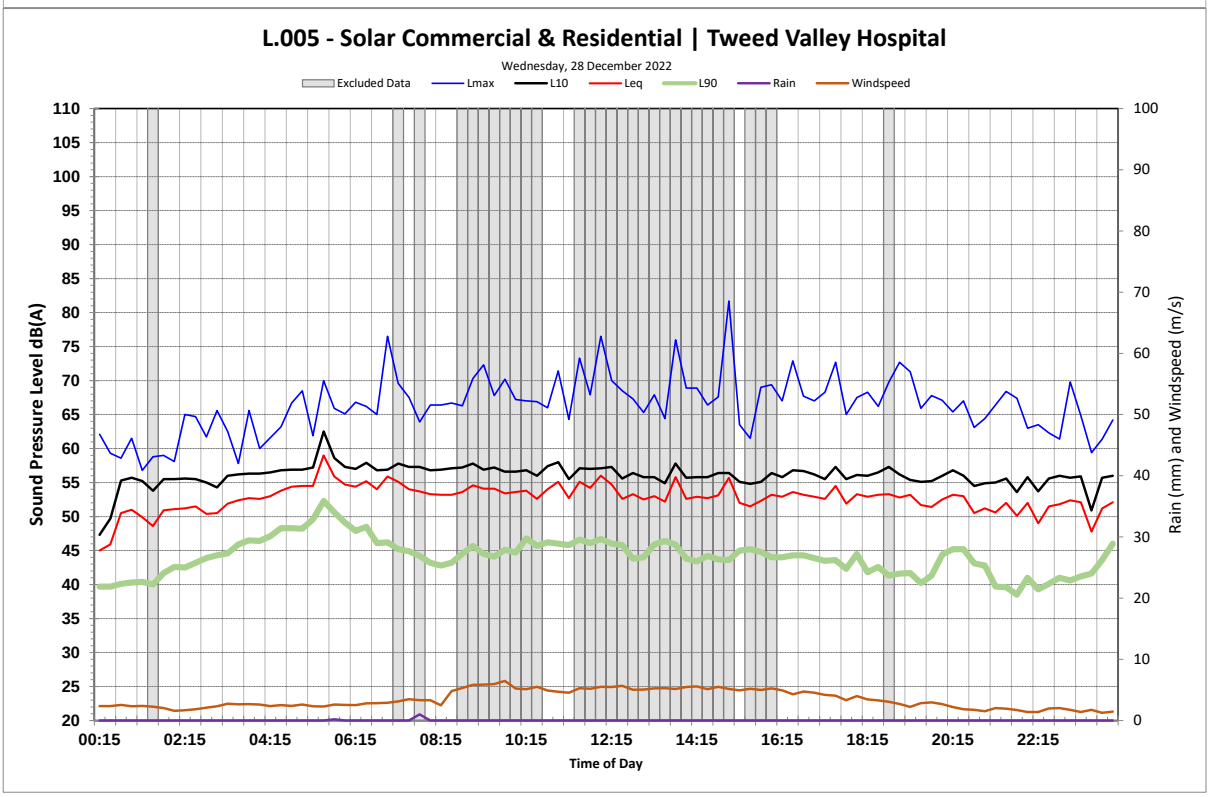
L.005 - Solar Commercial & Residential | Tweed Valley Hospital
Wednesday, 28 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
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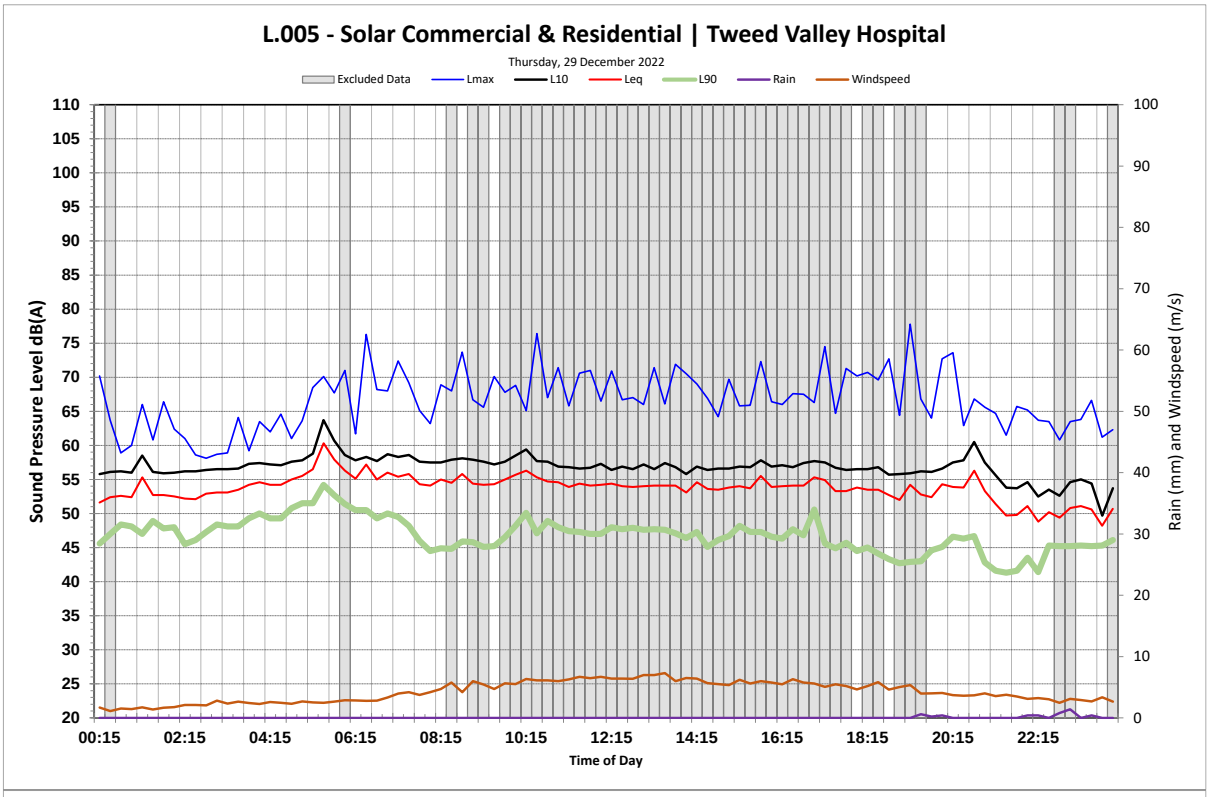
L.005 - Solar Commercial & Residential | Tweed Valley Hospital
Thursday, 29 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
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06:15
08:15
10:15
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14:15
16:15
18:15
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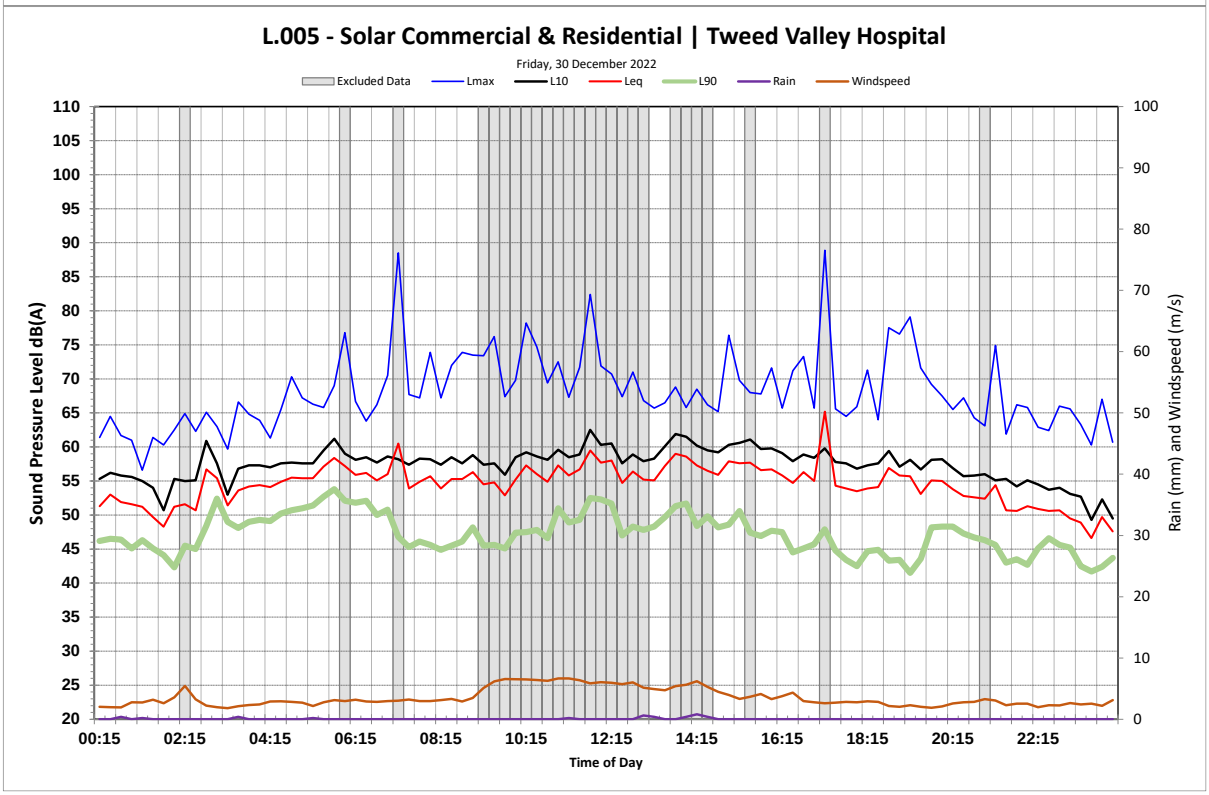
L.005 - Solar Commercial & Residential | Tweed Valley Hospital
Friday, 30 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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02:15
04:15
06:15
08:15
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14:15
16:15
18:15
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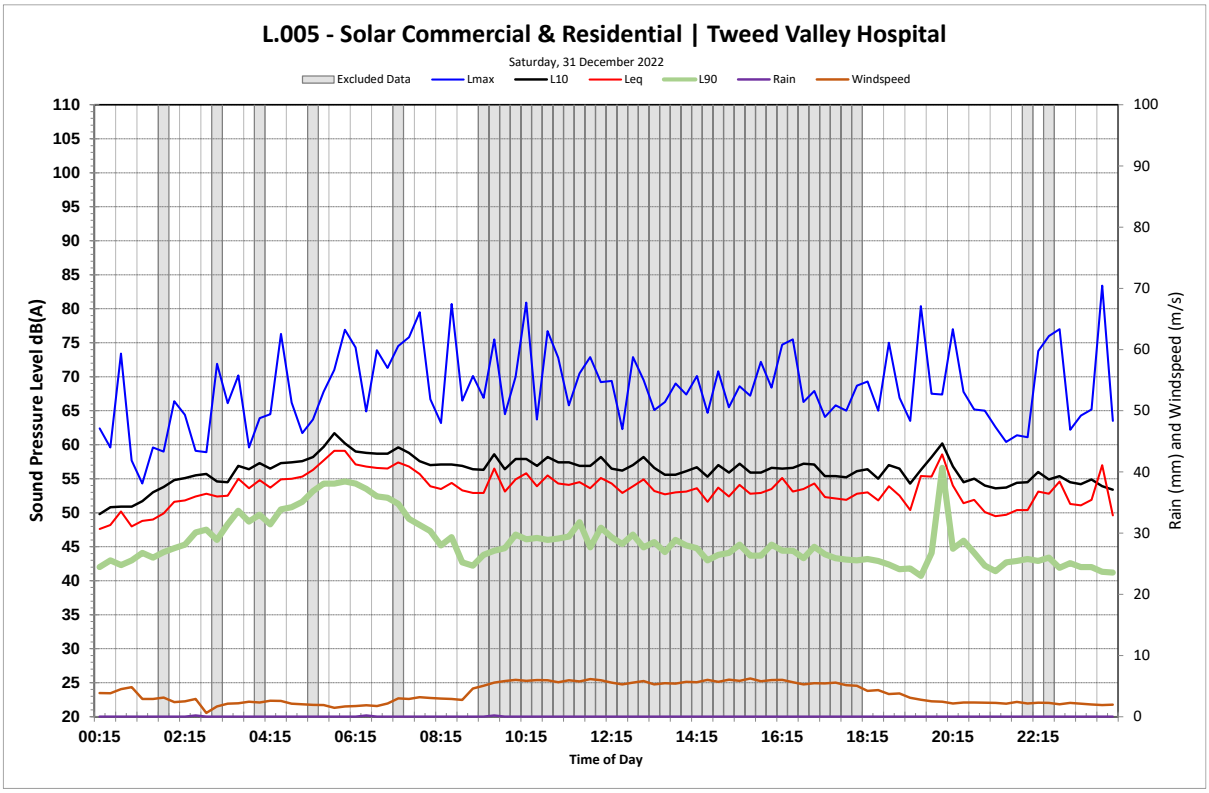
22:15


L.005 - Solar Commercial & Residential | Tweed Valley Hospital
Saturday, 31 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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04:15
06:15
08:15
10:15
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14:15
16:15
18:15
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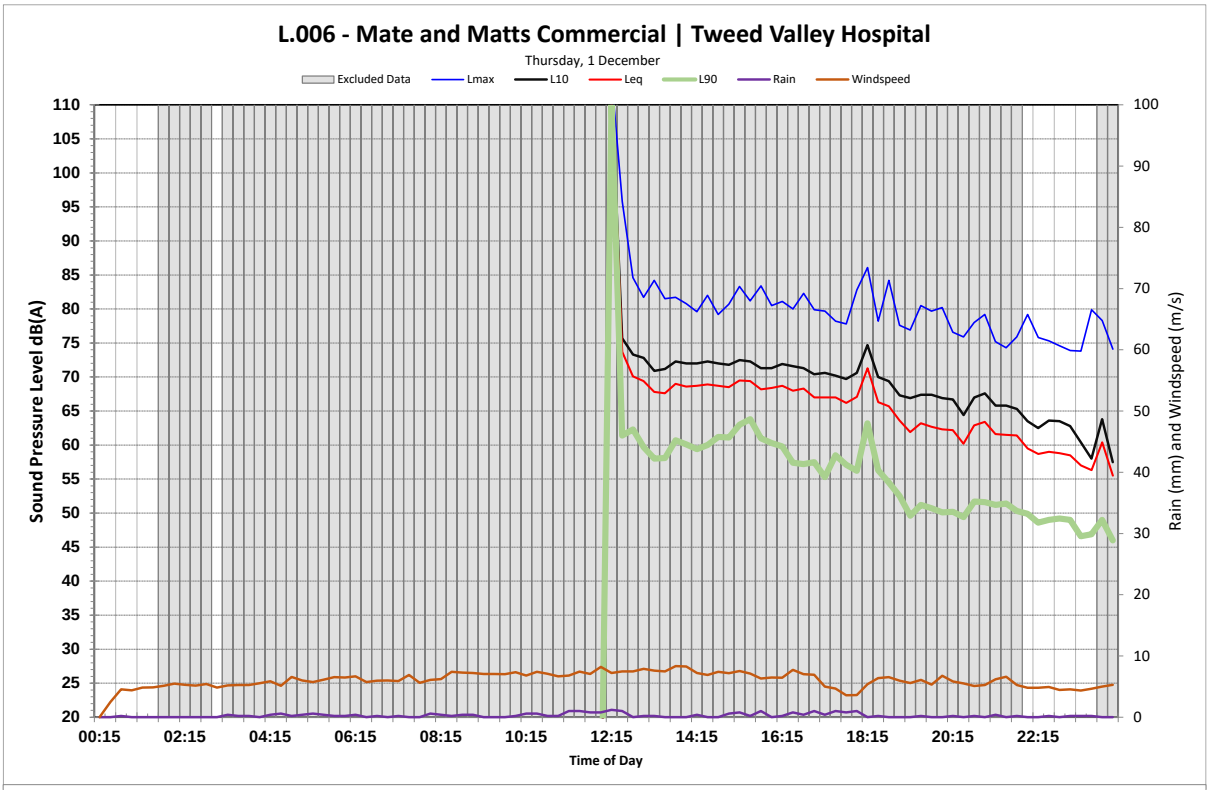
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Thursday, 1 December
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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04:15
06:15
08:15
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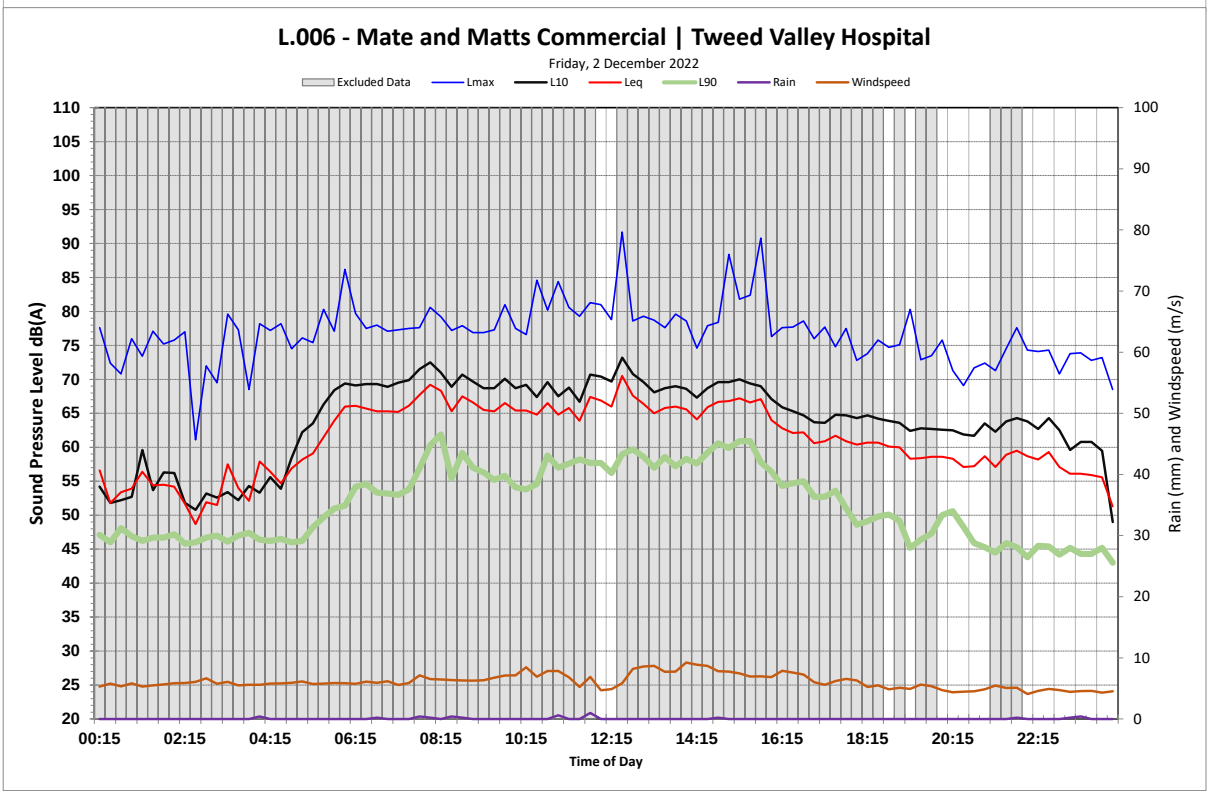
14:15
16:15
18:15
20:15
22:15


L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Friday, 2 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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02:15
04:15
06:15
08:15
10:15
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14:15
16:15
18:15
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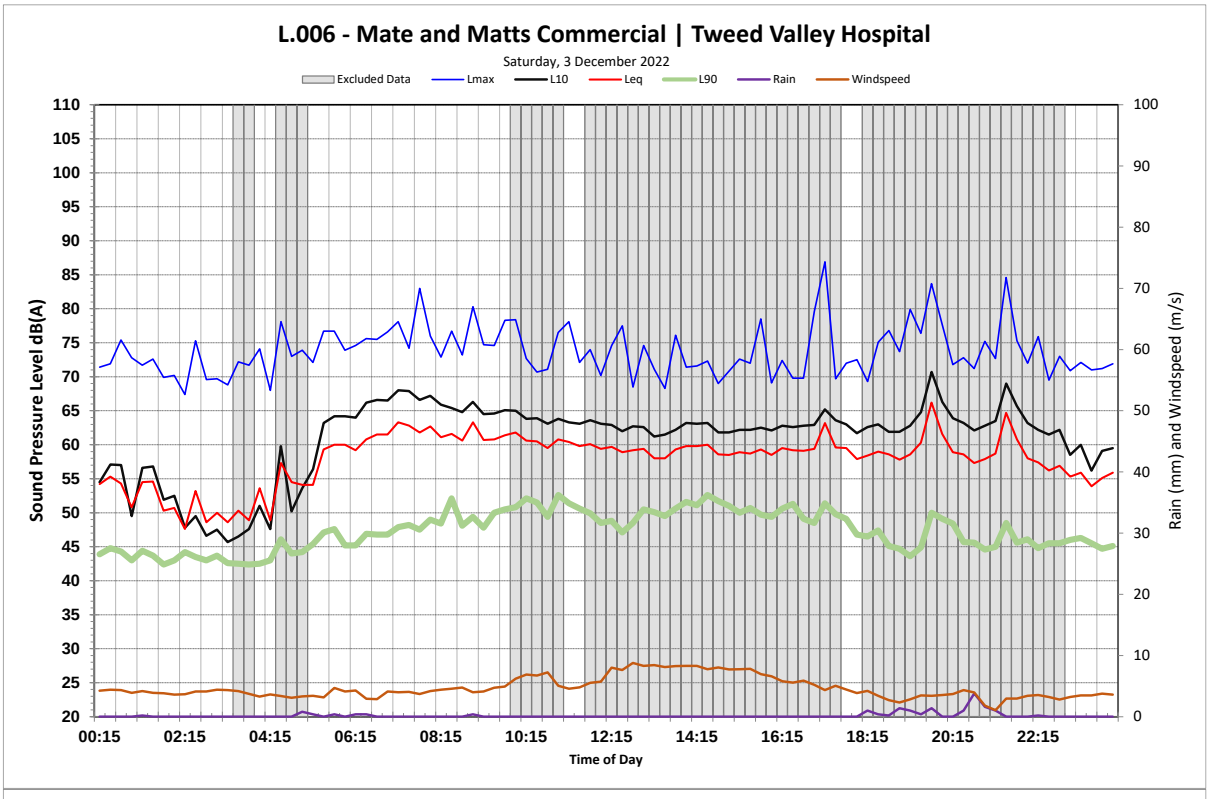
22:15


L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Saturday, 3 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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02:15
04:15
06:15
08:15
10:15
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14:15
16:15
18:15
20:15
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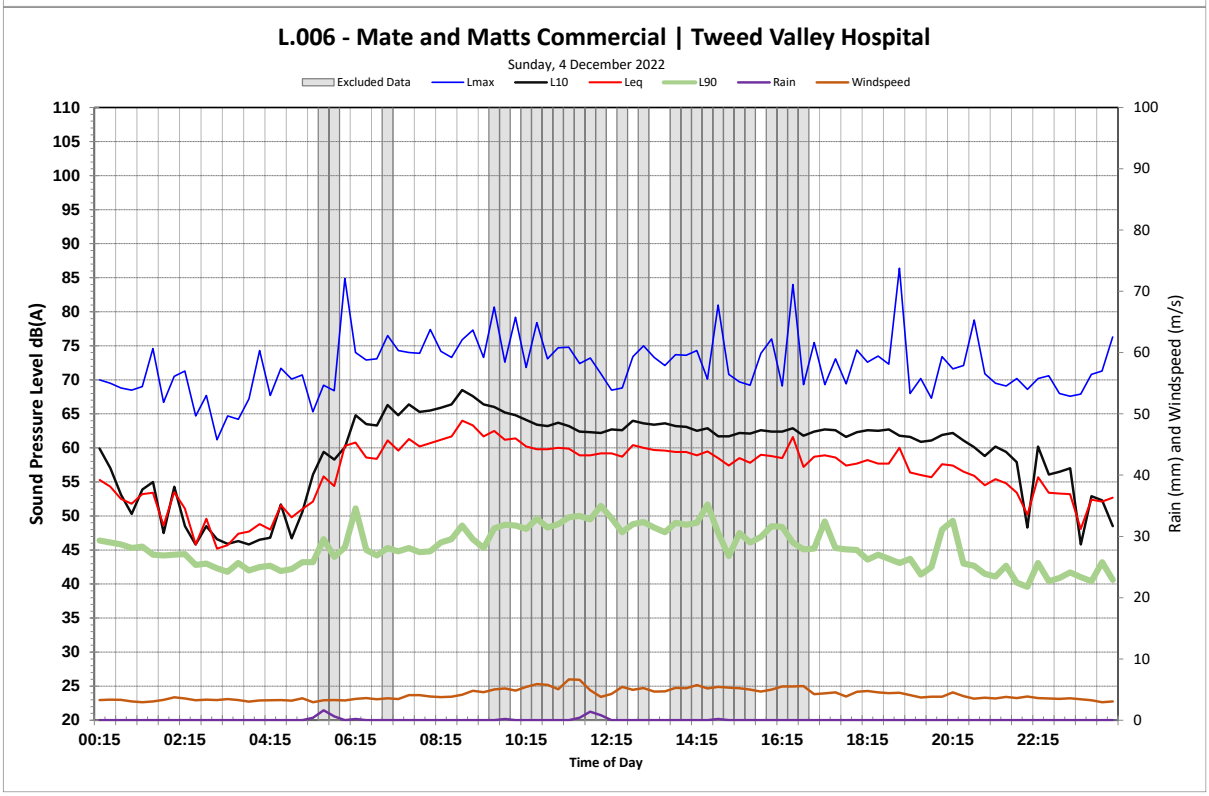
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Sunday, 4 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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02:15
04:15
06:15
08:15
10:15
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14:15
16:15
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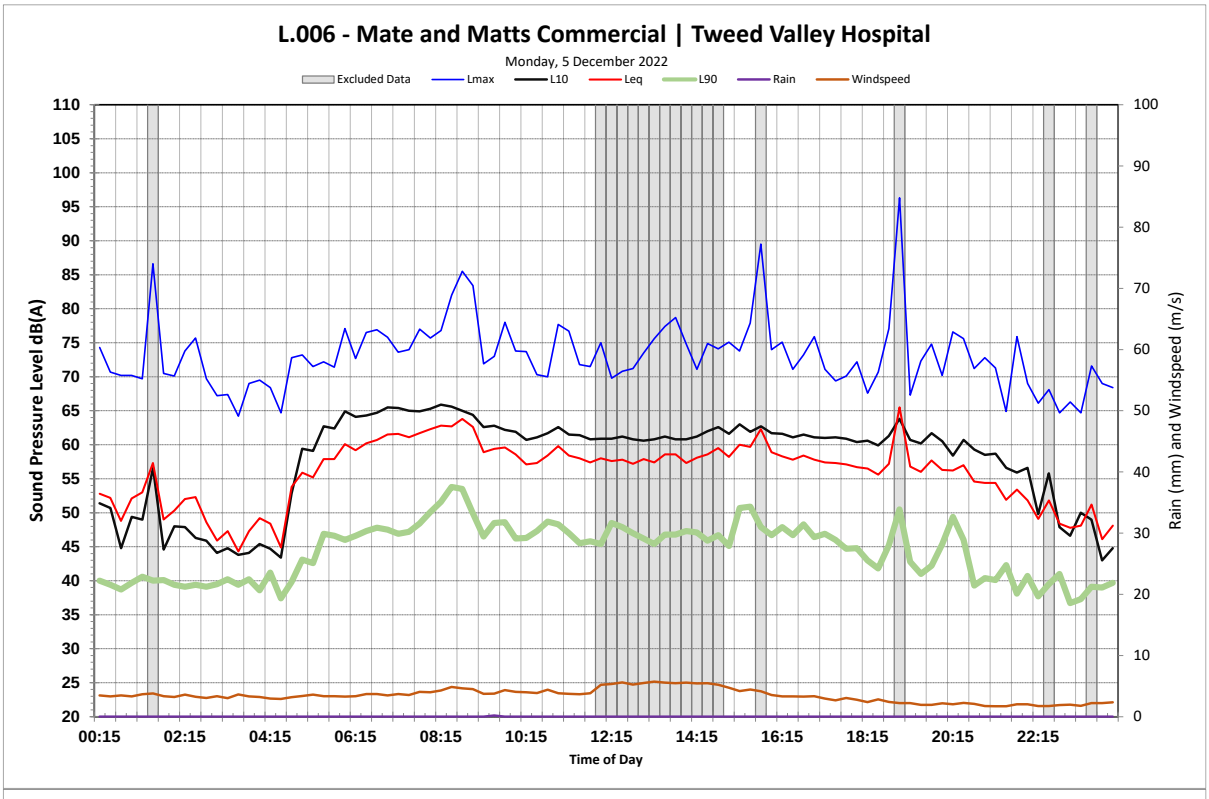
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Monday, 5 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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18:15
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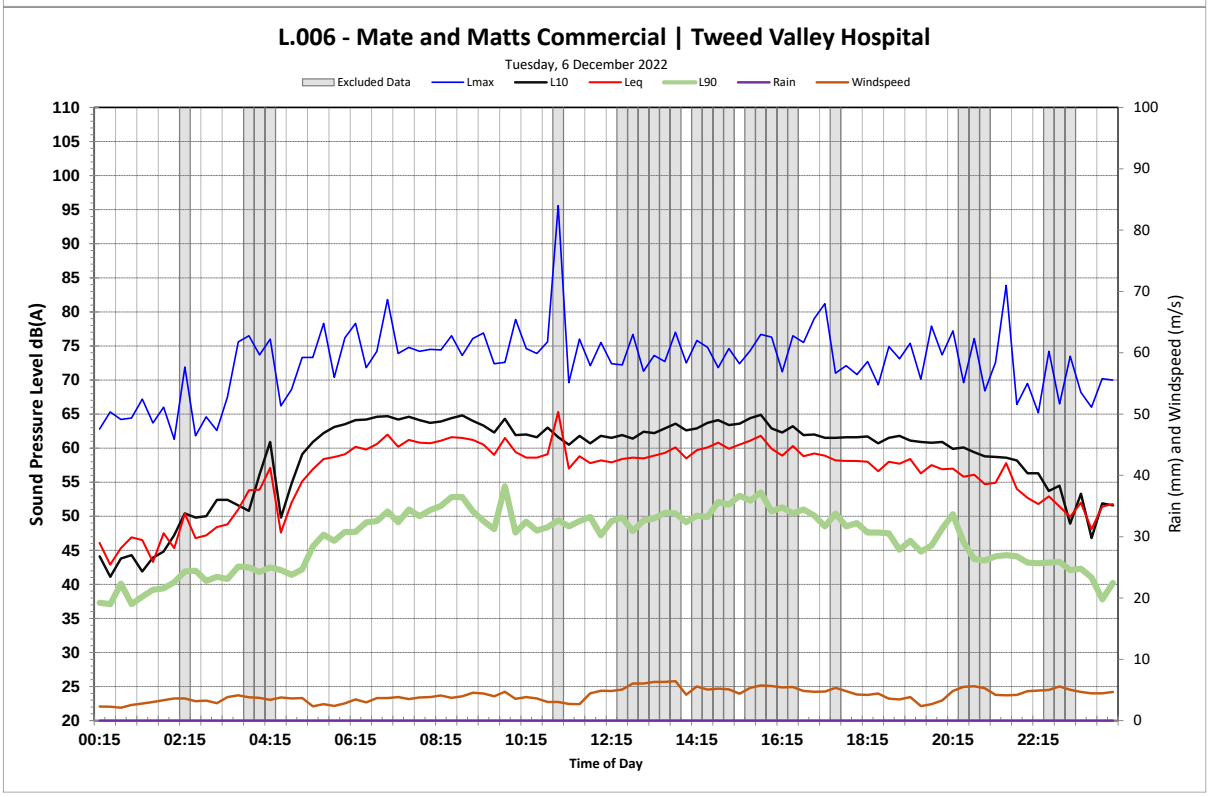
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Tuesday, 6 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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04:15
06:15
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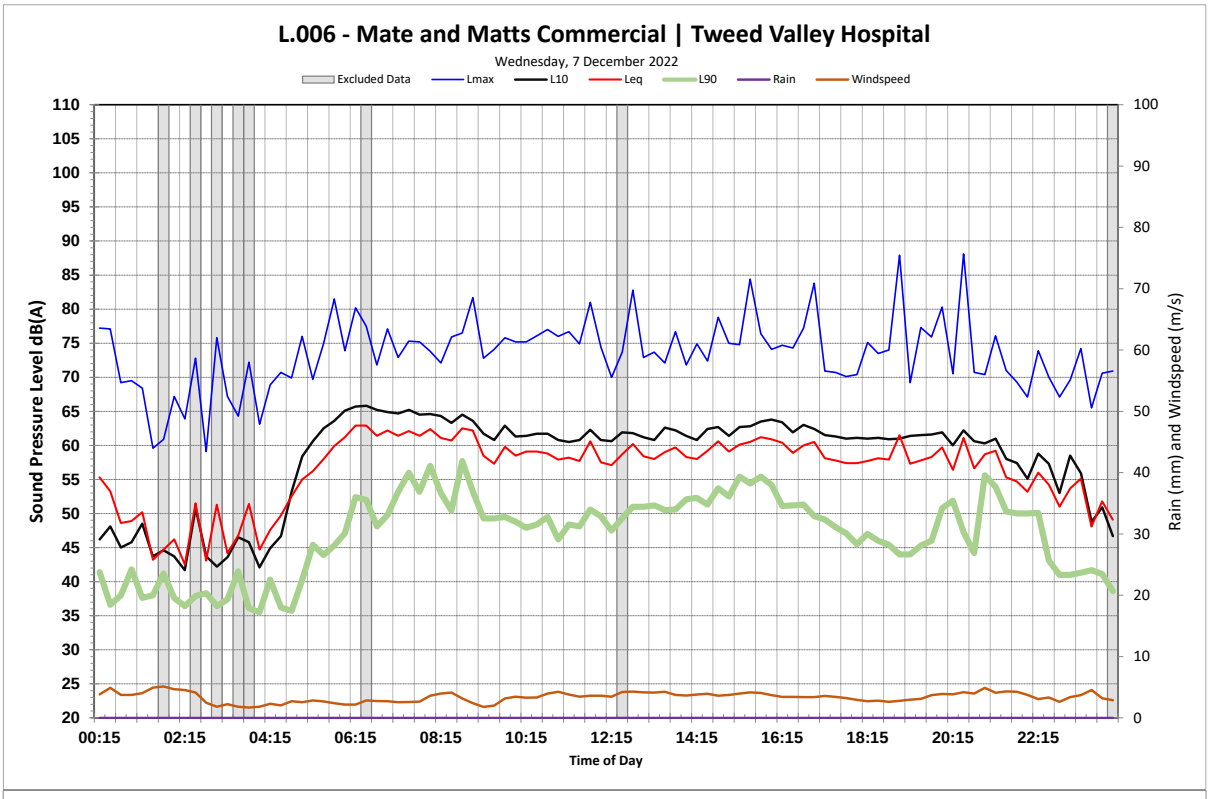
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Wednesday, 7 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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06:15
08:15
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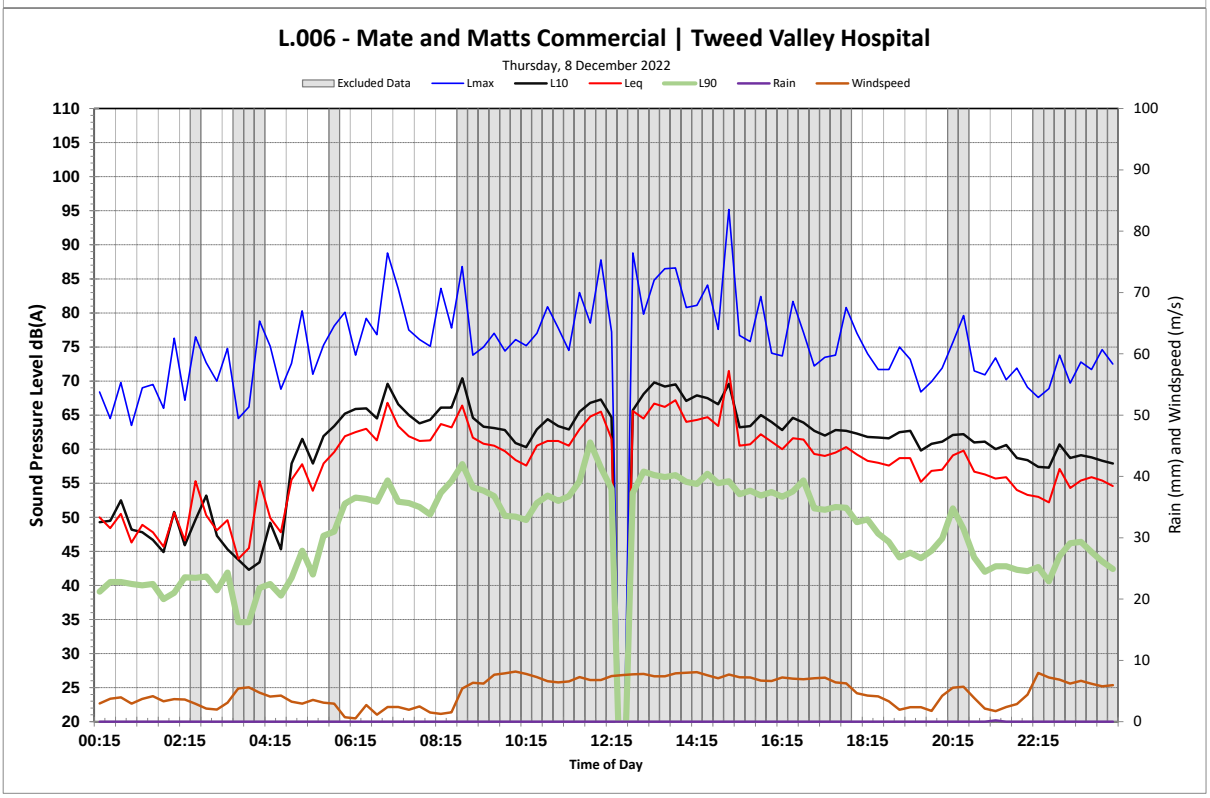
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Thursday, 8 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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04:15
06:15
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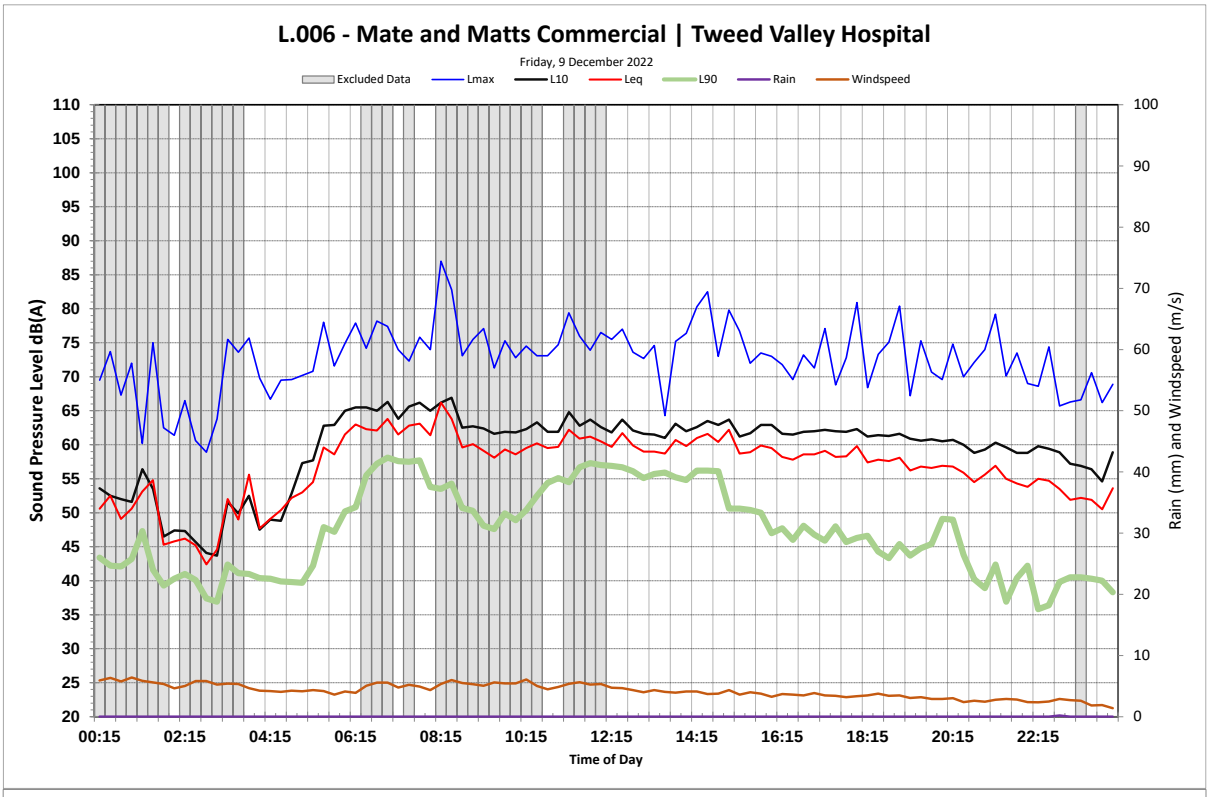
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Friday, 9 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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06:15
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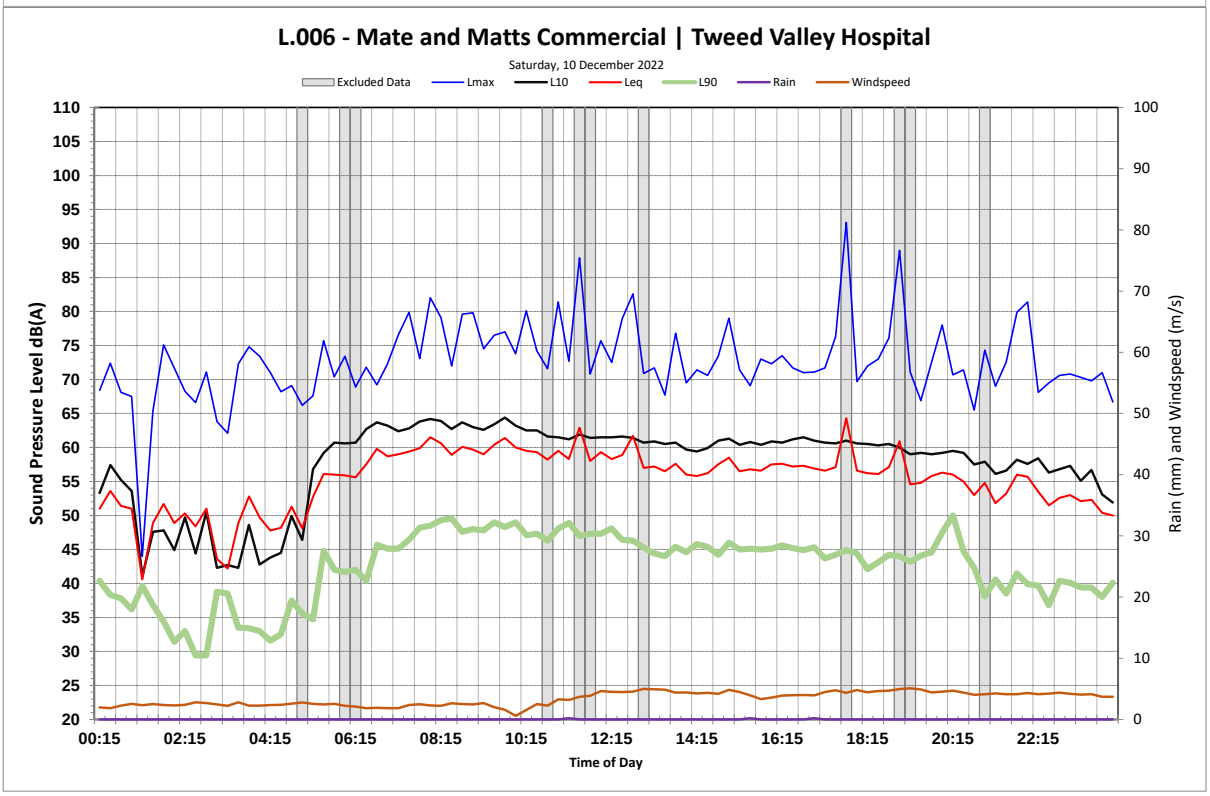
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Saturday, 10 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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14:15
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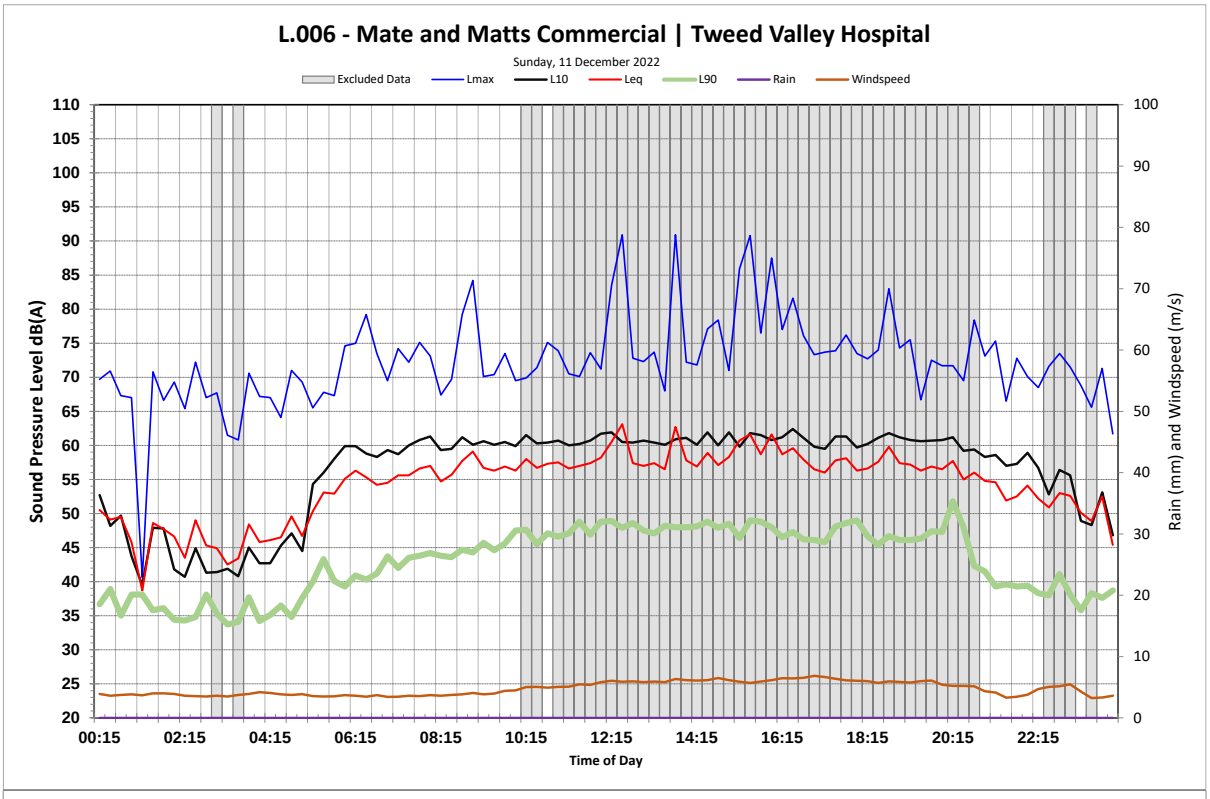
22:15


L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Sunday, 11 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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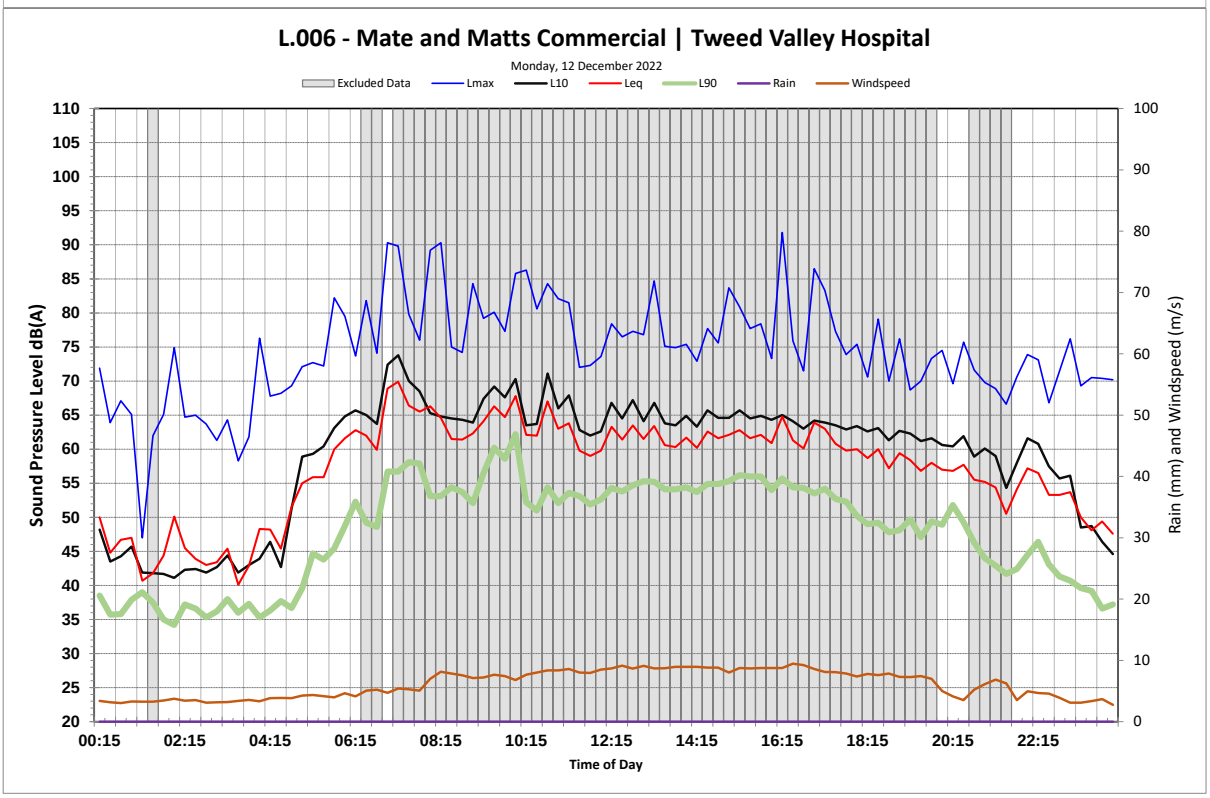
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Monday, 12 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
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16:15
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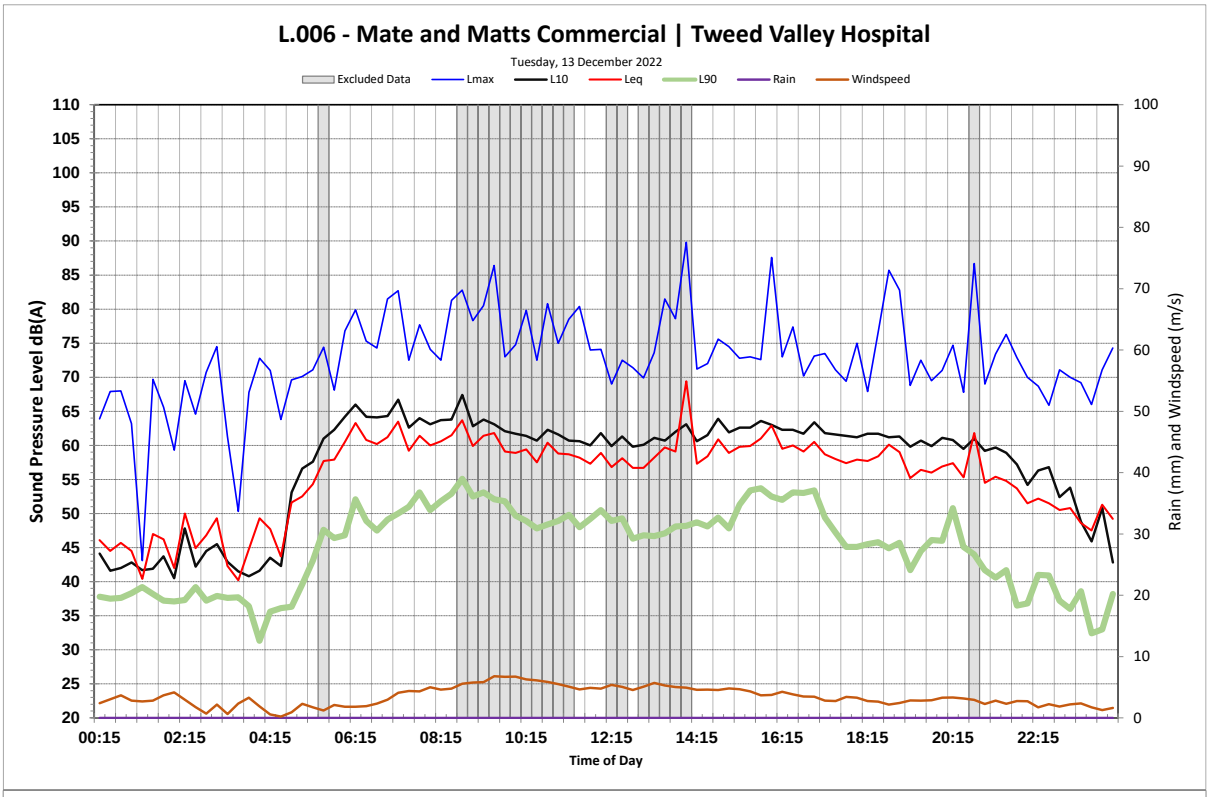
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Tuesday, 13 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
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06:15
08:15
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16:15
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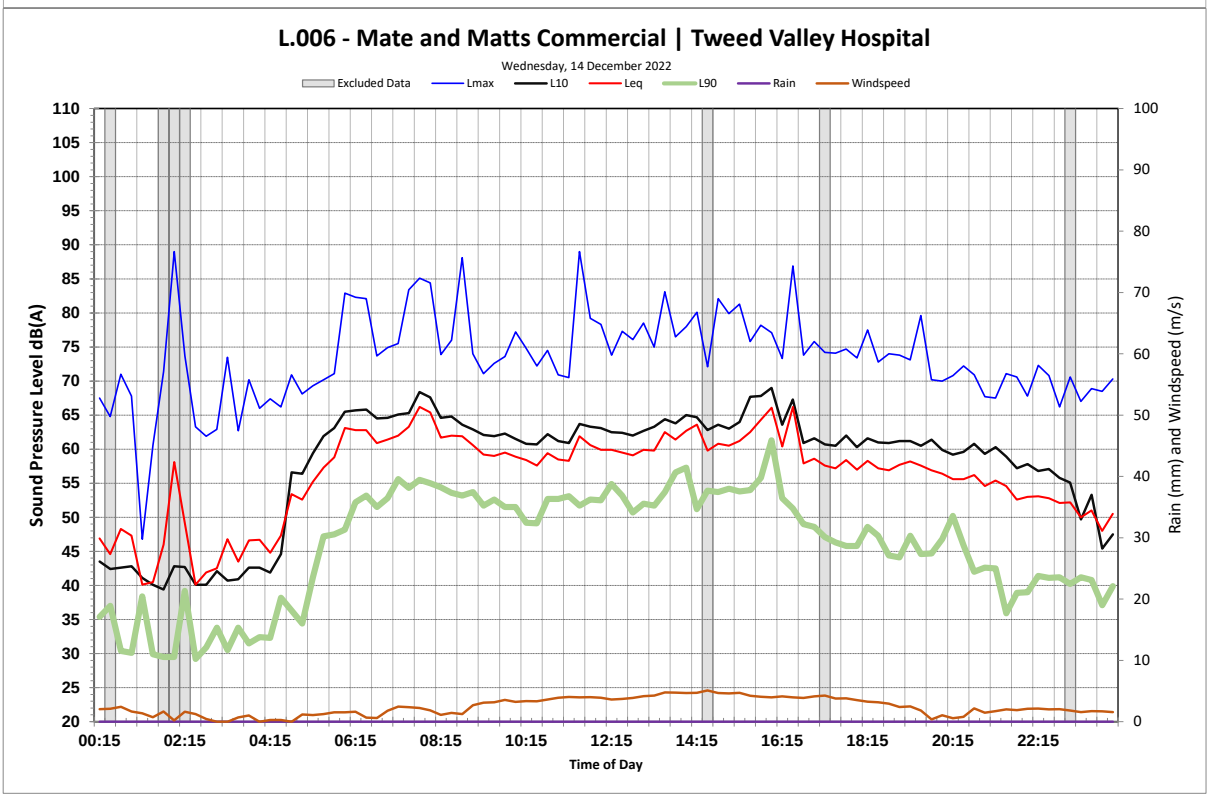
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Wednesday, 14 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
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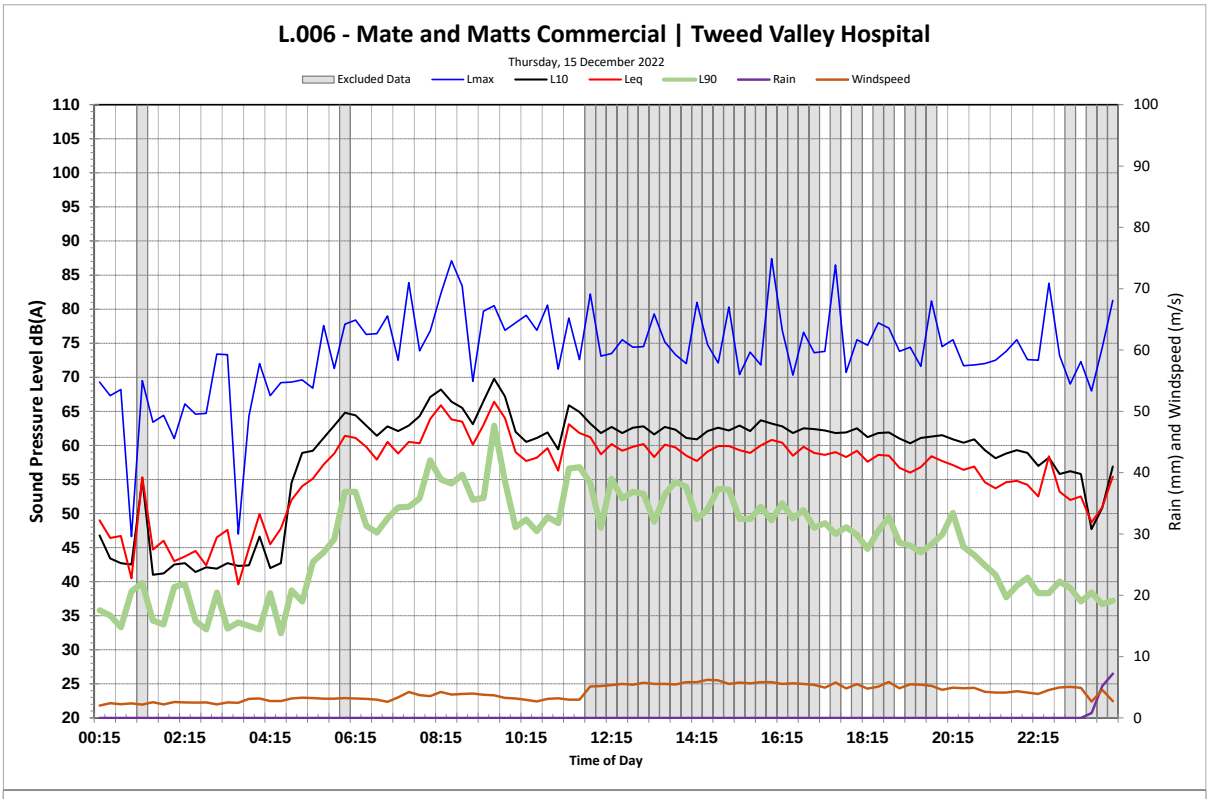
22:15


L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Thursday, 15 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
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16:15
18:15
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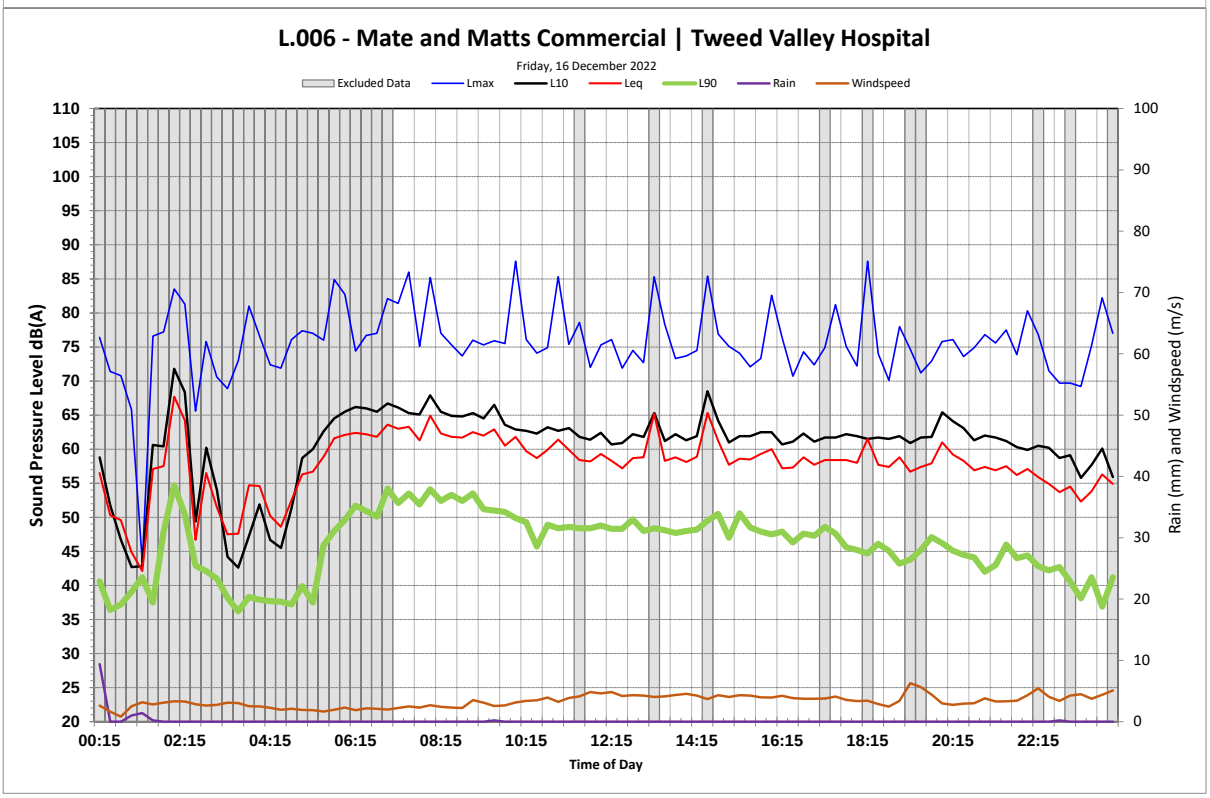
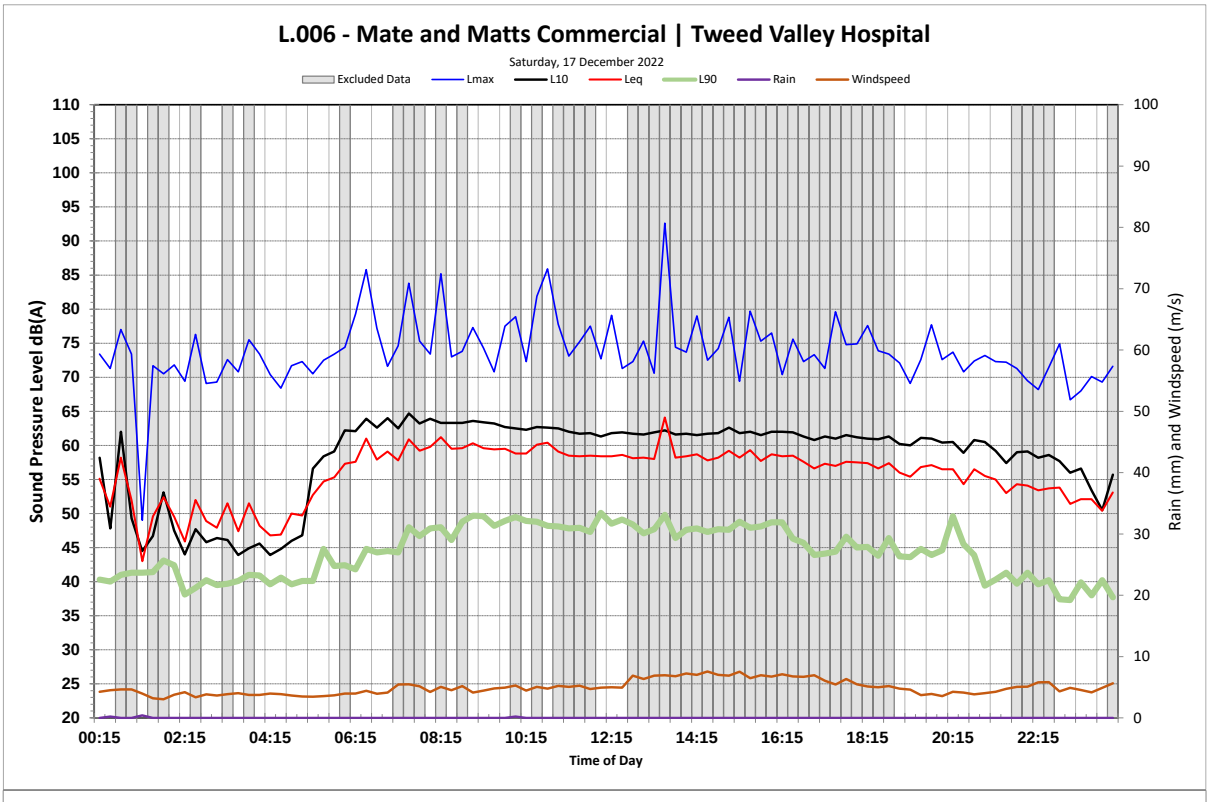
22:15


L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Friday, 16 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15


L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Saturday, 17 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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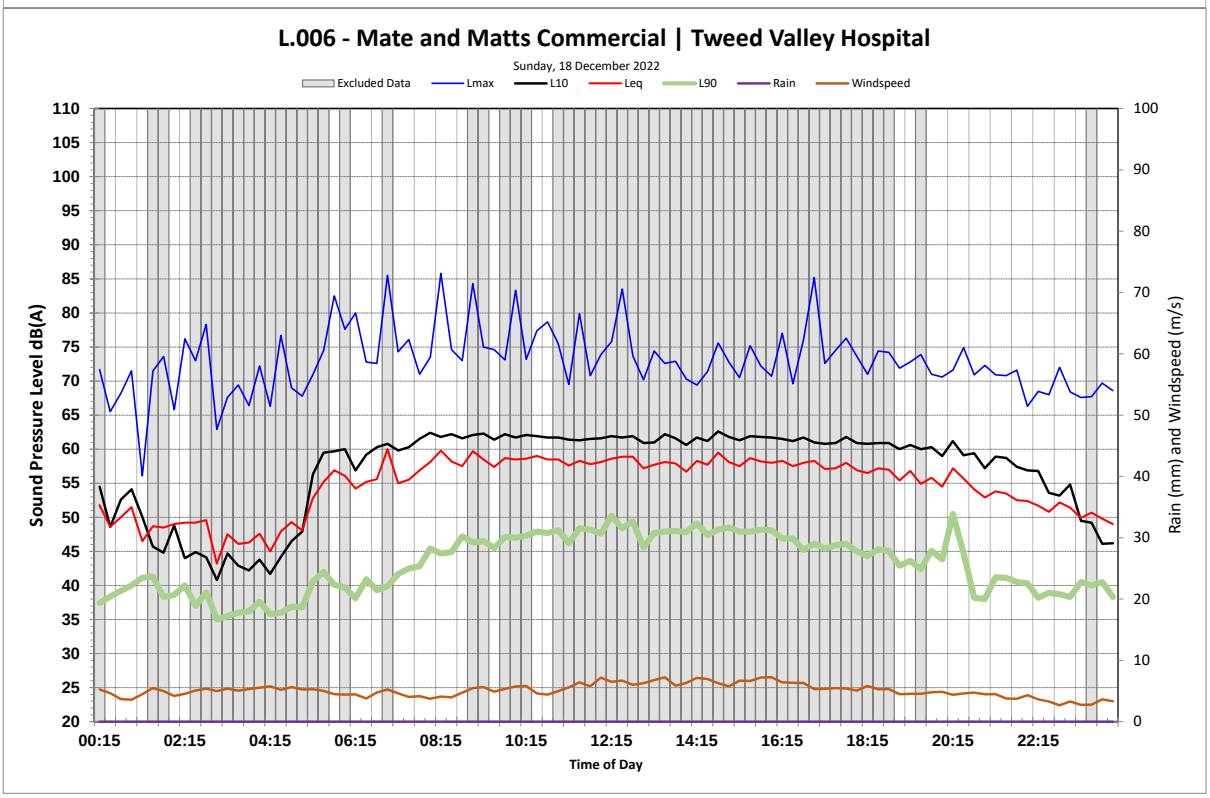
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Sunday, 18 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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14:15
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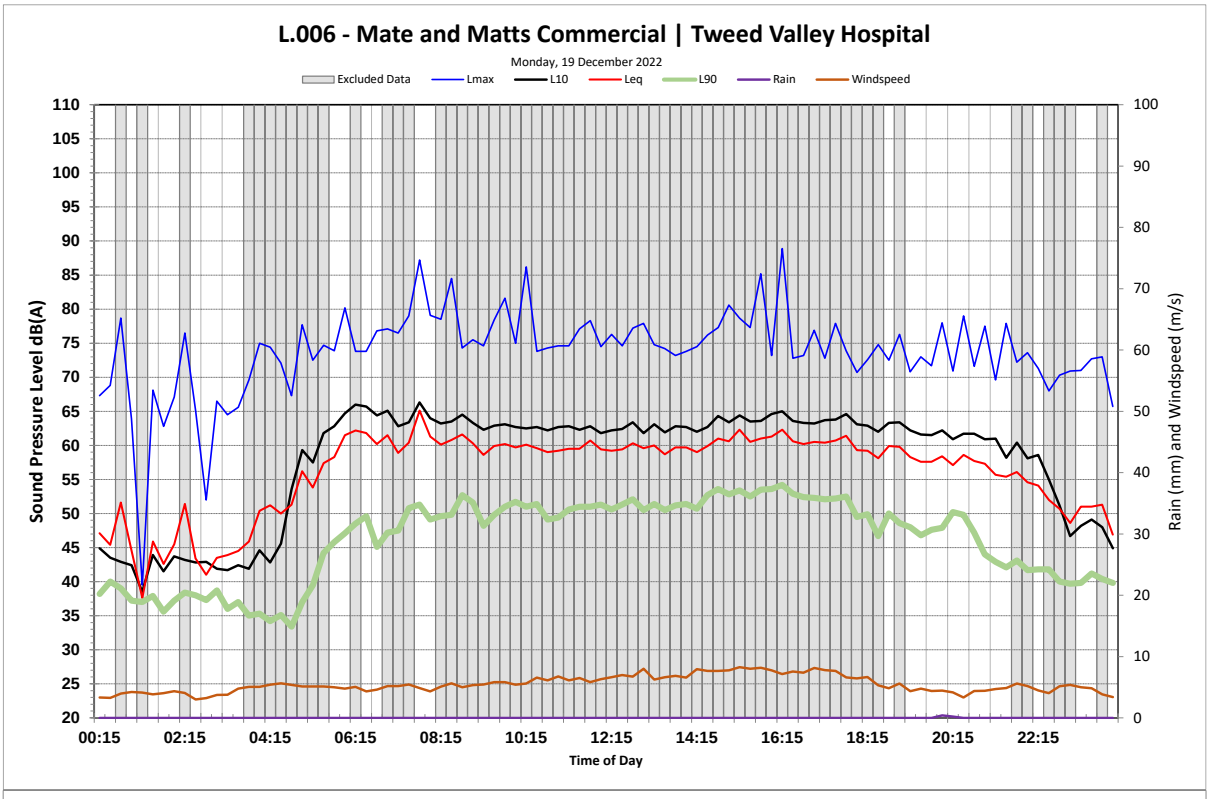
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Monday, 19 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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04:15
06:15
08:15
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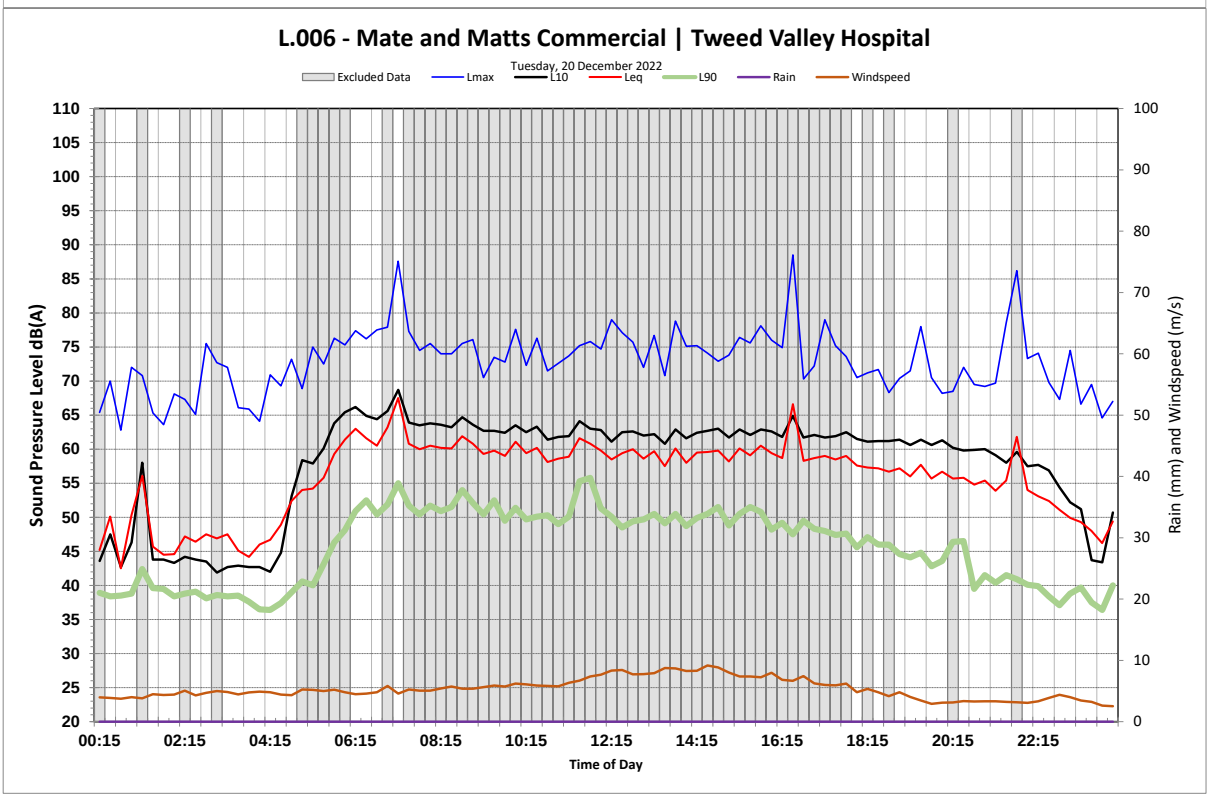
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Tuesday, 20 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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06:15
08:15
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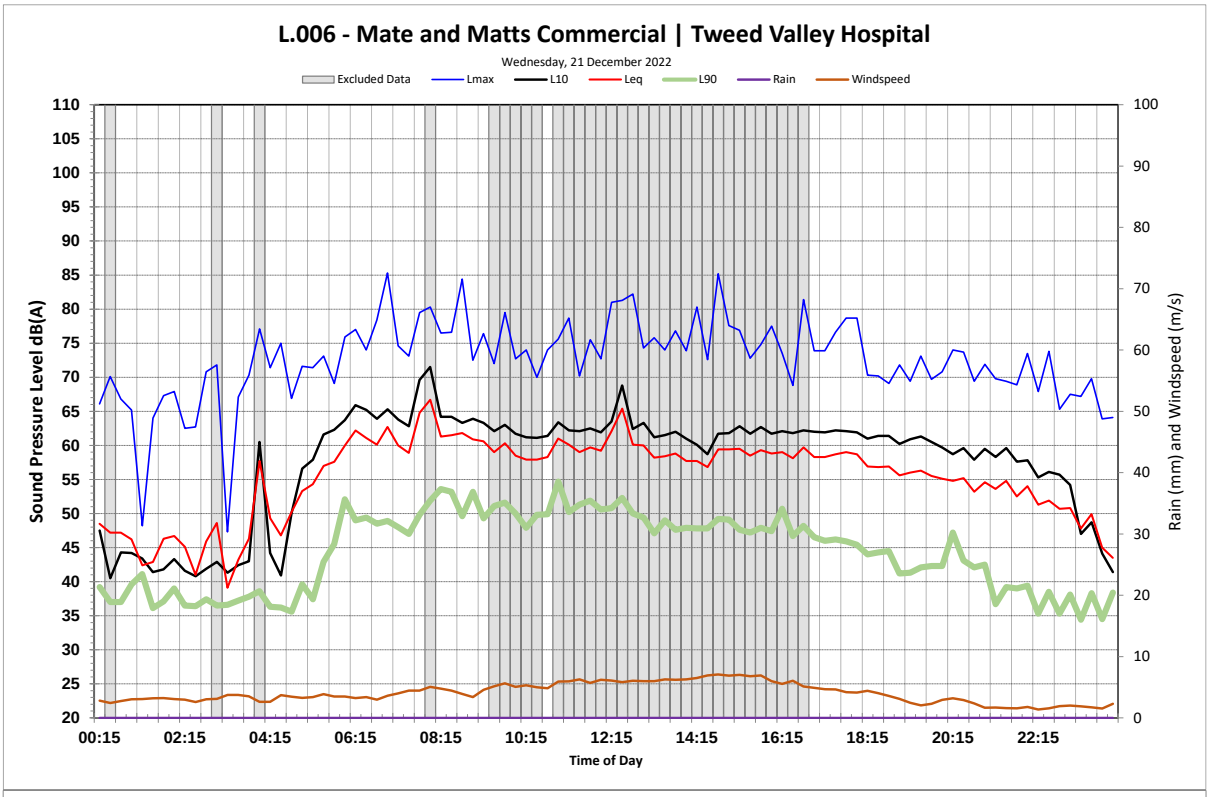
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Wednesday, 21 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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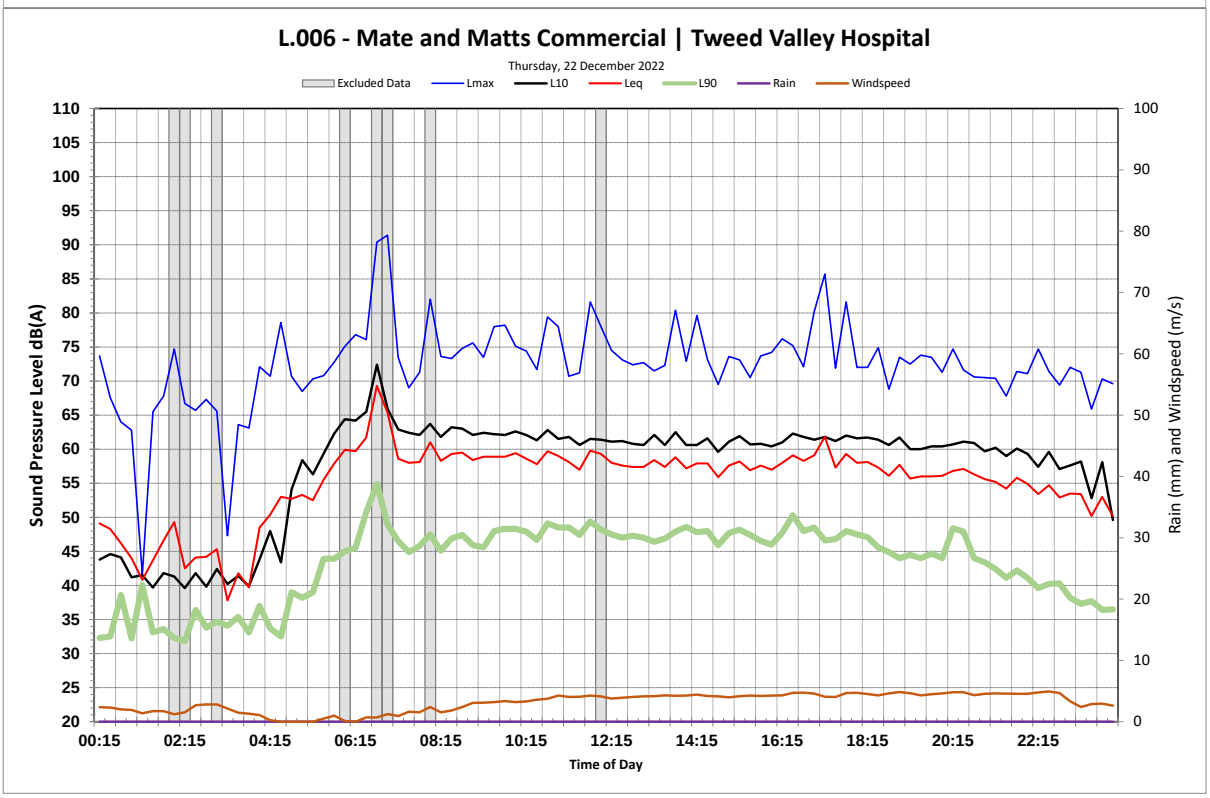
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Thursday, 22 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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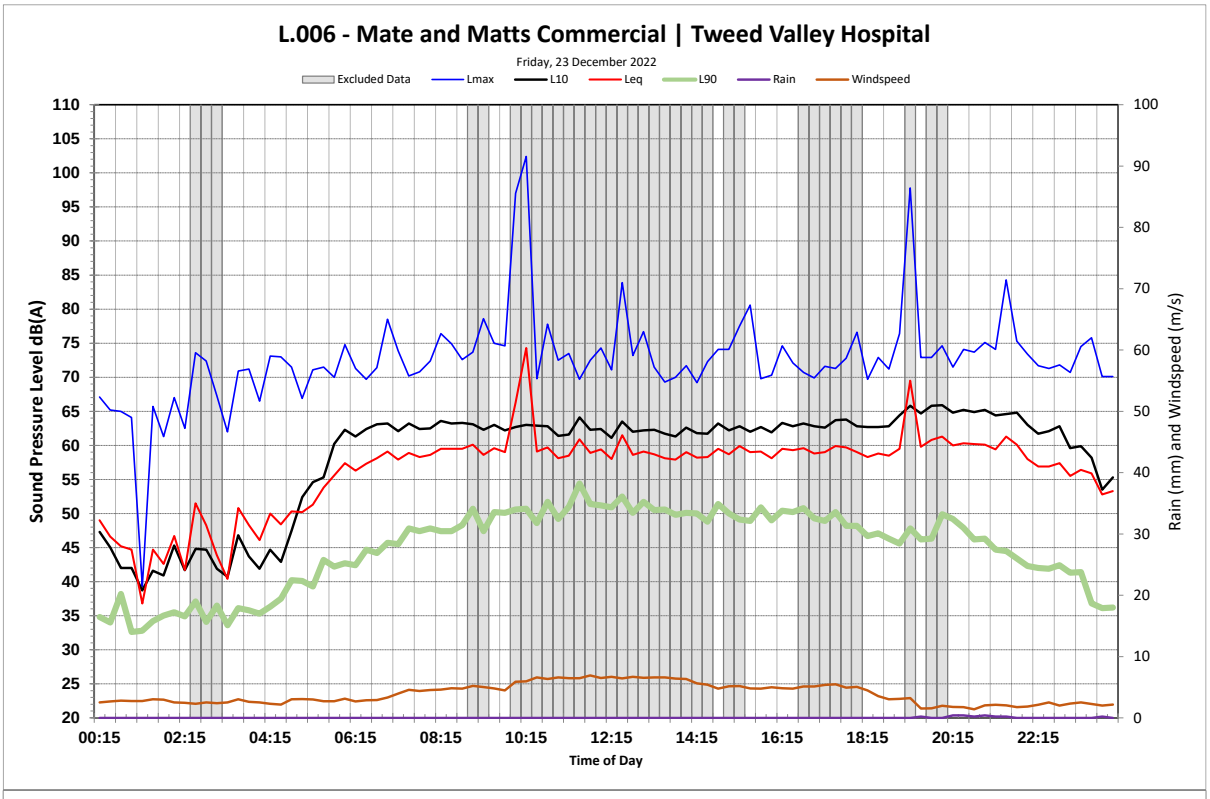
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Friday, 23 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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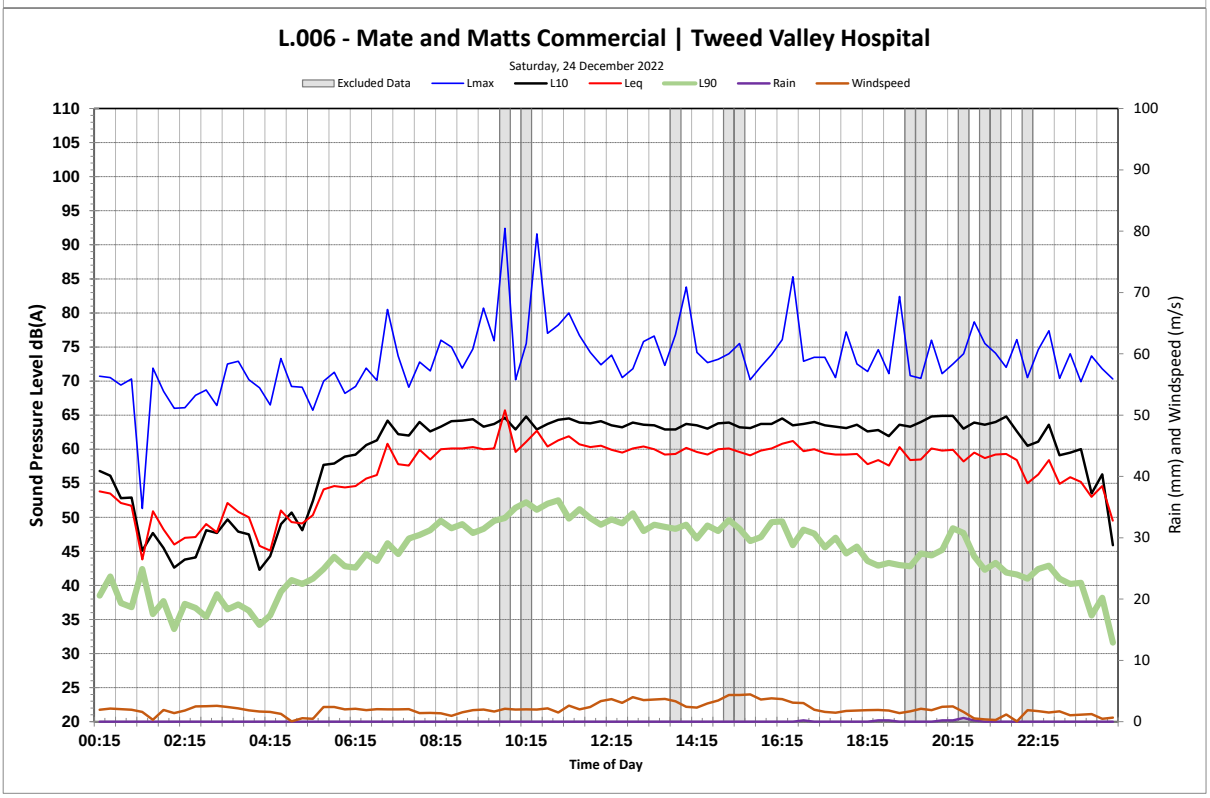
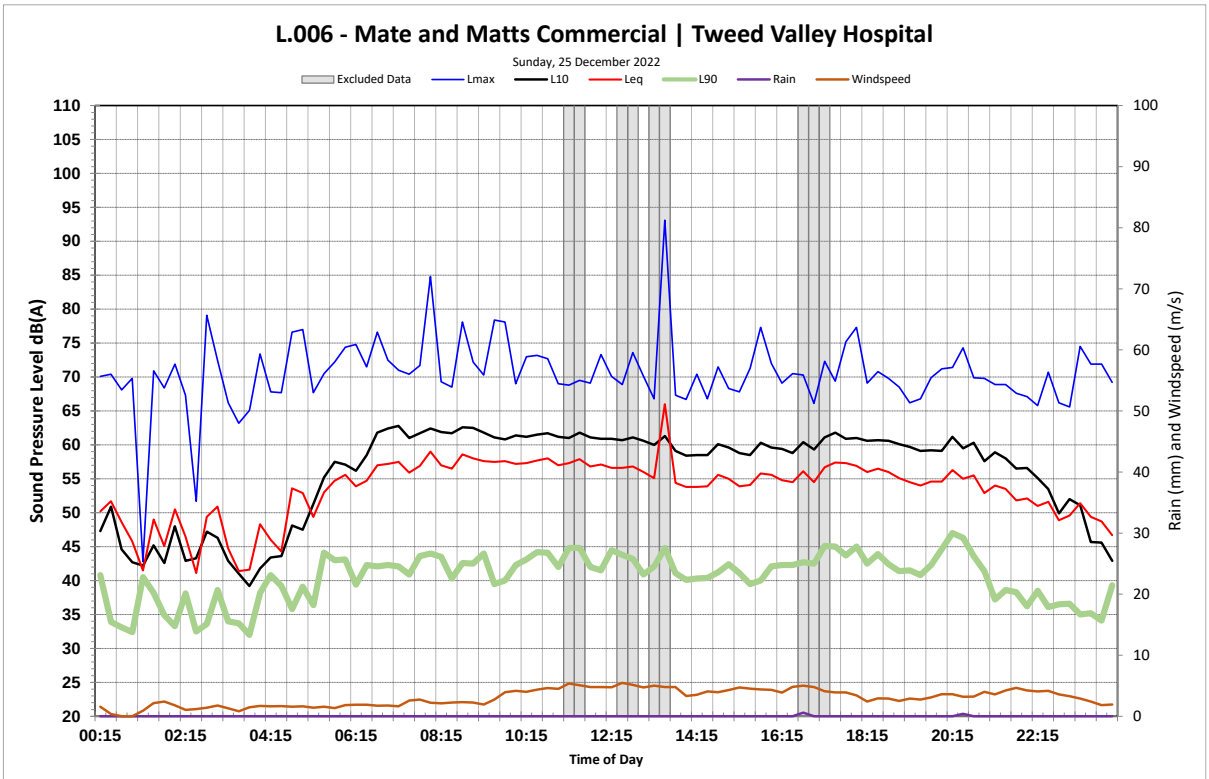

L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Saturday, 24 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15


L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Sunday, 25 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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06:15
08:15
10:15
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16:15
18:15
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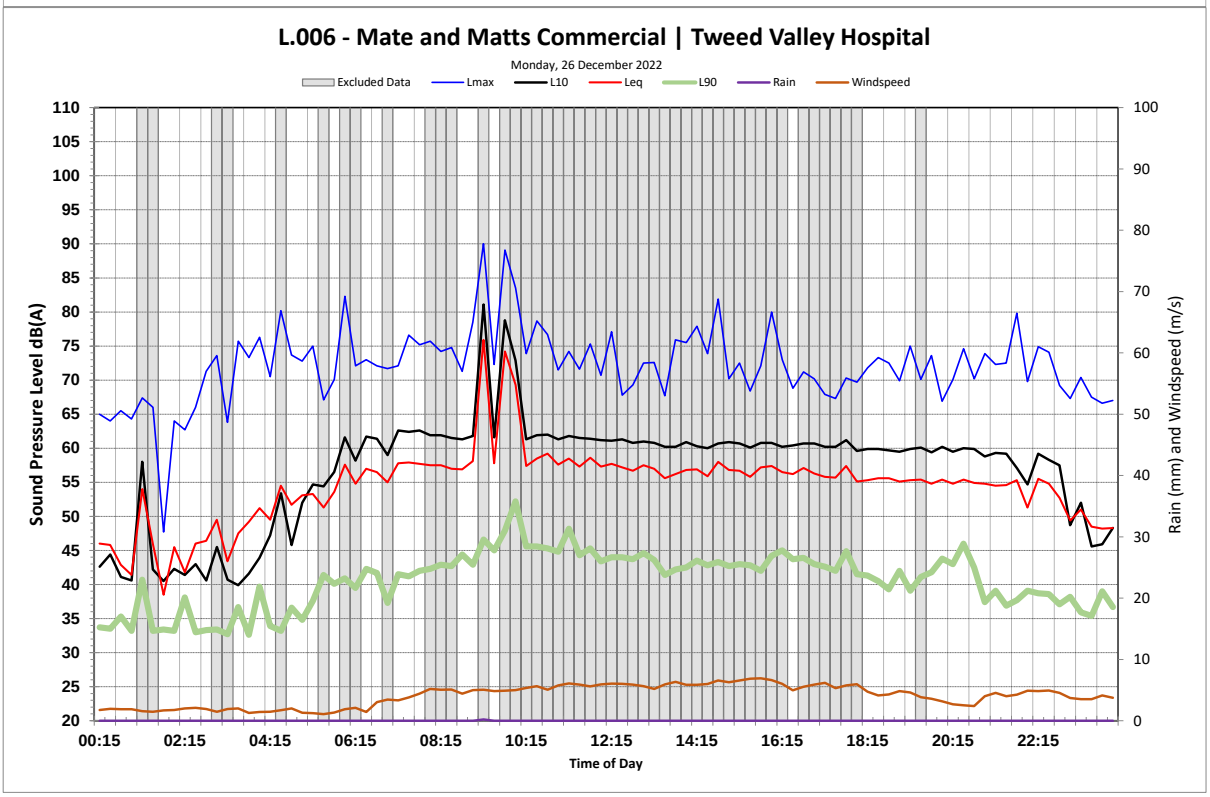
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Monday, 26 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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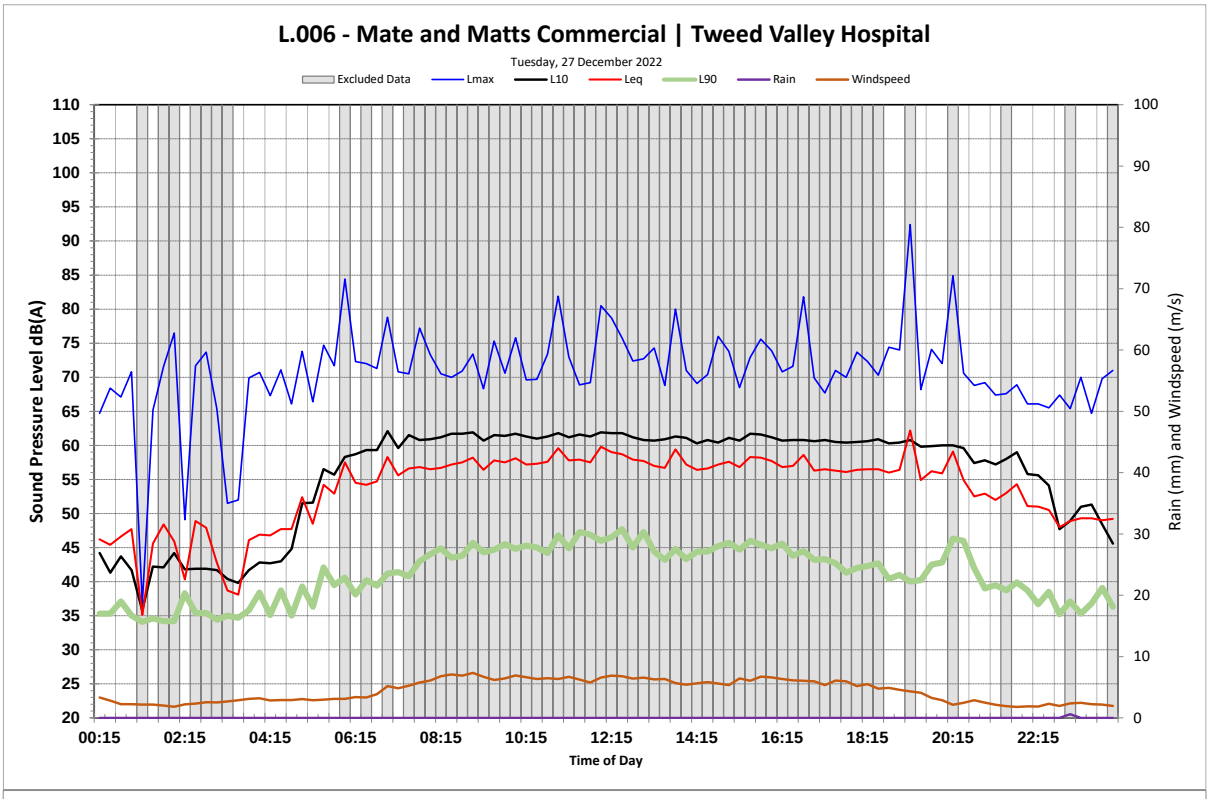
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Tuesday, 27 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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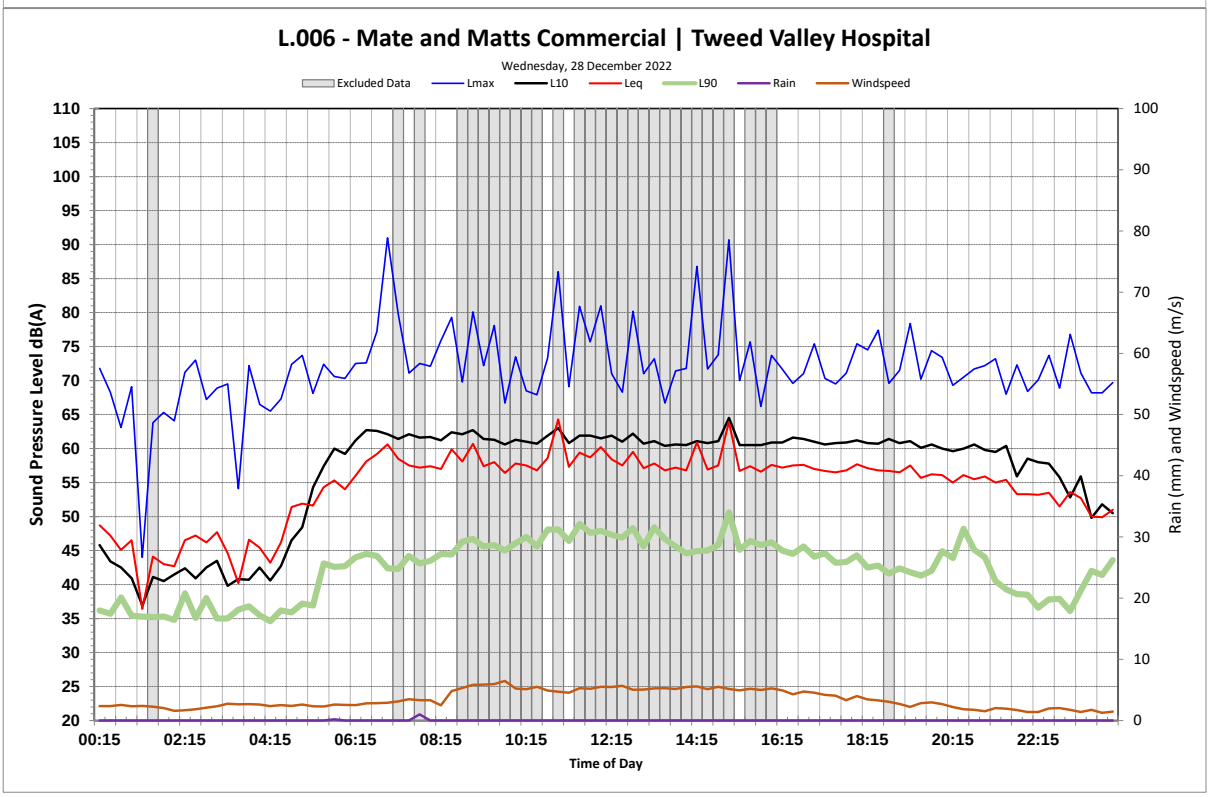
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Wednesday, 28 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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18:15
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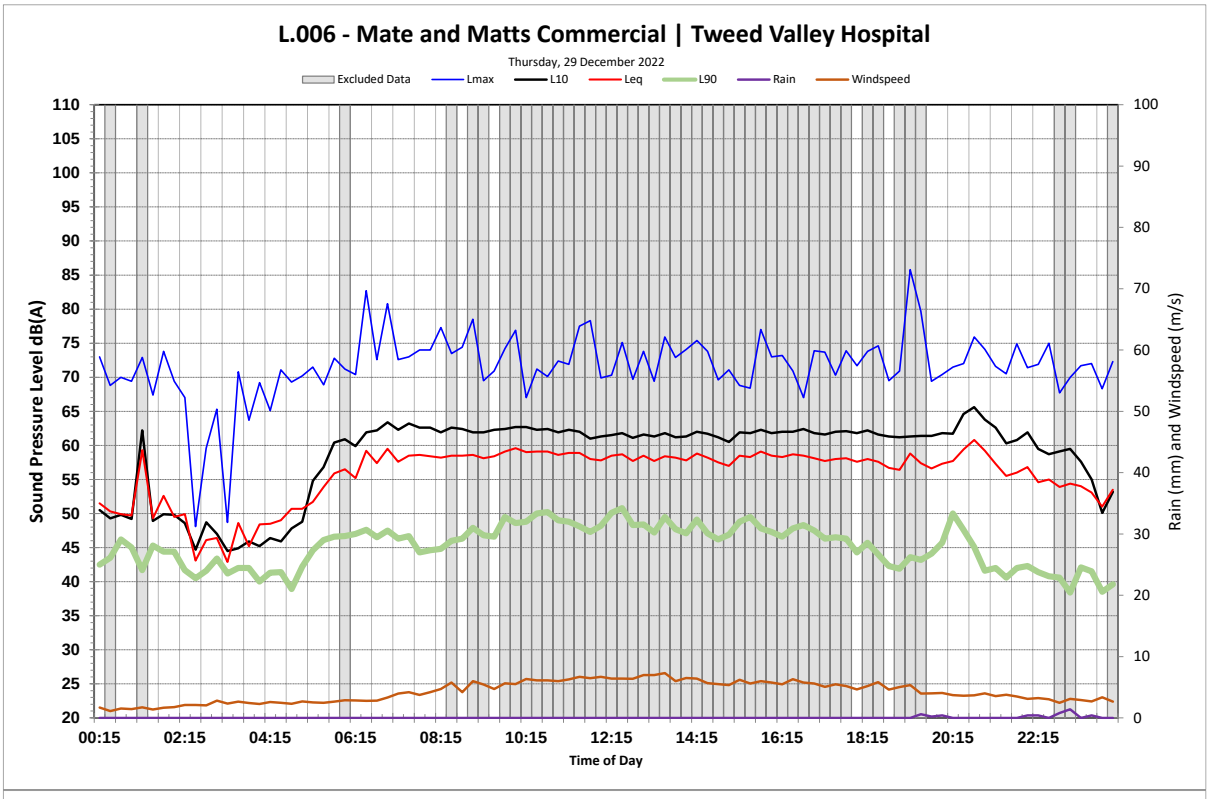
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Thursday, 29 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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04:15
06:15
08:15
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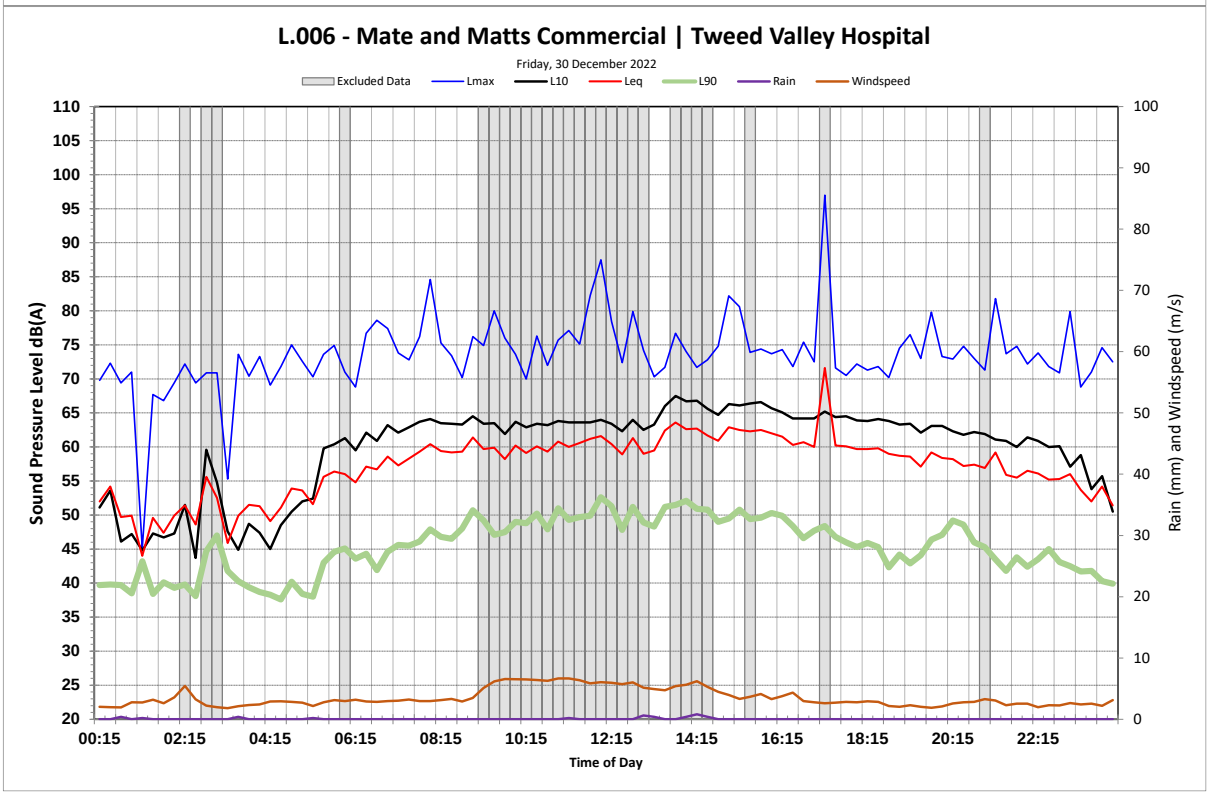
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Friday, 30 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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04:15
06:15
08:15
10:15
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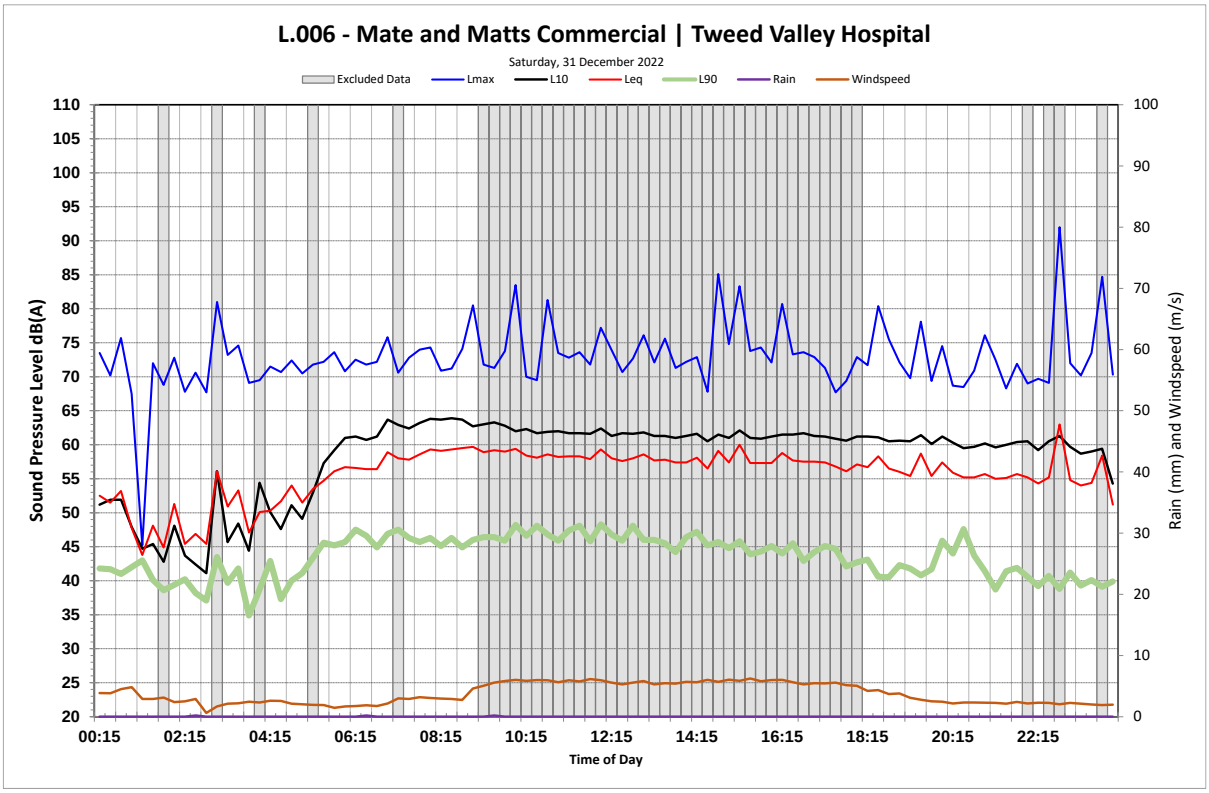
L.006 - Mate and Matts Commercial | Tweed Valley Hospital
Saturday, 31 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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02:15
04:15
06:15
08:15
10:15
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16:15
18:15
20:15
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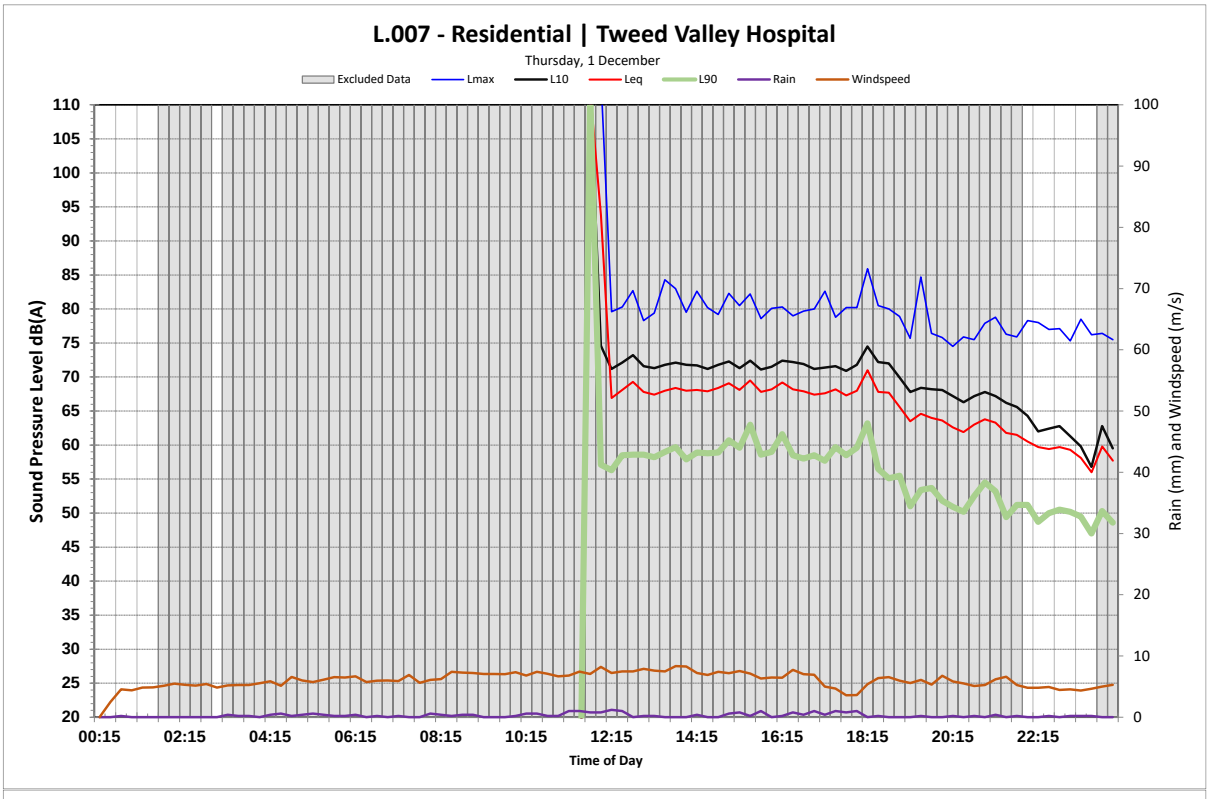
L.007 - Residential | Tweed Valley Hospital
Thursday, 1 December
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
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16:15
18:15
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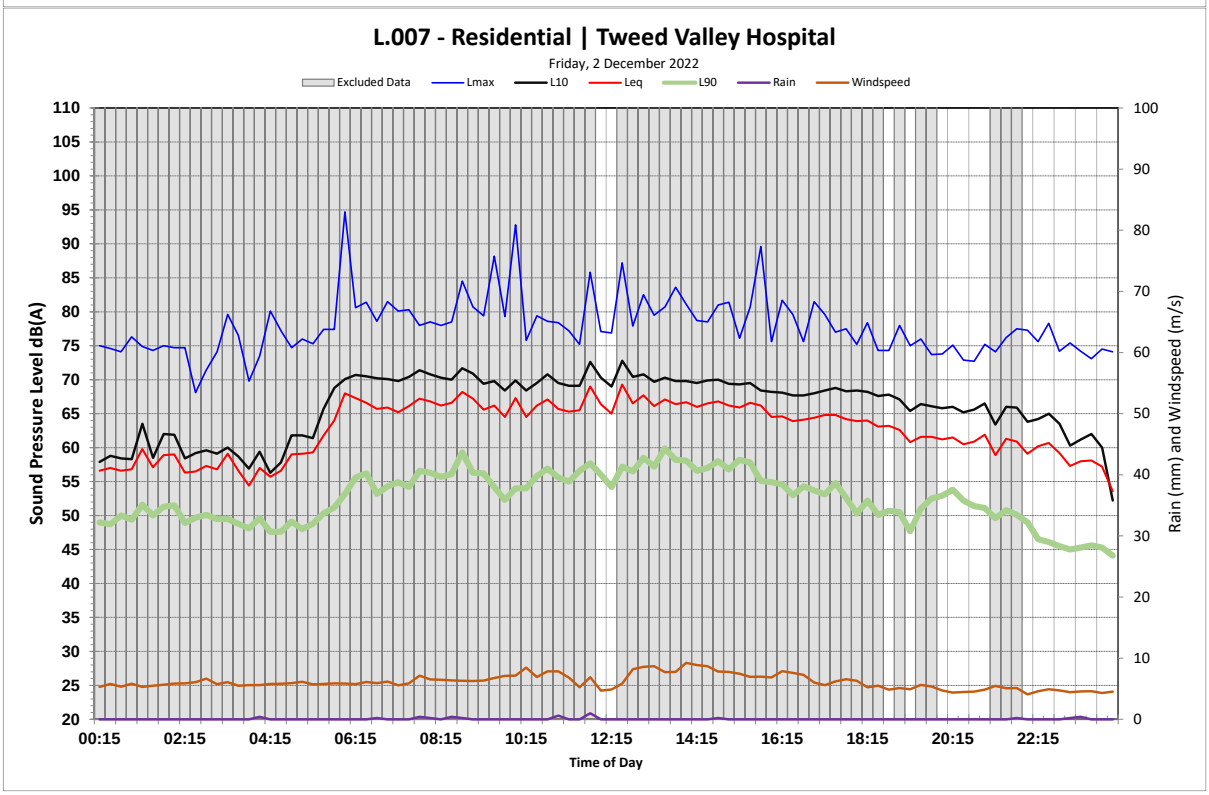
22:15


L.007 - Residential | Tweed Valley Hospital
Friday, 2 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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02:15
04:15
06:15
08:15
10:15
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14:15
16:15
18:15
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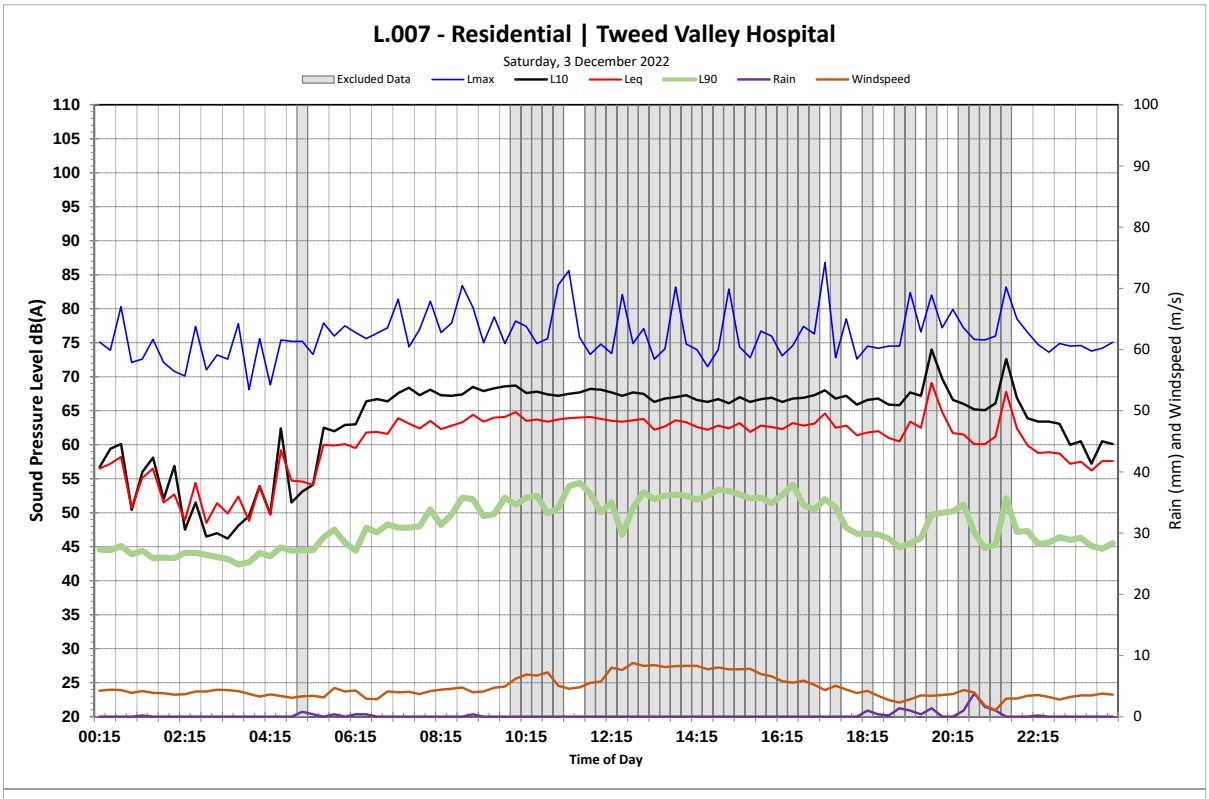
L.007 - Residential | Tweed Valley Hospital
Saturday, 3 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
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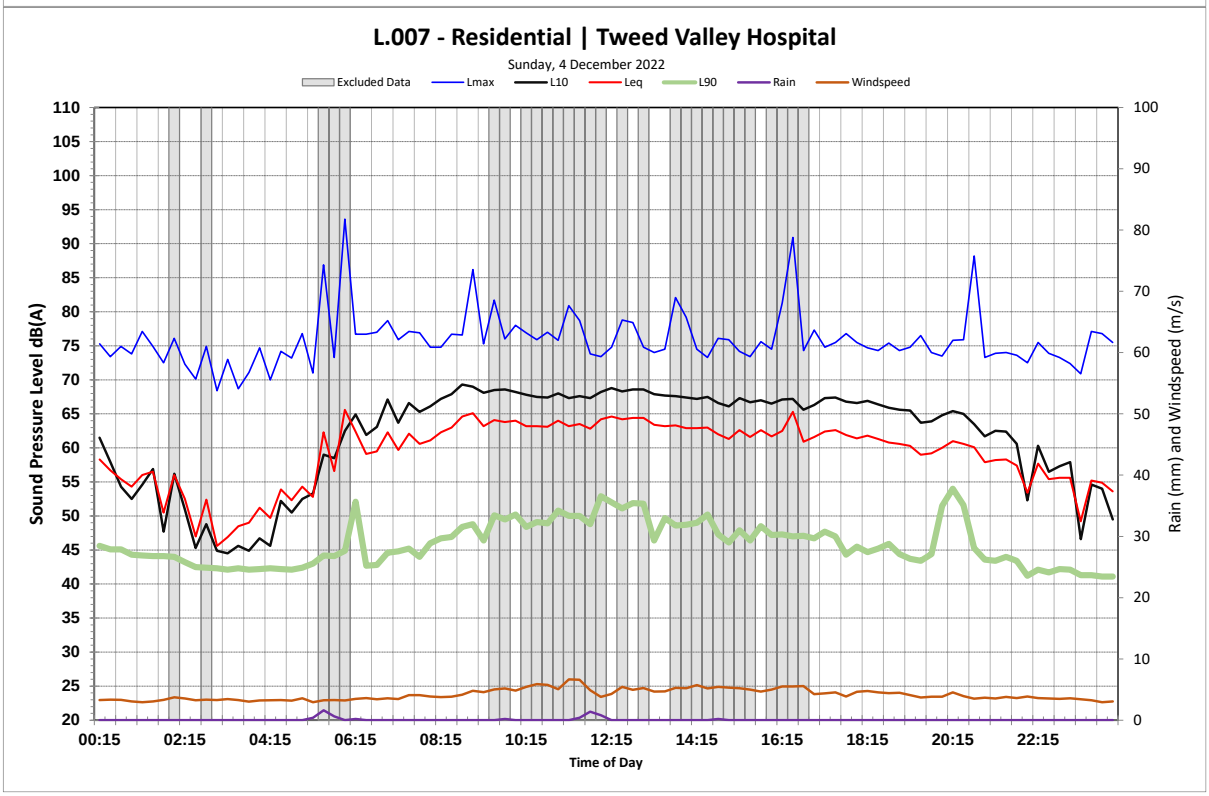
L.007 - Residential | Tweed Valley Hospital
Sunday, 4 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
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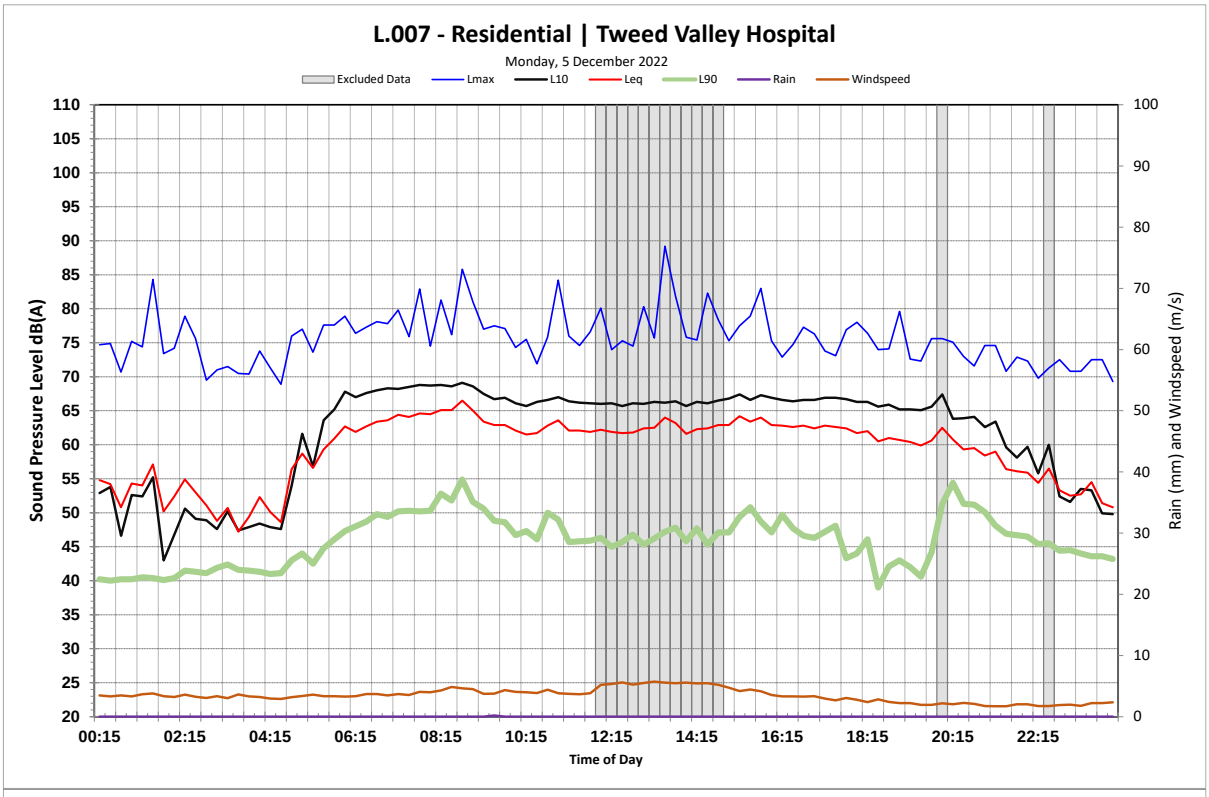
L.007 - Residential | Tweed Valley Hospital
Monday, 5 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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16:15
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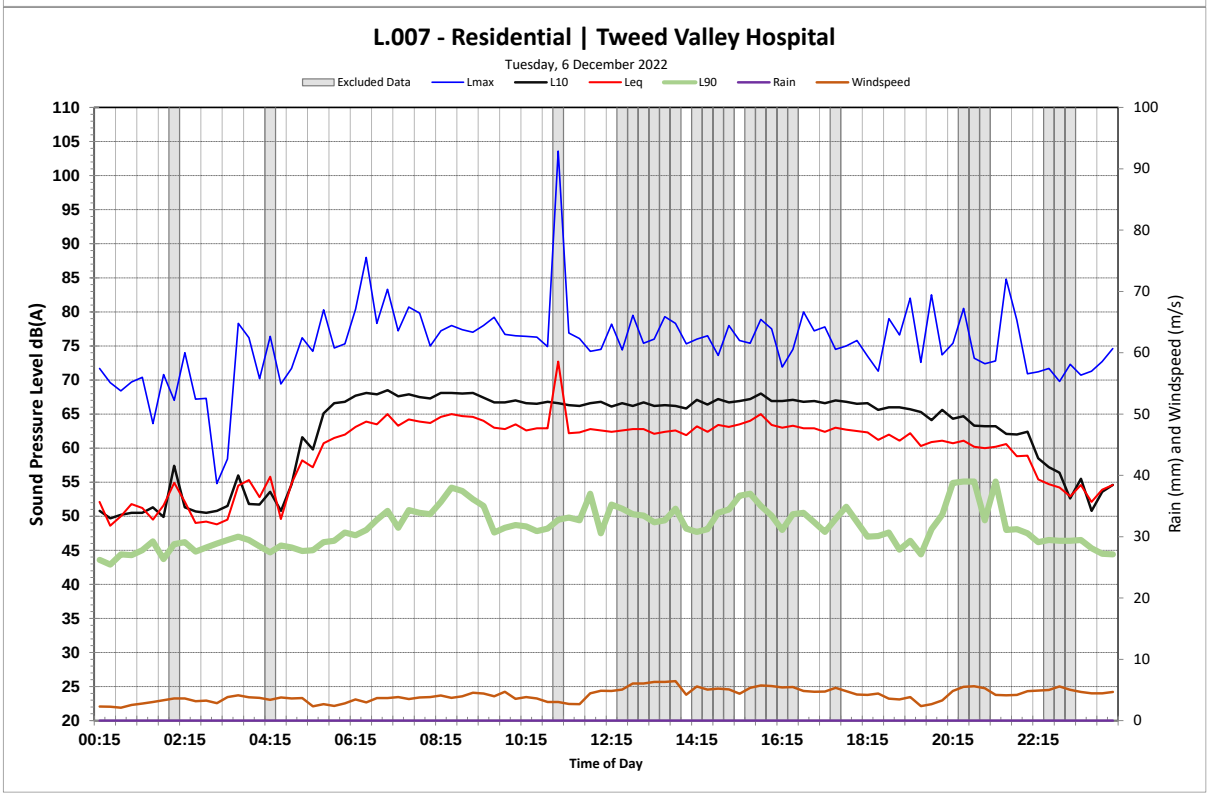
L.007 - Residential | Tweed Valley Hospital
Tuesday, 6 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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04:15
06:15
08:15
10:15
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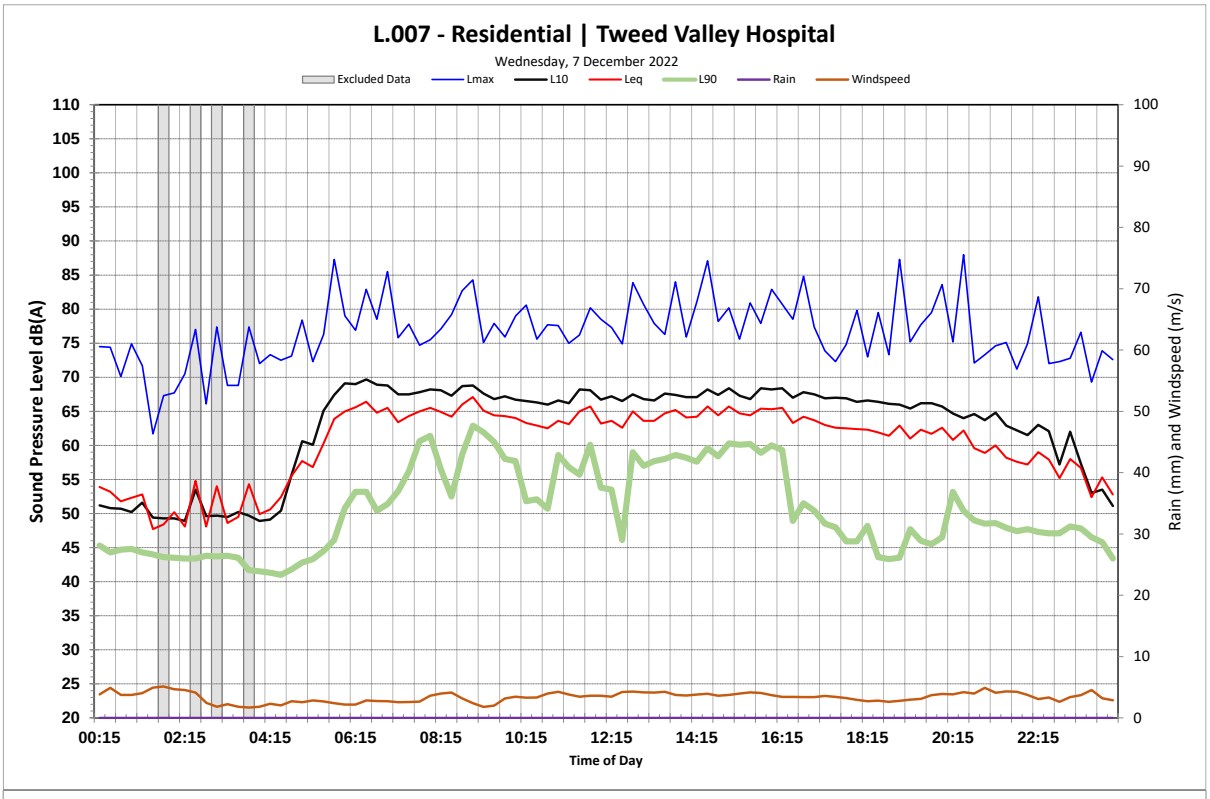
L.007 - Residential | Tweed Valley Hospital
Wednesday, 7 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
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16:15
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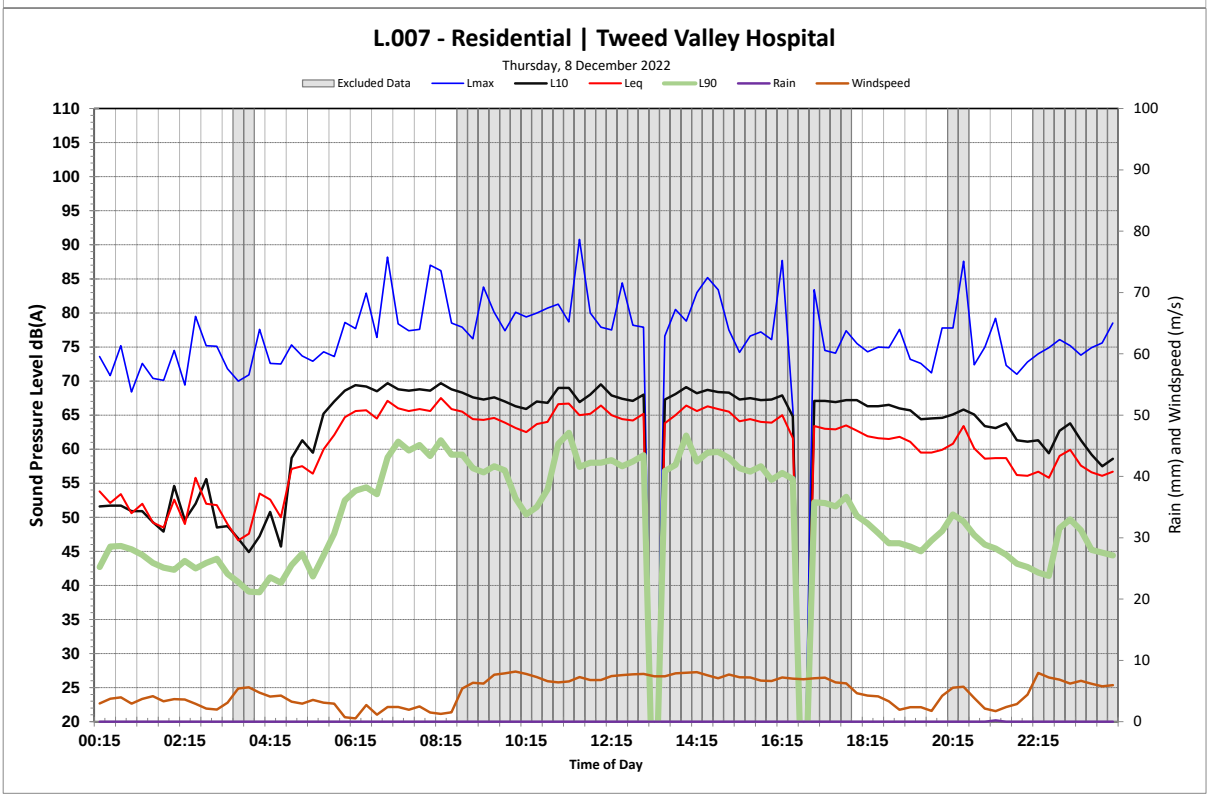
L.007 - Residential | Tweed Valley Hospital
Thursday, 8 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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06:15
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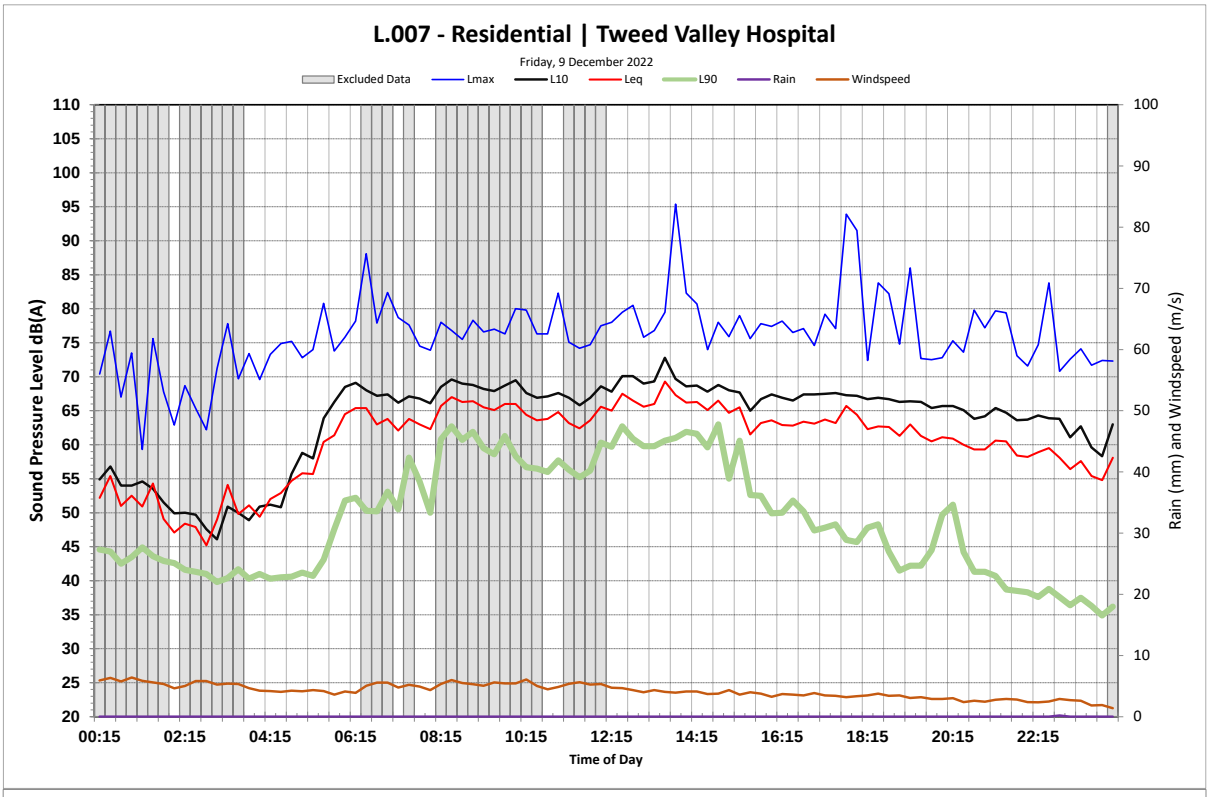
L.007 - Residential | Tweed Valley Hospital
Friday, 9 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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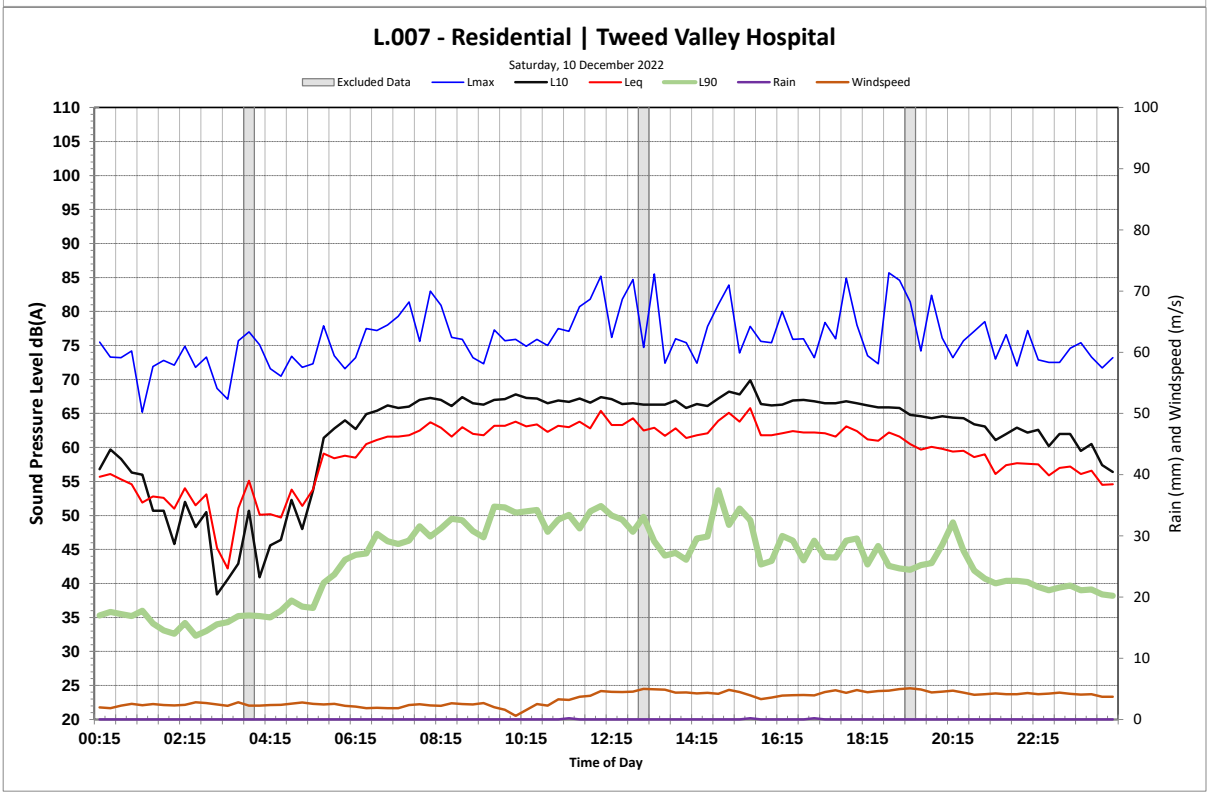
14:15
16:15
18:15
20:15
22:15


L.007 - Residential | Tweed Valley Hospital
Saturday, 10 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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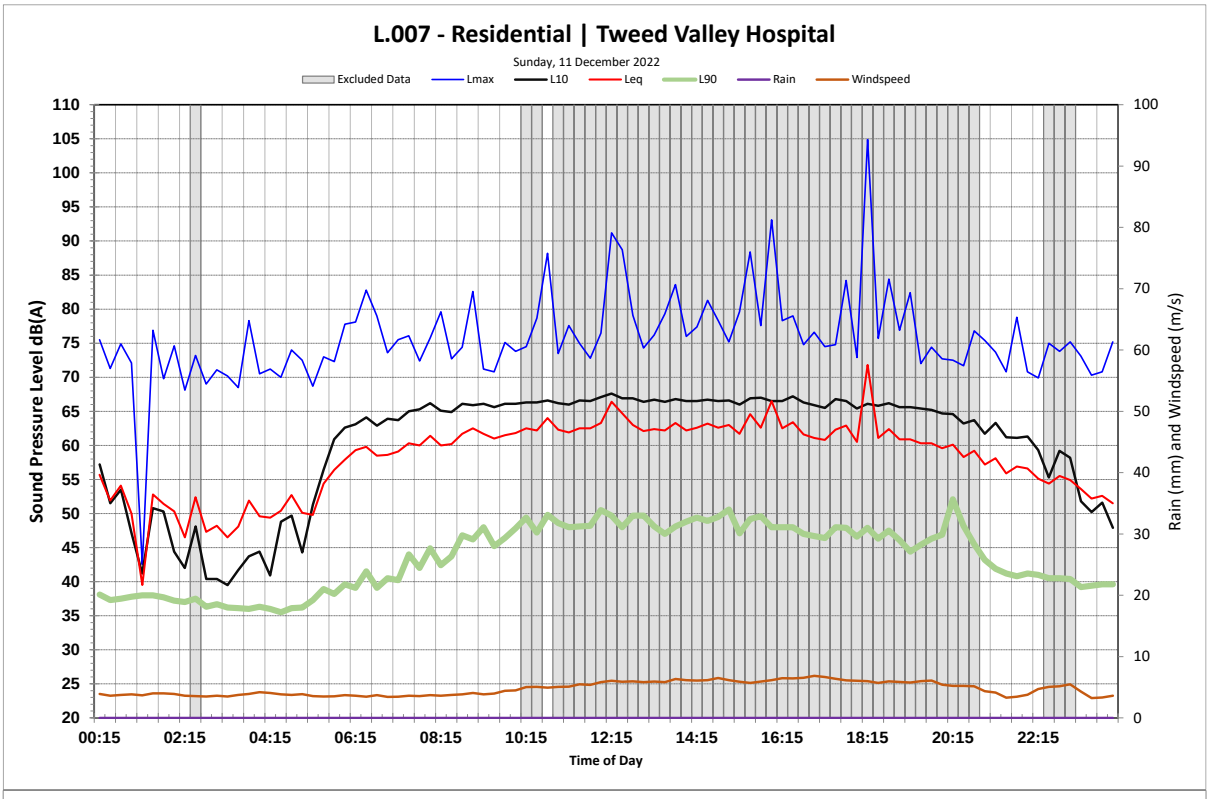
22:15


L.007 - Residential | Tweed Valley Hospital
Sunday, 11 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
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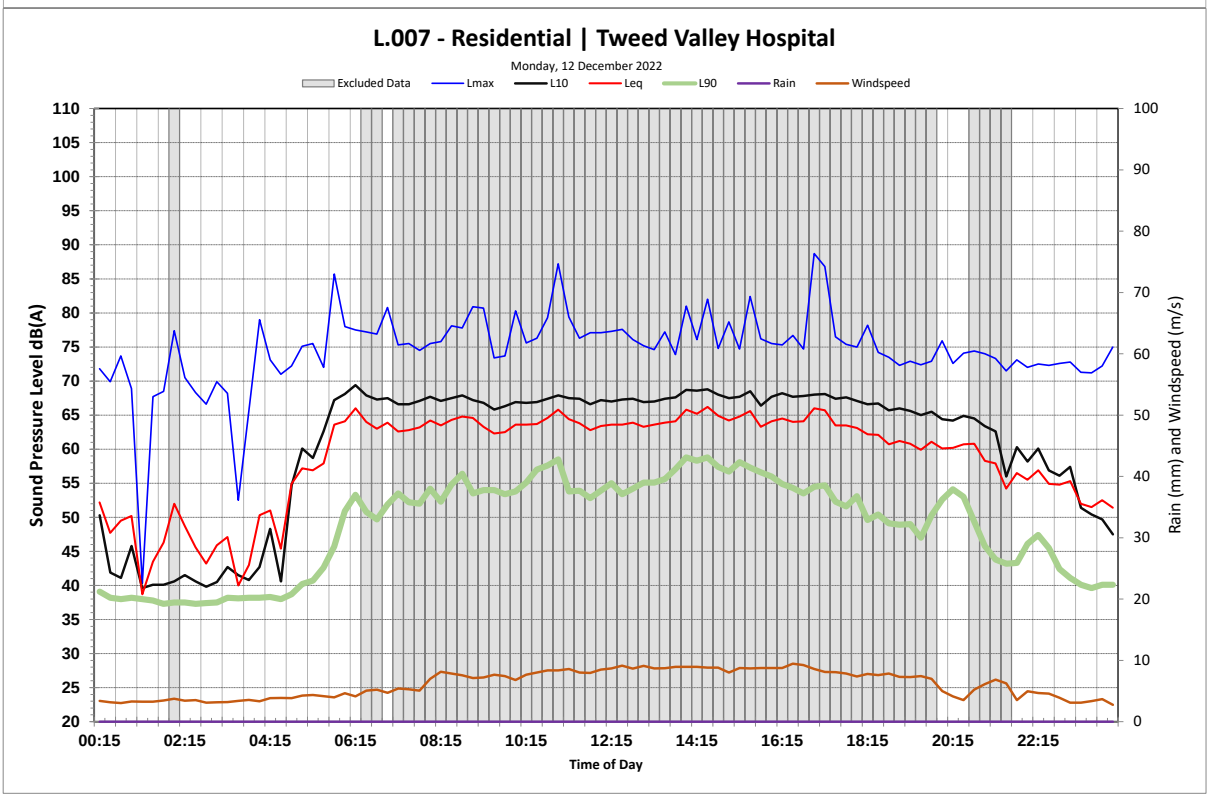
L.007 - Residential | Tweed Valley Hospital
Monday, 12 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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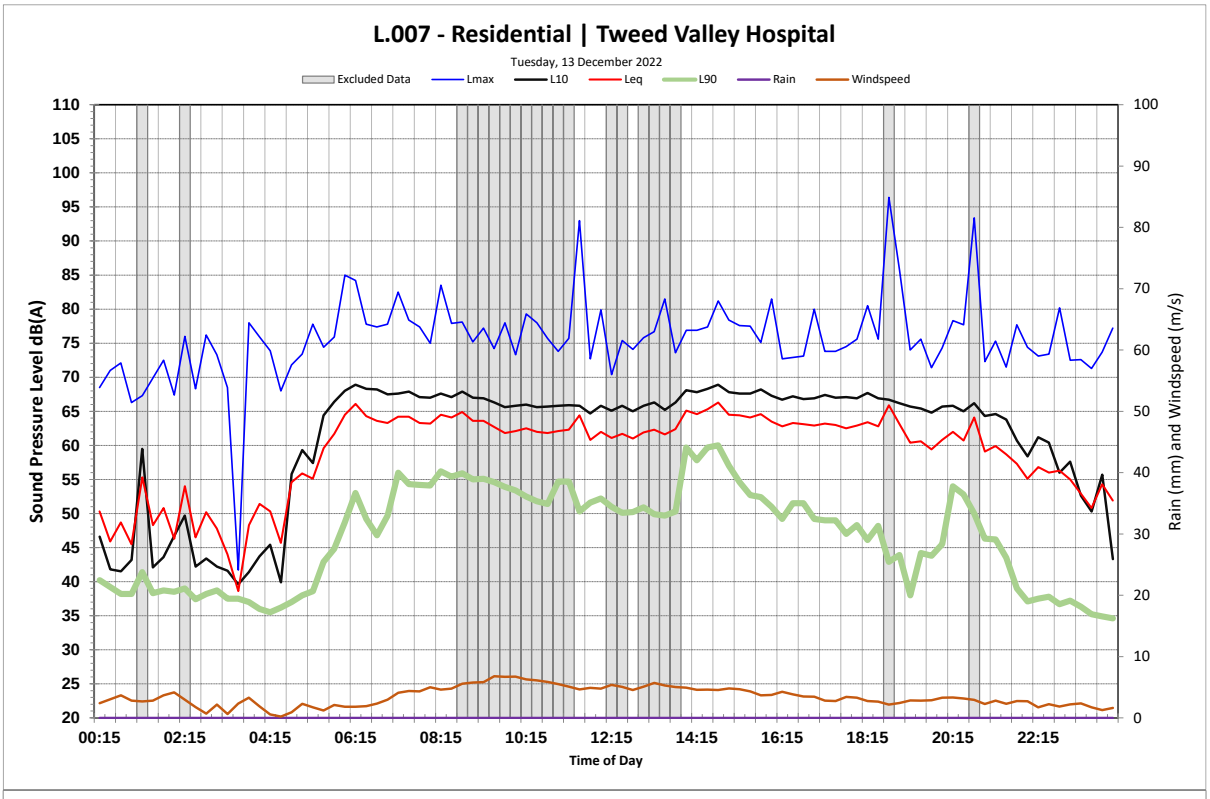
22:15


L.007 - Residential | Tweed Valley Hospital
Tuesday, 13 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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04:15
06:15
08:15
10:15
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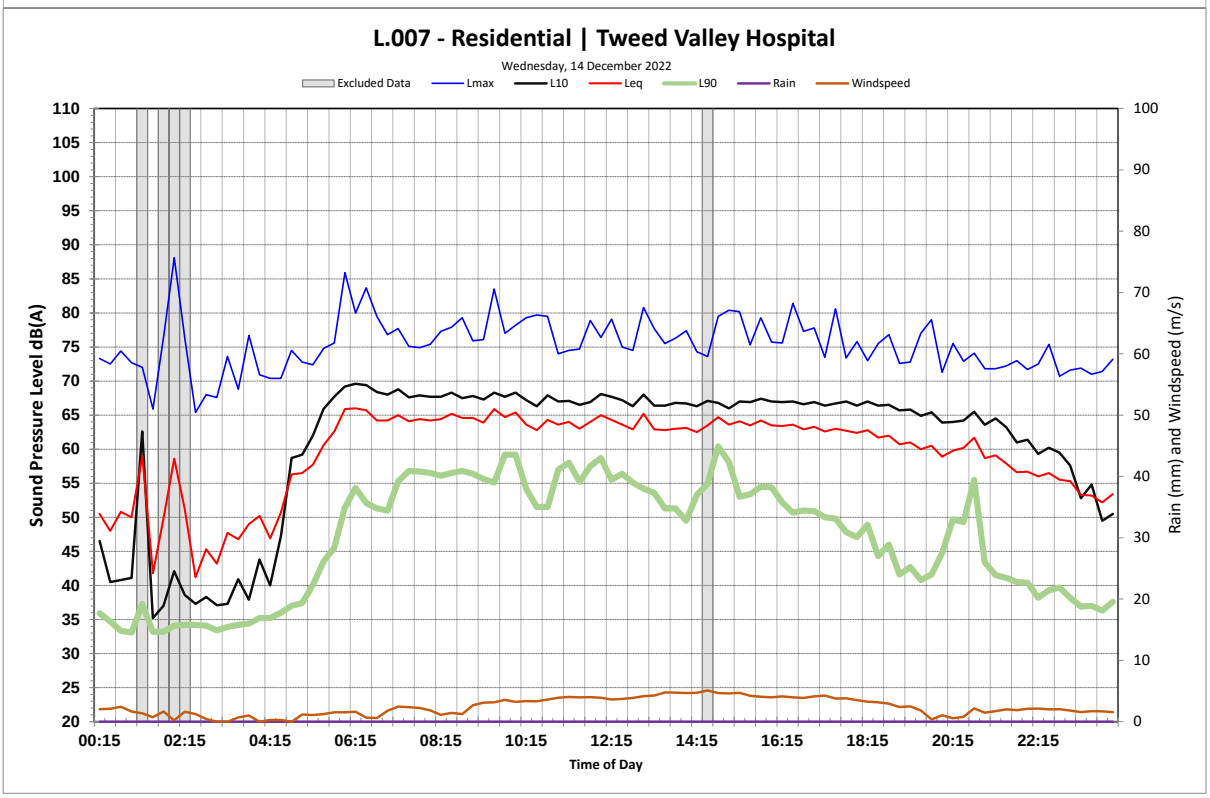
14:15
16:15
18:15
20:15
22:15


L.007 - Residential | Tweed Valley Hospital
Wednesday, 14 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
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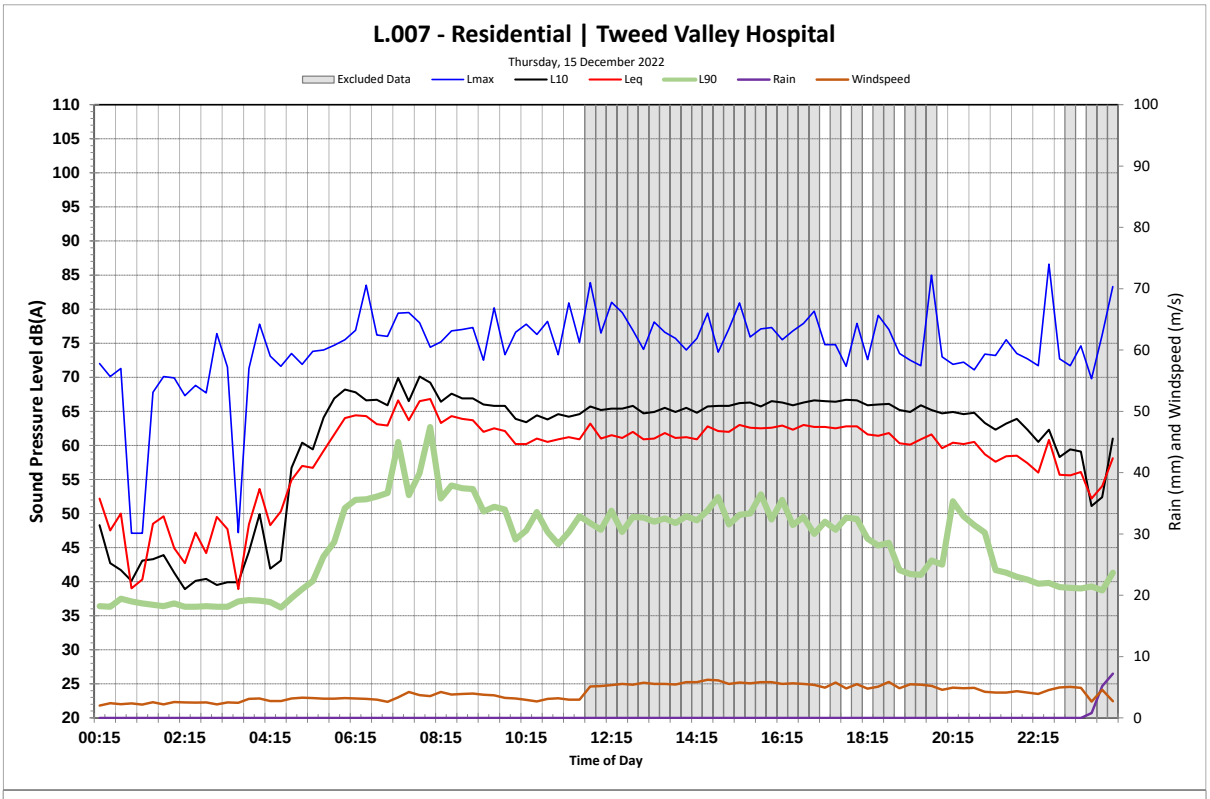
22:15


L.007 - Residential | Tweed Valley Hospital
Thursday, 15 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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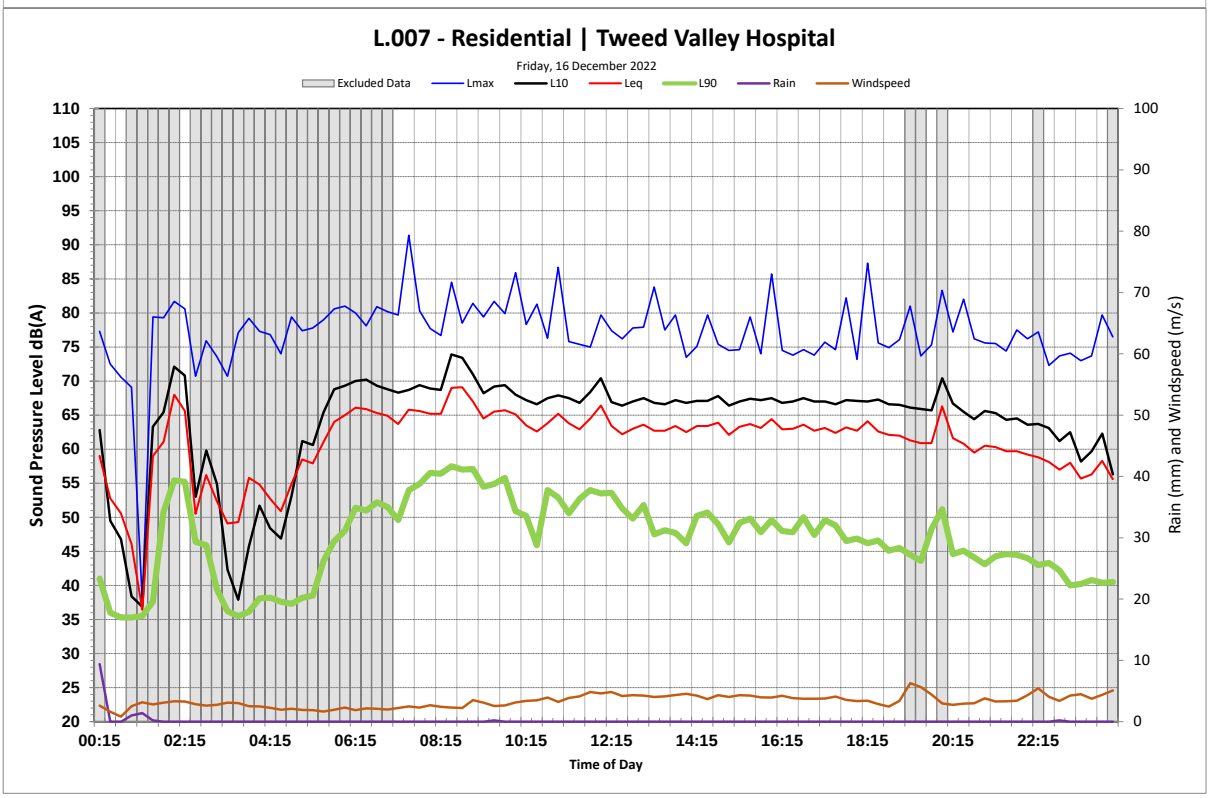
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15


L.007 - Residential | Tweed Valley Hospital
Friday, 16 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
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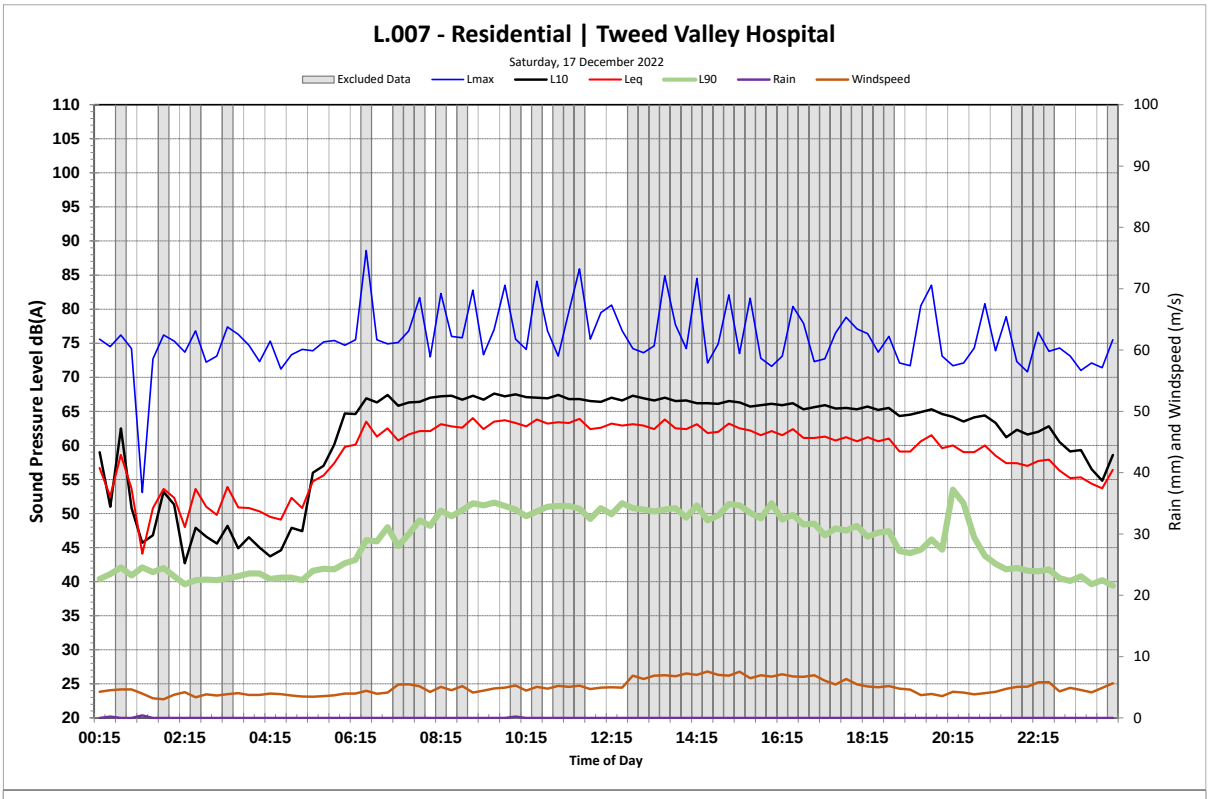
22:15


L.007 - Residential | Tweed Valley Hospital
Saturday, 17 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
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04:15
06:15
08:15
10:15
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16:15
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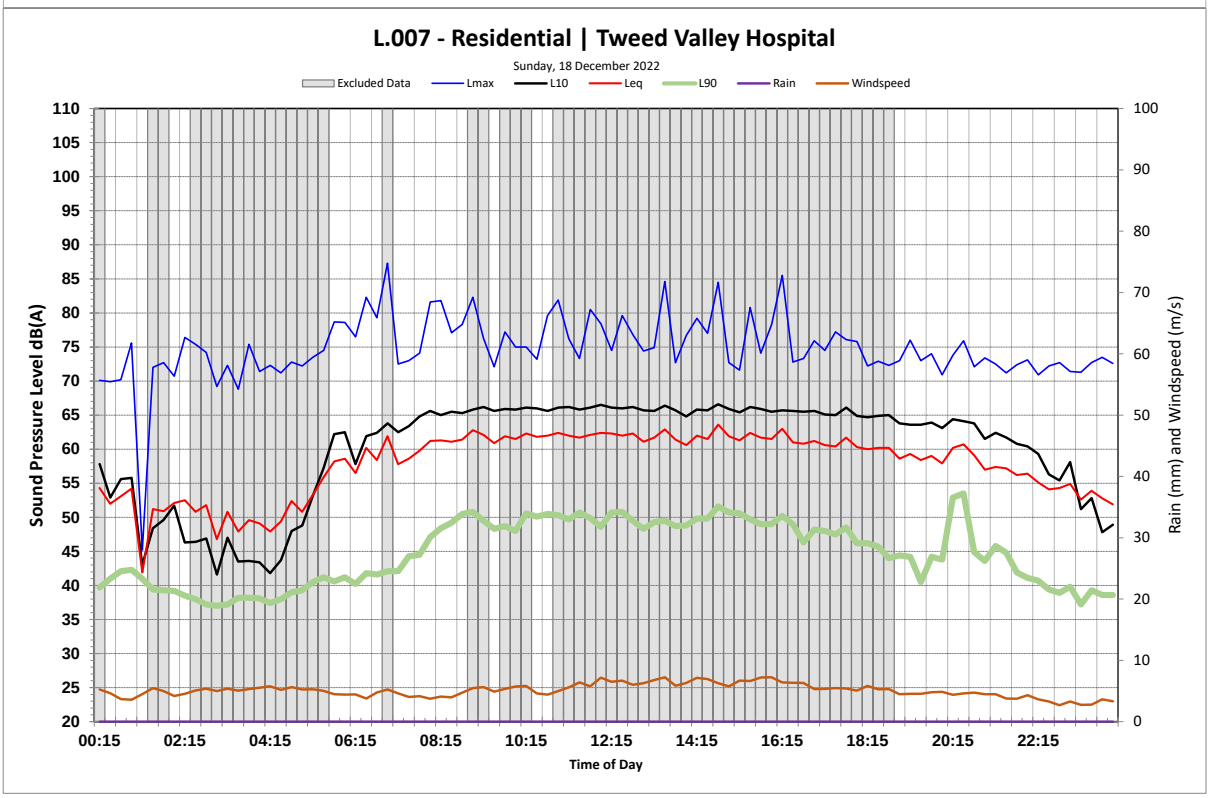
L.007 - Residential | Tweed Valley Hospital
Sunday, 18 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
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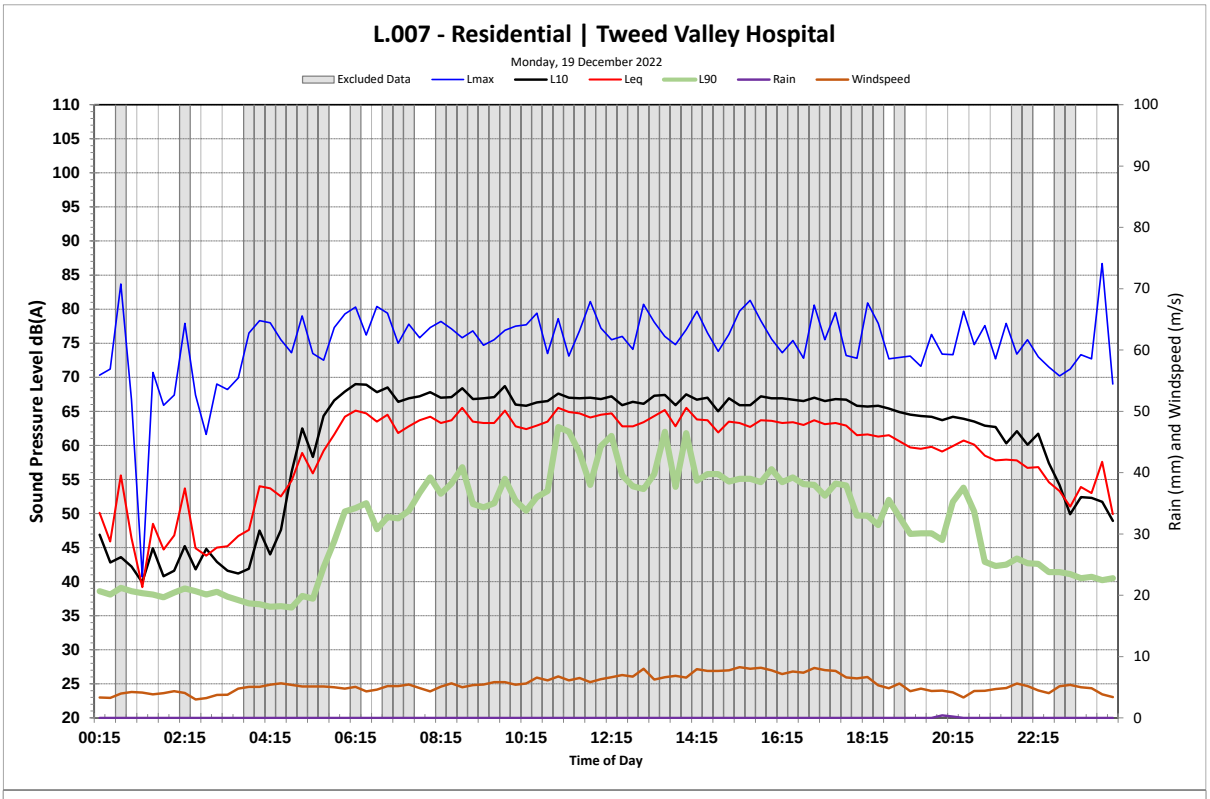
22:15


L.007 - Residential | Tweed Valley Hospital
Monday, 19 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
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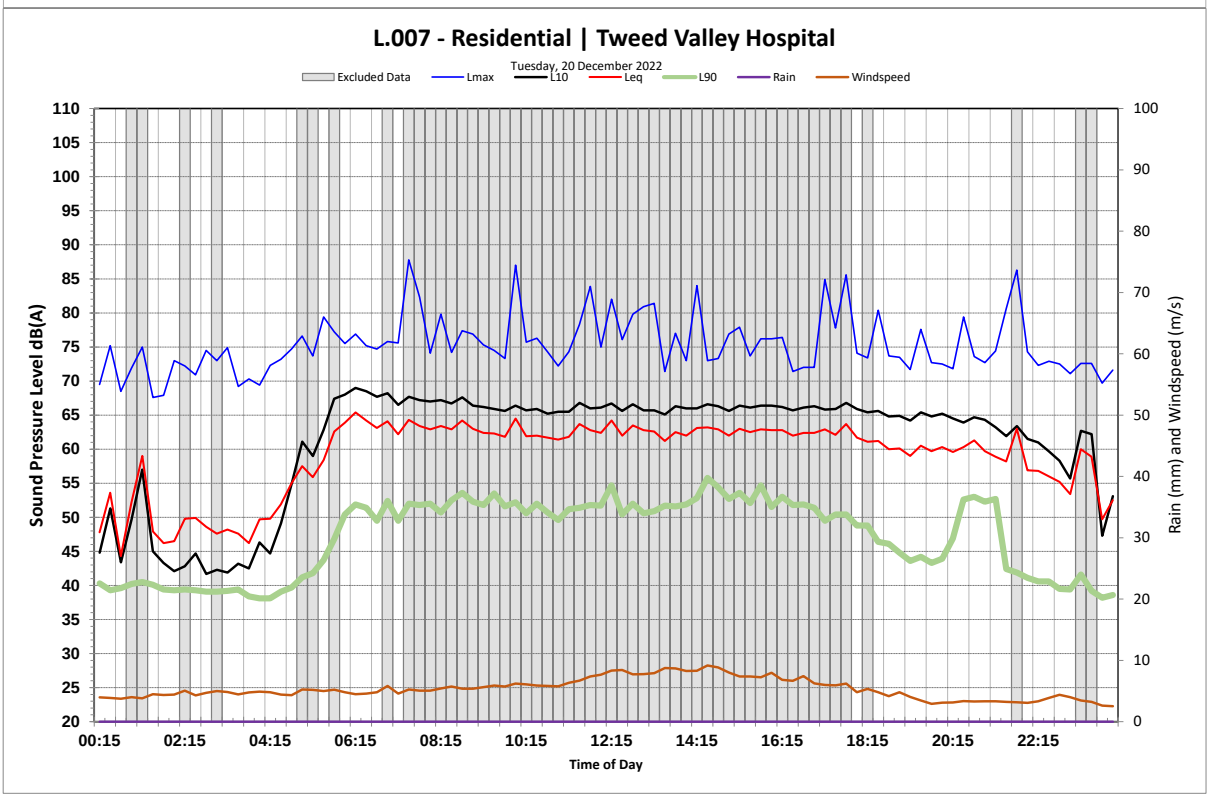
L.007 - Residential | Tweed Valley Hospital
Tuesday, 20 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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04:15
06:15
08:15
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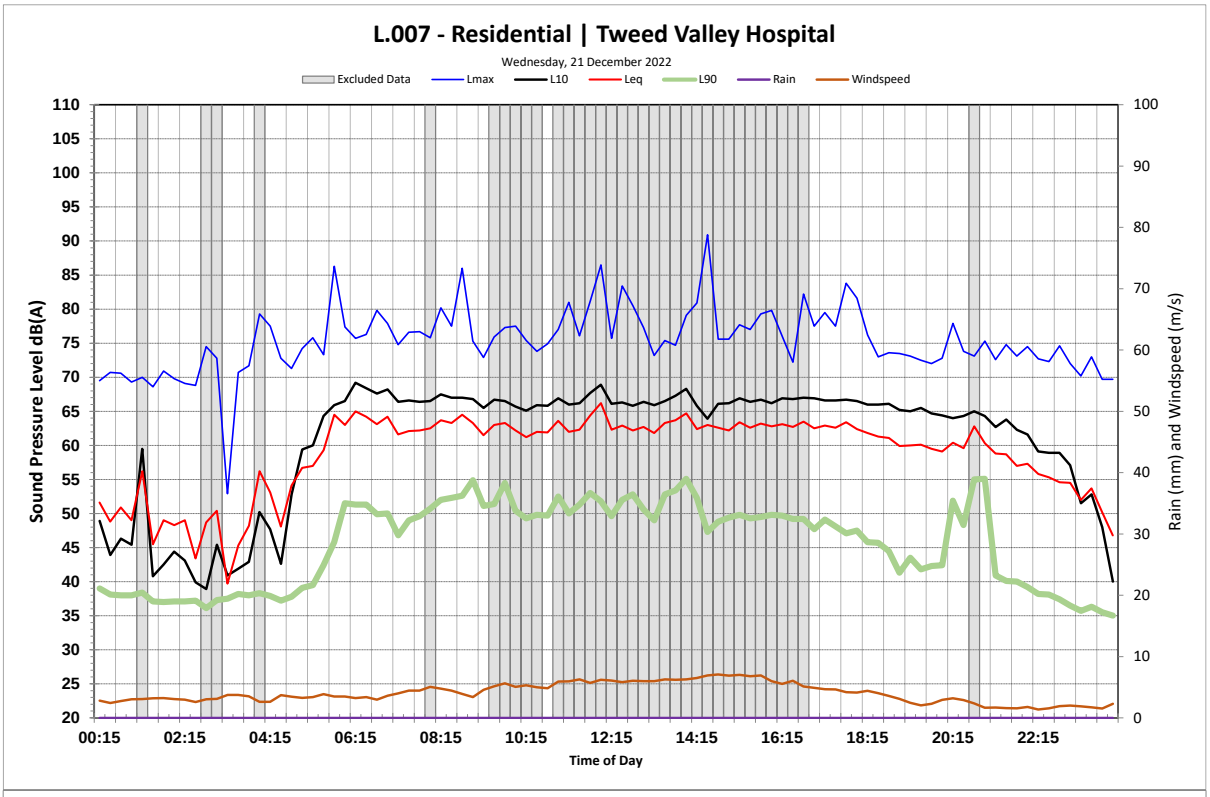
L.007 - Residential | Tweed Valley Hospital
Wednesday, 21 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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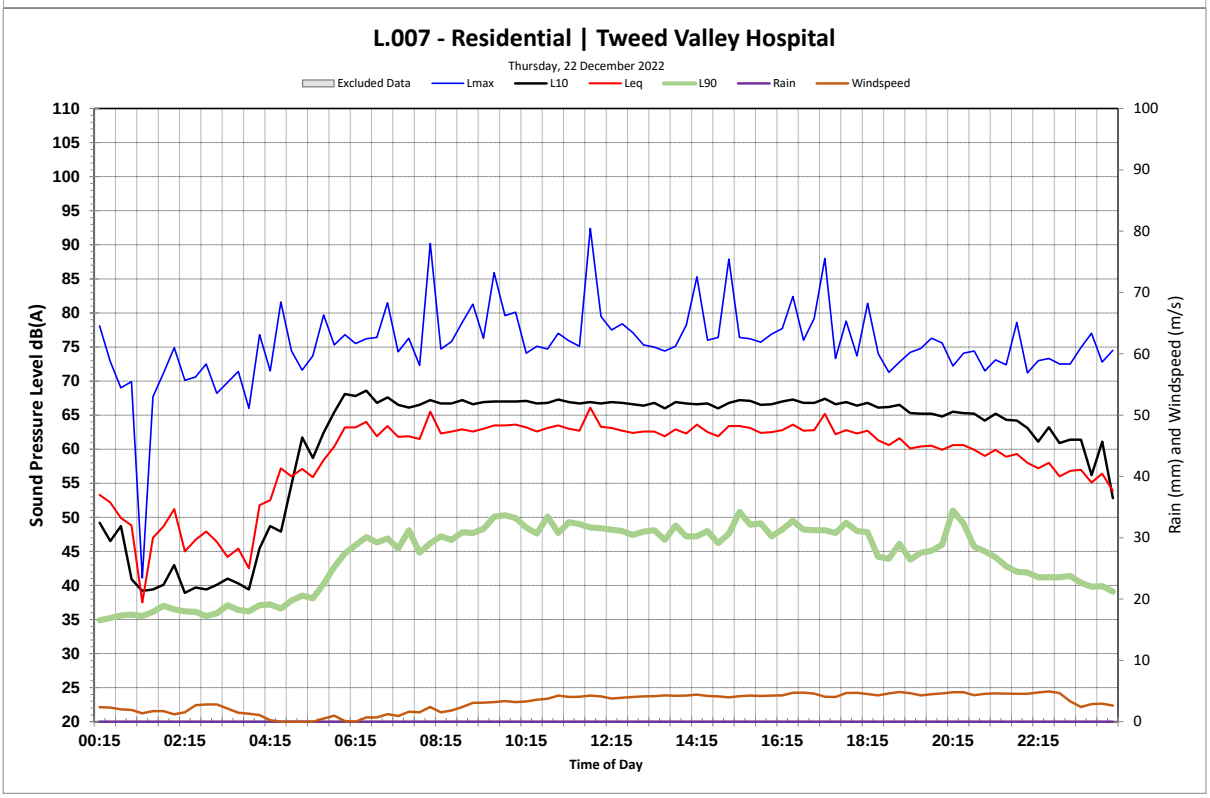
L.007 - Residential | Tweed Valley Hospital
Thursday, 22 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
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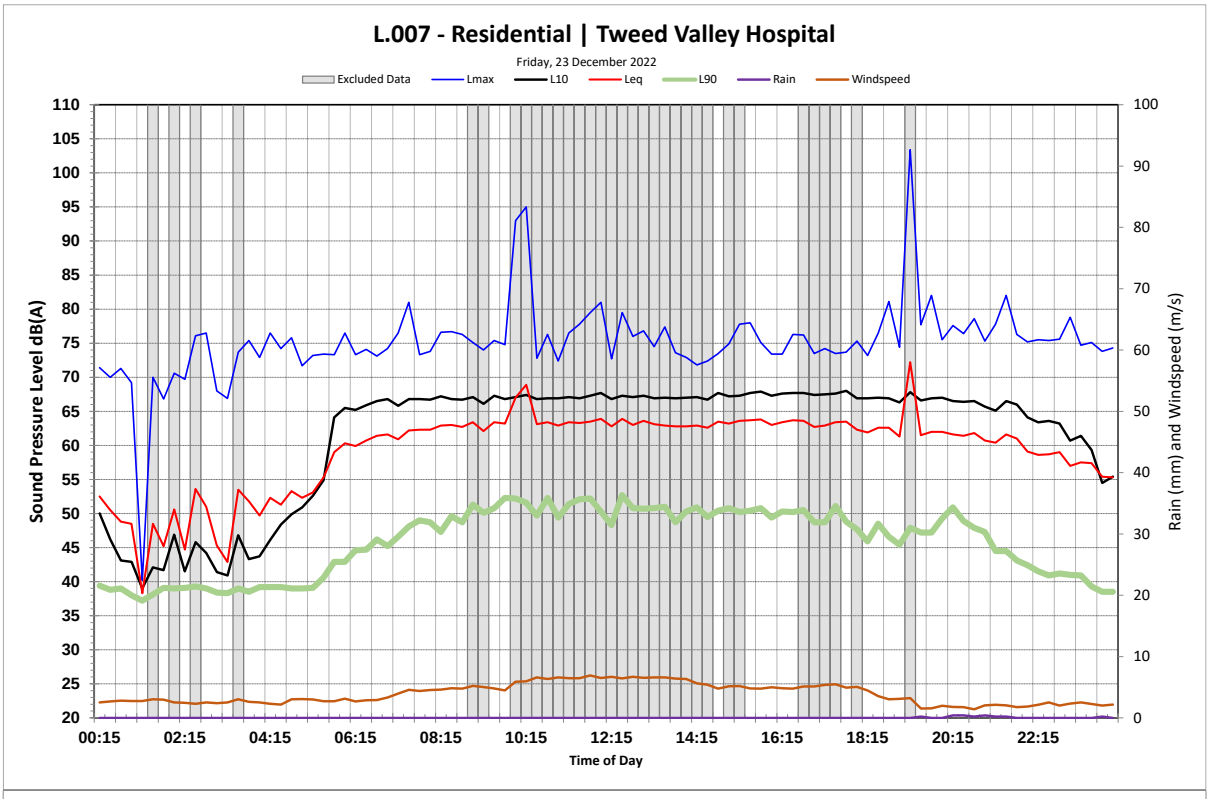
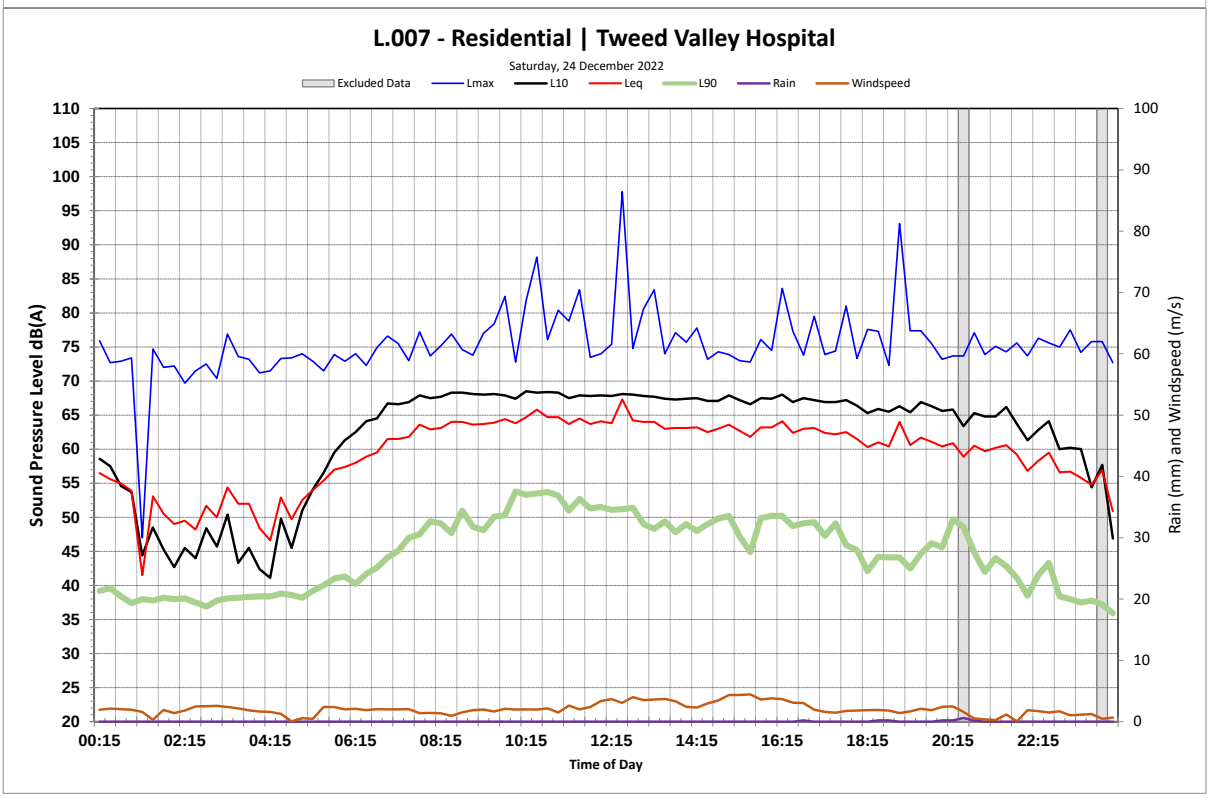
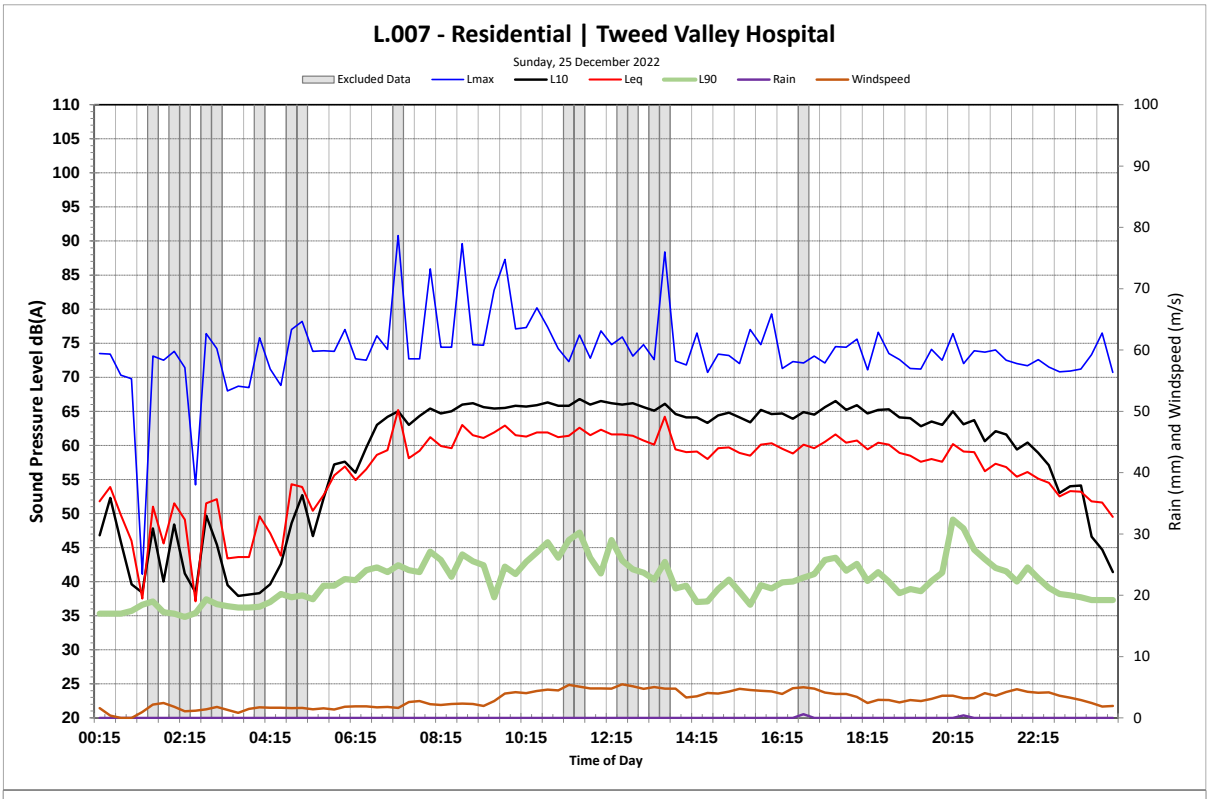
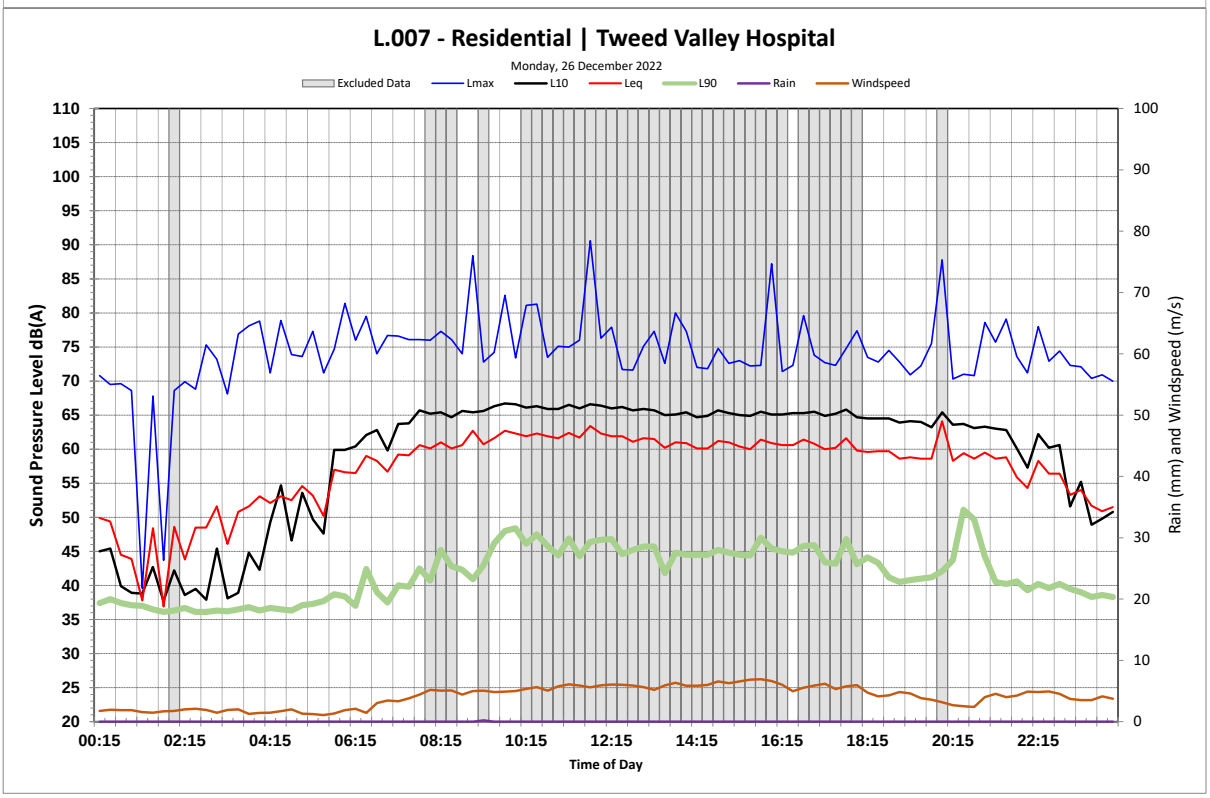
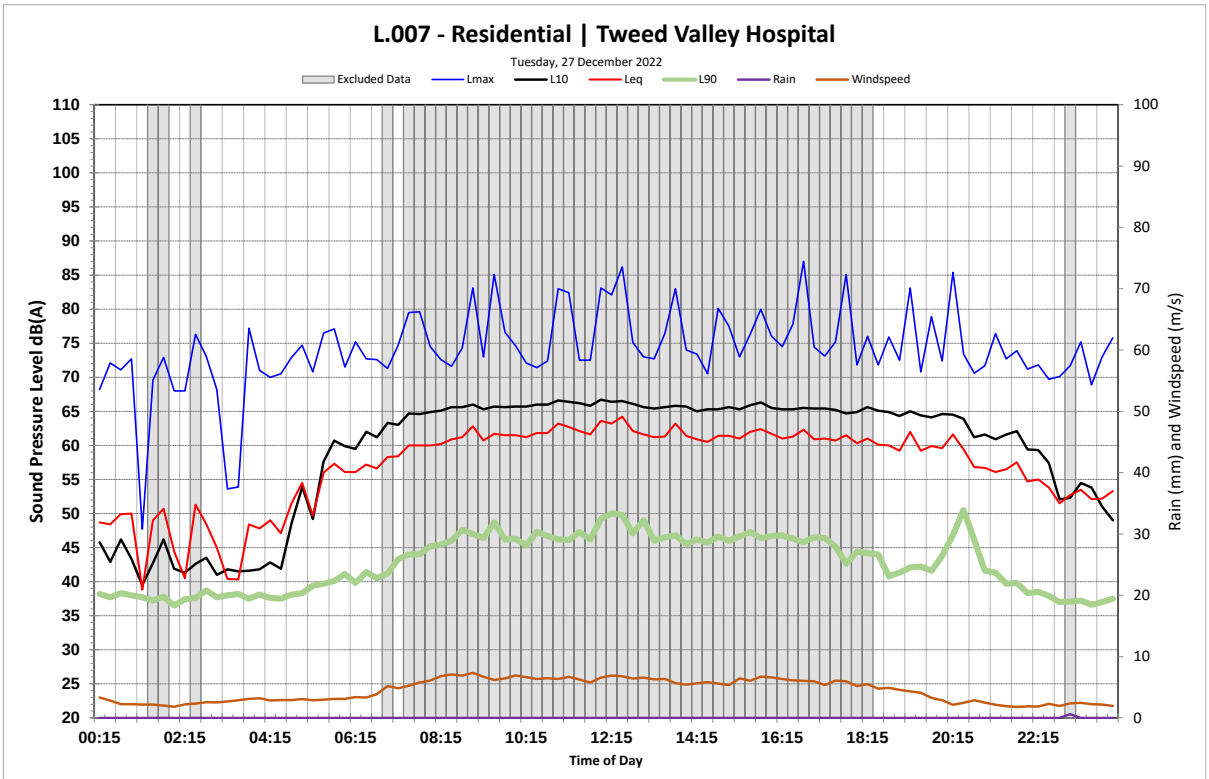
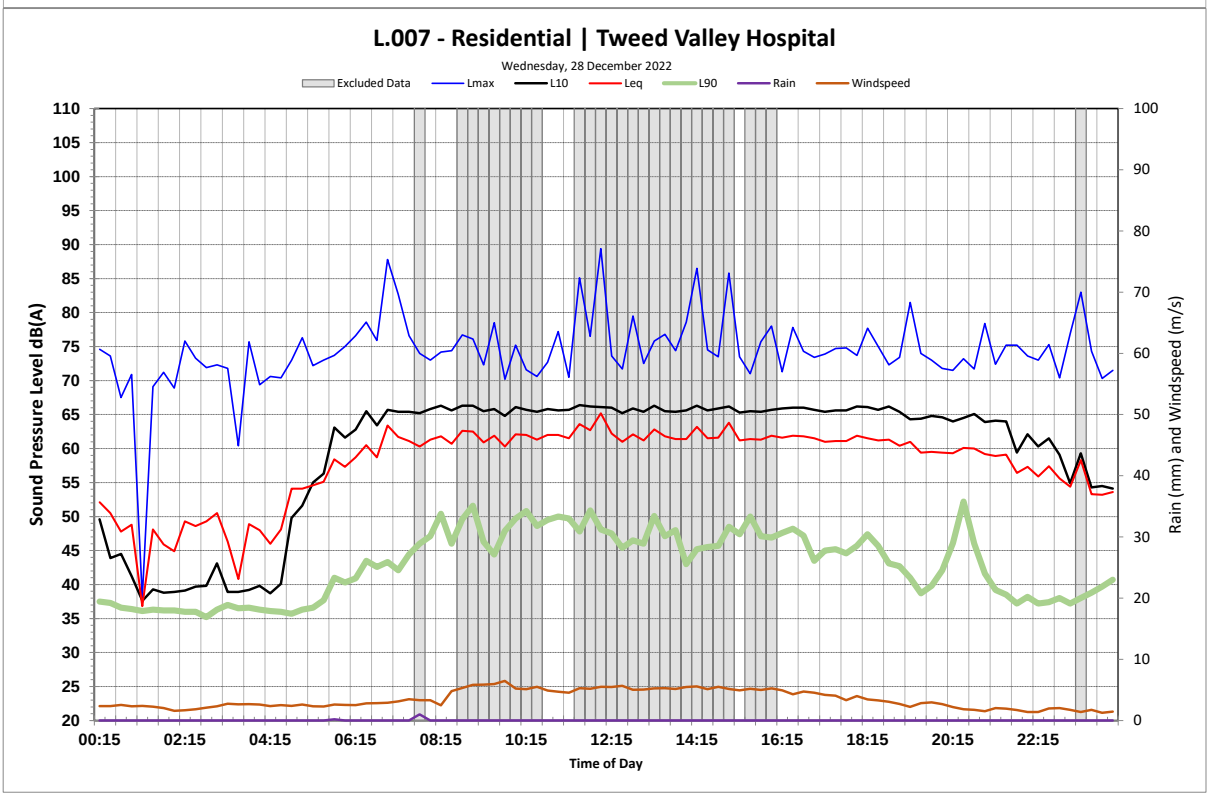

L.007 - Residential | Tweed Valley Hospital
Friday, 23 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15

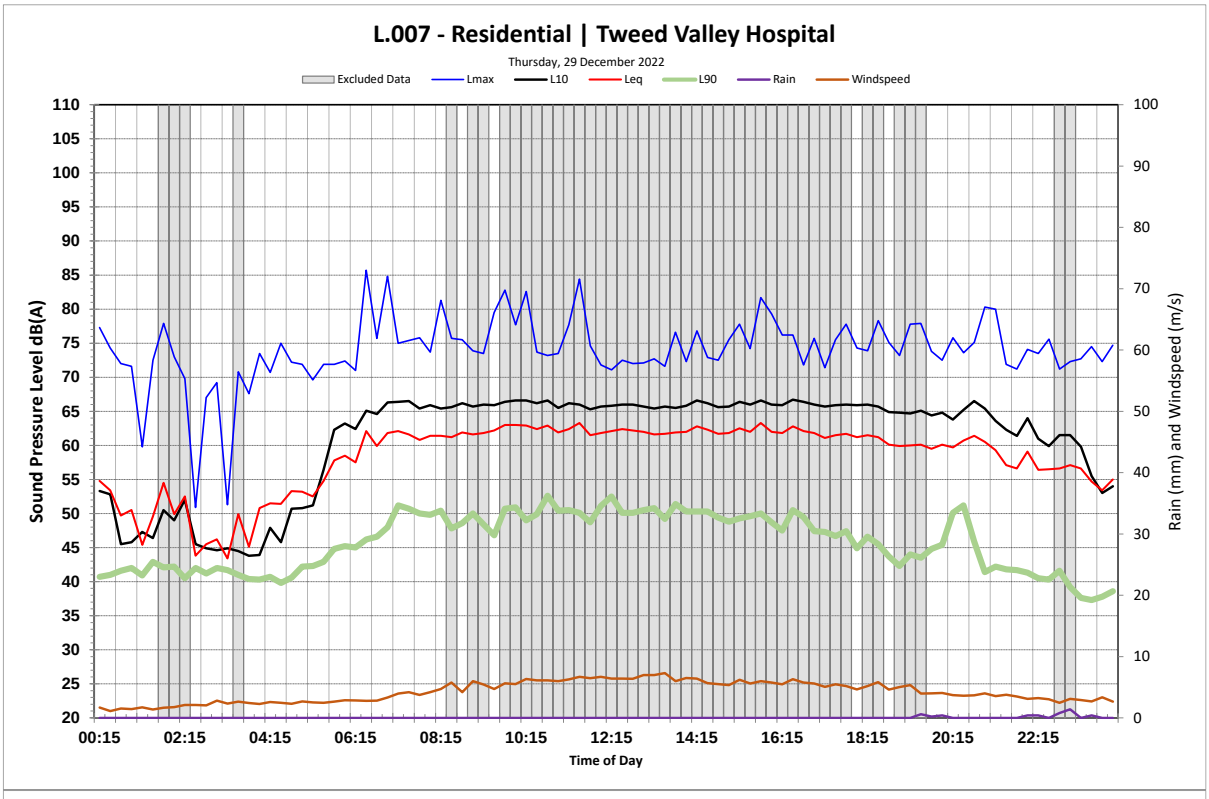

L.007 - Residential | Tweed Valley Hospital
Saturday, 24 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15

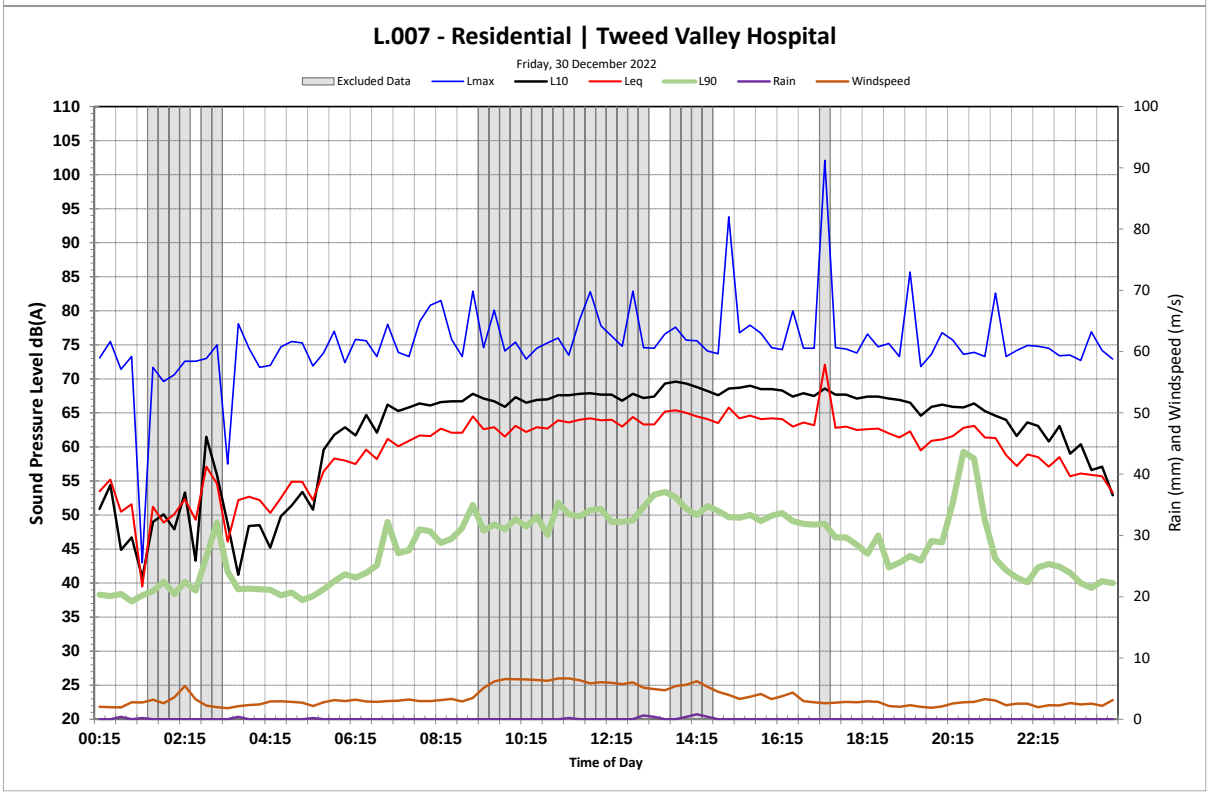

L.007 - Residential | Tweed Valley Hospital
Sunday, 25 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15

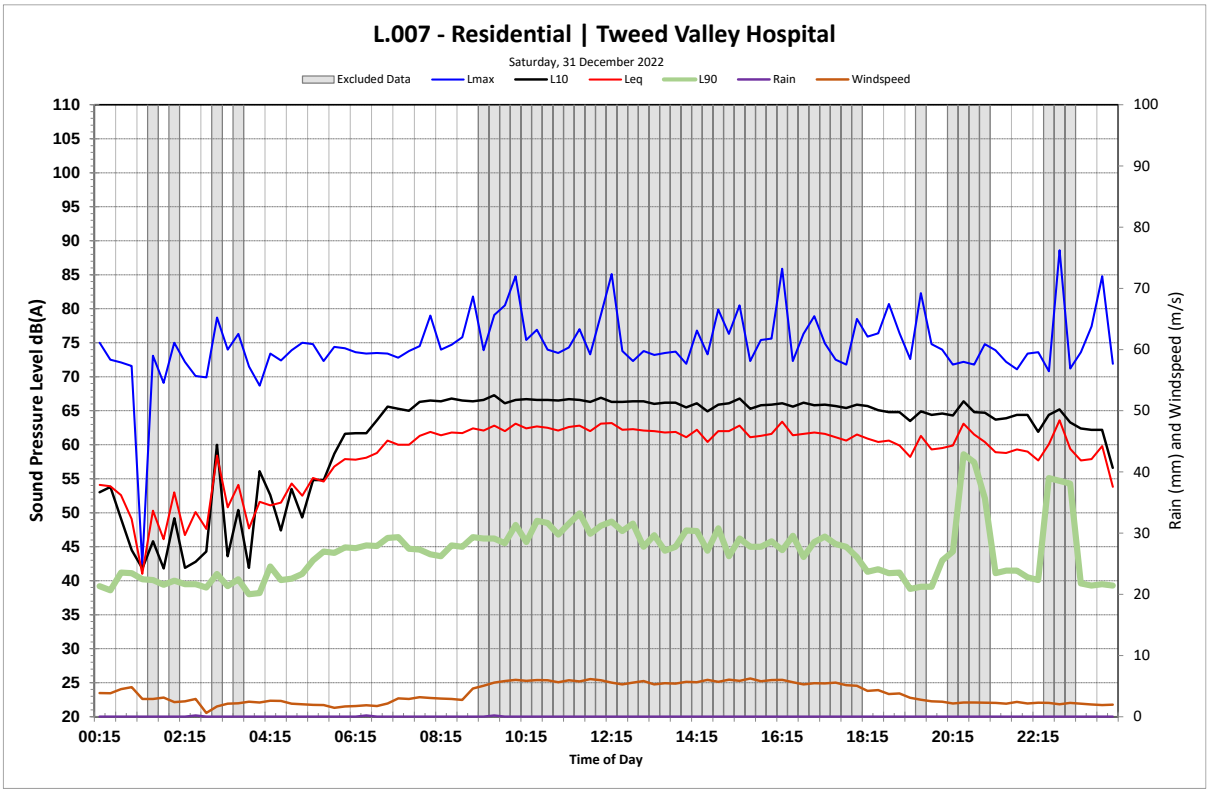

L.007 - Residential | Tweed Valley Hospital
Monday, 26 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15


L.007 - Residential | Tweed Valley Hospital
Tuesday, 27 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15


L.007 - Residential | Tweed Valley Hospital
Wednesday, 28 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15


L.007 - Residential | Tweed Valley Hospital
Thursday, 29 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15


L.007 - Residential | Tweed Valley Hospital
Friday, 30 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15


L.007 - Residential | Tweed Valley Hospital
Saturday, 31 December 2022
Excluded Data
Lmax
L10
Leq
L90
Rain
Windspeed
Sound Pressure Level dB(A)
Rain (mm) and Windspeed (m/s)
Time of Day
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15

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