



ENVIRONMENTAL NOISE SURVEY, NOISE BREAK-IN ASSESSMENT & SOUND INSULATION SCHEME

Client: Property Services Gravesham Borough Council

Client Address: Civic Centre, Windmill Street

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Site Address: St Columba's Close, Gravesend, Kent

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Executive Summary

An environmental noise survey and noise impact assessment have been undertaken to assess the suitability of the site at St Columba's Close, Gravesend, Kent for residential development. The measured ambient sound levels have allowed a BS8233:2014 noise assessment to be carried out. In addition, a BS4142:2014 assessment has been carried out to assess the potential impact that any future external plant unit may have on the surrounding residential dwellings.

A sound insulation scheme has been provided in Section 4.0, including glazing and an alternative ventilation strategy. These recommendations should be sufficient to achieve the internal and external noise levels for the proposed development according to the BS8233:2014 criteria. An overview of all recommendations can be found in the table below:

Recommendations and Mitigation Overview

BS8233 Assessment

- All glazing along the various façades requires the sound reduction specific in Table 4.0. Appropriate glazing specifications can be found in Table 5.0.
- Appropriate acoustically treated alternative ventilation can be found in Table 6.0.

BS4142 Assessment

- All mechanical plant associated with the development should not exceed the cumulative plant noise limit level of **26.0 dBA** at the closest NSR.
- Once all plant has been specified a suitably qualified person assess all emissions and plant locations to ensure the cumulative plant limit level can be achieved.

The findings of this report will require written approval from the Local Authority prior to work commencing.

1. Introduction

Overview

NOVA Acoustics Ltd has been commissioned to prepare a noise assessment for a residential development ('the Proposed Development') at St Columba's Close, Gravesend, Kent ('the Site').

The applicant is preparing a planning application to be submitted ('the Application') to Gravesham Borough Council

The following technical noise assessment has been prepared to support the planning application to Gravesham Borough Council. This report details the ambient sound climate at the proposed development site and provides a sound insulation scheme to protect the amenity of the occupants of the proposed residential dwellings.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

Scope & Objectives

The scope of the noise assessment can be summarized as follows:

- Ambient sound monitoring survey to evaluate the prevailing ambient and maximum sound levels incident on the proposed development;
- A detailed assessment of the suitability of the Site, in accordance with relevant standards in respect of sound from the surrounding noise sources; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of the National Planning Policy Framework (2019), Noise Policy Statement for England (2010) and British Standard BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. Further information on the legislation can be found in Appendix B.

2. Environmental Noise Survey

Measurement Methodology

In order to characterise the sound profile of the area at the proposed development, an environmental sound survey has been carried out from 24/03/2022 to 25/03/2022. The monitoring positions were chosen in order to collect representative sound levels at the proposed development during the day and night. Note that levels at MP2 will be considered as a worst-case scenario, as the immediate roads surrounding the proposed site can be considered to provide lighter levels of traffic flow. The sound level meters were positioned attached to a lamppost at approximately 4m above the ground level. The monitoring locations are shown in Figure 1.0.



Figure 1.0 - Indicative Site Layout

Context & Subjective Impression

The area surrounding the site is primarily residential, located in a residential area of Gravesend, northeast of Kent. Directly to the northwest of the site runs Valley Drive, a 30mph road that facilitates moderate levels of traffic flow. To the east runs St Dunstan's Drive, which provides access to the neighbouring residential properties and where traffic flow is light, as well as St Patrick Gardens and St Columba's Close, situated to the south and north of the site, respectively. The noise profile of the area is dominated by traffic flow and other noise sources secondary in nature.

Environmental Noise Survey Results

The following table outlines the highest $L_{Aeq,16hour}$ and $L_{Aeq,8hour}$ sound levels measured during the day and night periods that will be used in the noise break in assessment and external noise level assessment. A full summary of all results can be found in Appendix D.

Measurement Period ('t')	MP1	MP2
Highest $L_{eq,16hour}$ – Day 2 – 25/02/2022	69.0	60.0
Highest $L_{eq,8hour}$ – Night 1 – 24/02/2022	62.0	50.0

Table 1.0 – Sound Levels during day & night

In the following section, the maximum noise level events are assessed. ProPG states:

"...in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night."

The following table shows a summary of the maximum sound level results.

Measurement Position MP1			
Measurement Period ('t')	$L_{AFMax,15min}$	*SMR $L_{AFMax,15min}$	No. Exceedances of 81dB $L_{AFMax,15min}$
Night 1	94.0	79.0	5
Measurement Position MP2			
Measurement Period ('t')	$L_{AFMax,15min}$	*SMR $L_{AFMax,15min}$	No. Exceedances of 70dB $L_{AFMax,15min}$
Night 1	74.0	71.0	6

Table 2.0 – Maximum Sound Level Summary Results

*Statistically Most Repeated

3. Noise Break In & External Noise Level Assessment

Ambient Noise Level Map

The specific sound level at the NSRs has been calculated using Sound Plan 8.2, which undertakes its calculation in accordance with the guidance given in ISO9613 – 1:1993 and ISO9613 – 2:1996. The following assumptions have been made within the calculation software:

- To accurately model the land surrounding the development the topographical data has been taken from Google Maps, it is assumed this has an accuracy within the last 3 years.
- The ground between the source and receiver is considered 'hard'.
- MP2 levels have been applied to all access roads as worst-case scenario.

The following parameters have been used to calibrate the sound model:

- The highest measured L_{Aeq16h} and the highest measured L_{Aeq8h} .
- The highest L_{Amax} exceeded less than 10 times during the night time.
- Most exposed floor to noise for each proposed building.
- The grid heights of the maps have been set to 1.5m.

The proposed development has been separated in NSR façades 1 to 3 for the purpose of the specification of building elements and mitigation measures as shown in Figure 2.0 below.

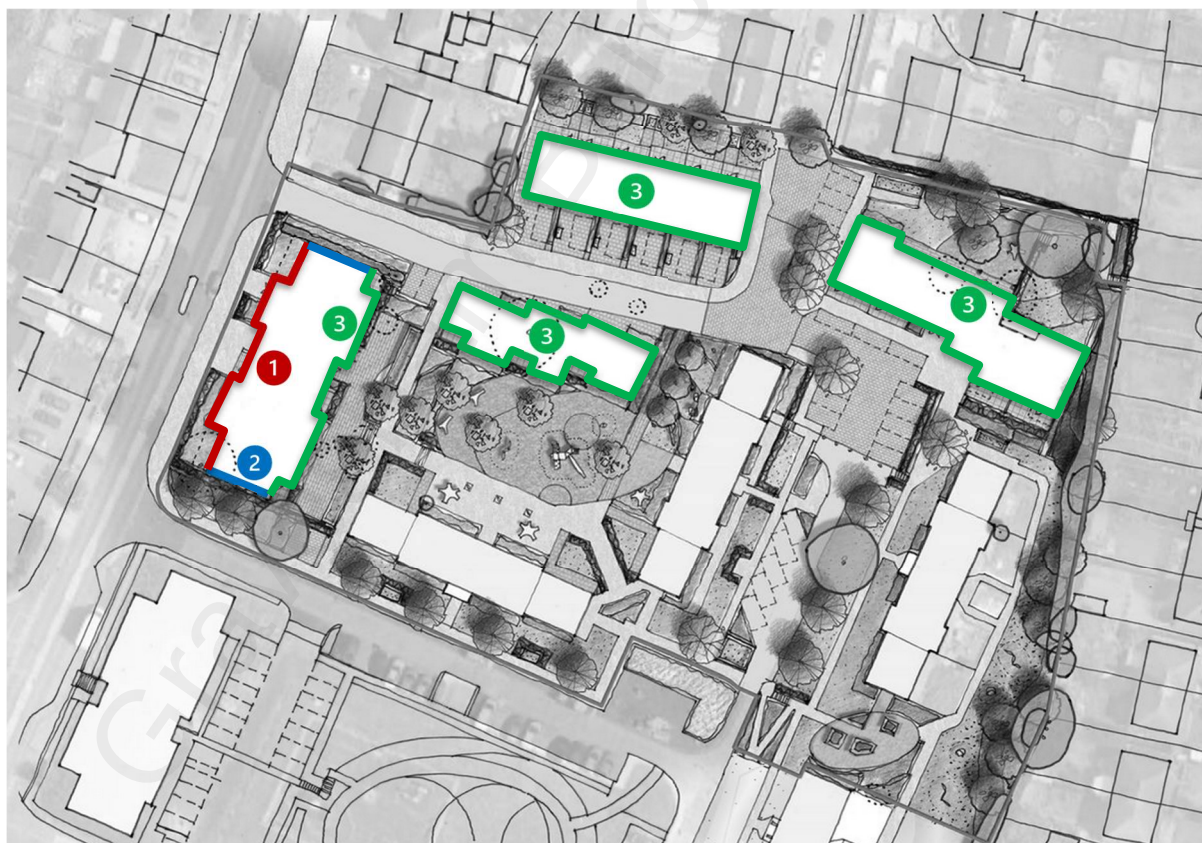


Figure 2.0 – Site Map Layout

The sound map showing the specific day time $L_{Aeq,16hour}$ sound levels at the Proposed Development can be seen below in Figure 3.0.

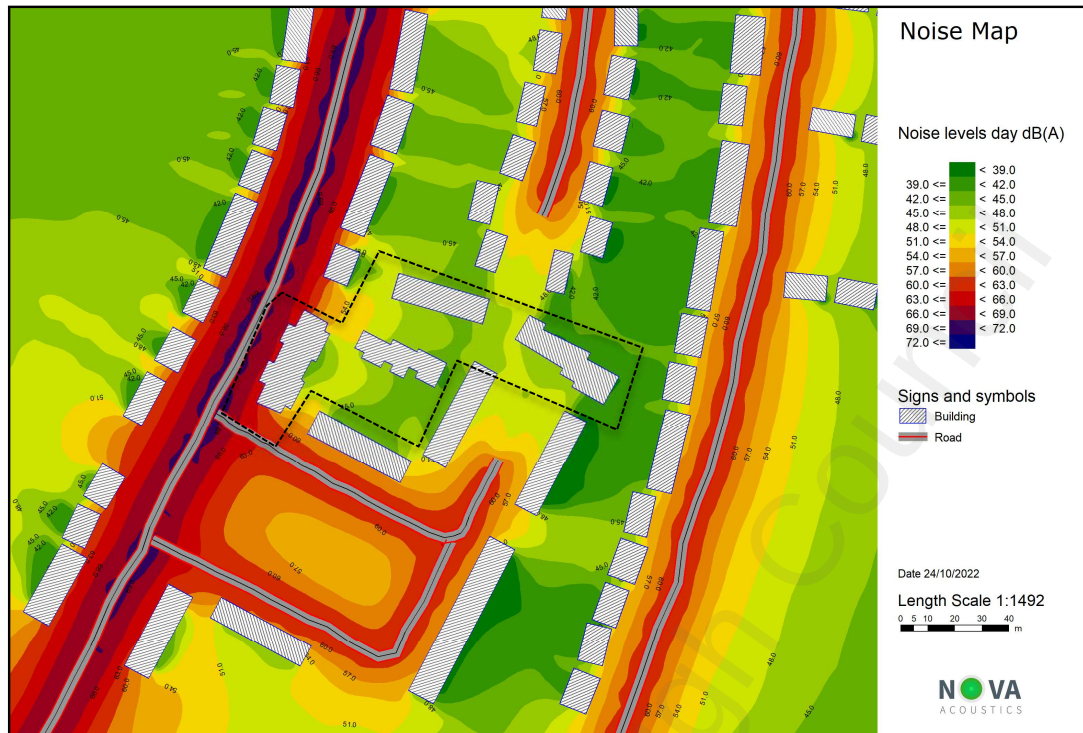


Figure 3.0 - Day-time Noise Map $L_{Aeq,16hour}$

The sound map showing the specific night-time $L_{Aeq,8hour}$ sound levels at the Proposed Development can be seen below in Figure 4.0.

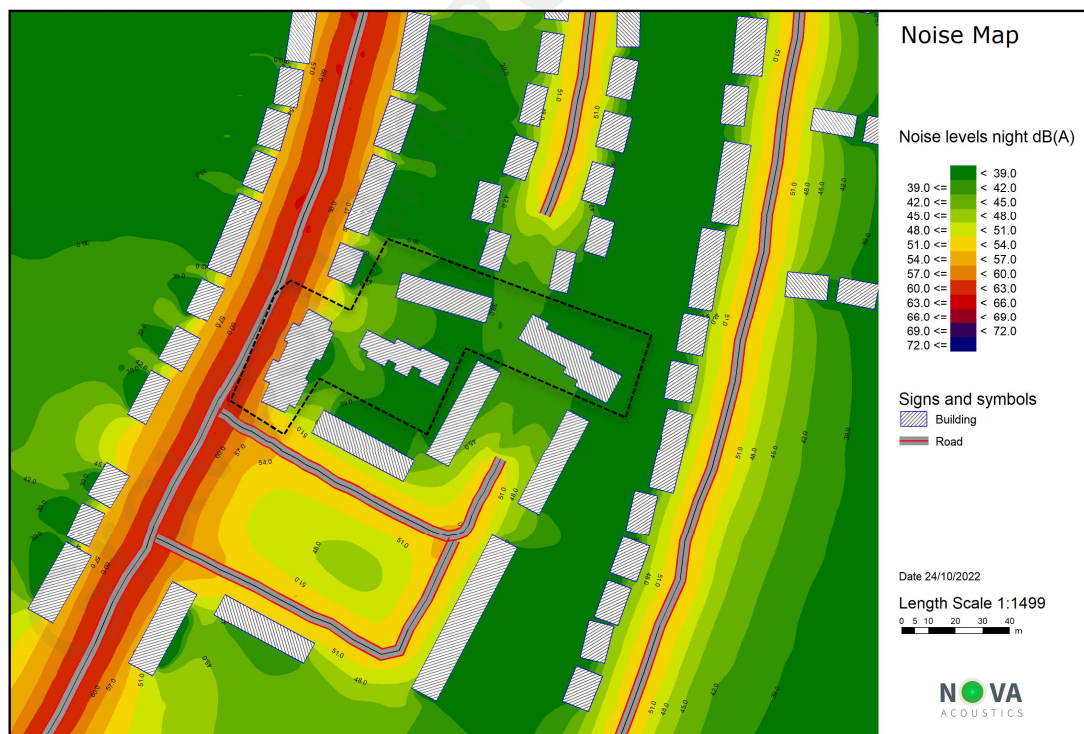


Figure 4.0 - Night-time Noise Map $L_{Aeq,8hour}$

The sound map showing the specific L_{Amax} sound levels at the Proposed Development can be seen below in Figure 5.0.

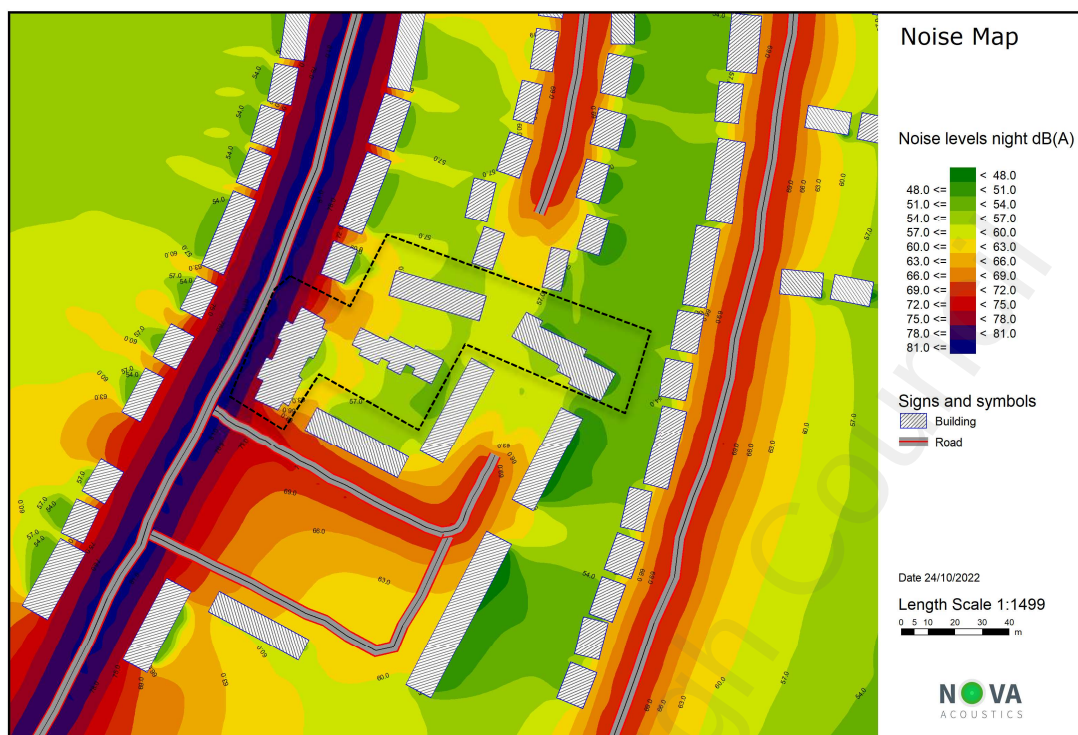


Figure 5.0 - Night-time Noise Map $L_{Amax,8hour}$

A summary of the highest $L_{Aeq,t}$ sound levels incident on the proposed development, based on the sound map shown in Figures 3.0, 4.0 & 5.0, can be seen in the following table.

Façade	L_{Aeq} Day Level (dBA)	L_{Aeq} Night Level (dBA)	L_{Amax} Night Level (dBA)
1	67.0	60.0	78.0
2	63.0	56.0	75.0
3	55.0	48.0	67.0

Table 3.0 - Sound Level Summary at the Proposed Development

Noise Break-In Assessment

The following section analyses the ambient sound levels incident on the development compared with the internal noise level criteria presented within BS8233:2014.

To ensure a robust analysis the following considerations have been taken:

- The $L_{AFmax,15min}$ during the night exceeded less than ten times.
- The highest $L_{Aeq,16hour}$ and $L_{Aeq,8hour}$ during the day and nighttime periods.

The following table outlines the minimum sound reduction required of the building envelope in order to achieve appropriate internal noise levels.

Façade	Room	Time Period	Façade Noise Level (dBA)	BS8233 Criteria	Min. SRI Required (dB)	
1	Bedroom / Living Room	Day time	67.0	35 dB $L_{Aeq,16hour}$	32.0	$R_w + C_{tr}$
	Bedroom	Night time	60.0	30 dB $L_{Aeq,8hour}$	30.0	$R_w + C_{tr}$
			78.0	45 dB $L_{Amax,8hour}$	33.0	R_w
2	Bedroom / Living Room	Day time	63.0	35 dB $L_{Aeq,16hour}$	28.0	$R_w + C_{tr}$
	Bedroom	Night time	56.0	30 dB $L_{Aeq,8hour}$	26.0	$R_w + C_{tr}$
			75.0	45 dB $L_{Amax,8hour}$	30.0	R_w
3	Bedroom / Living Room	Day time	55.0	35 dB $L_{Aeq,16hour}$	20.0	$R_w + C_{tr}$
	Bedroom	Night time	48.0	30 dB $L_{Aeq,8hour}$	18.0	$R_w + C_{tr}$
			67.0	45 dB $L_{Amax,8hour}$	22.0	R_w

Table 4.0 – Internal Noise Level Analysis

4. Sound Insulation Scheme

The following section outlines the required sound insulation scheme that should be installed at the proposed development to protect the amenity of the future residents. The sound insulation scheme should be installed prior to occupation and be retained thereafter.

Building Envelope

The noise levels within the proposed dwellings will be dictated by the configuration, materials, and elements of the façade. The non-glazed elements of the facade will contribute significantly to the reduction of ambient noise levels. The façade construction for lightweight or heavyweight constructions will provide ample levels of sound insulation, for the purposes of this report it is assumed the façade provides a minimum sound reduction of 50dB R_w . The following section provides a sound insulation scheme based on the weakest elements of the façade, including the glazing, ventilation and roof construction.

a) Roof Specification

If the development has rooms within the roof space the roof system will require additional sound insulation to achieve appropriate internal noise levels.

Where the roof, is being utilized as a voided loft space with thermal insulation the following detailing is not required. Where rooms are within the roof, the ceilings should consist of standard roofing slates, 100mm 45kg/m² fitted tightly between the 200mm roof joists and 1no. 15mm SoundBloc plasterboard fixed to British Gypsum RB1 resilient bars to achieve a minimum sound reduction of 50dB R_w . Any other configuration of roof that would achieve at least 50dB R_w will be suitable for the development.

For concrete base roof construction, where rooms are within the roof, the ceilings should achieve a minimum sound reduction of 50dB R_w . Concrete base constructions typically should achieve the minimum sound reduction. Any other configuration of roof that would achieve at least 50dB R_w will be suitable for the development.

b) Glazing Specification

Windows can be considered the weakest point of a façade in terms of noise reduction from external noise. The glazed elements installed in all the living rooms and bedrooms require the minimum sound reduction as shown in Section 3.0.

The glazing units shown in the following table provide a suitable sound reduction, any other window capable of providing this attenuation will be suitable. The performance is specified for the whole window unit, including frame and other design features. The glazing specifications have been taken from the Pilkington Optiphon Range.

Façade	Location	Glazing Configuration	Attenuation (dB)
1	Bedrooms & Living Rooms	Double Glazing 10mm Glass / 16mm Air Cavity / 6mm Glass	35.0 R_w 32.0 $R_w + C_{tr}$
2	Bedrooms & Living Rooms	Double Glazing 6mm Glass / 16mm Air Cavity / 4mm Glass	32.0 R_w 28.0 $R_w + C_{tr}$
3	Bedrooms & Living Rooms	Double Glazing 4mm Glass / 16mm Air Cavity / 4mm Glass	29.0 R_w 25.0 $R_w + C_{tr}$

Table 5.0 – Glazing Specification

The glazing suppliers are required to demonstrate the acoustic performance of their proposed system either by providing an acoustic test report in accordance with BS EN ISO 10140-2:2010 or an evidence-based calculation.

c) Ventilation Specification

BS8233 states;

"If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level."

and

"The Building Regulations' supporting documents on ventilation [48, 49, 50] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice. Alternatively, acoustic ventilation units are available for insertion in external walls. These can provide sound reduction comparable with double glazed windows. However, ducted systems with intakes on the quiet side of the building might be required in very noisy situations, or where appearance rules out through-the-wall fans."

An alternative ventilation system should be installed within habitable rooms to fully protect the amenity of future residents. As stated in BS8233:2014 section 5.4.4, having complete enclosure of the noise source or receiver is the most effective barrier of sound. An alternative ventilation strategy allows for maximum sound insulation from the noise source whilst still maintaining a sufficient level of ventilation. It is recommended that the alternative ventilation should provide the same resistance to sound as the glazed elements. The following table provides ventilation systems that meets the above recommendations.

Background Ventilation		
Façade	Model	Attenuation (dB)
Red Facades	Titon V50 Trickle Vent + C25	37dB Open $D_{n,e,w}$
Blue and Green Facades	Titon Standard Trickle Vent + C25	33dB Open $D_{n,e,w}$
OR:		
Through Wall Ventilation (not purge)		
Model		Attenuation (dB)
Titon Sonair F+ Mechanical Input Ventilator with G3 filter and DV100F duct ¹		56 dB $D_{n,e,w}$

Table 6.0 – Ventilation Specification

¹ The self-generated noise from the Titon Sonair F+ when measured at the maximum ventilation capacity of 60m³/h emits 23.5dB $L_{PA:10m2}$ which is below the required internal noise criteria from BS8233:2014.

The through wall ventilation specified within the table above is also capable of providing background ventilation. If the mechanical ventilation option is opted for the background trickle ventilation option is not required to be installed.

The ventilation suppliers are required to demonstrate the acoustic performance of their proposed system either by providing an acoustic test report in accordance with BS EN ISO 10140-2:2010 or an evidence-based calculation.

5. BS4142 Assessment

Environmental Noise Survey Results

The proposed plant may operate at any time during the day or night time periods. The table below outlines the background sound levels, during the operational period of the plant, that will be used as the baseline for the noise assessment. Further summary results for the entire measurement period can be found in Appendix D.

Measurement Position MP2				
Measurement Period ('t')	L _{A90,15min}	*SMR L _{A90,15min}	Min. L _{A90,15min}	Max. L _{A90,15min}
Night 1 – 24/03/2022 – 23:00 – 06:00	36.0	35.0	31.0	55.0

Table 7.0 – Background Sound Level Summary Results

**Statistically Most Repeated*

As can be seen in the table above the lowest measured L_{A90,15min} value is 31 dB. The range of measured background sound levels is relatively high and as such, the lowest measured L_{A90,15min} value is deemed 'Typical' and will be used in the following assessment.

Cumulative Plant Rating Noise Limit Level

In this section of the report, a plant noise limit level for any external plant will be set based on the measured background levels at the site. The specification and exact locations of all external plant have not yet been defined, consequently, a cumulative plant noise limit level has been provided to ensure all plant noise emissions fall significantly below the background sound level at the surrounding NSRs.

The table below shows the cumulative plant noise limit level at the NSRs. The plant rating limit level has been defined to ensure that all external plant noise falls below the lowest measured background sound level, as stated in Section 6.2 of the "Supplementary Planning Document – Adopted 2009 – Local Development Framework", it also has taken into account the addition of a rating penalty for a possible tonal component to the sound spectrum of the plant. This is shown in the table below.

Description	Value (dB)
Lowest Measured L _{A90,t}	31.0
Tonality Correction	-2.0
Intermittency Correction	-3.0
Cumulative Plant Noise Limit Level at NSR	26.0

Table 8.0 – External Plant Limit Level

Discussion:

As can be seen in the assessment above, provided the Cumulative Plant Limit Level is adhered to, all noise emissions for said plant will fall below the lowest L_{A90,15mins} background sound level. When

assessed in accordance with BS4142:2014 this indicates 'Low Impact'. When assessed in accordance with the NPPF the noise from all plant will indicate 'No Observed Effect Level'.

Given the outcome of the assessment, no further mitigation measures are required.

Recommendations & Mitigation

The following section outlines the mitigation measures that are necessary to reduce the impact of the proposed external plant.

- All mechanical plant associated with the development should not exceed the cumulative plant noise limit level of **26.0 dBA** at the closest NSR.
- Once all plant has been specified a suitably qualified person assess all emissions and plant locations to ensure the cumulative plant limit level can be achieved.

Appendix A – Acoustic Terminology

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa (20x10 ⁻⁶ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L _{eq,T}	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
L _{max,T}	A noise level index defined as the maximum noise level during the period T. L _{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L _{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L _{90,T}	A noise level index. The noise level exceeded for 90% of the time over the period T. L ₉₀ can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L _{10,T}	A noise level index. The noise level exceeded for 10% of the time over the period T. L ₁₀ can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided. The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source. A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10} , the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq} .

This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound. To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS4142:2014 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1\text{hour}}$ dB and $L_{A90,15\text{mins}}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125ms.

Appendix B – Legislation, Policy and Guidance

This report is to be primarily based on the following legislation, policy and guidance.

B.1 - National Planning Policy Framework (2019)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2019. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 170e, it states:

Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

Paragraph 180 states:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

B.2 - Noise Policy Statement for England (2010)

Paragraph 180 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision to:

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

To achieve this vision the Statement identifies the following three 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;*
- Where possible, contribute to the improvement of health and quality of life.*

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that “significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development”.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: “all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.”

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise. This can be related to the third aim above, which seeks: “where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.”

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 - BS8233:2014 'Guidance on sound insulation and noise reduction for buildings'

The British Standard BS 8233: 2014, Guidance on Sound insulation and noise reduction for buildings provides additional guidance on noise levels from sources without specific character in the built environment, based on the recommendations of the World Health Organization; specifically, WHO Guidelines on Community Noise, 1999. The criteria desirable levels of steady state, “anonymous” noise in unoccupied spaces within dwellings, from sources such as road traffic, mechanical services and other continuously running plant, are tabulated below:

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	--
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	--
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Table 9.0 - BS8233 Internal Noise Level Criteria

It is noted, however that where development is considered necessary or desirable, despite external noise level above WHO guidelines, the above target levels may be relaxed by up to 5 dB.

The standard also recommends that for traditional external amenity areas, such as gardens, it is desirable that external noise levels do not exceed 50 dB $L_{Aeq,T}$, and that 55 dB $L_{Aeq,T}$ would be acceptable in noisier environments. However, it is recognised that these values may not be achievable in all areas where development is desirable and in such locations development should be designed to achieve the lowest practicable levels.

General recommendations for mitigation to enable these targets to be achieved are provided, including the use of bunds and barriers to reduce external noise and space planning and sound insulation for the control of internal noise levels.

For this assessment, the above criteria are considered to be the LOAEL as defined in the NPSE above.



Appendix D – Environmental Survey

D.1 Tabulated Summary Noise Data

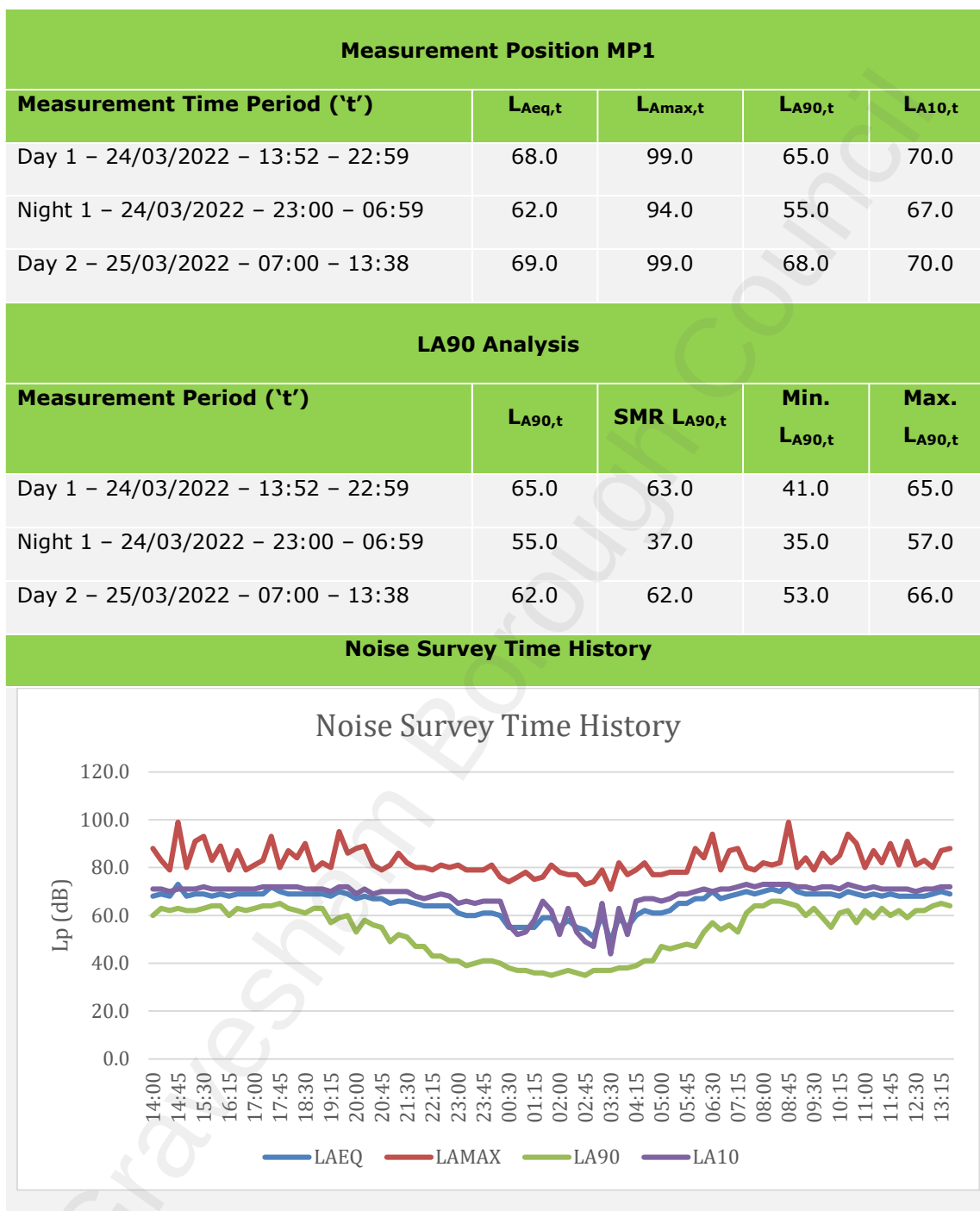


Table 10.0 – Sound Survey Summary Results – MP1

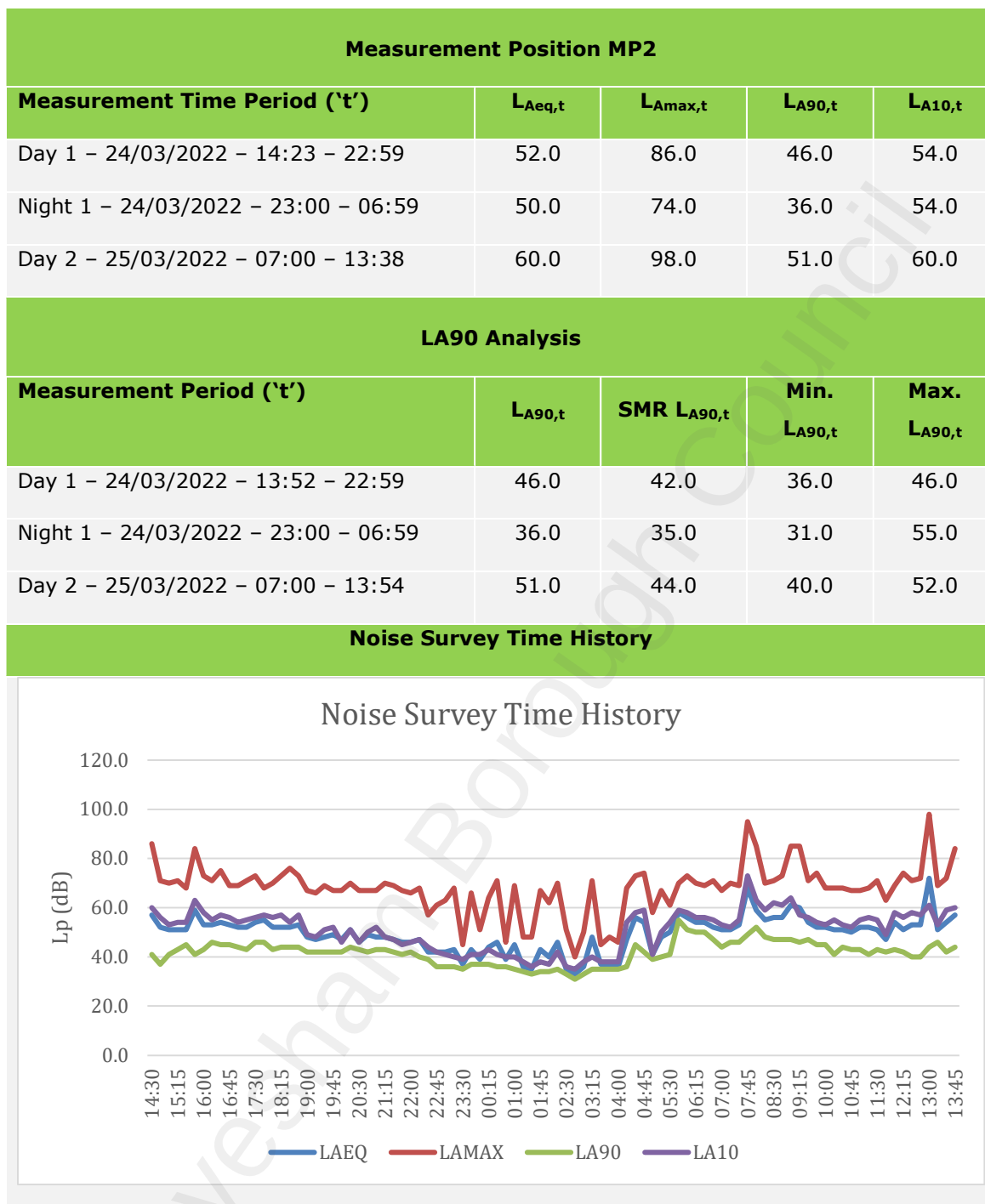


Table 11.0 – Sound Survey Summary Results – MP2

D.2 Surveying Equipment

Piece of Equipment	Serial No	Calibration Deviation
CESVA SC250 Class 1 Sound level meter	T252917	≤0.5
CESVA CB011 Class 1 Calibrator	T253551	
CESVA SC310 Class 1 Sound level meter	T221722	≤0.5
CESVA CB005 Class 1 Calibrator	37771	

Table 12.0 – Measurement Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.5 dB. All sound level meters are calibrated every 24 months and all calibrators are calibrated every 12 months, by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

D.3 Meteorological Conditions

As the environmental noise survey was carried out over a long un-manned period no localized records of weather conditions were taken. However, during the set up and collection of the monitoring equipment the weather conditions have been documented in the following table. All measurements have been compared with met office weather data of the area, specifically the closest weather station, the data from the weather station is outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather conditions – Closest Weather Station				
Time period	Air temp (°C)	Rainfall mm/h	Prevailing Wind Direction	Wind Speed (m/s)
24/03/2022 – 00:00 – 23:59	2.2 – 18.6	0.0	E	0.0 – 2.15
25/03/2022 – 00:00 – 23:59	2.5 – 15.9	0.0	ESE	0.0 – 2.6

Table 13.0 – Weather Summary