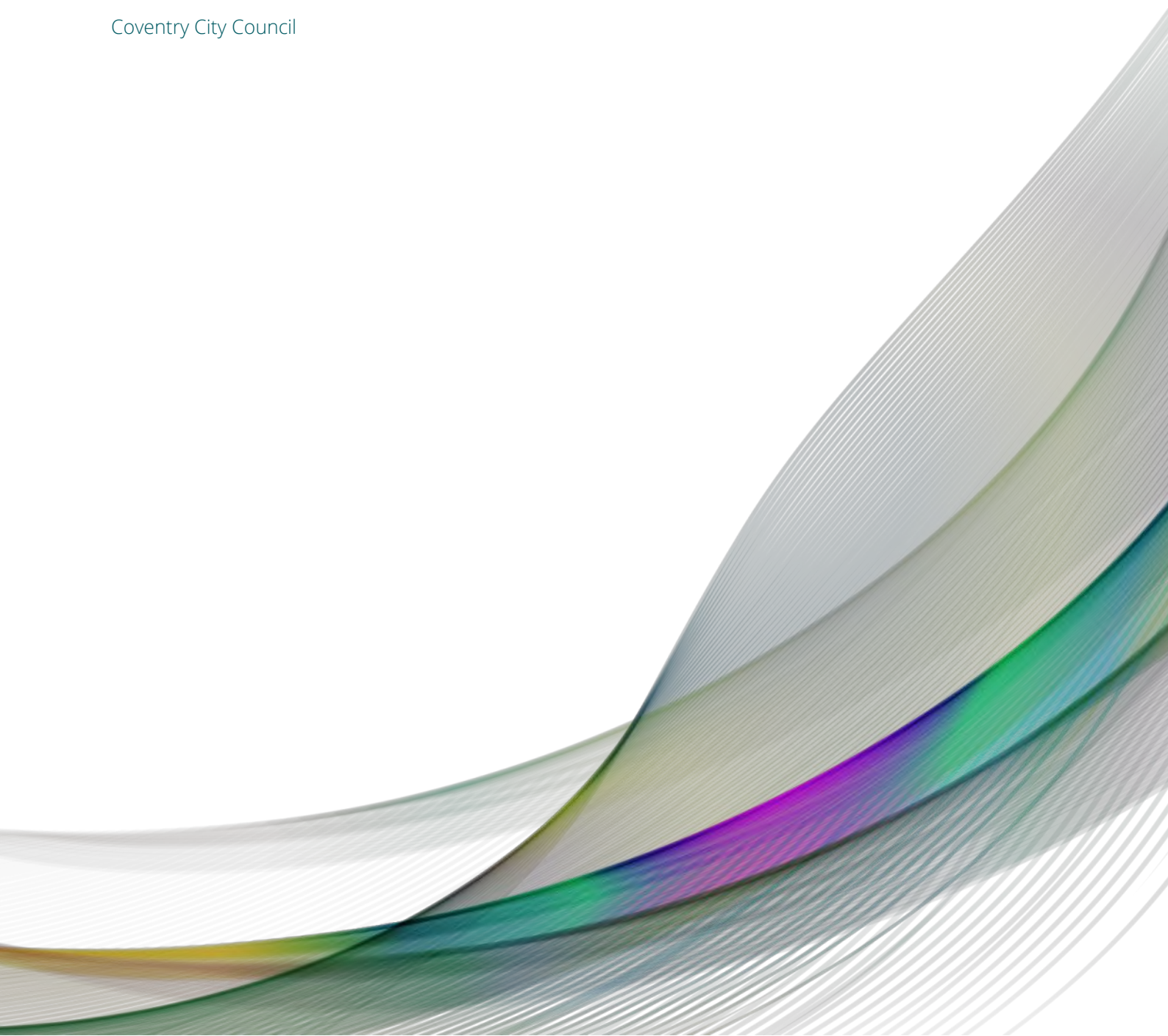
MACH GROUP

THINKING DIFFERENTLY

WOODFIELD SCHOOL STONELEIGH ROAD SITE

Environment Noise Assessment

Coventry City Council



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CONTENTS

1.0 INTRODUCTION

MACH Acoustics has been appointed by Coventry City Council to conduct an environmental noise assessment for the proposed development at the former Woodfield School – Stoneleigh Road site, Coventry, CV4 7AB. The proposed development is understood to include new built residential houses.

The noise break-in assessment aims to inform the acoustic design of the building envelope, such that external noise ingress is controlled within the requirements of the local planning authority.

Such to establish the existing noise levels across the site, a noise survey has been undertaken. This report describes the noise survey, its results, and the outcomes of subsequent noise break-in and break out assessments. An appropriate set of internal noise criteria has also been presented, when windows are closed and means of background ventilation are enabled.

2.0 LEGISLATION FOR NOISE

2.1 National Planning Policy Framework (NPPF)

In March 2014 the Government published the National Planning Policy Framework (NPPF) for noise which sets out the Government's planning policies for England and how these are expected to be applied.

The NPPF provides a framework within which local people and their council can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

With regards to noise the Framework states that 'Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

- whether or not a significant adverse effect is occurring or likely to occur;
- whether or not an adverse effect is occurring or likely to occur; and
- whether or not a good standard of amenity can be achieved."

It also states that:

"The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation."

2.2 Noise Policy Statement for England (NPSE)

The aim of the Noise Policy Statement for England (NPSE) is to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion. The NPSE applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

Noise Policy Vision: Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims: Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life

2.3 National Planning Policy Guidance - Noise

Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The current guidance contained in the NPPG is summarised in the table below. This advice has not changed since the introduction of the 2018 version of the NPPF.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g., turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g., avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 2.1: Noise exposure hierarchy

3.0 OVERVIEW OF RELEVANT GUIDANCE DOCUMENTS

3.1 Internal Ambient Noise Limits – Residential - BS8233:2014 & WHO

The standard design guide for internal noise levels for residential developments is within BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings'. BS8233 states that to achieve adequate sleeping and living conditions, background noise levels should be 30 dB L_{Aeq} or less within bedrooms at night, and 35 dB L_{Aeq} or less within Living rooms during the day. The advised levels are tabulated below.

Activity	Location	0700 - 2300	2300 - 0700
Resting	Living Room	35 dB $L_{Aeq, 16\ Hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16\ Hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq, 16\ Hour}$	30 dB $L_{Aeq, 8\ Hour}$

Table 3.1 - BS8233 internal noise levels

BS8233:2014 - NOTE 7 states;

> "Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

BS 8233: 2014 provides no definitive methodology for the assessment of L_{Amax} levels.

The WHO Community Noise Guidelines 1998 states that in order to avoid sleep disturbance within bedrooms during the night, the internal sound pressure level should not exceed 45 dB $L_{Amax.}$ It is widely accepted that noise events should not exceed 45 dB L_{Amax} more than 10-15 times during the nighttime period (2300 - 0700).

3.2 Plant Noise Limits - BS 4142: 2014

BS 4142:2014 "Methods for rating and assessing industrial and commercial sound" describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions.

This assessment typically focuses on a comparative study against the existing typical background noise level, L_{A90}. Although in some cases the context of an absolute noise level in terms of $L_{Aeq,T}$ may be considered.

For this reason, the typical L_{A90} noise levels and where required the ambient $L_{Aeq,T}$ noise levels will be reported.

4.0 ENVIRONMENTAL NOISE SURVEY

To establish the existing environmental noise levels on site, 24-hour noise survey was conducted on the 29/08/2019 and 30/08/2019.

4.1 Site Description

The proposed site is located in Coventry near the University of Warwick, just off the A429, Kenilworth Road. Stoneleigh Road runs along the south-west of the site while Kenilworth Railway runs along the south-east of the site. In decreasing distance, Warwick Medical School, the A249 and the ASI School of Motoring are located to the north-west of the site. Residential dwellings are situated to the south and west of the site.

The proposed site in relation to its surroundings is shown in the site map presented in Figure 4.1 below.

Figure 4.1: Proposed Development (Red)

Noise Sensitive Receiver	Distance from Site Boundary (m)
Nearest Residential Dwelling – Stoneleigh Road	20

Table 4.1: Nearest Noise Sensitive Receivers

4.2 Noise Sources

Noise levels varied across the site with the dominant noise source being road traffic along the A429, as well as train movements along the track to the east, which occur approximately every 10 minutes. A summary of the main noise sources is provided below.

Noise Source	Description
A429 (Kenilworth Road)	The Broad Ln is situated along the north boundary of the site.
Train passing	Track to the east, every 10 mins on average
Stoneleigh Road	Other residential roads also contribute to the overall noise level on site.

Table 4.2: Summary of Main Noise Sources

4.3 Measurement Positions

Measurement positions used throughout the survey are shown below.

Figure 4.2: Measurement Positions

4.4 Measured Noise Levels

4.4.1 Fixed Position

Noise levels were measured at the fixed position between 11:20 29/04/2019 and 12:20 30/04/2019. Measured noise levels are presented in the graph below. A summary of noise levels are shown in the table.

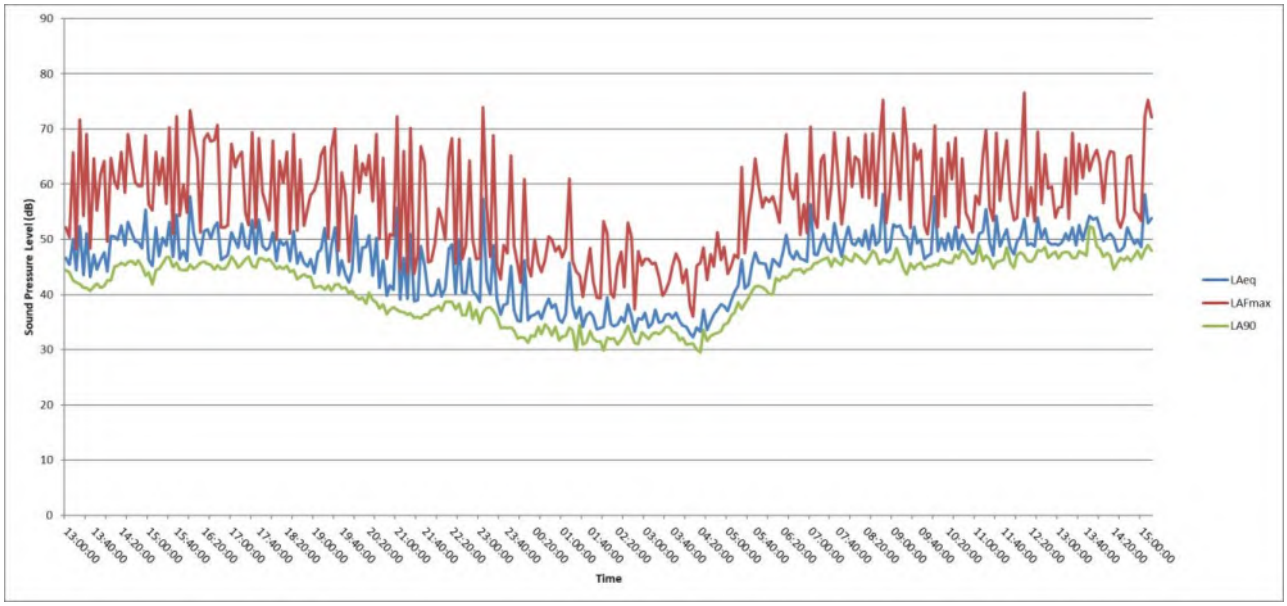

Table 4.3: Summary of Fixed Position Measurements

Time		Measured Noise Levels (dB)	
		Minimum	Mode
Daytime (07:00 - 23:00)	L_{A90}	36	46
Night Time (23:00 - 07:00)	L_{A90}	30	33

Table 4.4: Summary of Fixed Position Measurements

4.4.2 Spot Positions

Additional spot measurements were taken between 10:30 and 12:00, 29/04/2019.

Spot Position	Times (hh:mm)	$L_{Aeq,15min}$
S4	13:05-13:20	48

Table 4.5: Summary of Spot Measurements

5.0 FAÇADE NOISE BREAK-IN

5.1 Ventilation Strategy

Based on noise levels observed on-site, MACH recommends a natural ventilation strategy via trickle vents for the proposed development scheme. All habitable spaces can have trickle vents to facilitate natural ventilation

5.2 Glazing System

Table 5.1 and Table 5.2 below provide the minimum sound reduction indices for windows and trickle vents to meet the Part E internal noise level requirements. Note that the values presented are representative of the entire window including frames and other elements. The acoustic performance of the chosen systems should be verified via a laboratory test certificate.

Element	Sound Reduction Indices, dB (Octave Band Centre Frequency, Hz)						Weighted, dB
	125	250	500	1000	2000	4000	
Windows	24	20	25	34	37	37	31 R_w

Table 5.1 Minimum Sound Reduction Indices (SRI) for Windows

It is anticipated that the glazing requirements outlined above can be achieved with a double-glazed system

Element	Sound Reduction Indices, dB (Octave Band Centre Frequency, Hz)						$D_{n,ew} + 10Log_{10}(N)$
	125	250	500	1000	2000	4000	
Trickle Vents	26	36	35	31	32	37	32*

Table 5.2 Sound reduction for Trickle Vents

*The calculations assume one trickle vent is required for background ventilation in each room on the external façade. Should more than one trickle vent be required, the D_{ne} spectrum of the element should be increased by using the formula $D_{n,e} + 10Log_{10}(N)$, where N is the number of ventilators required to provide background ventilation. If this is not clear, please contact MACH Acoustics with any queries

5.3 Wall Construction

MACH has undertaken a feasibility study on suitable external wall constructions which can be used with the minimum sound insulation performance. MACH has not provided specific build-ups for the façade or roof, such that there can be flexibility in the design of the new build aspects of the scheme. Although the roof and façade will be of different constructions, the necessary acoustic performance is the same.

Element	Sound Reduction Indices, dB (Octave Band Centre Frequency, Hz)						Weighted, dB
	125	250	500	1000	2000	4000	
External Wall and Roof	34	34	40	55	55	55	45 R_w

Table 5.3 Minimum Sound Reduction Indices (SRI) for External wall

6.0 PLANT NOISE LIMITS

The sum of all noise from any plant units should not exceed the limits in Table 6-1 at the window of any existing residential receptor. These plant noise rating level limits have been derived from fixed position F4.

Daytime and night-time limits have been set equal to background noise level during day and night time respectively. This should be confirmed with the local authority.

Measurement Period	Rating Level Requirement	Noise Rating Limits at Noise Sensitive Receptors (dB $L_{Ar,T}$)
Day time (07:00 -23:00)	equal to background*	≤ 46
Night time (23:00 -07:00)		≤ 33
*Subject to agreement with the local authority		

Table 6-1 Maximum plant noise limits at existing residential receptors

7.0 CONCLUSION

MACH Group has been appointed by Coventry City Council to undertake an environmental noise assessment for the proposed development scheme at Woodfield School, Coventry. The report has the following conclusions.

- Based on the results of the noise survey, MACH has established façade noise levels across the development.
- It has been determined that all habitable spaces can be naturally ventilated through trickle vents.
- A full acoustic specification for windows, trickle vents, walls and roof has been provided. The specifications will enable compliance with the internal noise criteria of BS 8233: 2014.
- Maximum rating level limits have been provided for mechanical plants associated with the proposed development.

APPENDIX A – METHODOLOGY

BS 7445:2003

Environmental noise measurements were conducted in accordance with BS 7445 "Description and measurement of environmental noise".

BS 4142:2014

BS 4142 states that one should *'obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level and consider the following:*

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.*

The aforementioned rating level is based upon the specific noise level of the noise source in question. A correction should be applied to the specific noise level to obtain an increased rating level if *'a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources.* To summarise, BS4142 section 9.2 advises the following in regards to corrections for acoustic characteristics:

- Tonality – *for sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.*
- Impulsivity – *A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level., Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.*
- Other sound characteristics – *Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied*
- Intermittency – *When the specific sound has identifiable on/off conditions, if the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.*

APPENDIX B – MEASUREMENT EQUIPMENT

Name	Serial Number	Last Calibrated	Certificate Number	Calibration Due
NTI Precision Sound Analyser XL2 TA	A2A-11002-E0	Dec-17	UCRT17/2147	Dec-19
NTI Pre-amplifier MA220	7183	Dec-17	UCRT17/2147	Dec-19
NTI Microphone Capsule MC230	8105	Dec-17	UCRT17/2147	Dec-19

The measurement equipment listed above was used during the survey, where all equipment complies with BS EN 60942:2003 i.e. a class 1 device

APPENDIX C – METEOROLOGICAL CONDITIONS

Date	Time (hh:mm)	Temperature (°C)	Humidity (%)	Pressure (hPa)	Wind Speed (m/s)	Wind Direction	Conditions
29/09/19	00:00	10	98	1.017	3.7	SSE	Passing Clouds
	06:00	13	88	1.018	6.8	SSW	Passing Clouds
	12:00	18	67	1.019	10.6	SW	Broken Clouds
	18:00	17	71	1.019	8.1	S	Passing Clouds
30/09/19	00:00	15	86	1.019	6.8	S	Passing Clouds
	06:00	17	80	1.019	9.9	S	Scattered Clouds
	12:00	21	61	1.018	11.8	SSW	Passing Clouds
	18:00	19	75	1.016	6.8	SSW	Passing Clouds