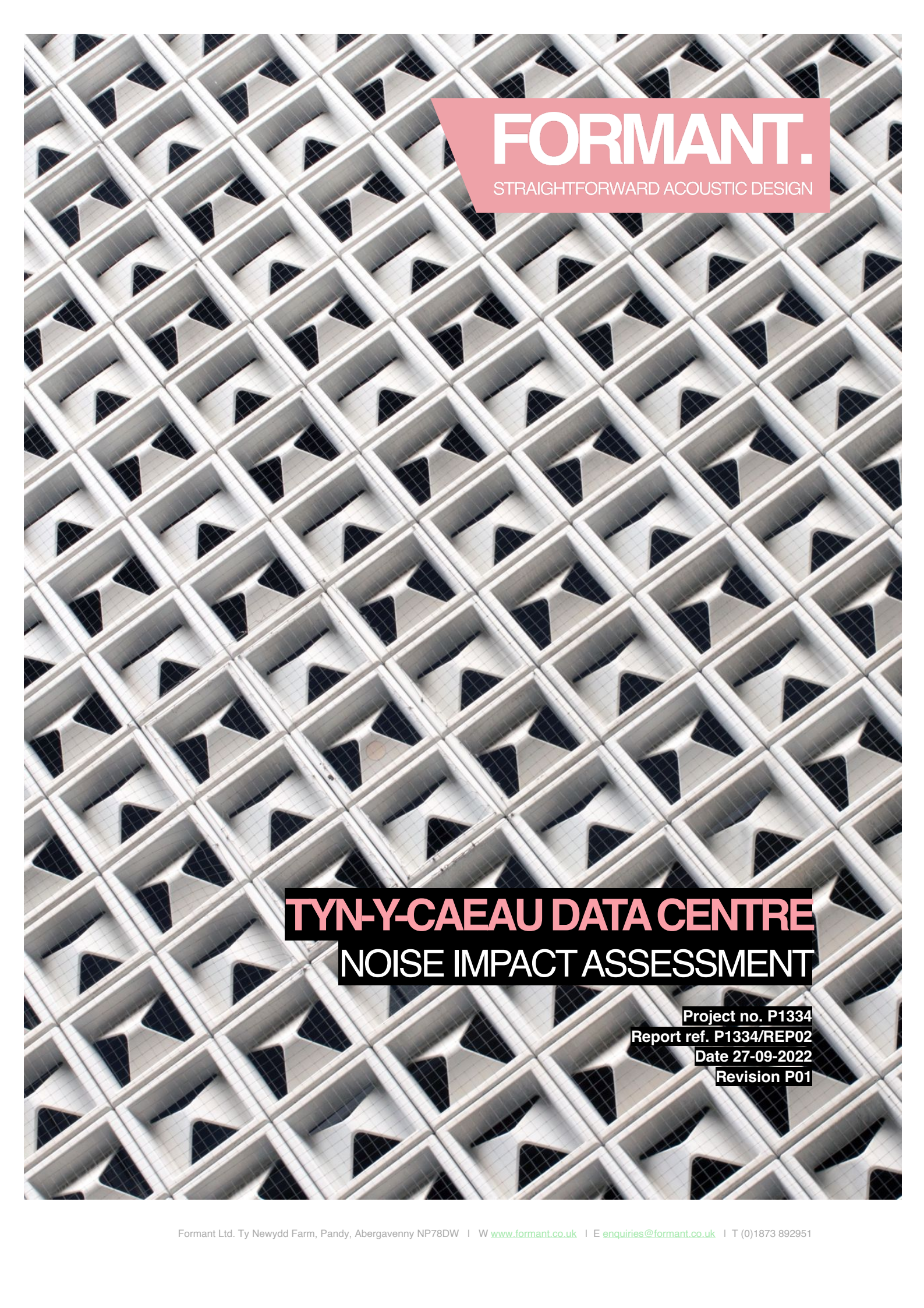




FORMANT.

STRAIGHTFORWARD ACOUSTIC DESIGN

TYN-Y-CAEAU DATA CENTRE NOISE IMPACT ASSESSMENT

Project no. P1334

Report ref. P1334/REP02

Date 27-09-2022

Revision P01



1 INTRODUCTION

Formant has been appointed to review the potential noise impacts arising from the proposed development of a new data centre on land at Tyn-y-Caeau, Margam, Port Talbot, SA13 2NW.

The proposed development will not be noise-sensitive but it has the potential to generate noise which could have an adverse noise impact on nearby noise-sensitive receptors (NSRs).

This report provides:

- 1) A description of the existing site and the proposed development, including its potential noise impacts
- 2) A summary of applicable legislation, policy and guidance
- 3) An initial assessment of potential noise impacts

2 PROPOSED DEVELOPMENT

EXISTING SITE

The existing site comprises a former residential property (currently unoccupied) and a grass paddock, accessed off the A48 Margam Rd. The site is located close to a number of significant transportation and industrial noise sources:

- The A48 Margam Rd, a dual carriageway immediately to the east of the site
- The M4 motorway immediately to the east of the A48.
- Margam Green Energy, an industrial site approx. 250* m to the west of the site
- Western Bio Energy, an industrial site approx. 275* m to the southwest of the site
- The London-Swansea mainline railway approx. 800* m west of the site
- Tata Steel works, approx. 900* m to the west of the site.

The nearest noise-sensitive receptors are

- **NSR1:** Residential properties on 9 Ten Acre Wood, located approx. 275* m to the east on the opposite side of the M4
- **NSR2:** Residential properties on Longland Lane approx. 300* m south of the site
- **NSR3:** Residential properties on Abbot's Close approx. 580* m to the north of the site.

* Distances are measured from the centre of the proposed building as this is the theoretical centre of the noise source.

The residential receptors are all located close to the M4, so are expected to experience fairly high background noise levels and the receptors on Abbot's Close are also in an area designated by the Welsh Government as an Air Quality Management Area, reflecting the significant levels of traffic noise exposure. A site location plan showing the location of the proposed development and nearby NSRs is shown in Figure 1.

PROPOSED DEVELOPMENT AND NSRs

The proposed development involves the construction of a new data centre, with cooling plant located on the roof of the building. The cooling plant will generate mechanical noise and has the potential to cause noise disturbance at nearby NSRs. The existing former residential building on the site will form part of the proposed development, but will not comprise residential accommodation, instead forming office accommodation for the applicant's data centre operational staff. Therefore it is not considered an NSR for the purpose of this noise assessment.



Figure 1: Google Maps aerial photo of the local area showing the proposed development site and the location of nearby NSRs and industrial sites.

3 LEGISLATION, POLICY AND GUIDANCE

3.1 POLICY

PLANNING POLICY WALES

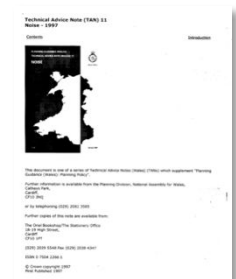
Planning Policy Wales (PPW) sets out the policy framework for all planning applications in Wales. It provides broad objectives with respect to creating appropriate soundscapes and managing noise pollution. With regards new developments, it states that developers must:

- address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;
- not create areas of poor air quality or inappropriate soundscape; and
- seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.



TECHNICAL ADVICE NOTE 11 (WALES)

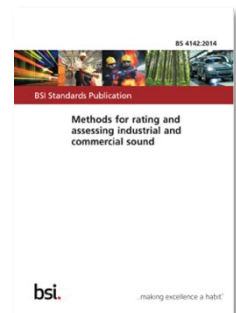
Technical Advice Note (Wales) 11 (TAN11) sets out the Welsh Assembly Government's policies on noise-related planning issues. It sets out the overarching policy context for management of noise within the planning system, in terms of both noise-generating and noise-sensitive developments.



3.2 GUIDANCE

BS 4142:2014

BS4142 provides a method for rating industrial and commercial sound and resulting impacts upon people. The method is relevant to the assessment of noise from the mechanical plant serving the proposed development.





4 BASELINE NOISE SURVEY

4.1 MEASUREMENT METHODOLOGY

A baseline noise survey was undertaken by Paul Driscoll MIOA of Formant, between 20 and 23 Sept 2024. Attended short-term measurements were undertaken between 11:30 - 12:30 hrs on 20 Sept 2024 and an unattended noise logger was left at the site for the following 3 days/nights. All measurements were taken at approximately 1.5 metres above local ground/floor level.

External measurements were made in line with BS 7445:2003 *Description of Environmental Noise*. It was not possible to measure at a distance of 3 metres from the façade of buildings or other reflecting surfaces therefore they do not represent free-field noise levels.

4.2 EQUIPMENT

All measurement equipment owned or hired and operated by Formant has annual or bi-annual calibration checks carried out by external companies traceable to UKAS or national standards. Copies of all calibration records are kept and can be provided upon request. The following measurement equipment was used to conduct the survey:

- Nti XL2 Class 1 Sound level meter, XL2, SNo. A2A-08079-E0, FW4.71 Type Approved
- Larson Davies CAL200 Calibrator, SNo. 18652

4.3 DESCRIPTION OF SOUNDSCAPE

The soundscape at the site during the survey was dominated by traffic on the M4 and to a lesser extent, on local roads around the different measurement positions. Occasional industrial/commercial noise was audible at times and at varying degrees at each measurement position, although it did not dominate the soundscape at any of the measurement positions.

4.4 WEATHER CONDITIONS

The weather conditions during the attended measurements were cool and cloudy with a gentle breeze. The weather conditions for the unattended survey have been taken from publicly available weather data for the nearest weather station and are provided in full in the Appendix to this report.

4.5 NOISE PARAMETERS

A full range of noise data was captured during the survey including the following statistical measurements:

L _{Amax}	The sound pressure level of the single noisiest event during the measurement period.
L _{Aeq}	Time averaged sound pressure level. This is generally considered to be an acceptable representative descriptor of environmental noise.
L _{A90}	Sound pressure level exceeded for 90% of the measurement period, this is generally accepted to be indicative of the continuous background noise level.



4.6 MEASUREMENT RESULTS

A summary of the key noise survey results is provided in Table 1 and the time history graph of the results from the unattended noise logger is provided in Figure 3.

Position	Details	Photo
MP1 Margam Road, near NSR1 residential properties. Soundscape dominated by traffic on the M4. Other contribution from birdsong and high altitude aircraft.	20/09/2024 10:40	
	Duration, T: 15 mins	
	L_{Aeq} 58 dB	
	L _{Amax(F)} 67 dB L _{A90} 57 dB	
MP2 Heolcae'r Bont Road, near NSR2 residential properties. Soundscape dominated by traffic on the M4 a lesser contribution from traffic on local roads and distant industrial noise.	20/09/2024 11:05	
	Duration, T: 15 mins	
	L_{Aeq} 62 dB	
	L _{Amax(F)} 89 dB L _{A90} 53 dB	
MP3 Heolcae'r Bont Road, near NSR2 residential properties. Soundscape dominated by traffic on the M4 a lesser contribution from traffic on local roads and distant industrial noise.	20/09/2024 11:25	
	Duration, T: 15 mins	
	L_{Aeq} 60 dB	
	L _{Amax(F)} 80 dB L _{A90} 56 dB	
MP4 Application site, approx. 75m north of the existing property. Soundscape as per MP3.	20/09/2024 to 23/09/2024	
	DAYTIME	
	NIGHT-TIME	
	0700-2300 hrs	2300-0700 hrs
	L_{Aeq} 58-62 dB	L_{Aeq} 54-57 dB
	L _{Amax(F)} 73 dB L _{A90} 58 dB*	L _{Amax(F)} 70 dB* L _{A90} 48 dB*
* Night-time L _{Amax(F)} night-time values are the 95 th percentile of the full dataset. L _{A90} values are modal average of the individual 15-minute measurements during each period.		

Table 1: Noise survey results summary



BACKGROUND SOUND LEVELS

In order to determine the representative background sound levels we have considered the noise data from the logger during periods of inclement weather (see Appendix for full weather data) in case this resulted in higher noise levels. No significant change arose in the L_{A90} during the periods of rainfall therefore no data has been excluded from the assessment.

The results from the logger have been plotted on a graph to see the spread of L_{A90} values over the survey period:

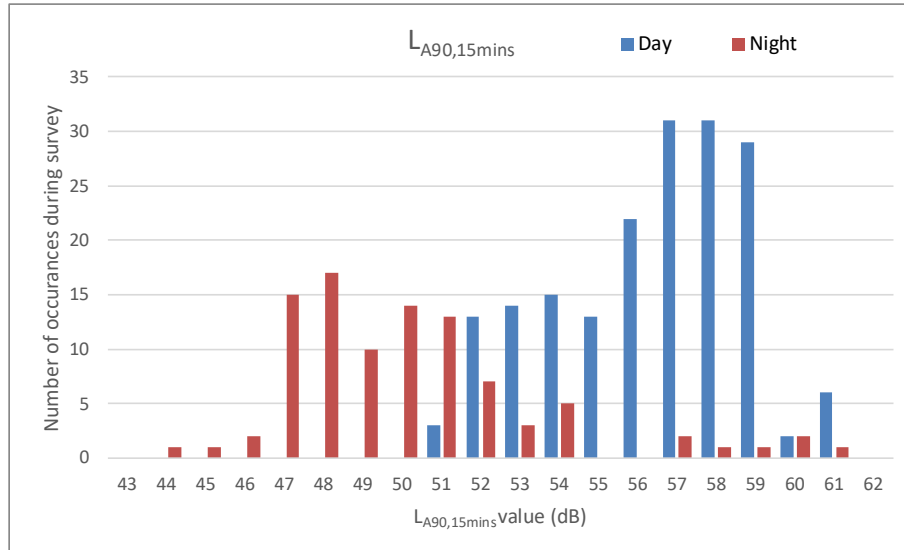


Figure 2: Analysis of night-time $L_{Amax(F)}$ values for each 15-minute sample period during the survey

The modal average $L_{A90,15min}$ were 58 dB (daytime) and 48 dB (night time), indicating a 10 dB difference between daytime and night time levels. This difference has been used to extrapolate the daytime results at NSR1, 2 and 3 and determine the following background levels for use in the noise assessment:

Representative background sound level (L_{A90})	Daytime (0700-2300 hrs)	Night time (2300-0700 hrs)
NSR1	57	47
NSR2	53	43
NSR3	56	46

Table 2: Representative background sound levels at NSRs.

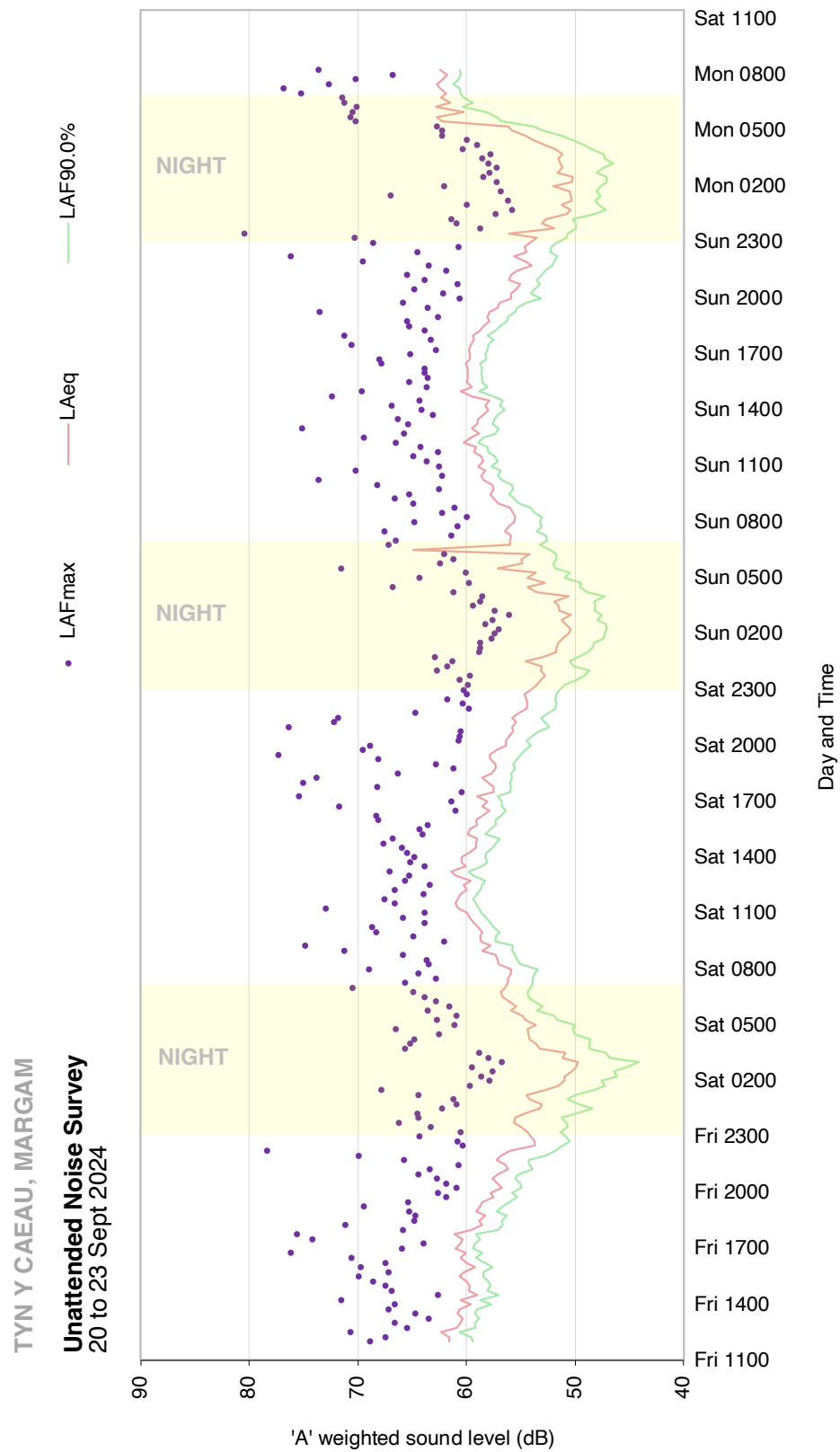


Figure 3: Time history graph for the unattended noise logger

5 NOISE IMPACT ASSESSMENT

5.1 POTENTIAL NOISE IMPACTS

The proposed development has the potential to result in adverse noise impacts at nearby NSRs due to noise from the proposed mechanical cooling plant located on the roof of the main building.

The proposed development is unlikely to generate significant numbers of commercial vehicle movements therefore no assessment of this issue is required. The proposed development is not noise-sensitive therefore no assessment of environmental noise impacts on the proposed development is required.

5.2 NOISE SOURCES

We understand that the proposed development will incorporate a bank of roof-mounted chillers. The final design and specification of the chillers is not known at this stage but based on experience of similar previous projects, we adopted a sound power level of 101 dBA per unit. The proposed plans (reproduced in Figure 2 below) show an indicative rooftop plant layout comprising 6 no. chillers and based on information from the mechanical engineer, we have assumed that 5 of the 6 units would run on full duty continuously 24 hrs a day.

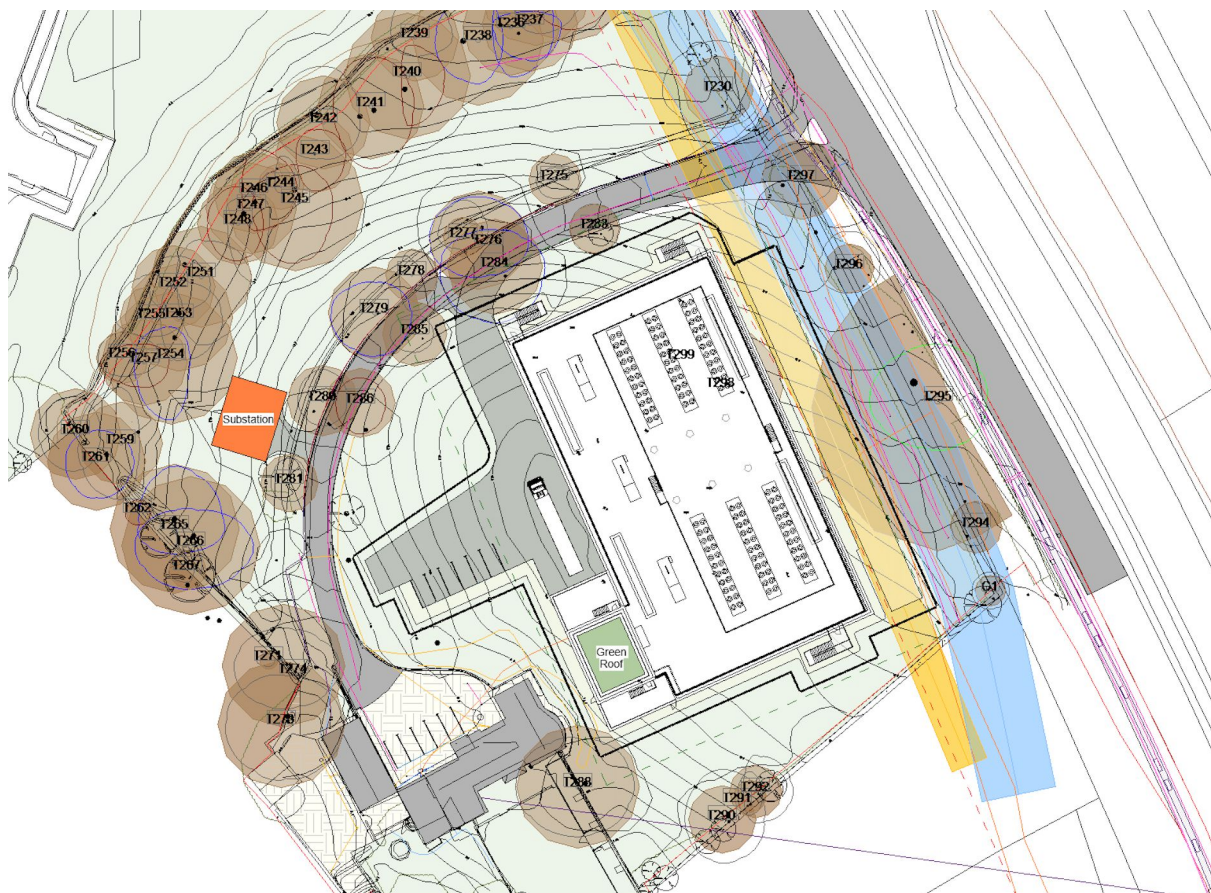


Figure 4: Indicative roof plant layout showing proposed chillers



5.3 NOISE MITIGATION

The final plant selections have not been made at this stage, therefore we cannot determine the exact noise mitigation which will be employed, but the initial assessment has been made with 150 mm deep acoustic louvres around the entire rooftop plant compound, with the following insertion losses:

Octave band centre frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Acoustic louvre insertion loss (dB)	3	6	8	10	14	16	16	15

Table 3: Initial BS 4142 calculation based on spherical noise propagation to represent the soft ground conditions

5.4 INITIAL NOISE IMPACT ASSESSMENT

An initial assessment of the plant noise emissions has been made in line with the methodology in BS 4142:2014+A1:2019. This method assesses the impact by subtracting the background sound level from the rating level from the plant. We do not have measured background sound data for the site nor for the nearby NSRs, but estimated levels have been taken from the Welsh Government's noise mapping. Similarly we do not have final selections for the proposed plant, but assumptions are stated above based on similar previous projects.

The initial assessment results are shown in the noise plots in Figure below:

NSR	Specific noise level (dBA)	Comaprison to daytime background sound level (dBA)	Comaprison to night time background sound level (dBA)	Compliant?
1	45	-12	-2	Yes
2	43	-10	0	Yes
3	38	-18	-8	Yes

Table 4: Initial BS 4142 calculation based on spherical noise propagation to represent the soft ground conditions

FEATURE CORRECTIONS

The type of noise generated by rooftop chillers is typically broadband, therefore it does not typically contain strong tonal components. It is also typically continuous for a building like a data centre, where the cooling load is fairly constant, therefore the units should not be switching on/off regularly.

On this basis, and the fact that the predicted specific sound levels are no higher than the representative background sound levels, we have assumed that the sound at the NSRs will not contain any readily distinguishable features such as tonality, impulsiveness or intermittency, therefore no feature corrections should be required. This assumption should be checked with the chiller manufacturer once the final selections have been made.

This means that the specific sound levels shown in Table 4 and Figure 5 are effectively equal to the rating sound levels and the BS 4142 initial impact assessment is a 'low impact'.

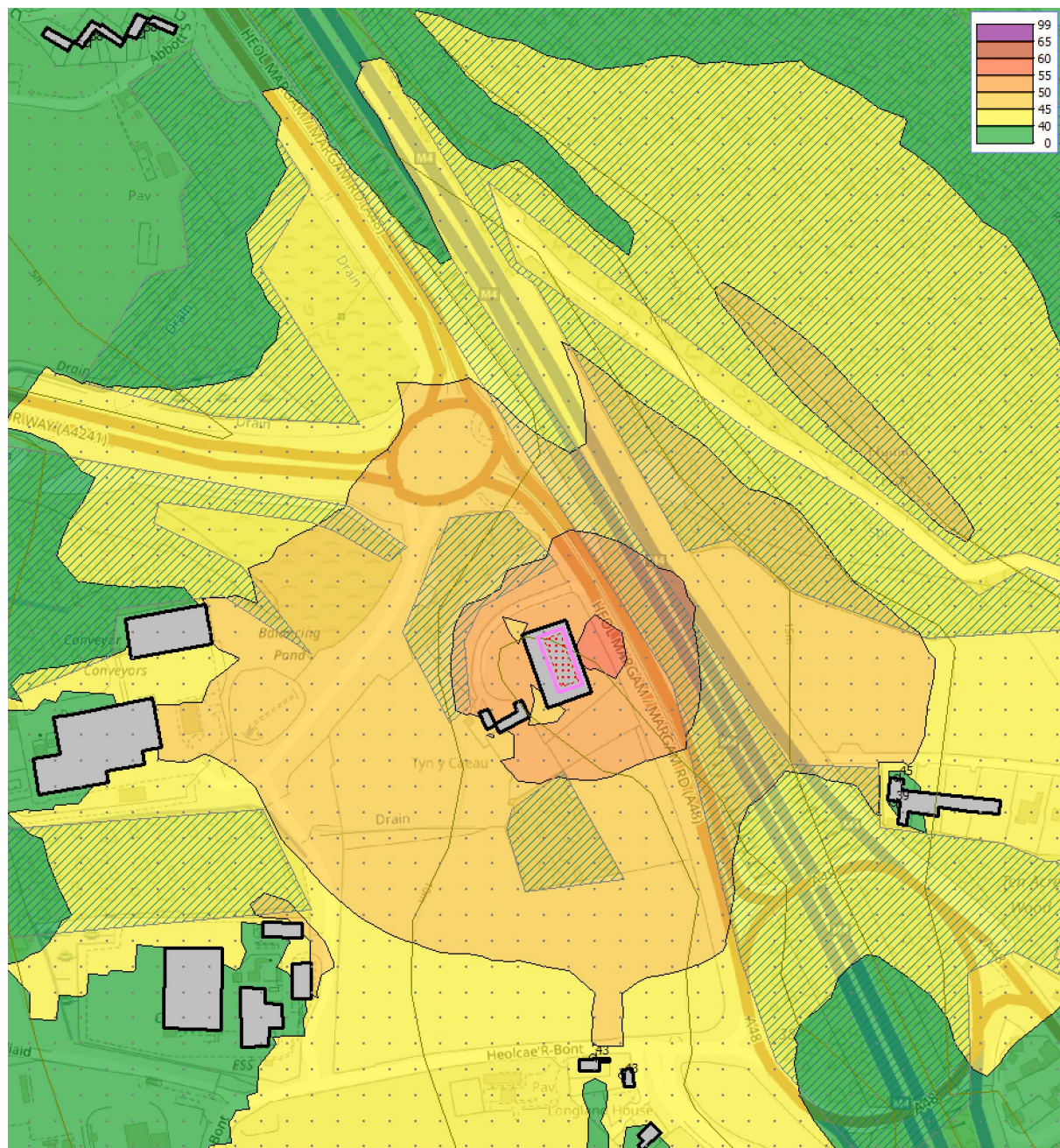


Figure 5: Specific sound level contour plot (4 m above local ground level)

5.5 SITE CONTEXT

The site is located in an area with a number of existing industrial noise sources, as illustrated in the publicly available noise mapping from the Welsh Government's DataMapWales. The mapping provides noise contours for individual noise sources with either daytime (L_{16h}) or night time (L_{night}). As shown in Figure 4 below:

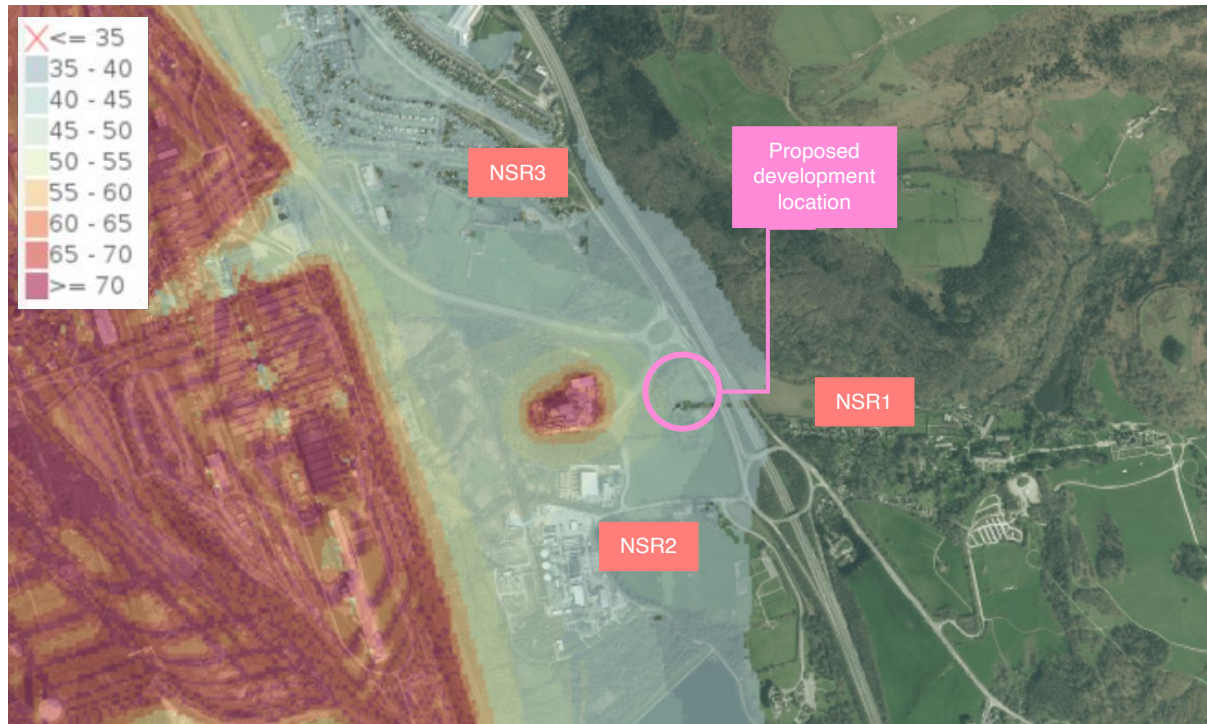


Figure 6: Night time industrial noise contour plot (dBL_{night})

The industrial noise contour plot shows that the site is located in an area with a number of mapped industrial noise sources and also several unmapped industrial noise sources (e.g. Western Bio Energy) which were audible to varying degrees at the different NSR locations.

It is not possible to state from the modelling data whether the industrial noise is constant (which could affect the background sound levels) or intermittent (which may not affect the background sound levels), but it is important to note its presence as it affects the context of the noise assessment.



5.6 NOISE IMPACT ASSESSMENT SUMMARY

The initial assessment shows that the predicted rating sound levels are no higher than the representative background sound level at the NSRs. During daytime hours the predicted specific sound levels are more than 10 dB below the representative background sound levels.

In line with BS 4142, these rating sound levels are indicative of a 'low impact', subject to the context of the site. The context of this site is that the local area is already affected by several significant road, rail and industrial noise sources therefore the introduction of a new broadband continuous sound source which is no higher than the representative background sound level.

This context does not change the impact assessment and the assessment concludes that **no significant adverse noise impacts are predicted at any NSR locations.**

UNCERTAINTY

The initial assessment is subject to uncertainty because:

- Plant specifications have not been finalised at this stage therefore the assessment is based on an overall dBA sound power level for similar chillers from another similar project with an octave band spectrum assumed from a similar type of plant. Any uncertainty arising from the plant data can be reduced with a more detailed assessment once the final plant selection has been made.
- Background sound levels have been extrapolated from a combination of attended measurements at each NSR location supplemented with unattended noise logging at the application site. Conservative assumptions have been made where necessary e.g. to omit noise data during periods of rainfall which may have raised the background sound levels above their normal levels. Despite this fact there may still be some variation in noise levels used in the assessment and those measured on a particular day and at a particular time, but the assessment is considered suitably robust for assessing the potential noise impact of the development.
- Noise propagation calculations have been based on a 3D computer noise model. Whilst the model uses an internationally recognised ISO modelling methodology, there are always assumptions about issues such as ground absorption, areas of vegetation, wind direction/speed and topography which can result in slight variations between modelled results and real-world measurements. The assessment is considered to have taken all reasonable efforts to minimise these uncertainty and to make conservative assumptions where possible.

5.7 RECOMMENDATION TO THE DECISION MAKER

The BS 4142 assessment indicates a low risk of significant noise impacts at the NSRs therefore our recommendation is that planning permission may be granted. If required, a planning condition may be applied to control the provision of noise mitigation which is appropriate for the final plant selections and building layouts.



APPENDIX: WEATHER CONDITIONS DURING SURVEY

Date Time	Temp (°C)	Precip (mm)	Wind gust (kph)	Wind speed (kph)	Conditions
2024-09-20T11:00:00	16.2	0	30.2	19.9	Partially cloudy
2024-09-20T12:00:00	17.2	0	30.2	22.3	Partially cloudy
2024-09-20T13:00:00	18.2	0	27.7	20.5	Overcast
2024-09-20T14:00:00	17.6	0	29.9	23.4	Overcast
2024-09-20T15:00:00	17.6	0	27.4	23.4	Partially cloudy
2024-09-20T16:00:00	18.1	0	26.3	19.6	Partially cloudy
2024-09-20T17:00:00	18	0.1	26.3	24.2	Rain, Partially cloudy
2024-09-20T18:00:00	16.6	0.1	27.7	17.3	Rain, Partially cloudy
2024-09-20T19:00:00	16.6	0	20.9	19.7	Partially cloudy
2024-09-20T20:00:00	16.1	0	21.2	17.2	Partially cloudy
2024-09-20T21:00:00	15.7	0	17.3	21.6	Partially cloudy
2024-09-20T22:00:00	15.7	0	10.1	24.6	Partially cloudy
2024-09-20T23:00:00	15.7	0.4	7.2	22.3	Rain, Partially cloudy
2024-09-21T00:00:00	15.3	0.1	16.2	22.3	Rain, Partially cloudy
2024-09-21T01:00:00	15.2	0.1	20.9	22.2	Rain, Partially cloudy
2024-09-21T02:00:00	14.7	0	20.5	15.1	Partially cloudy
2024-09-21T03:00:00	14.3	0	18.4	17.9	Overcast
2024-09-21T04:00:00	14.4	0.2	14	19.7	Rain, Overcast
2024-09-21T05:00:00	14.9	0.9	10.4	17.9	Rain, Partially cloudy
2024-09-21T06:00:00	15.3	0.8	10.4	17.9	Rain, Overcast
2024-09-21T07:00:00	15.4	0	14.8	18.6	Overcast
2024-09-21T08:00:00	15.8	0	16.6	18.7	Overcast
2024-09-21T09:00:00	15.8	0.4	20.2	18.2	Rain, Partially cloudy
2024-09-21T10:00:00	15.8	0.5	33.5	18.9	Rain, Partially cloudy
2024-09-21T11:00:00	15.8	0.5	36.7	20.1	Rain, Overcast
2024-09-21T12:00:00	15.8	0.1	38.5	20.8	Rain, Overcast
2024-09-21T13:00:00	16.5	0.1	29.9	19.4	Rain, Overcast
2024-09-21T14:00:00	17.5	0	30.2	18.7	Overcast
2024-09-21T15:00:00	18.9	0.4	28.1	17.2	Rain, Overcast
2024-09-21T16:00:00	18.9	0.5	22.7	12.2	Rain, Partially cloudy
2024-09-21T17:00:00	18.9	1.5	18.4	9.6	Rain, Partially cloudy
2024-09-21T18:00:00	19.4	1.7	22	9.1	Rain, Partially cloudy
2024-09-21T19:00:00	17.8	0.7	23.4	9.7	Rain, Partially cloudy
2024-09-21T20:00:00	16.8	0	23	12.4	Partially cloudy
2024-09-21T21:00:00	16.8	0	19.8	14	Overcast
2024-09-21T22:00:00	16.4	0	16.9	12.4	Partially cloudy



Date Time	Temp (°C)	Precip (mm)	Wind gust (kph)	Wind speed (kph)	Conditions
2024-09-21T23:00:00	16.3	0	18	15.9	Partially cloudy
2024-09-22T00:00:00	15.8	0.1	18.4	15.3	Rain, Overcast
2024-09-22T01:00:00	15.7	0	8.3	16.9	Partially cloudy
2024-09-22T02:00:00	15.2	0.1	8.6	18.7	Rain, Partially cloudy
2024-09-22T03:00:00	14.8	0	6.1	19.7	Partially cloudy
2024-09-22T04:00:00	15.3	0.3	7.6	19.3	Rain, Partially cloudy
2024-09-22T05:00:00	15.3	0.9	11.2	20	Rain, Partially cloudy
2024-09-22T06:00:00	14.9	0.7	11.2	15.1	Rain, Partially cloudy
2024-09-22T07:00:00	15	0	5.8	15.1	Overcast
2024-09-22T08:00:00	15.4	0	9.4	17.8	Partially cloudy
2024-09-22T09:00:00	15.8	0.4	11.9	17.8	Rain, Overcast
2024-09-22T10:00:00	16.1	2.2	10.4	17	Rain, Partially cloudy
2024-09-22T11:00:00	16.2	4.3	10.8	16.8	Rain, Overcast
2024-09-22T12:00:00	15.8	1.2	13.7	17.1	Rain, Partially cloudy
2024-09-22T13:00:00	16.6	1	20.2	21.7	Rain, Overcast
2024-09-22T14:00:00	16.4	0	21.2	19.2	Overcast
2024-09-22T15:00:00	15.9	1	16.9	16.5	Rain, Overcast
2024-09-22T16:00:00	16.4	0.6	15.5	17.4	Rain, Overcast
2024-09-22T17:00:00	17	0.2	14	14.2	Rain, Partially cloudy
2024-09-22T18:00:00	16.5	0.4	13.7	11.6	Rain, Partially cloudy
2024-09-22T19:00:00	16.4	0.1	13.7	9.9	Rain, Overcast
2024-09-22T20:00:00	16.4	0	13.3	10.4	Overcast
2024-09-22T21:00:00	15.5	0.1	13.7	9.6	Rain, Partially cloudy
2024-09-22T22:00:00	15.9	0.1	12.6	8	Rain, Overcast
2024-09-22T23:00:00	15.8	0.3	12.6	7.1	Rain, Overcast
2024-09-23T00:00:00	15.4	0.2	12.2	3.4	Rain, Overcast
2024-09-23T01:00:00	15.4	0.3	7.6	2.9	Rain, Overcast
2024-09-23T02:00:00	15.4	0	10.1	3.4	Overcast
2024-09-23T03:00:00	14.8	0.5	10.8	5.4	Rain, Overcast
2024-09-23T04:00:00	14.9	0.3	12.2	6.7	Rain, Overcast
2024-09-23T05:00:00	14.9	0.2	13	8.6	Rain, Overcast
2024-09-23T06:00:00	14.9	0.5	14	8.6	Rain, Overcast
2024-09-23T07:00:00	14.8	2.1	15.1	9.9	Rain, Overcast
2024-09-23T08:00:00	14.8	6.4	13.7	6.7	Rain, Overcast
2024-09-23T09:00:00	14.8	0.9	13.3	10.4	Rain, Overcast
Data in red has been excluded from the assessment as it was affected by significant quantities of rain					