



Environmental Noise Report



Project: The Shack, Hitchin

Client: The Shack Hut Ltd

Revision: A
Job Number: 2024-11-20 A0180

Date: 06/12/2024
Written by: CJB

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Revision	Date of issue	Purpose of issue
-	05/12/2024	First issue
A	06/12/2024	Removed non noise sensitive receptors
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1.1 Project overview

Noise Harvest has been commissioned by The Shack Hut Ltd to carry out a noise impact assessment on the existing fixed item of plant at the restaurant at the following address:

32 Sun Street
Hitchin
Hertfordshire
SG5 1AH

It is understood that a kitchen extract has been installed to the roof of the restaurant and therefore an assessment of this plant has been requested.

The location of the extract is shown in red below:



Figure 1 Site plan and location of extract

The purpose of this report is to:

- Assess the impact of the existing fixed item of plant using BS 4142:2014;
- Suggest and assess mitigation measures if required to meet the requirements of BS 4142.

2.0 Assessment Criteria

It is understood The Shack has recently installed a new kitchen extract onto the roof. Following the installation, an environmental noise survey and assessment have been requested by the client. The following guidance and standards will be used to assess the noise.

2.1 BS 4142

BS 4142:2014 provides a method for rating and assessing sound of an industrial and/or commercial nature, which includes sound from industrial and manufacturing processes, fixed services plant, sound generated by the loading and unloading of goods and sound from mobile plant / vehicles associated with industrial / commercial premises (e.g. fork-lift trucks).

The standard utilises various descriptors to assess the likelihood of complaints and the impact of sound associated with proposed industrial / commercial activities.

The magnitude of impact is assessed by subtracting the measured background sound level (dB L_{A90}) at a location representative of the nearest noise-sensitive receiver, from the 'rating level' (dB $L_{Ar,Tf}$) – the specific sound source to be introduced into the locality, corrected for acoustically distinguishing characteristics which may make it more subjectively prominent, over a reference time interval of 1 hour during the day and 15 minutes at night.

As a guideline, BS 4142 states that:

- "a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

For reference, the following terms are introduced in BS 4142:

- **Specific sound** – the commercial / industrial sound source under consideration;
- **Residual sound** – the sound level at the sound-sensitive receivers in the absence of the specific sound;
- **Ambient sound** – the sound level at the sound-sensitive receivers in the presence of the specific sound (i.e. ambient = residual + specific);
- **Background level** - the sound pressure level which is exceeded by the residual sound for 90% of the measurement period;
- **Rating level** – the specific sound, corrected for acoustically distinguishing characteristics.

3.0 Site description

3.1 General

The Shack is a restaurant located in the centre of Hitchin close to the market place.

The restaurant is on the ground floor of a two storey building with a hairdressers upstairs on the first floor.

Neighbouring the site is Pizza Express, a Pizza restaurant which has residential flats above it.

To the front of the site is Sun Street which is a pedestrian street with other restaurants and retail shops.

The image below shows The location of the Shack in red with the location of the plant in blue.



Figure 2 Location of Kitchen extract

4.0 Noise survey

An unattended noise survey was carried out between the following dates, Monday 25th November 2024 starting at approximately 13:00 hours until Tuesday 26th November 2024 ending at approximately 14:00 hours.

The engineer who carried out the survey was C J Biggs, who is a full member of the Institute of Acoustics and holds the Institute of Acoustics diploma and a master's in applied acoustics. He has seventeen years of experience in acoustics.

4.1 Equipment and measurement locations

A single measurement position for the noise survey was chosen which was representative of the nearest noise sensitive receptor generally in accordance with the guidance given in BS 7445: 1993. The sound level meter was field-calibrated before and after use with no significant drift witnessed. Laboratory calibration certificates for all measurement equipment used are available upon request. The meter was set up on the roof of the restaurant on a tripod. The approximate survey location is indicated below:



Figure 3 Approximate survey location

It was understood that that the newly installed fixed items of plant were not operating on Monday 25th November 2024 and was switched on at 10:30 hours on Tuesday 26th November 2024.

The Table below summarises the equipment used and the picture of the equipment.

Position	Make and model	Image
P1	Sound level meter NTi XL2 (s/n: A2A-19463-E0) Calibrator Cirrus CR515 Calibrator (s/n: 95717)	

Table 1 List of equipment used

At the start and end of the survey the engineer noted the following subjective impressions:

Noise: The main noise source was from items of plant on the adjacent roof and noise from the Pizza Express kitchen when the roof light window was open.

4.2 Weather conditions

The Table below shows the highest and lowest temperatures, the wind speed and the precipitation

Day	Date	Temp (°C)		Max Wind (mph)	Precipitation
		Low	High		
Monday	25/11/2024	4	10	21	None
Tuesday	26/11/2024	3	8	10	None

Table 2 Recorded weather during survey

Further details of the weather can be seen in the Appendix.

Despite the weather data in the appendix suggesting wind exceeded 5 m/s, onsite measurements were lower than anticipated in the appendix. The figure below shows an onsite wind measurement taken at 13:00 on the 25th of November 2024 and proves the wind speed to be 0.0 m/s (0.0 mph) whereas the weather data suggested the windspeed was 17mph. therefore it can be concluded that wind speed didn't exceed 5 m/s during the survey.



Figure 4 Onsite wind measurement

5.0 Survey results

5.1 Noise survey

It is understood that the kitchen extract runs from 10:30 hours and no longer than 22:00 hours and therefore only daytime values will be required.

The Table below shows a summary of the daytime noise levels with the new fixed item of plant running and not running. The values are the logarithmically averaged L_{Aeq} , the maximum $L_{AF,max}$ and the lowest L_{A90} . All figures have been rounded to the nearest integer value (as fractions of a decibel are imperceptible).

Date	Period	Averaged L_{Aeq} (dB)	Maximum $L_{AF,max}$ (dB)	Typical L_{A90} (dB)
26/11/2024	Day (Plant on)	52	73	51
25/11/2024 to 26/11/2024	Day (Plant off)	54	87	54

Table 3 Summary of measured noise levels

It is understood that the noise with the plant off is higher than the plant on is due to the noise generated from the adjacent Pizza Express.

6.0 Noise emission limits – building services plant

Based on the BS 4142 requirement for fixed items of plant to achieve equal to the typical measured background, the following table summarises the maximum rating level (when penalties such as tonality and impulsiveness are applied) for all new items of fixed services plant associated with the proposed development when assessed at 1 m from the nearest noise-sensitive receptor:

Period	Lowest background noise level dB $L_{A90,10 \text{ mins}}$	Maximum sound pressure level for items of plant
Daytime 07:00 – 23:00 hours	54 $L_{A90,1 \text{ hour}}$	54 $L_{Ar,Tr}$

Table 4 Summary of limiting noise levels

The above limit applies to all new items of services plant, running simultaneously at the appropriate design duty.

7.0 BS 4241:2014 assessment

The following sub-sections provide an assessment of noise impacts associated with the kitchen extract.

It is understood that the shack have the following opening hours:

Monday	Closed
Tuesday	11:30 am–2:30 pm, 5–9:30 pm
Wednesday	11:30 am–2:30 pm, 5–9:30 pm
Thursday	11:30 am–2:30 pm, 5–10 pm
Friday	11:30 am–2:30 pm, 5–10 pm
Saturday	11:30 am–10 pm
Sunday	11:30 am–8:30 pm

Therefore it is understood the plant will operate no earlier than 10:30 hours and not later than 23:00 hours, therefore only the daytime will be assessed.

7.1 Nearest noise sensitive receptors

The image below shows the nearest noise sensitive receptor in blue and the kitchen extract in red.

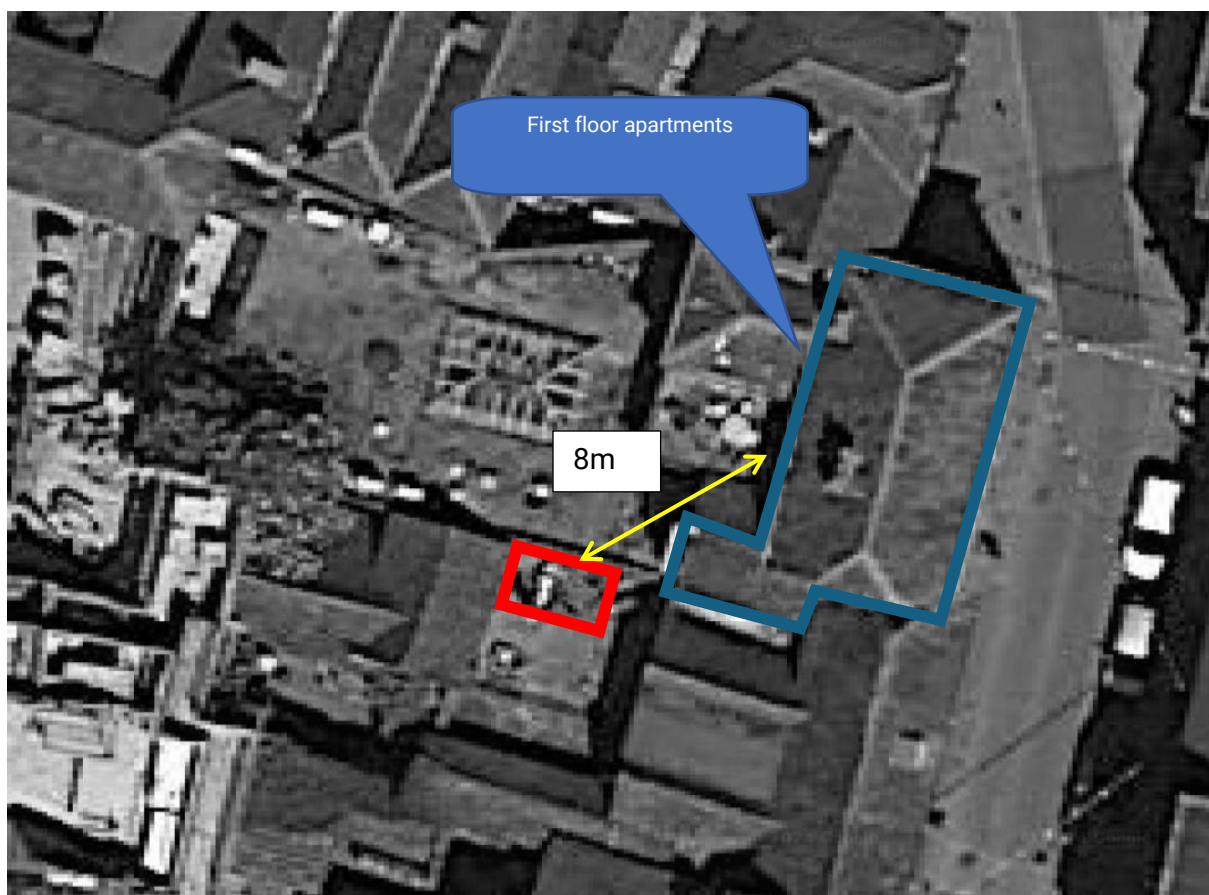


Figure 5 Nearest noise sensitive receivers

It should be noted that the first floor apartment was surveyed as the noise from the kitchen extract is said to be more perceptible on the first floor when compared to the ground floor due to it having a direct line of sight to the extract.

7.2 Background noise level

The table below shows the typical measured background noise whilst the extract is not operating with the façade correction and the typical measured background noise.

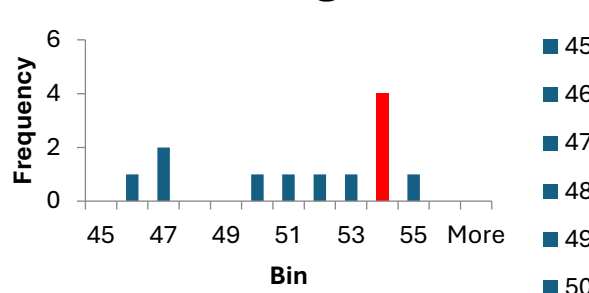
Period	Typical Background $L_{A90,T}$ dB	Measured Histogram																
Daytime	54 $L_{A90,1\text{hour}}$	Histogram <table><caption>Histogram Data</caption><thead><tr><th>Bin</th><th>Frequency</th></tr></thead><tbody><tr><td>45</td><td>1</td></tr><tr><td>47</td><td>2</td></tr><tr><td>49</td><td>1</td></tr><tr><td>51</td><td>1</td></tr><tr><td>53</td><td>4</td></tr><tr><td>55</td><td>1</td></tr><tr><td>More</td><td>0</td></tr></tbody></table>	Bin	Frequency	45	1	47	2	49	1	51	1	53	4	55	1	More	0
Bin	Frequency																	
45	1																	
47	2																	
49	1																	
51	1																	
53	4																	
55	1																	
More	0																	

Table 5 Background noise levels

7.3 Specific Noise level and Background Level

The image below shows the kitchen extract to be assessed.



Figure 6 Kitchen Extract

As the fixed item of plant has been installed, the specific noise level was measured onsite while the extract was running. Measurements were taken at the extract (shown above) and at the intake (shown below).



Figure 7 Kitchen extract intake

The table below shows the specific noise levels of the extract and intake .

Date	Period	Measured L_{Aeq} with extract (dB)	Measured L_{Aeq} with intake (dB)
26/11/2024	Day	56	62

Table 6 Summary of measured noise levels

7.4 Penalties for acoustic characteristics of activity noise

As discussed in Section 2, it is a requirement of BS 4142 that the subjective prominence of the specific sound is considered when assessing the likely impact at nearby sound sensitive receivers, based on the likelihood of any acoustically distinguishing characteristics of the specific sound which may attract attention (whilst considering the existing residual sound climate).

Noise Harvest have experience of assessing industrial sound, and the staff carrying out the assessment are (minimum) degree-qualified engineering consultants in acoustics or a related discipline. All staff are either corporate members or members of the Institute of Acoustics and are therefore considered suitably qualified to make the following assessments.

7.5 Tonality

Annex C of BS 4142 provides the following guidance with respect to assessing a noise source for the presence of prominent, spectral components:

For a prominent, discrete tone to be identified as present, the time-averaged sound pressure level in the octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent one-third-octave bands by some constant level difference.

The level differences between adjacent octave bands that identify a tone are:

- 15 dB in the low-frequency one-third-octave bands (25 Hz to 125 Hz);
- 8 dB in the middle-frequency one-third-octave bands (160 Hz to 400 Hz);

And

- 5 dB in the high-frequency one-third-octave bands (500 Hz to 10 000 Hz).
- The image below shows the measured third octave band data of the kitchen extract.

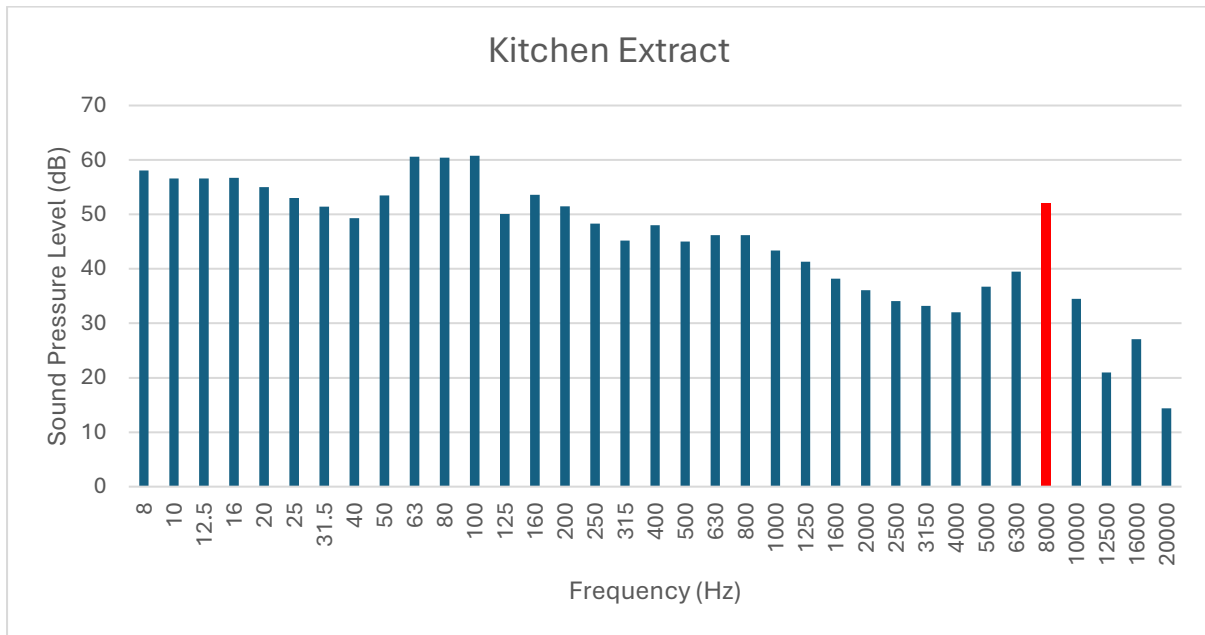


Figure 8 Third octave band data for kitchen extract

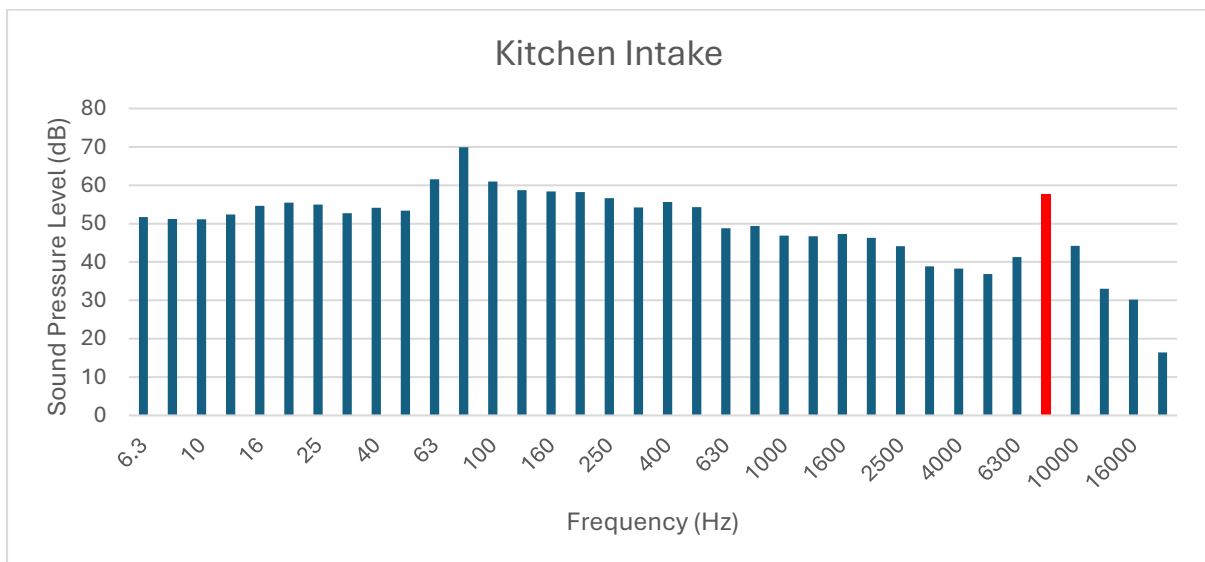


Figure 9 Third octave band data for kitchen extract intake

As can be seen from the image above both the kitchen extract and the kitchen intake are considered to be tonal however this is only deemed slightly perceptible therefore a 2dB penalty will be applied.

7.6 Impulsivity and Intermittency

It is understood that the kitchen extract runs constantly at the same noise level, therefore the extract is not considered to be impulsive or intermittent and no penalty will be applied.

7.7 3D Noise Modelling and BS 4142 assessment

3D noise modelling was used to assess the impact of the item of plant on the nearest noise sensitive receptor.

Noise modelling software takes account of complex terrain and distance and should predict noise more accurately. The 3D model software iNoise 2024.2.1 Pro complies with ISO 9613. The following scenario has been modelled:

Scenario	Noise sources in the model
Scenario A Daytime – BS4142 assesment	- Intake of Kitchen Extract - Extract of Kitchen Extract

Table 7 Summary of Scenarios

The table below shows the scenario, the predicted single point receptor, the typical back-ground noise level and the difference between the corrected rating level and background.

Scenario	Receptor	Predicted noise at receptor	BS 4142 correction	Rating level	Back-ground	difference
Daytime	First floor apartment	45	+2	47	51	-4

Table 8 BS 4142 assessment

As can be seen in the table above there is a difference of-4 dB at the nearest noise sensitive receptor. As the specific noise level does not exceed the background noise level, there will be no impact at the nearest noise sensitive receptor.



8.0 Uncertainty

The following subsections focus on the potential uncertainty of the measurements and calculation.

8.1 Measurements

The measurement position potentially may be marginally different to the nearest noise sensitive receptor as there may be more of a direct line of sight to a noise source that may not be seen.

8.2 Calculations

Meteorological conditions such as wind diffraction or temperature inversions have not been taken into account.

9.0 Conclusion

Noise Harvest has been commissioned by The Shack Hut Ltd to carry out an assessment of the noise impact from the kitchen extract at The Shack restaurant, Hitchin .

The purpose of this assessment is to carry out a BS 4142 assessment of the noise impact of the plant.

9.1 BS 4142 assessment

The assessment of the kitchen extract at The Shack restaurant, Hitchin predicted that there would be no adverse impact at the nearest noise sensitive receptors for the daytime period and therefore no mitigation are required.

10.1 Environmental noise survey data.

Date and Time	L _{Aeq,15min}	L _{AfMax. 15min}	L _{A90, 15min}
25/11/2024 13:30	54.3	59.2	53.5
25/11/2024 13:45	54.5	64.8	53.4
25/11/2024 14:00	54.5	61.6	53.4
25/11/2024 14:15	54.5	62.5	53.3
25/11/2024 14:30	54.2	63.6	53.0
25/11/2024 14:45	54.5	63.2	53.4
25/11/2024 15:00	54.9	66.0	54.0
25/11/2024 15:15	54.7	61.9	53.8
25/11/2024 15:30	54.3	72.3	53.4
25/11/2024 15:45	54.4	61.8	53.4
25/11/2024 16:00	54.6	65.4	53.2
25/11/2024 16:15	53.6	62.1	50.7
25/11/2024 16:30	52.4	63.3	50.9
25/11/2024 16:45	54.9	76.5	51.2
25/11/2024 17:00	55.1	67.3	53.7
25/11/2024 17:15	54.1	67.3	53.5
25/11/2024 17:30	54.2	64.2	53.6
25/11/2024 17:45	54.5	66.1	53.4
25/11/2024 18:00	54.4	69.4	53.6
25/11/2024 18:15	54.8	66.9	53.7
25/11/2024 18:30	54.4	73.8	53.5
25/11/2024 18:45	55.0	66.1	54.0
25/11/2024 19:00	54.6	62.8	53.9
25/11/2024 19:15	54.7	63.5	54.0
25/11/2024 19:30	54.5	66.6	53.6
25/11/2024 19:45	56.0	68.2	53.5
25/11/2024 20:00	57.1	71.3	55.9
25/11/2024 20:15	56.5	65.7	55.7
25/11/2024 20:30	55.8	70.4	52.6
25/11/2024 20:45	52.8	63.8	51.8
25/11/2024 21:00	55.7	67.1	52.5
25/11/2024 21:15	56.1	67.3	55.5
25/11/2024 21:30	56.0	64.3	55.4
25/11/2024 21:45	56.0	65.2	55.3
25/11/2024 22:00	55.0	76.9	50.8
25/11/2024 22:15	57.2	86.8	50.5
25/11/2024 22:30	51.6	70.3	49.4
25/11/2024 22:45	51.3	69.4	49.1
25/11/2024 23:00	51.3	68.6	49.4
25/11/2024 23:15	51.2	70.8	49.8
25/11/2024 23:30	50.6	63.7	49.3
25/11/2024 23:45	49.9	60.9	48.8
26/11/2024 00:00	47.7	65.1	39.4
26/11/2024 00:15	45.3	52.8	41.4
26/11/2024 00:30	44.7	51.0	38.0

Date and Time	L _{Aeq,15min}	L _{AfMax. 15min}	L _{A90, 15min}
26/11/2024 00:45	46.2	54.5	42.9
26/11/2024 01:00	44.2	49.6	39.7
26/11/2024 01:15	45.7	51.8	40.2
26/11/2024 01:30	44.6	53.4	39.8
26/11/2024 01:45	43.5	54.1	35.8
26/11/2024 02:00	43.6	54.0	33.4
26/11/2024 02:15	42.6	53.2	29.5
26/11/2024 02:30	40.3	50.1	32.9
26/11/2024 02:45	45.1	52.2	38.3
26/11/2024 03:00	43.2	53.1	33.8
26/11/2024 03:15	42.4	53.0	30.7
26/11/2024 03:30	45.7	53.4	43.7
26/11/2024 03:45	45.8	55.5	41.2
26/11/2024 04:00	45.2	55.3	38.9
26/11/2024 04:15	43.2	53.8	34.1
26/11/2024 04:30	44.3	51.6	36.0
26/11/2024 04:45	46.1	52.5	41.8
26/11/2024 05:00	45.5	53.0	41.3
26/11/2024 05:15	45.2	54.8	40.6
26/11/2024 05:30	44.7	52.3	40.6
26/11/2024 05:45	46.0	55.0	42.9
26/11/2024 06:00	45.8	54.6	39.3
26/11/2024 06:15	45.6	52.2	42.0
26/11/2024 06:30	45.9	52.0	42.3
26/11/2024 06:45	47.4	54.5	44.5
26/11/2024 07:00	47.5	52.6	43.5
26/11/2024 07:15	47.7	53.8	45.6
26/11/2024 07:30	50.7	56.4	48.9
26/11/2024 07:45	50.0	55.6	48.2
26/11/2024 08:00	50.7	58.4	48.7
26/11/2024 08:15	49.0	54.5	46.4
26/11/2024 08:30	49.0	53.0	46.6
26/11/2024 08:45	50.2	59.8	48.4
26/11/2024 09:00	48.9	58.7	47.1
26/11/2024 09:15	48.8	56.3	46.4
26/11/2024 09:30	48.8	56.3	46.9
26/11/2024 09:45	48.8	58.7	46.6
26/11/2024 10:00	49.5	58.7	45.5
26/11/2024 10:15	49.1	54.4	47.2
26/11/2024 10:30	48.8	59.7	46.3
26/11/2024 10:45	51.6	66.5	50.3
26/11/2024 11:00	51.4	61.5	50.3
26/11/2024 11:15	53.6	72.6	50.8
26/11/2024 11:30	53.3	70.4	50.6
26/11/2024 11:45	52.7	66.8	50.7
26/11/2024 12:00	52.1	65.7	51.2
26/11/2024 12:15	52.7	65.2	50.8
26/11/2024 12:30	52.2	64.6	50.4

Date and Time	L _{Aeq,15min}	L _{AfMax. 15min}	L _{A90, 15min}
26/11/2024 12:45	52.7	72.4	51.0
26/11/2024 13:00	52.4	65.0	50.7
26/11/2024 14:00	52.2	65.6	50.1

10.2 Weather

The following Table shows the recorded weather from www.timeanddate.com

Date	Time	Temp	Weather	Wind
25/11/2024	12:50	10 °C	Broken clouds.	21 mph
25/11/2024	13:20	9 °C	Clear.	17 mph
25/11/2024	13:50	9 °C	Clear.	21 mph
25/11/2024	14:20	9 °C	Passing clouds.	18 mph
25/11/2024	14:50	9 °C	Broken clouds.	20 mph
25/11/2024	15:50	9 °C	Broken clouds.	17 mph
25/11/2024	16:20	8 °C	Passing clouds.	16 mph
25/11/2024	16:50	8 °C	Passing clouds.	18 mph
25/11/2024	17:20	8 °C	Clear.	15 mph
25/11/2024	17:50	7 °C	Clear.	15 mph
25/11/2024	18:20	7 °C	Clear.	17 mph
25/11/2024	18:50	7 °C	Clear.	15 mph
25/11/2024	19:20	7 °C	Clear.	13 mph
25/11/2024	19:50	6 °C	Clear.	12 mph
25/11/2024	20:50	5 °C	Clear.	8 mph
25/11/2024	22:20	5 °C	Clear.	9 mph
25/11/2024	22:50	5 °C	Clear.	9 mph
25/11/2024	23:20	4 °C	Clear.	10 mph
25/11/2024	23:50	4 °C	Clear.	8 mph
26/11/2024	00:20	4 °C	Clear.	8 mph
26/11/2024	00:50	5 °C	Passing clouds.	8 mph
26/11/2024	01:20	4 °C	Clear.	8 mph
26/11/2024	01:50	4 °C	Passing clouds.	8 mph
26/11/2024	02:20	4 °C	Clear.	8 mph
26/11/2024	02:50	4 °C	Clear.	8 mph
26/11/2024	03:20	3 °C	Clear.	7 mph
26/11/2024	03:50	3 °C	Light rain. Clear.	8 mph
26/11/2024	04:20	4 °C	Clear.	9 mph
26/11/2024	04:50	4 °C	Clear.	7 mph
26/11/2024	05:20	3 °C	Clear.	7 mph
26/11/2024	05:50	3 °C	Clear.	7 mph
26/11/2024	06:20	3 °C	Clear.	7 mph

Date	Time	Temp	Weather	Wind
26/11/2024	06:50	3 °C	Clear.	7 mph
26/11/2024	07:20	3 °C	Clear.	5 mph
26/11/2024	07:50	4 °C	Clear.	3 mph
26/11/2024	08:20	4 °C	Clear.	2 mph
26/11/2024	08:50	4 °C	Clear.	3 mph
26/11/2024	09:20	5 °C	Clear.	5 mph
26/11/2024	09:50	6 °C	Clear.	6 mph
26/11/2024	10:20	7 °C	Clear.	10 mph
26/11/2024	10:50	8 °C	Clear.	8 mph
26/11/2024	11:20	8 °C	Clear.	6 mph
26/11/2024	11:50	8 °C	Clear.	9 mph
26/11/2024	12:20	8 °C	Clear.	9 mph
26/11/2024	12:50	8 °C	Clear.	9 mph
26/11/2024	13:20	8 °C	Clear.	9 mph