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**PROPOSED NEW DWELLING AT SUNDOWN FARM  
MARTIN**

**NOISE IMPACT ASSESSMENT**

Technical Report: R9986-1 Rev 0

Date: 4th April 2023

For: Boon Brown Architects  
Southwest Studio  
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## 24 Acoustics Document Control Sheet

**Project Title:** Proposed new dwelling at Sundown Farm, Martin - Noise Impact Assessment

**Report Ref:** R9986-1 Rev 0

**Date:** 4th April 2023

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### Document Status and Approval Schedule

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## 1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by Boon Brown Architects to undertake an environmental noise assessment for Sundown Farm, Martin in connection with a proposed new dwelling. It is proposed to replace the existing dwelling on the site with a new dwelling which will be situated further back from the A354.

1.2 The following assessment has considered:

- Environmental noise monitoring;
- Consideration of the noise arising from nearby sources affecting the site;
- Assessment of internal noise levels within the dwellings;
- Assessment of external noise levels within external areas;
- Comparison of noise levels between the existing and proposed property locations.

1.3 This report presents the results of the assessment, following site visits and ambient noise surveys undertaken between 24th March and 3rd April 2023.

1.4 An explanation of acoustical terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20  $\mu$ Pa.

## 2.0 SITE DESCRIPTION

2.1 Planning permission is sought for the replacement of the dwelling on land at Sundown Farm. The existing property at the site was constructed prior to the expansion of the A354 dual carriageway and is subject to very high traffic noise levels.

2.2 The location of the proposed replacement dwelling is set further back from the A354, which runs along the southern boundary of the site and is the dominant source of noise at the site.

2.3 The site is surrounded by farmland, with a small number of properties on the southern side of the A354.

2.4 A site location plan is provided in Figure 1 with the proposed site layout shown in Figure 2.



### 3.0 ASSESSMENT CRITERIA

3.1 The following criteria have been used in the assessment.

National Planning Policy Framework and Noise Policy Statement for England

3.2 The National Planning Policy Framework (NPPF) [Reference 1], revised in July 2021, states (paragraph 185) in relation to noise that planning policies and decisions should aim to:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.3 The NPPF states that where the operation of an existing business could have a significant adverse effect on new development in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed. Paragraph 187 states:

*"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."*

3.4 It is relevant to note that the Agent of Change principle applies under the condition of a likely significant adverse impact.



3.5 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term 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' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life.

3.6 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

*"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

3.7 The National Planning Practice Guidance (NPPG) [Reference 3] is written to support the NPPF with more specific planning guidance. The NPPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. The NPPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.

3.8 The NPPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.



- 3.9 The NPPG also expands on the 'agent of change' principle and provides guidance on how the risk of conflict between new development and existing businesses can be addressed, including where mitigation is required.
- 3.10 The NPPF, NPSE and NPPG documents do not refer to specific noise criteria. For residential developments 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria and guidance from British Standard 8233:2014 and the World Health Organisation are adopted.

#### BS 8233:2014 and World Health Organisation Criteria

- 3.11 BS 8233:2014 [Reference 4] provides design guidance for dwelling houses, flats and rooms in residential use and recommends that internal noise levels in dwellings do not exceed 35 dB  $L_{Aeq,16hr}$  in living rooms and bedrooms during the day, 40 dB  $L_{Aeq,16hr}$  in dining rooms during the day and 30 dB  $L_{Aeq,8hr}$  in bedrooms at night.
- 3.12 The standard states that the above limits apply to steady external noise sources without specific character, and also states the following:

*"Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."*

- 3.13 BS 8233 also notes that *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or  $L_{Amax,f}$ , depending on the character and number of events per night."*
- 3.14 The World Health Organisation (WHO) [Reference 5] provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines suggest internal noise levels not exceeding 30 dB  $L_{Aeq,8hr}$  or regularly exceeding 45 dB  $L_{Amax,f}$  for 'a good night's sleep'.



### Professional Practice Guidance on Planning & Noise (ProPG)

3.15 The Professional Practice Guidance on Planning and Noise (ProPG) [Reference 6] was published jointly by the Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health in May 2017. The guidance relates to the consideration of existing sources of transportation noise upon proposed new residential development and strives to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- Improve understanding of how to determine the extent of potential noise impact and effect; and
- Assist the delivery of sustainable development.

3.16 The guidance describes a recommended approach for new residential development, which includes four key elements of the assessment process, identified below:

- (i) Good acoustic design process;
- (ii) Internal noise level guidelines;
- (iii) External amenity area noise assessment;
- (iv) Assessment of other relevant issues.

3.17 It is important to note that the guidance in ProPG does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.



## Summary

3.18 The impact of noise upon the site has been assessed using the following internal noise criteria:

- Road traffic noise
  - An upper internal daytime level of 35 dB  $L_{Aeq,16hr}$  for bedrooms/living rooms and a night-time level of 30 dB  $L_{Aeq,8hr}$  for bedrooms should apply.
  - A maximum night-time internal level of 45 dB  $L_{Amax,fast}$  should also apply for regular events within bedrooms.
- External Amenity
  - Target noise level in external amenity areas of 55 dB  $L_{Aeq,16hr}$ .

## **4.0 ENVIRONMENTAL NOISE MEASUREMENTS**

4.1 An ambient noise survey was undertaken on site between 24th March and 3rd April 2023. The following instrumentation was used during the surveys:

- 1 x Rion Type 1 sound level meter: Type NL-52;
- 1 x Rion Type 1 sound level meter: Type NL-32;
- Brüel and Kjær Class 1 acoustic calibrator: Type 4231.

4.2 The instrumentation was configured to monitor in 5 minute sample periods and was set up to measure and store overall A-weighted and linear octave band statistical parameters including the  $L_{eq}$ ,  $L_{90}$ , and  $L_{max,f}$  sound pressure levels. Noise measurements were made in accordance with BS 7445:1991 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use' [Reference 7].

4.3 Measurements were undertaken at two locations in free field conditions at a height of approximately 1.5 m. Measurement locations are described below and shown in Figure 1:

- Location 1 – At the existing property, at OS coordinates SU 05123 21067, 7 m from the centre of the nearest lane of the A354.
- Location 2 – Close to the proposed new dwelling, at OS coordinates SU 04980 21155.



- 4.4 Calibration of all instrumentation was checked before and on completion of the measurements and no drift was found. The calibration of all 24 Acoustics' equipment is traceable to National Standards.
- 4.5 Average wind speeds throughout the survey were less than 5 m/s. Rainfall was experienced on several days throughout the survey. Where possible, the influence of adverse weather conditions has been removed from the analysis. Figure 3 shows a summary of weather conditions measured at nearby weather stations.
- 4.6 It should be noted that new fencing was installed at the site on 25th and 28th March 2023. These periods (during which noisy machinery was used) have been discounted from the analysis.

#### Noise Survey Results

- 4.7 The measurement results at Location 1 are presented graphically in Appendix B and summarised in Table 1 below.

<b>Measurement Results: Location 1</b>			
<b>Date</b>	<b>Daytime 07:00 – 23:00</b>	<b>Night-time 23:00 – 07:00</b>	
	<b>dB L<sub>Aeq,16hr</sub></b>	<b>dB L<sub>Aeq,8hr</sub></b>	<b>Typical dB L<sub>Amax,f</sub></b>
Friday 24/3/2023	72*	60	85
Saturday 25/3/2023	70	59	83
Sunday 26/3/2023	70	64	87
Monday 27/3/2023	71	64	86
Tuesday 28/3/2023	72	63	86
Wednesday 29/3/2023	72	64	87
Thursday 30/3/2023	71	63	86
Friday 31/3/2023	72	61	85
Saturday 1/4/2023	70	58	84
Sunday 2/4/2023	69	63	86
Monday 3/4/2023	72*	--	--
<b>Representative</b>	<b>71</b>	<b>63</b>	<b>86</b>

**Table 1:** Location 1 Measurement Results \*incomplete period



- 4.8 The measurement results at Location 2 are presented graphically in Appendix B and are summarised in Table 2.

<b>Measurement Results: Location 2</b>			
<b>Date</b>	<b>Daytime 07:00 – 23:00</b>	<b>Night-time 23:00 – 07:00</b>	
	<b>dB LAeq,16hr</b>	<b>dB LAeq,8hr</b>	<b>Typical dB LAmax,f</b>
Friday 24/3/2023	55*	43	62
Saturday 25/3/2023	54	41	59
Sunday 26/3/2023	46	42	60
Monday 27/3/2023	51	46	62
Tuesday 28/3/2023	58	45	64
Wednesday 29/3/2023	54	46	63
Thursday 30/3/2023	53	50	68
Friday 31/3/2023	52	43	62
Saturday 1/4/2023	50	39	60
Sunday 2/4/2023	48	43	61
Monday 3/4/2023	55*	--	--
<b>Representative</b>	<b>53</b>	<b>46</b>	<b>62</b>

**Table 2:** Location 2 Measurement Results \*incomplete period

- 4.9 24 Acoustics determines the typical  $L_{Amax}$  to be the 10th highest  $L_{Amax}$  level over the measurement period.
- 4.10 Noise from road traffic on the A354 was the primary source of ambient noise at both measurement locations. Maximum noise events were controlled by road traffic.
- 4.11 Measured noise levels have been used to calibrate a detailed acoustic model of the site, discussed below in Section 5.



## 5.0 CALCULATIONS AND NOISE IMPACT ASSESSMENT

- 5.1 The following assessment has been undertaken based on the latest indicative site layout drawing at the time of writing (dated 10th January 2023). Internal layouts are not currently available. Therefore, calculations are based on typical room dimensions and glazed areas for bedrooms and living rooms. This assessment may need to be revised once internal layouts are determined.
- 5.2 An acoustic model of the site has been developed to determine the noise levels across the site of the proposed development. The model has been produced using IMMI noise mapping software and has used the propagation methodology of ISO 9613 [Reference 8], which takes into account the effects of distance, geometric divergence and acoustic screening.
- 5.3 The landform rises from the A354 to the site and the proposed location of the dwelling is within a slight dip in the topography. This topography, which provides some natural screening to the proposed development from traffic noise, is taken into account within the acoustic model.
- 5.4 The results of the acoustic propagation model are shown in Figures 4 and 5. Results are shown at heights of 1.5 m and 4 m above local ground level for daytime and night-time periods respectively.
- 5.5 Calculations have been undertaken to determine acoustic requirements for windows and ventilators, which will ensure that noise levels do not exceed the criteria outlined in Section 3.
- 5.6 The calculations have assumed that external wall build-ups will comprise a cavity masonry construction that would be expected to achieve a minimum sound insulation performance of 52 dB  $R_w$ .

### Windows/Glazing

- 5.7 Standard thermal glazing and trickle vents will be acceptable across the site, achieving the minimum acoustic performance described in Table 3.



Minimum SRI (dB) per Octave Band Centre Frequency (Hz)					
125	250	500	1k	2k	4k
25	22	30	39	44	38

**Table 3:** Window/Glazing Minimum Acoustic Performance

5.8 In making a comparison with the values in Table 3, it is important that the window figures used are the result of tests in accordance with ISO 10140, Part 2: 2010 and that the quoted minimum sound reduction specifications are met by the entire window system as a whole, including frames, seals, any insulated panels and not just the glass. The requirements also apply to any external glazed doors to habitable rooms.

5.9 For costing purposes, the following window configuration is capable of achieving the performance values stated in Table 3:

- 4 mm glass: 6 - 16 mm cavity: 4 mm glass (33 dB  $R_w$ ).

5.10 Note, the above window configuration is provided for guidance only. Final selections should be based on the minimum acoustic performance in Table 3.

5.11 The minimum acoustic performance requirements for ventilation performances are shown in Table 4.

Minimum $D_{n,ew}$ (dB) per Octave Band Centre Frequency (Hz)					
125	250	500	1k	2k	4k
23	26	29	30	33	33

**Table 4:** Recommended Ventilator Performance

5.12 In making a comparison with the above ventilator specification, it is important that the figures used are the result of laboratory tests with the vent in the open position.

5.13 Note that the stated minimum performance value assumes one ventilator per habitable room. The specific ventilation requirements (e.g., equivalent free area etc.) should be confirmed by others.



- 5.14 Note, ventilation systems should be specified to allow for adequate ventilation to meet background ventilation requirements as per Part F of the Building Regulations. If multiple vents are required to provide sufficient ventilation rates, this assessment will require updating accordingly.
- 5.15 The above assessment demonstrates that the internal noise level criteria (outlined in Section 3) would be readily achievable, subject to the appropriate specification and design of the external façade elements.

#### Road Traffic Noise levels in External Amenity Areas

- 5.16 External noise levels at the proposed property location are significantly lower than those at the existing property location. Furthermore, external noise levels at the proposed property location would fall comfortably below the 55 dB  $L_{Aeq,16hrs}$  criterion discussed in Section 3.

#### Overheating

- 5.17 The proposed development will be designed and constructed to comply with Approved Document O [Reference 9], which came into effect in June 2022 and requires all new dwellings to provide mitigation to control overheating. The overheating mitigation strategy must be usable, and Section 3 of the approved document provides thresholds for night-time noise levels within bedrooms. The document states:

*"Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:*

- a. 40dB  $L_{Aeq,T}$ , averaged over 8 hours (between 11pm and 7am).*
- b. 55dB  $L_{AFmax}$ , more than 10 times a night (between 11pm and 7am)."*

- 5.18 The internal noise levels stated above can be achieved at the site with partially open windows, which will greatly assist in controlling overheating within the property.



## 6.0 COMPARATIVE ASSESSMENT

- 6.1 The proposed location of the new dwelling is approximately 190 metres from the A354, which offers a significant reduction in ambient noise levels when compared with the existing property location.
- 6.2 Ambient noise levels at the proposed location are approximately 15 dBA lower than those at the existing location. A 10 dBA reduction would be perceived as a halving of noise level, so the measured difference of 15 dBA would provide a significant increase in amenity.
- 6.3 Maximum night-time noise levels would also reduce by approximately 20 dBA, which, again, is highly significant.
- 6.4 The major reduction in noise levels has multiple benefits:
- Glazing specification is greatly simplified without the need to use heavy panes of glass (which would be required at the existing property location).
  - External noise levels fall within the aspirational target levels set out in Section 3 without the need for acoustic barriers.
  - Strategies to handle overheating are simplified by the ability to use partially open windows during the night-time period.
- 6.5 By setting the property back from the A354, the environmental impact of the development is greatly reduced, as there would be no requirement for acoustic screening and heavy glazing units, and the risk of requiring mechanical ventilation to control overheating is reduced.



## 7.0 CONCLUSIONS

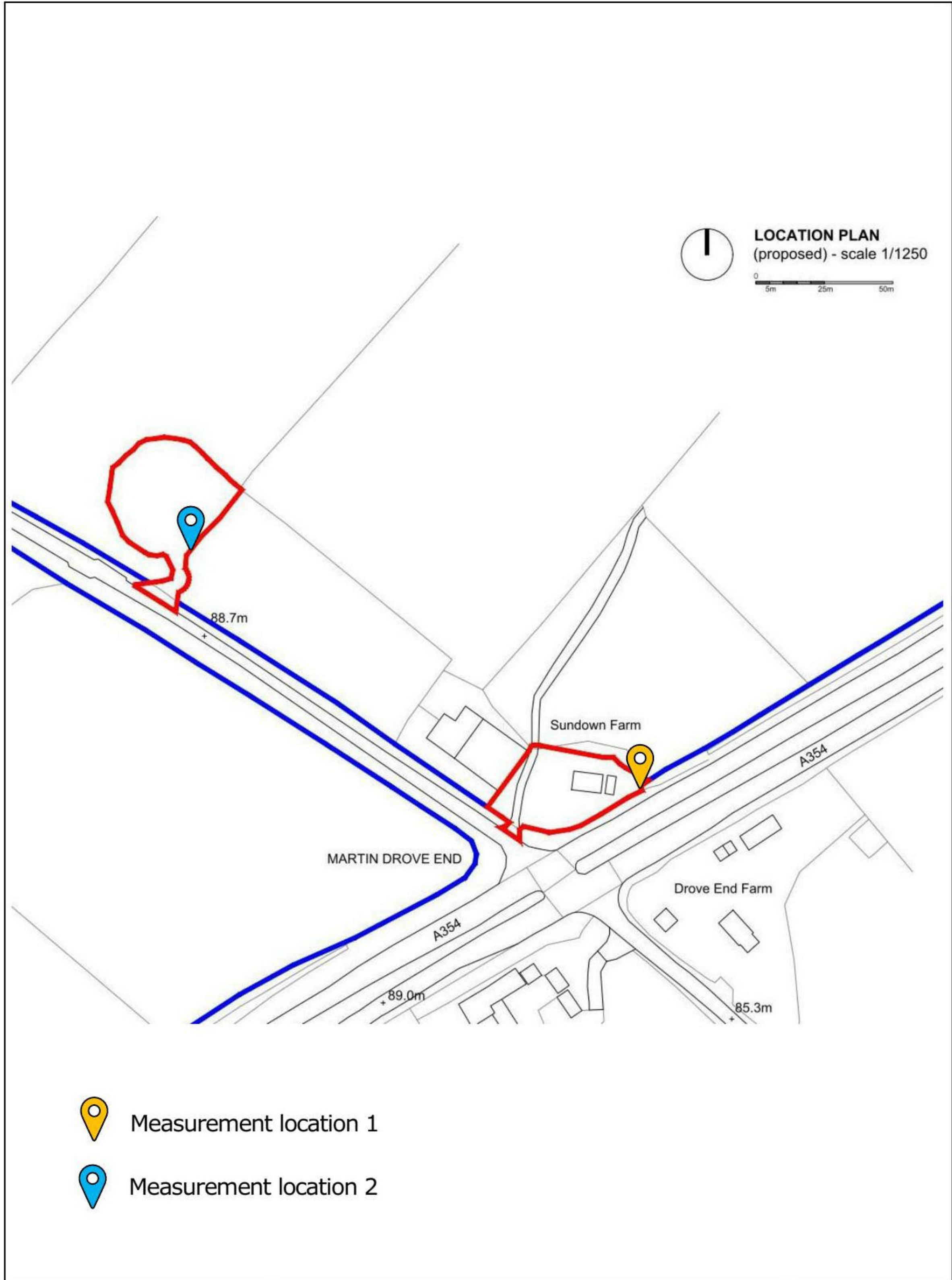
- 7.1 24 Acoustics Ltd has been instructed by Boon Brown Architects to undertake a noise impact assessment for a proposed redevelopment at Sundown Farm, Martin. It is proposed to replace the existing dwelling on the site with a new dwelling situated further back from the A354.
- 7.2 The assessment has considered the noise impact from the A354 upon the proposed new property, and has compared noise levels at the proposed location with those at the existing property location.
- 7.3 The difference in noise levels between the two locations is highly significant. Ambient noise levels at the new location are approximately 15 dBA lower, and maximum night-time noise levels are approximately 20 dBA lower.
- 7.4 The reduction in noise levels between the two locations will result in a reduction in the environmental impact of the development, with no acoustic screening required, no heavy glazing requirement, and the possibility of opening windows at night to manage overheating (which reduces the risk of requiring mechanical ventilation).
- 7.5 Calculations have been undertaken which show that daytime external noise levels in gardens fall comfortably below 55  $L_{Aeq,16hr}$ , in line with the aspirational target set out in BS 8233.
- 7.6 With the recommended measures, noise within habitable rooms would comply with internal levels of 35 dB  $L_{Aeq,16hr}$  during the daytime and 30 dB  $L_{Aeq,8hr}$  and 45 dB  $L_{Amax,f}$  at night.
- 7.7 It is concluded that the proposed location for the replacement property will provide a dwelling which is significantly less affected by road traffic noise compared to the existing property location, and will therefore provide a significant increase in amenity to the future occupiers at this location.






## REFERENCES

1. Department for Communities and Local Government. The National Planning Policy Framework (NPPF), 2021.
2. DEFRA. Noise Policy Statement for England, 2010.
3. Department of Communities and Local Government. Planning Practice Guidance, March 2014.
4. British Standards Institution. British Standard 8233: Guidance on sound insulation and noise reduction for buildings, 2014.
5. World Health Organisation. Guidelines for Community Noise, 2000.
6. ProPG Professional Practice Guidance on Planning and Noise (ProPG), ANC, IOA, CIEH, May 2017.
7. British Standards Institution. BS 7445: 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use' 1991.
8. International Standards Organisation. ISO 9613, Acoustics- Attenuation of Sound During Propagation Outdoors, 1993.
9. Building Regulations, Approved Document O, 2022.






-  Measurement location 1
-  Measurement location 2

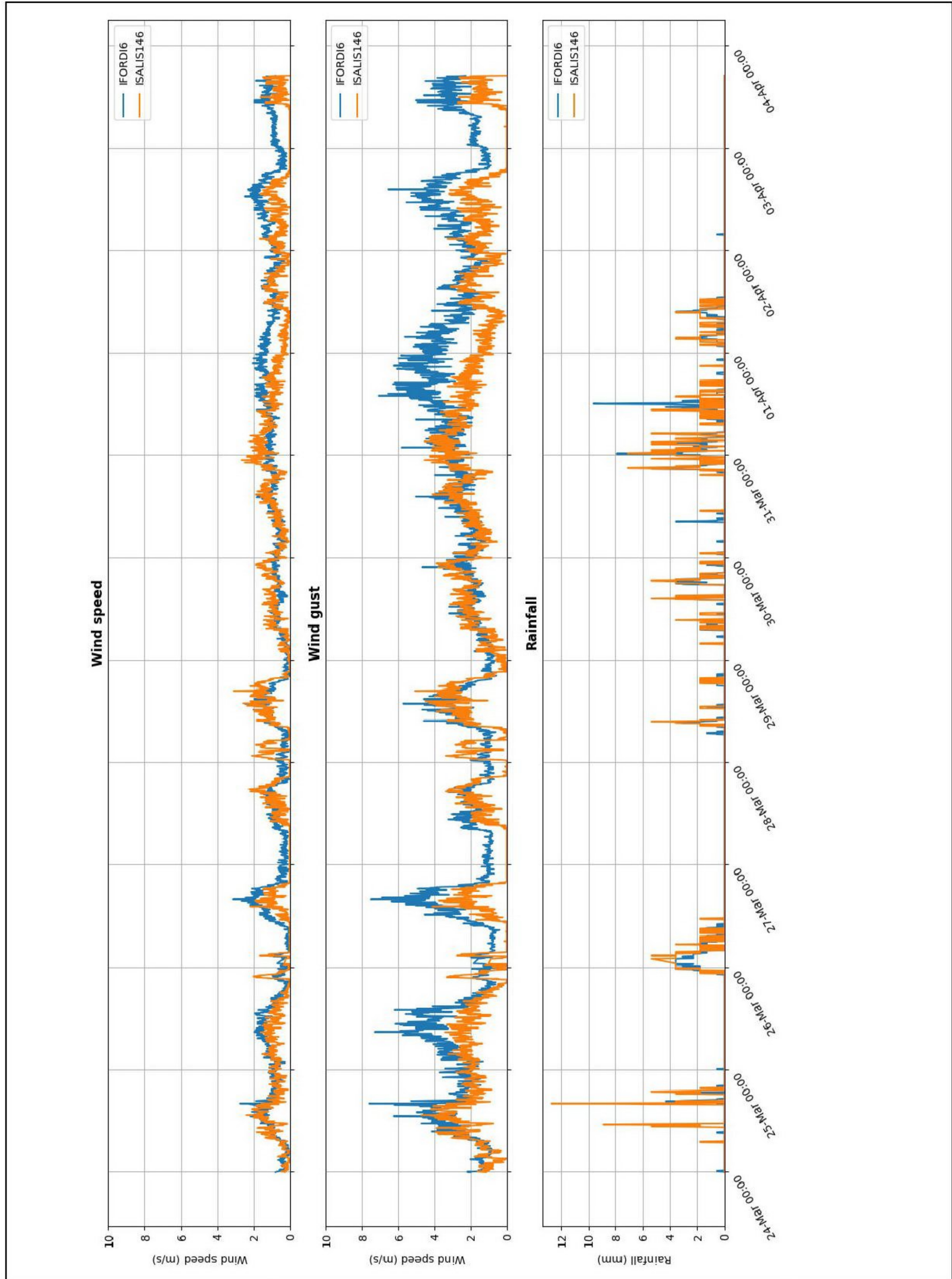
<b>Project:</b> Sundown Farm, Martin		<b>Title:</b> Site & Survey Locations		
<b>DWG No:</b> Figure 1	<b>Scale:</b> N.T.S.	<b>Rev:</b> 0		
<b>Date:</b> April 2023	<b>Drawn By:</b> DC	<b>Job No:</b> 9986-1		






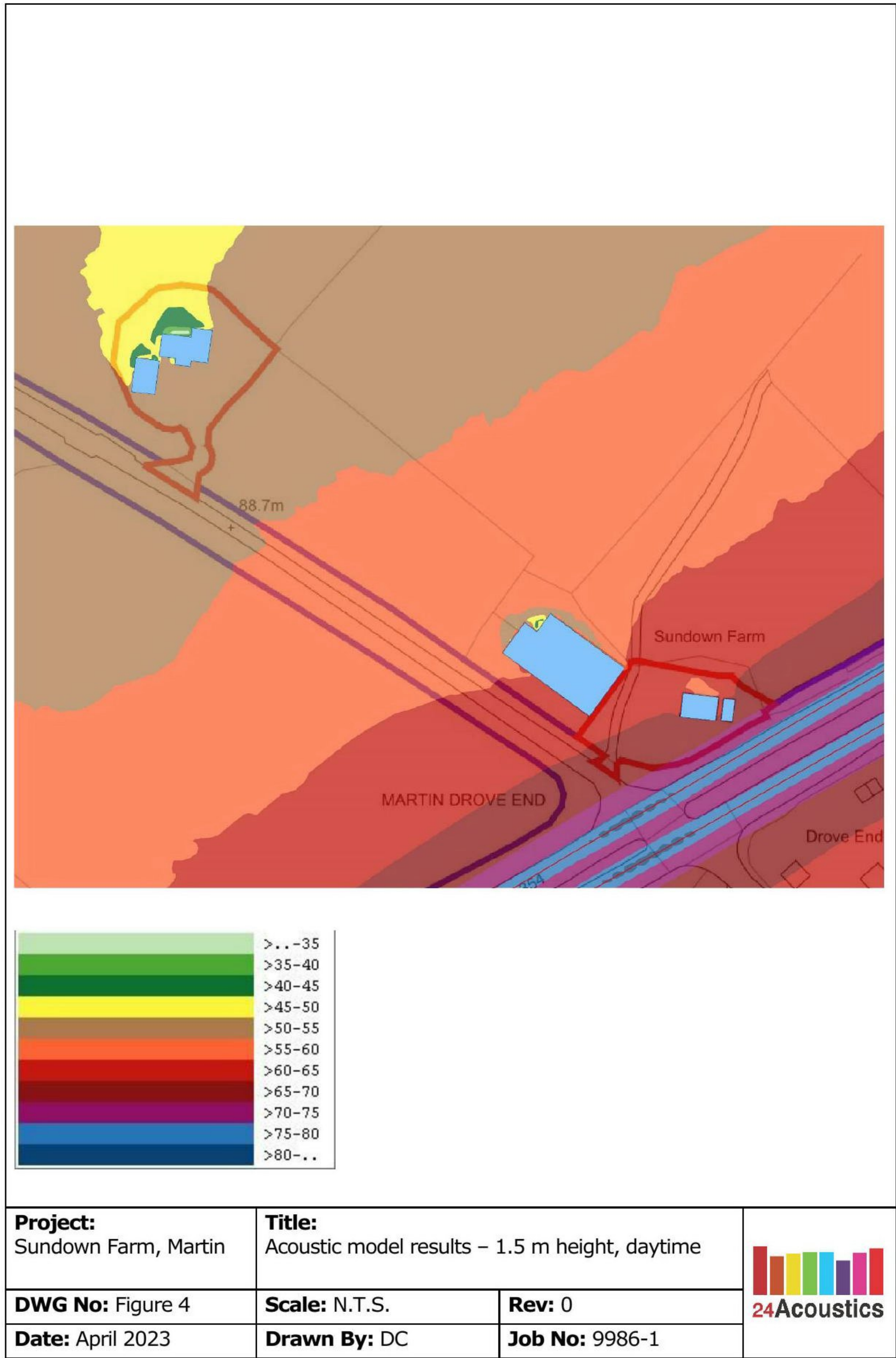
<b>Project:</b> Sundown Farm, Martin		<b>Title:</b> Proposed site layout		
<b>DWG No:</b> Figure 2	<b>Scale:</b> N.T.S.	<b>Rev:</b> 0		
<b>Date:</b> April 2023	<b>Drawn By:</b> DC	<b>Job No:</b> 9986-1		



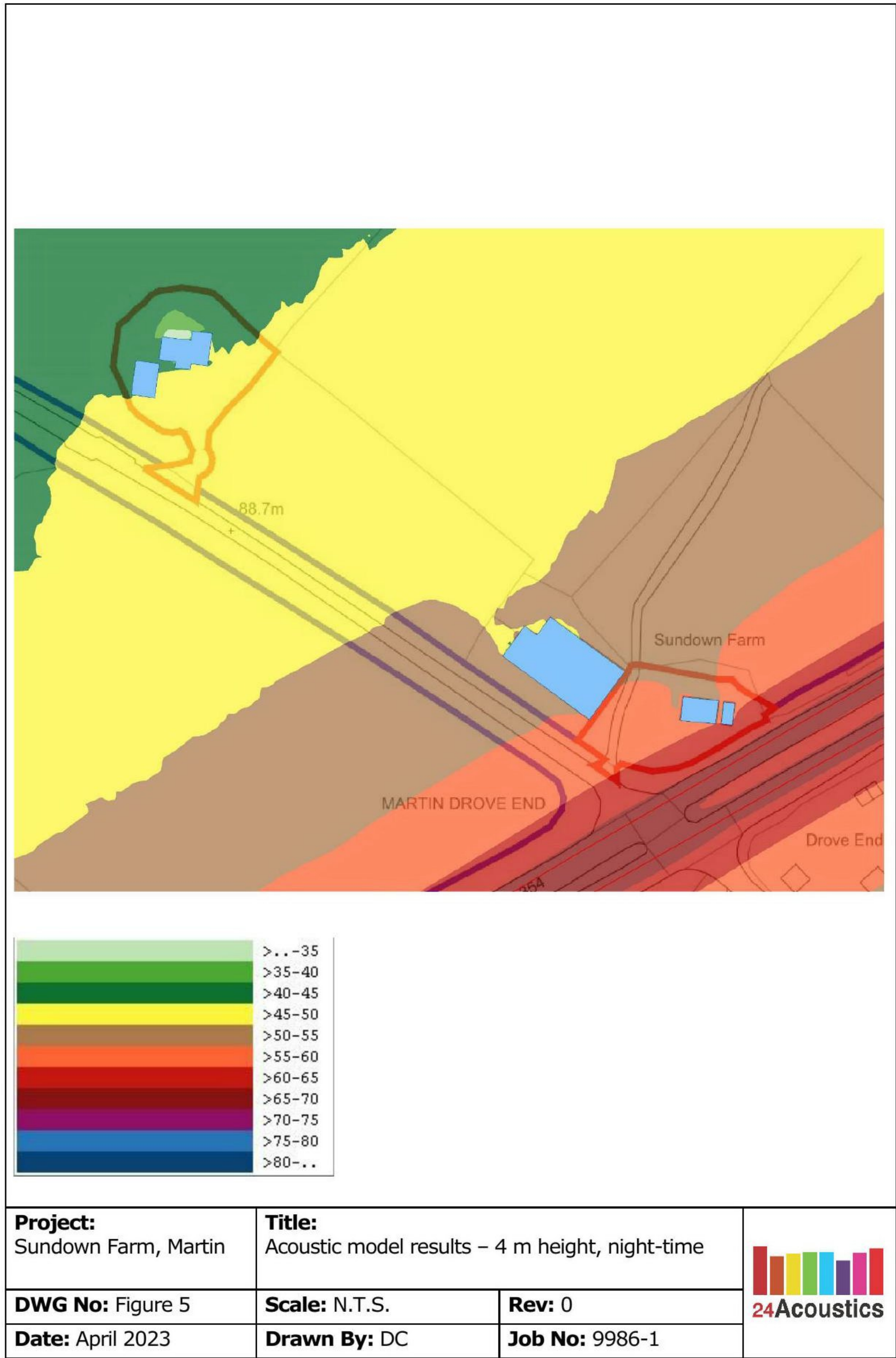


<b>Project:</b> Sundown Farm, Martin		<b>Title:</b> Summary of meteorological conditions		
<b>DWG No:</b> Figure 3	<b>Scale:</b> N.T.S.	<b>Rev:</b> 0		
<b>Date:</b> April 2023	<b>Drawn By:</b> DC	<b>Job No:</b> 9986-1		











## APPENDIX A: ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In an attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

- i) The  $L_{Amax}$  noise level

This is the maximum noise level recorded over the measurement period.

- ii) The  $L_{Aeq}$  noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.



iii) The  $L_{A10}$  noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The  $L_{A90}$  noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.



### APPENDIX B: ENVIRONMENTAL NOISE SURVEY RESULTS

