ACOUSTICAL CONTROL Engineers & Consultants

GUARANTEED SOLUTIONS TO YOUR NOISE & VIBRATION PROBLEMS

Acoustic Review Report

[redacted]

For: Mollett's Farm

Report Reference: B5393 2021-05-11 R

1 Intro

1.1 The Planning Inspectorate (PINS) is currently considering the Development Consent Order (DCO) from EDF for the Sizewell C Nuclear Power Plant. Part of the proposed power plant project involves the upgrading of the A12 through Suffolk, which will be used by vehicles approaching the site during construction. The road upgrade has therefore been included with the scope of the Environmental Statement for the whole project.

1.2 Part of the A12 upgrade scheme will involve a bypass around the villages of Stratford St Andrew and Farnham (The Two Villages Bypass). Mollett's Farm is located to the east of Farnham and is currently to the south of the A12. The proposed route of the bypass will move the A12 to the south of the property. The farm was identified as a potential noise sensitive receptor in the noise assessment for the scheme produced by EDF. However, Mr and Mrs Ayres, the owners of the farm, are concerned that the assessment does not adequately consider the potential impacts on their home and its associated businesses.

1.3 It is in the nature of a DCO assessment for very large-scale projects that there will be "winners and losers" in terms of environmental impacts and effects, and it is understood that these will be balanced against national and local strategic and economic benefits.

1.4 Acoustical Control Consultants (ACC) was appointed by Mr and Mrs Ayres to undertake a third-party review of the assessment submitted by EDF to determine whether it accurately evaluates the impact and effects of the project on the specific conditions and context of Mollett's Farm.

1.5 The review was undertaken, and this report was written, by Mike Hewett MIOA, who has 31 years' experience of undertaking similar assessments and reviews.

1.6 This report summarises the review.

Mike Hewett MIOA
Principal Acoustician
11 May 2021

2 Scope

2.1 ACC was appointed for the following scope:

- Review in detail the noise assessment documentation provided to the client by EDF.
- Critique the criteria applied to the assessment at Mollett's Farm, both in terms of the potential impact on the farmhouse residents and the potential impacts on the holiday homes.
- Critique the sound monitoring undertaken as part of the assessment, particularly with respect to the levels presented for Mollett's Farm. Provide comment on the levels presented and advise on the appropriateness of undertaking further, site specific, monitoring.
- Review the details of the noise prediction modelling undertaken by EDF and undertake 'sense-check' calculations of the likely levels at Mollett's Farm.
- Review the noise mitigation proposals within the assessment and propose others if appropriate.
- Prepare a report describing the details and finding of the reviews, critiques and calculations set out above.
- Undertake ambient and background sound monitoring at a single location representative of the farmhouse and holiday homes. Include the results and their implications within the report.

2.2 The EDF documents reviewed are listed in the references section at the end of this report along with other standards and guidance.

2.3 Documents 1, 2 and 3 were supplied to the client by EDF the other documents were obtained from the online public portal for the DCO application.

3 Site Description and context

3.1 [redacted] is a family home and an arable farm and holiday accommodation business located to the east of the village of Farnham in rural Suffolk.

3.2 The location of the farm and its surroundings are shown on the figure below. The farm and holiday homes are surrounded by fields, hedgerows and trees all round with the current route of the A12 currently 250 m to the north and 330 m to the north west. To the south and east are open farmland an isolated farms and minor roads for several miles.

3.3 In addition to being a residence itself, the main business of Mollett's Farm is the provision of holiday accommodation in six new built residential units near the farmhouse. A key feature of these holiday lets is their location in a rural and tranquil settling. This does not appear to have been addressed in the assessment.

3.4 The holiday accommodation part of the business uses the tranquility of the area as a selling point, and this is reflected in the feedback placed on public internet services by people who have stayed there, for example:

> *"...a lovely quiet retreat..."* - jenny D, July 2020, trip advisor
>
> *"...very quiet in beautiful countryside"* – Peter B Oct 2018, trip advisor
>
> *"....The farm is accessed from the A12, but sufficiently far off the road to be quiet (we were never conscious of traffic.."* – Tina P Apr 2018, trip advisor

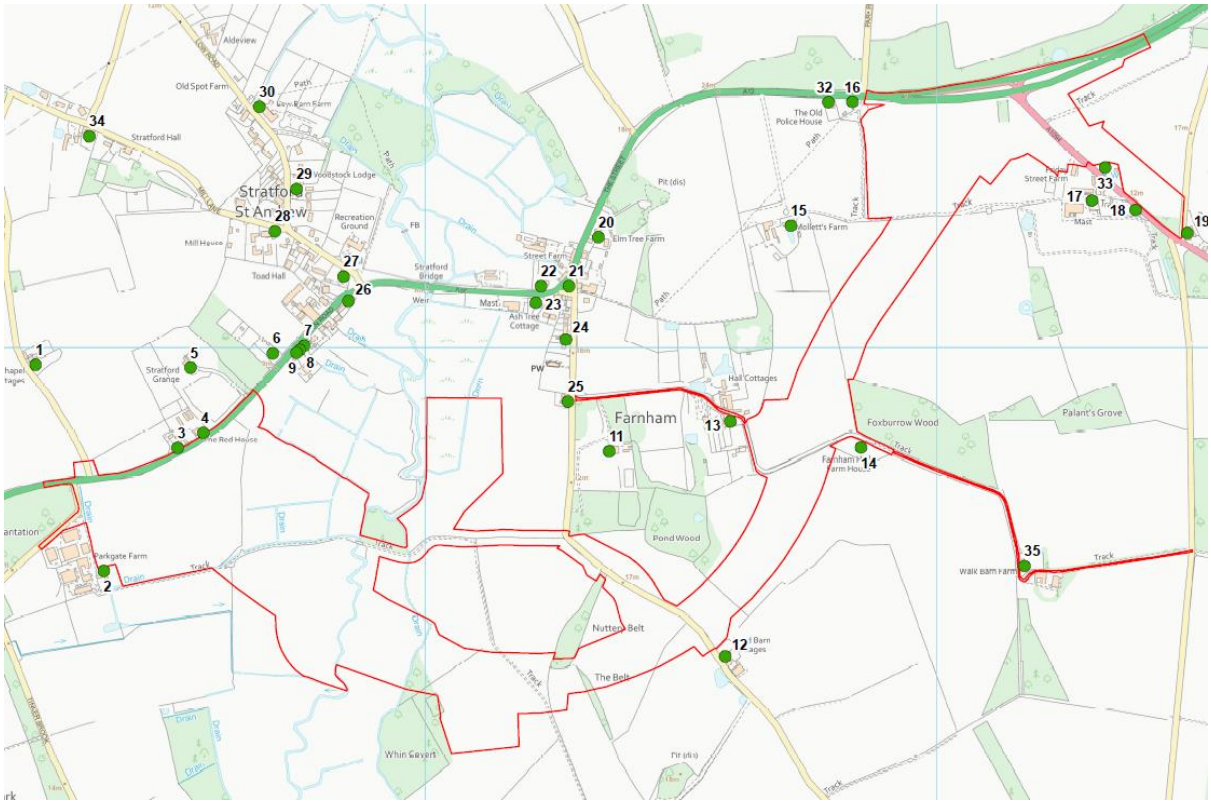
"Excellent location on A12, but quiet…" – Ken Nov 2019, booking.com

"…Even though it is close to the A12 it's very quiet you can hear owls most nights…" – Peter Oct 2019, booking.com

"Very peaceful…" – Siobhan May 2021, booking.com

3.5 Any impact on this tranquility could therefore have a material impact on the business.

3.6 The proposed route for the Two Villages Bypass runs south of the farm within the red corridor in the figure below. This is significant both because of the reduced separation distance and associated attenuation for road traffic noise at the farm, and also because the prevailing wind currently attenuates sound from the A12 at the farm, whereas it will tend to slightly increase sound from the re-routed A12 at the farm.



4 Review of Documents

4.1 EDF supplied the client with the noise assessment for the bypass from the DCO application ES. Volume 5 Two Village Bypass Chapter 4 Noise and Vibration (Vol 5 Ch 4) and its two appendices (refs 1,2 and 3)

4.2 Vol 5 Ch 4 makes reference to other documents submitted as part of the DCO application.

4.3 Relating to assessment methodologies and scope, reference is made to Volume 1 Appendices 6A, 6C and 6G. Appendices A and C cover the scoping the of overall assessment and responses from stakeholders. These were downloaded from the portal but did not yield any information of direct relevance to this review. Appendix 6G is said (in Vol 5 Ch 4) to contain a *"full method of assessment for noise and vibration*". However, appendix G is not available on the portal.

4.4 Sections 4.2 and 4.3 of Vol 5 Ch 4 deal with the legislation and guidance applied to the assessment and make several references to Vol 1 App 6G. The guidance used is listed in section 4.2 and the criteria for evaluating impacts and effects are derived from these and described in section 4.3. These appear to follow the established pattern for assessment of this type for both construction and operational noise impacts and effects, with no apparent deviations from what is usually applied to assessment of this type. Any relevant specific points arising will be addressed in the sections below.

5 Baseline

5.1 Paragraph 4.3.41 discusses the baseline sound levels used in the assessment:

> *"4.3.41 The existing baseline character and noise levels have been determined by monitoring as detailed in section 4.4. Baseline noise levels against which road traffic noise effects from the new road are assessed, have been calculated using 3D noise modelling software (SoundPLAN). Calculations of road traffic noise were carried out using the methodology specified in Calculation of Road Traffic Noise … using a 3D model of the area and based on traffic flow data which is shown in Appendix 4A of this volume"*

5.2 The traffic data in Appendix 4A (ref 3) has been reviewed and does not appear to contain any anomalies. However, the key point of paragraph 4.3.41 is that there is a contradiction. **It states that the baseline character was established by monitoring i.e. a survey, but that the assessment was based on calculated levels not the results of the survey.**

5.3 Section 4.4 of Vol 5 Ch 4 which deals with baseline sound levels refers to the baseline report for the whole project: Volume 2 Main Development Site Appendix 11A Baseline Survey Report (Vol 2 App 11A) (ref 4).

5.4 The baseline survey identified a group of receptors specifically for the Two Villages Bypass. The rationale and procedure for the selection of and measurement at these receptors is given on page 15 of Vol 2 App 11A.

> *"Proposed two village bypass site survey locations – TVB prefix*
>
> *5.25 A total of nine locations were identified for surveys, and field operatives undertook attended surveys at all locations to capture samples of typical ambient and background sound levels during morning and afternoon periods.*
>
> *5.26 Most of these locations were also visited during the night-time assessment period (23:00 – 07:00 hours) and a short sample measurement made of typical ambient and background sound levels.*
>
> *5.27 The field operative recorded the principal sound sources at each survey location, weather conditions, and took photographs for the summary survey sheets."*

5.5 More detail of the procedure for the survey is given on page 9:

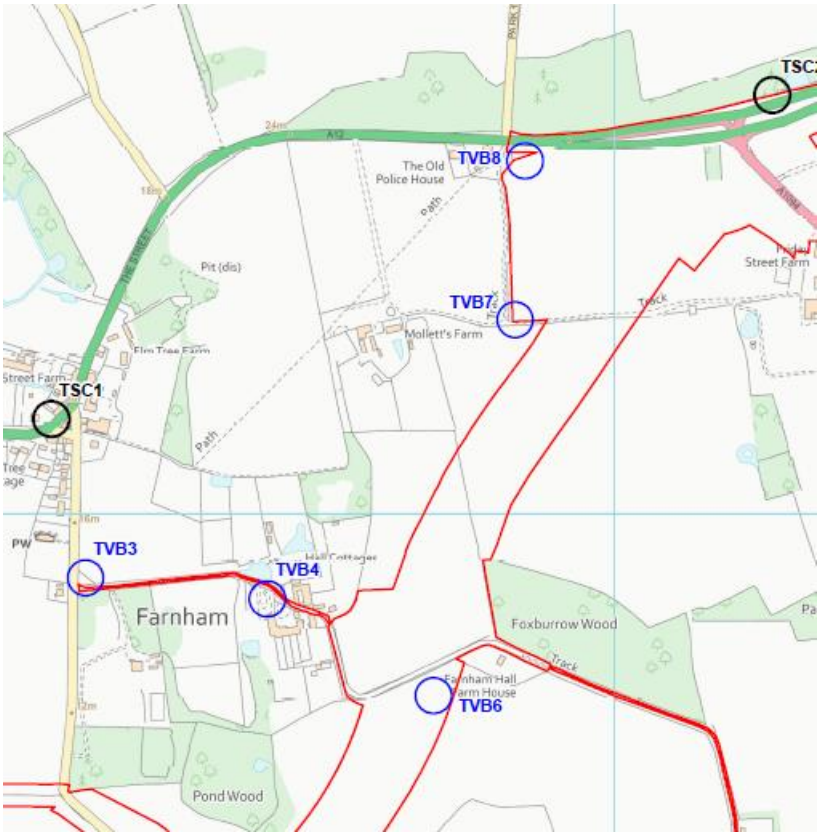
> *"3.12 All baseline sound survey locations were attended by competent field operatives who recorded the sound level meter position, the weather conditions and a commentary on the significant sound sources at the survey position. This included identification of the sources of high maximum sound levels (LAmax) during surveys where possible.*
>
> *3.13 Where the field operative was in attendance throughout all survey periods at a given location, the weather and existing sound source information was updated*

as necessary throughout the survey. At survey locations where a meter was left unattended for longer term survey periods (24 hours and over), these observations were updated on a periodic basis and at equipment servicing intervals.

3.14 As far as was possible, all sound measurements were made away from trees, and with little to no precipitation observed or forecast. On the occasions when a field operative experienced a period of heavy or sustained rain, the surveys were stopped and either recommenced once the rain had ceased, or the survey was rescheduled and repeated on another day. Wind speeds were monitored during surveys where possible.

3.15 Where high winds have been noted by the field operative during a baseline sound survey to the extent that the gathered data is unreliable, the data has been discarded and additional surveys have been undertaken. First-hand information on wind speeds was not available for all of the longer-term sound measurement positions. As a precaution therefore, any data which upon analysis appeared unreliable by means of either heavy rain or high winds (as indicated by publicly available historical weather data), was removed or noted in subsequent data analysis and site summaries."

5.6 Two of the nine locations were relatively close to Mollet's Farm, TVB7 and TVB8. The locations of which are shown on the figure below.



5.7 Table 7.6 on page 20 of Vol 2 App 11A gives a summary of the of the survey results. Those for

TVB 7 and TVB 8 are repeated below.

Receptor Name	***Receptor Reference***	***Typical Sound Level (day)***		***Typical Sound Level (night)***	
		$L_{Aeq,T}$ ***(dB)***	$L_{A90,T}$ ***(dB)***	$L_{Aeq,T}$ ***(dB)***	$L_{A90,T}$ ***(dB)***
Mollett's Farm	*TVB7*	*46-47*	*43*	*-*	*-*
The Old Police House	*TVB8*	*64-66*	*50-51*	*57*	*23*

5.8 Based on experience of similar locations, and the reports of the guests at the holiday cottages, these levels seem high, particularly those at TVB7. A quiet rural location would typically have sound levels lower than these.

5.9 Individual pages giving details of the measurement at each location are included in the annexes to Vol 2 App 11A. For TVB7 and TVB 8 the information provided was as follows.

5.10 TVB 7 Mollett's Farm, was on a public footpath east of the farm, and was surveyed on 15 May 2019. The survey notes in the baseline report were:

> *"The sound climate was mainly dominated by natural sounds in this location. The A12 was continuously audible in the background but was at a low level. The only other man-made sound was an aircraft. Birdsong and insect sound could be heard alongside the rustling of nearby trees and bushes. Daytime ambient sound levels were typically 46-47dB whilst background sound levels were 43dB."*

5.11 The results given were:

Results: Period	***Time***	***Duration***	***Sound Pressure Level [dB]***		
			L_{Aeq}	L_{A90}	L_{Amax}
Morning	*09:58*	*30 Mins*	*47*	*43*	*58*
Afternoon	*13:30*	*30 Mins*	*46*	*43*	*65*

5.12 TVB 8 Old Police House, was at the edge of a field, in close proximity to the A12, approximately 10 m to the road centre, was surveyed on 15 May and 22 June 2019. The survey notes in the baseline report were:

> *"The daytime sound climate was dominated by the A12 due to its proximity. Various birdsong could be heard particularly in gaps between traffic. Various vehicles were present on the A12 including cars, motorbikes, HGVs and tractors. The night-time sound climate was noted as quiet in the absence of traffic, which was occasionally heard from the A12. Occasional bird song was audible. Daytime ambient sound levels were measured as typically between 64-66dB while night-time ambient levels were measured as 57dB. Background sound levels during the day were measured between 50-51dB and 23dB at night."*

5.13 The results given were:

Results: Period	***Time***	***Duration***	***Sound Pressure Level [dB]***		
			L_{Aeq}	L_{A90}	L_{Amax}
Morning	*10:15*	*30 Mins*	*66*	*51*	*81*
Afternoon	*14:24*	*30 Mins*	*64*	*50*	*93*
Night	*03:25*	*15 Mins*	*57*	*23*	*81*

5.14 Paragraph 5.27 of Vol 2 App 11A stated that weather conditions were recorded for each measurement. But no such information is included in the results or annexes sections of the document.

5.15 The wind direction can have a very significant effect on the propagation of sound across open countryside. Upwind and downwind levels can differ greatly with levels when the source is upwind of the receiver being greater than when it is downwind. The size of the difference depends on many factors including the topography and nature of the intervening ground, the nature of the sound itself and the speed of the wind. For this reason, many standards and guidance documents make reference to this effect but few attempt to quantify it, for example BS 5228 (ref 8) in Annex F states:

> *"Meteorological conditions can result in increased noise levels due to focusing of the sound and this can be important, for example, where screening is present."*

5.16 However, clause 6.8 of BS 8233 (ref 7) states:

> *"Whether noise levels are measured or predicted, wind gradients, temperature gradients and turbulence affect the level of received sound and audibility over short periods. The magnitude of these effects, i.e. variations in noise level and audibility, increases with increasing distance between source and receptor. The effects are asymmetrical and, for distances of 500 m to 1 000 m, typically range from increasing the level by typically 2 dB downwind to reducing it by typically 10 dB upwind."*

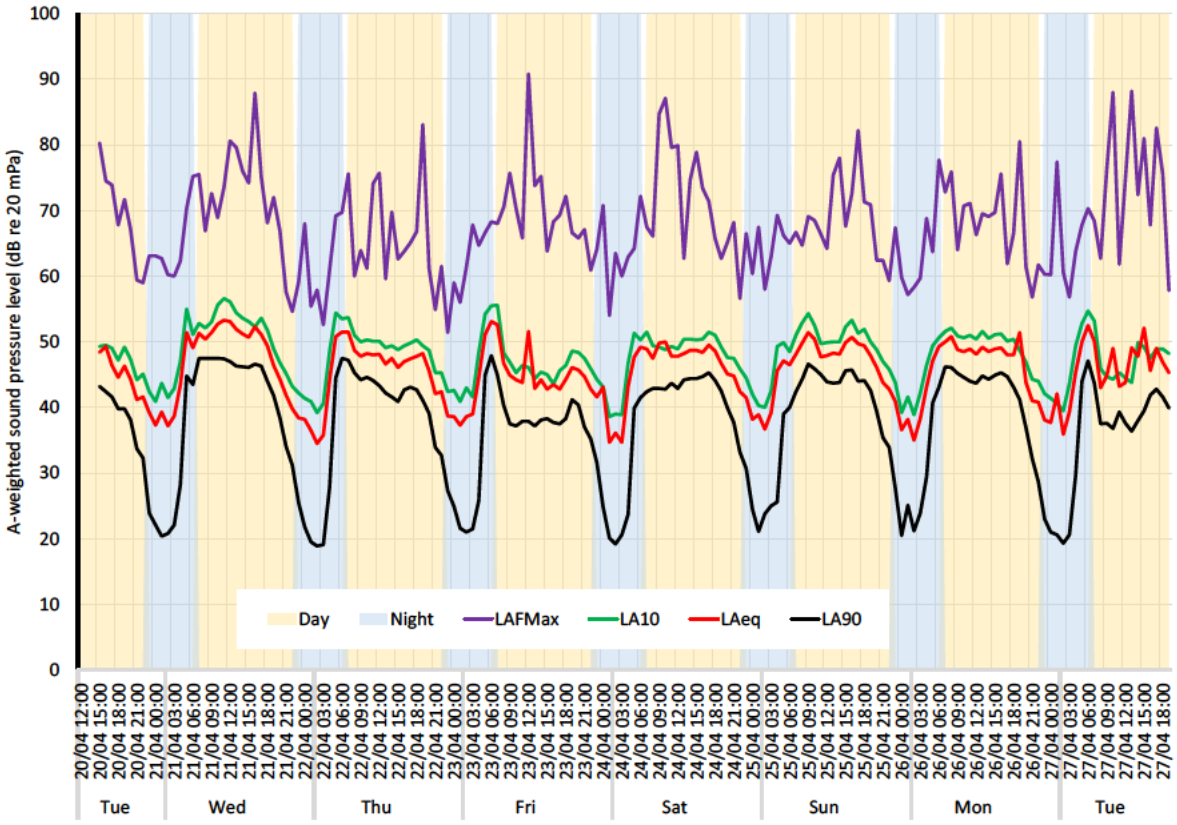
5.17 This gives a difference between upwind and downwind of the same source of 12 dB. The A12 is a significant source of Ambient sound at Mollett's Farm. Therefore, without information on the wind conditions present during the monitoring surveys there is no way of determining whether the measured levels are representative.

5.18 As part of this review ACC has undertaken a series of measurements at location in the garden to the south of the house and holiday homes. This location was chosen to reflect the area were the family and guests tend to congregate when outdoors. This was more representative than TVB7, which is to the east of the farm.

5.19 It is not intended to give a full description of those measurements in this report. Details of the procedure, instrumentation and calibration are available on request, but follow the principles of BS 7445 Description & Measurement of Environmental Noise Part 1:2003 and Part 2 1999.

5.20 The measurements took place over a week (20th-27th April 2021) with sound levels being

measured and recorded every second. These values were then combined to give the 1 hour average values summarised in the figure below.



5.21 The day and night periods are highlighted in yellow and blue and the four lines show different environmental sound indicators for each hour

- L_{AFmax} - the maximum instantaneous sound pressure level,
- L_{A10} - the sound pressure level exceeded 10% of the time (used as an indicator for road traffic noise)
- L_{Aeq} - the residual sound level (average)
- L_{A90} - the sound pressure level exceeded 90 % of the time (background sound level)

5.22 The wind was light (generally < 5 m/s) throughout the period and the direction varied between the north, north east and east wind for the entire duration of the measurements.

5.23 The loudest time of the day or night was generally the period between 05:00 and 07:00. Examination of the frequency analysis information stored with the data revealed a frequency content consistent with bird song. This was therefore caused by the dawn chorus. As this is a seasonal and natural part of the tranquil environment these periods were excluded from a determination of representative levels.

5.24 Mr and Mrs Ayres also reported unusual activity by military aircraft during some of the daytime

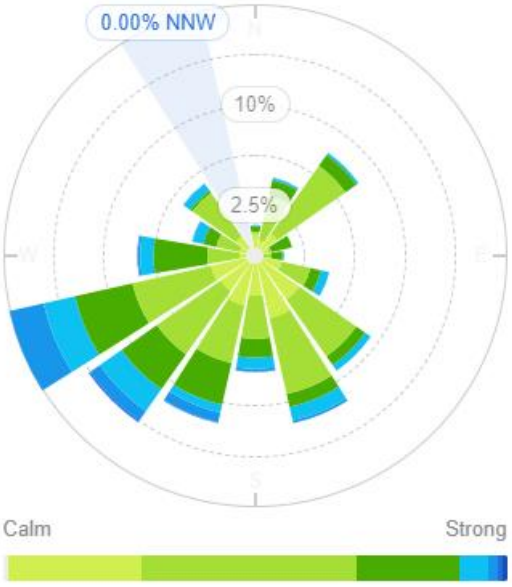
periods, which produced very high short duration sound levels.

5.25 The wind speeds and directions in the area were logged throughout the measurement period. For example, on Friday 23rd the wind was from the east and south east, which would be generally unfavorable conditions for propagation of sound from the A12. On Monday 26th the wind was from the north east, which would be more favorable conditions for propagation of sound from the road. The residual sound level during the day on the 23rd in periods unaffected by the dawn chorus or aircraft was in the range 43 to 46 dB L_{Aeq}. On the 26th the residual levels were 48 - 49 dB L_{Aeq}. Similarly, the L_{A10} levels were between 45 and 48 on the 23rd and 50 and 52 on the 26th.

5.26 At night, before the start of the dawn chorus, residual sound level consistently dropped to 35 to 37 dB L_{Aeq}.

5.27 The relocation of the A12 from the north of the farm to the south will have a major impact on the conditions under which the noise propagates from the road to the property.

5.28 The figure below shows a five-year wind rose for the area around Mollett's Farm (the data is for a site in Southwold, but it would be expected that the conditions in Farnham would be very similar).



Source willyweather.com

5.29 The rose shows that for the majority of the time (>75%) the wind blows from the south or southwest, with relatively little wind from the north and east. Therefore, the proposed bypass route will be upwind of the farm for a significantly greater proportion of the time than the existing route is. This is material to the impact at Mollett's Farm

6 Operational noise from road

6.1 The baseline noise levels used for the assessment of road traffic noise were predicted by modelling rather than derived from the survey results. There are several reasons for this. The principal reason is that the assessment of the impact of the sound from the operation of the road is based on the expected traffic flows at the future assessment date. Therefore, there is an expectation that road traffic flows will increase anyway regardless of whether or not the bypass goes ahead. The changes in noise levels that would be expected from these increases on the existing roads are therefore predicted using modelling. However, to be robust the model should be calibrated against the current measured baseline. This does not appear to have been done.

6.2 Table 4.14 of Vol 5 Ch 4 gives the day and night predictions of future baseline. The results for Mollett's farm are reproduced below:

Receptor	***Name***	***Day time ambient level $L_{Aeq,16hr}$***		***Night time level L_{night}***	
		2028	***2034***	***2028***	***2034***
15	*Mollett's Farm*	*48*	*48*	*42*	*42*

6.3 As required by the CRTN method, these predictions are made assuming down wind conditions from the road to the receptor. So the above predictions have assumed a north westerly wind, which is unusual for this location. Noise levels in the more usual southerly wind would be lower, possibly by around 12 dB as described above. As the route of the bypass is to the south of the farm then the baseline when the wind is from the south is more relevant to assessment of impacts there.

6.4 No measured baseline data for a consistently southerly wind is currently available. However, the results of the ACC survey indicate that daytime background sound levels in wind conditions unfavorable to propagation from the existing road are lower than those presented in Table 4.14.

6.5 Table 4.18 gives the predicted road noise levels for the "peak construction year" and compares them with the baseline.

6.6 The "peak construction year" refers to the year in which the construction of the power station is expected to result in the highest additional traffic flows. It does not refer to the construction of the road itself. The assumption is that the road will be finished, and it is just the impact of power station construction traffic on the road that is being considered.

Receptor		Baseline 2028		With development 2028		Difference		Effect	
		Day $L_{A10,18hr}$ dB	Night L_{night} dB	Day $L_{A10,18hr}$ dB	Night L_{night} dB	Day	Night	Day	Night
15	Mollett's Farm	52.4	42.1	55.8	45	3.4	2.9	Moderate adverse	Minor adverse

6.7 Table 4.19 gives the same assessment for the expected worst single day of the entire power station construction period:

Receptor		Baseline 2028		With development 2028		Difference		Effect	
		Day $L_{A10,18hr}$ dB	Night L_{night} dB	Day $L_{A10,18hr}$ dB	Night L_{night} dB	Day	Night	Day	Night
15	Mollett's Farm	52.4	42.1	56.4	45.1	3.9	3.0	Moderate adverse	Moderate adverse

6.8 Table 4.20 gives the same assessment for the first year with no Sizewell construction traffic. 2034:

Receptor		Baseline 2028*		With development 2034		Difference		Effect	
		Day $L_{A10,18hr}$ dB	Night L_{night} dB	Day $L_{A10,18hr}$ dB	Night L_{night} dB	Day	Night	Day	Night
15	Mollett's Farm	52.4	42.1	55.3	44.4	2.94	2.3	Negligible	Negligible

** sic*

6.9 The units for evaluation of daytime baseline are L_{A10}, which is the indicator produced by the CRTN method. This is compared with baseline L_{A10}. The baseline values in table 4.14 were given in different units (L_{Aeq}). No explanation is given for how the L_{A10} values have been derived. In paragraph 4.4.13 it is stated that "a difference of 2 dB has been applied" to convert L_{Aeq} to L_{A10}, but the value in Table 4.14 and those in Tables 4.18-4.20 differ by 4.4 dB. Clause 6.2.2 of BS 8233 (ref 7) says the correction is usually 2 dB ±2 dB. The L_{A10} values are not included in previous tables and no LA10 results are included in the baseline survey report.

6.10 The baseline value for daytime L_{A10} given in the assessment tables is 52.4 dB. The results of the ACC survey indicated that a value closer to 47 or 48 dB would be more appropriate for the prevailing wind conditions. On this basis the differences would increase by around 5 dB which would result in a major adverse effect in all three daytime scenarios.

6.11 Similarly at night the results of the ACC survey indicate that the night time baseline level in prevailing wind conditions at least 5 dB lower than that used in the assessment. This again would result in a major adverse effect in all three night time scenarios

7 Construction of road itself

7.1 The assessment of construction noise impacts is in section 4.6 b) of Vol 5 Ch 4. This assessment follows a typical methodology for this type of application and uses the standards and criteria that would be expected.

7.2 Assessment of construction noise for this type of application is based on the acceptance that noise cannot be avoided but its impacts should be managed and mitigated as appropriate.

7.3 Although the construction programme for the Two Villages Bypass project is 24 months. It is explained that different receptors will be affected by different parts of the construction process at different times and that each of these may have different associated noise levels. The assessment and modelling is therefore based on worst case periods for each location. Therefore, the predicted levels are not expected to occur for the entire 24-month period and the contractors will be expected to liaise with the residents regarding when and where noisy activities will occur. It is also expected that there will be a noise monitoring programme in place.

7.4 The results for Mollett's farm are given in Table 4.15 and assessed in Table 4.16 using the criteria set out in section 4.3. they are summarised below:

Table	***Receptor***	***Range of predicted levels $L_{Aeq,T}$***		***Representative predicted levels $L_{Aeq,T}$***	
		Preparatory works	***Main construction phase***	***Preparatory works***	***Main construction phase***
4.15	*15 Mollett's Farm*	*54-58*	*60-63*	*55*	*63*
4.16	*15 Mollett's Farm*	*Minor adverse* ***not significant***	*Moderate adverse* ***significant***	*Moderate adverse* ***significant***	*Major adverse* ***significant***

7.5 The base data and calculations from which these results are derived are given in Vol 5, Ch 4, Appendix 4B Construction Assumptions and Calculations (ref 2) was reviewed and appeared to follow usual practice for these assessments with no apparent anomalies.

7.6 The results in tables 4.15 and 4.16 therefore clearly acknowledge the potential adverse impact of the road construction work on Mollett's Farm. The document acknowledges that the impacts will need to be managed through the Construction Noise Management Plan.

8 Mitigation

8.1 Section 4.5 of Vol 5 Ch 4 deals with the various kinds of noise mitigation to be applied during the construction and operation of the project. These are fairly generic in nature, and do not address the specific issues of Mollett's Farm.

8.2 Options for further mitigation for Mollett's Farm are limited. To be effective a sound barrier needs to be located very close to either source or receiver. A large barrier close to the farm dwellings would be unsightly and intrusive.

9 Conclusions

9.1 The baseline sound levels used to represent Mollett's Farm are not adequate for a proper assessment. The measurement durations were too short, the location was unrepresentative, one of the key indicators was not reported and the absence of weather data in the survey report means the validity and relevance of the results cannot be determined.

9.2 The methodology of the noise assessment follows established practice for this type of assessment, but this does not adequately evaluate the specific impact on the tranquility of Mollett's Farm.

9.3 Wind direction has a significant effect on sound propagation. The assessment methodology is based on a comparison of predicted levels for the existing and proposed routes that assume downwind propagation to the farm from both. This is unrepresentative as the farm is located between the two routes. The prevailing wind direction is such that sound from the proposed route will have favorable propagation conditions to the farm much more often than the existing route.

9.4 As a result, occasions when road noise is audible and intrusive at the farm are likely to be more frequent, and its impact and effect will be greater than predicted by the methodology used.

9.5 The assessment predicts adverse impacts at several stages of the road construction process. It is vital that the Construction Noise Management Plan for the road scheme includes monitoring of noise levels and extensive liaison with residents about the location and duration of high noise activities.

10 References

1. The Sizewell C Project 6.6, Volume 5 Two Village Bypass, Chapter 4 Noise and Vibration, Revision: 1.0, PINS Reference Number: EN010012, May 2020
2. The Sizewell C Project 6.6, Volume 5 Two Village Bypass, Chapter 4 Noise and Vibration, Figures 4.1 – 4.2, Revision: 1.0, PINS Reference Number: EN010012, May 2020
3. The Sizewell C Project 6.6, Volume 5 Two Village Bypass, Chapter 4 Noise and Vibration, Appendices 4A and 4B, Revision: 1.0, PINS Reference Number: EN010012, May 2020
4. The Sizewell C Project 6.3, Volume 2 Main Development Site Chapter 11 Noise and Vibration Appendix 11A Noise and Vibration Baseline Report, PINS Reference Number: EN010012, May 2020
5. The Sizewell C Project 6.1, Volume 1 Introduction to the Environmental Statement, Chapter 6 EIA Methodology' Appendix 6A - EIA Scoping Report, Revision: 1.0, PINS Reference Number: EN010012, May 2020
6. The Sizewell C Project 6.1, Volume 1 Introduction to the Environmental Statement, Chapter 6 EIA Methodology' Appendix 6C - EIA Scoping Report, Revision: 1.0, PINS Reference Number: EN010012, May 2020
7. British Standard BS 8233:2014, Guidance on sound insulation and noise reduction for buildings.
8. British Standard BS 5228-1:2009+A1 Code of practice for noise and vibration control on construction and open sites – Part 1 Noise
9. Calculation of Road Traffic Noise, Department of Transport and the Welsh Office
10. British Standard BS 7445:2003, Description and measurement of environmental noise. Part 1: Guide to quantities and procedures
11. British Standard BS 7445:1991, Description and measurement of environmental noise. Part 2: Guide to acquisition of data